International Ecology 2018 Symposium

Abstract Book
19-23 June 2018
Kastamonu/Turkey
INTRODUCTION

We are honored to welcome you to Kastamonu, which is the Cultural Capital of the Turkish World in 2018, for the International Ecology 2018 Symposium, which is hosted by our university.

Dear Participants,

In the Symposium, 24 topics in ecology are presented in the field of environmental studies which is becoming more and more important every day in the world by bringing up current scientific information and taking advantage of expert scientists in the foreground by increasing environmental awareness, bringing together civil society organizations, public and private sector managers gathered them also to present their latest research and their results in Kastamonu.

Within a sustainable environmental understanding, we aimed at a scientific program in which current environmental problems can be discussed with scientific approaches, suggestions for solutions will be put forward and mutual experiences will be conveyed. We would like to express our sincere appreciation for your valuable participation by believing that the Western Black Sea will be able to enjoy an unforgettable symposium in a relaxed and pleasant environment by seeing the historical and touristic places of Kastamonu, the city of western saints, the Cultural Capital of the 2018 Turkish World.

The Ecology 2018 Symposium provides a total of 826 scholars from 18 different countries participating in the name of 152 universities, institutions and organizations to present their scientific work and strengthen their cooperation. In the Symposium's Scientific Program, 3 invited speakers, 605 Oral Presentations and 472 Poster Presentations will be presented. Oral announcements will be conducted in 10 sessions with 14 different seals and 4 sessions with the same poster.

We started the process of accepting the papers which is the most important stages of scientific studies on 1 December and finished on 30 May 2018. Each submitted paper has been subjected to blind review by 2 reviewers. During this time, I give thanks and gratitude to the Scientific Committee which gives us scientific support. Ecology 2018 will be awarded in 4 categories: Best oral presentation, Best poster presentation, Young researcher of the year and Honorable mention.

We offer our gratitude and thanks to our rector, Prof.Dr. Seyit AYDIN who gave endless support to us during the symposium preparatory process.

I give my sincere thanks to Dean of faculty of Economics and Administrative Sciences Prof. Dr. Yavuz DEMIREL, the Vice Dean Assist.Prof. Yunus ÇELİK and their administrative personel, Dean of the Faculty of Tourism Prof. Dr. Saim ATEŞ, which supports social programs, Dean of the Faculty of Fine Arts and Design Prof. Dr. Ahmet KAÇAR and all the academic staff.

I would like to thank my valuable sponsors for providing financial support to the symposium. I would like to thank our rector Prof. Dr. Seyit AYDIN, who has undertaken the symposium opening dinner and Tahsin BABAŞ, the Mayor of the Cultural Capital of the Turkish World Kastamonu in 2018, who conveyed to us the great pleasure of giving Gala dinner.

In this short period, I want to share my thanks to our Dean Prof. Dr. Naci TÜZEMEN for his helps and supports to myself, to my colleagues in organizing committee, to our academic and administrative staff, to the symposium secretariat and to the Department of Environmental engineering. I also appreciate my family preciously that I thought I had neglected during the 10 months of preparation.
I commemorate Bilgihan BİLGİLİ, Mehmet Hakan AKYILDIZ and Faik Ahmet KARAVELİOĞULLARI, whom always want to be among us in the academic community, but who have lost their lives for too long. Rest in peace.

Our special guests, once again we share our greetings in respect, and want to see you in our scientific and social programs of symposium. We are very happy and proud to host you in our university. I offer our respects and want to say welcome again with my most heart feelings.

Prof. Dr. Savaş CANBULAT
Chairman of the Symposium Organizing Committee
We are honored to welcome you for International Ecology 2018 Symposium hosted by our university. Today, we are carrying out one of the international activities that contribute Kastamonu University to be a world university under the mission of 2018 The Cultural Capital of Turkic World.

Dear distinguished guests,

International Ecology 2018 Symposium inaugurated today is an important organization that ecology very big discipline, which is included living and non-living assets in universe. For this, 1077 papers will be presented by 826 academics from 18 different countries during 5 days of the congress.

Dear guests,

I would like to thanks organizing committee of the congress and symposium chair Prof. Dr. Savaş CANBULAT and my colleagues, administrative staff, and all participants.

I would also like to extend my thanks invited speakers to Prof. Dr. Jagbir SINGH, the Prof. Dr. Serap ERGENE, the Prof. Dr. Marina SAZYKINA, and academics from all over the world.

I hope that the International Ecology 2018 symposium will make a contribution to the whole world.

Prof. Dr. Naci TÜZEMEN
Dean
We are honored to host you here at Kastamonu University for International Ecology 2018 Symposium.

Our university has been established in a city which has been a home to many civilizations and has a rich historical and cultural progress. In this consciousness, it has a mentality that sustains and conserves national, cultural and moral values. Therefore, we have hosted many national and international scientific symposia, congresses, panels in the fields of theology, history, aquaculture, tourism, literature, forestry, and development of Kastamonu and that of the Turkic and Islamic world so far.

Also, comprehensive efforts have been made in order to be a university that can cooperate with universities at international level. In this context, we have organized symposia in different countries such as Azerbaijan, Kyrgyzstan, Kazakhstan, Turkish Republic of Northern Cyprus and Serbia.

Today, we are carrying out one of the international activities that contribute Kastamonu University to be a world university under the mission of 2018 The Cultural Capital of Turkic World.

1077 papers will be presented by 826 academics from 18 different countries during 5 days of the congress. Not only will you enjoy scientific feast, but also you will have the chance of enjoying historical and cultural sides of Kastamonu in a broad perspective from The Seljuk Empire to Ottoman Empire and from Sheikh Şaban-ı Veli to Mehmet Feyzi.

Dear distinguished guests,

Today, with its 13 faculties, 3 Schools, 13 Vocational Schools, 3 Institutes, 20 Research Centers, approximately 800 academics and 29500 students, Kastamonu University has already taken its place among the recognized and respected universities of Turkey. It has also become a scientific center preferred by 2250 international students from 49 different countries.

One of the most basic approaches to ecology is the "holistic" approach. The aim of ecology is to assess living things and living systems as a whole, not to examine them locally. When ecologists examine a living creature in the natural world, they try to understand in a unified sense the functions and functions of the surrounding ecosystem, which is composed of air, soil, plants, inanimate materials, types of competition, hunters, decomposition organisms, moisture and other elements.

Rather than how parts of the nature work in ecology, concentrating on the relationship of these parts to one another aims to examine the effects of these parts on each other. It is our duty to bring new life habitats and protect them for this purpose, bringing together human beings and all living beings the same natural habitat which is exposed to a serious destruction by the developing industry and urbanization.

We are trying to contribute to our university, Kastamonu, our country, Turkic and Islamic world. From now on, these and similar activities will continue with your support and contribution in accordance with the goals of our State 2023, 2053, 2071.

I would like to express my gratitude to academic and organizing committee of the congress and symposium chair Prof. Dr. Savaş CANBULAT. I would also like to extend my thanks and appreciation to Prof. Dr. Jagbir SINGH, the Prof. Dr. Serap ERGENE, Prof. Dr. Marina SAZYKINA, and academics from all over the world.

I wish that the International Ecology 2018 symposium will make a contribution to the whole world, especially Turkic and Islamic geography, and bring goodwill and I wholeheartedly wish that such scientific gatherings will continue to bring us together in the forthcoming occasions.

With my kindest regards

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CONTENTS

ORGANIZING COMMITTEE ........................................................................................................ VI
S C I E N T I F I C COMMITTEE ................................................................................................ IX
S P O N S O R S ........................................................................................................................ XI
CONTENTS ........................................................................................................................................ 1
K E Y N O T E S P E A K E R S ............................................................................................................. 43
Environmental Degradation and Human Health ........................................................................... 44
Whole-Cell Luminescent Bacterial Biosensors for Environmental Monitoring ..................... 45
Past, Present and Future of Endangered Sea Turtle in Turkey ...................................................... 46
O R A L P R E S E N T A T I O N S ....................................................................................................... 47
Changes in Adobe Construction Technology as a Contemporary Building Material ................... 48
Treatment of Wastewater by Electrocoagulation Combined with Ultrasonic Waves ................ 49
Oribatid mites (Acari: Cryptostigmata) from the weed plants of garlic growing plantations in Kastamonu .................................................................................................................. 50
Accumulation of Toxins in Human Adipose Tissue .................................................................... 51
Mite biodiversity in garlic cultivation areas of Taşköprü/Kastamonu ........................................... 52
Metal Accumulations in Water and Sediment of Gala Lake National Park (Edirne, Turkey) ........ 53
A New Epiphytic Bryophyte Community (-isothecietosum alopecuroidis) .................................. 54
Oxidative Stress Related to the Organophosphate Insecticide Chlorpyrifos Exposure in Endangered Trout Salmo coruhensis Spermatozoa: Alterations in Sperm Quality ............................................. 55
Comparison of Oxidant and Antioxidant Status of Çoruh Trout (Salmo coruhensis), Anatolian Trout (Salmo rizeensis) and Rainbow Trout (Oncorynchus mykiss) Spermatozoa in Wild .......................................................... 56
Pollen Morphology of Some Taxa of Aegilops Genus in Triticeae (Gramineae) Tribe ............... 57
Environmental Impacts of Hydroelectric Power Plants and Landscape Restoration Process on Damaged Areas in Alabalık HEPP Case ......................................................................................... 58
Karyotypic Characteristics of Pelophylax ridibundus .................................................................. 59
A New Epiphytic Bryophyte Community for Turkey (Pterigynandretum filiformis -leucodentosum sciuroidis) ..................................................................................................................... 60
A Study on Some Morphometric Parameters of Freshwater Crayfish (Astacus leptodactylus Eschsoltz, 1823) in Ulugöl, Samsun, Turkey ......................................................................................... 61
Water Efficient Use for Sustainability of Water Resources: Xeriscape ..................................... 62
An Ecological Approach to Roadside Barriers: Green Barrier ..................................................... 63
An Urbanization Theory that Supports the Superiority of Landscape: Landscape Urbanism ...... 64
Estimation of Growth of Pedunculate Oak (Quercus robur L.) Individuals by Using Ecological Based Models .................................................................................................................................. 65
Bean Genetic Resources in Turkey; Diversity and Characterization .......................................... 66
Study to Assess the Quality of the Coastal Waters of Some of the Beaches of Al-Jabal Al- Akhdar (Libya) .............................................................................................................. 67
Stem Anatomy of Potamogeton (Potamogetonaceae) Species in Turkey.......................... 68
Evaluation of the Effect of Some Climatic Parameters on Time-Dependent Spatial Variation of Lake Burdur; 1975-2017 .............................................................................................. 69
Effect of cutting intervals and cutting heights on the forage yield and some yield characteristics of Napier grass (Pennisetum purpureum Schumach.) ......................................................... 70
Effective Use of Water in Urban Landscape Applications .................................................. 71
A New Approach (Subsurface-Drip) to Irrigating Turf Areas ......................................... 72
Microalgae Growth in Anaerobic Digestate For High-Value Product Recovery ............... 73
Economic Chain Analysis of Cyclamen Species ............................................................... 74
Comparison of phenotypic plasticity in ecotypes across habitats .................................... 75
Usage of Different Poplar (Populus sp.) Clones at the Determination of Heavy Metal Pollution Levels ........................................................................................................... 76
Quantitative Comparison of The Species Diversity of Earthworm (Clitellata: Annelida) Turkey with Other Countries ......................................................................................... 77
The Determination of Ecotourism Areas Using Network Systems and Analysis Case Study of Burdur...................................................................................................................... 78
Occurrence and composition of Copepodes in Tigris River southern Baghdad, and impact of Al-Rasheed Power Plant on its Biodiversity ............................................................................ 79
The Current Healthy Situation and Improvement of Rangelands in Gümüşhane, in Turkey...... 80
Biosorption of Heavy Metal Ions Using Waste Seaweed Biomass: A Phycoremediational Approach to Environmental Pollution ............................................................... 81
Usage of Backyards as Urban Agricultural Area in Balıkesir City: Modernity or Tradition? ...... 82
Zoonotic Fish Pathogens in Fish Farm of Kastamonu, Turkey ............................................. 83
Urbanization and Problems of Environmental and Occupational Health .......................... 84
The Impacts of Urbanization on Environmental Sensitivity: A Case Study in the Gulf of Edremit, Balıkesir-Turkey ................................................................. 85
Predicting the Height to Crown Base in Pinus brutia Based on Tree Characteristics .......... 86
The Ecology of Forest Vegetation in the Western Part of Black Sea Region ....................... 87
Phytosociological Characteristics of Aquatic Forest Association in Azerbaijan .................. 88
Identification and Biodiversity of Genus Padina Distributed on Coast of Black Sea, by the Molecular Methods ........................................................................................................... 89
Impacts of Aspect on Soil Organic Carbon and Nitrogen Storage Capacities of Scots Pine and Black Pine at Higher Altitude in Kastamonu Region ........................................ 90
Magnetized Fungal Bio-Solid Phase Extractor for Enrichment Of Co(II) from Food Samples...... 91
Investigation of Changes in IL-1β, IL-6 and TNF-α levels in Permethrin-Exposed Carp Fish (Cyprinus carpio L. 1758). .............................................................. 92
Determination of dl-PCB and indicator PCB levels in meat samples by HR-GC/MS ............ 93
Ecological Approaches to Urban Transformation, Green Cases from European Green Capitals .... 94
Identify to Cows/Sheep Herd near Forest Area with High Resolution Digital Aerial Photographs: A Case Study Tercan, NE of Turkey ......................................................... 95
Karyotypes on Ssection Anthyloidei of Astragalus (Fabaceae) from Turkey ...................... 96
Altitudinal Genetic Variation Among Pinus brutia Ten. Populations: Diameter Growth at Age 35-years at Two Test Sites on the Taurus Mountains ........................................... 97
Antioxidant Response in Gammarus pulex After Exposure to Secondary Effluent from Municipal Wastewater Treatment Plant, Elazig, Turkey .................................................... 98
Investigation of Oregano (Origanum L.) Genetic Diversity in Turkey .............................. 99
Importance of Some Ecological Factors in Farming Animals ....................................... 100
Effectiveness of Horizontal Separator Panel in Demersal Trawl Net .......................... 101
Steppe Flora and Its Reflection to Urban Area (Ankara) ............................................. 102
The Bryophyte Diversity and Ecological Characteristics of Samanlı Mountains (Sakarya-Kocaeli-Yalova-Bursa) in Northwest Turkey .................................................... 103
Antifungal and Bioherbicidal Activity Of Natural Distributed Salvia absconditiflora Greuter&Burdet Essential Oil in Kırşehir Province ............................................. 104
Surface Modification of Fish Bones Using 3-(Methacryloyloxy) propyl-trimethoxysilane and Acrylamide .......................................................................................... 105
Sustainability of the Limited Land Resources in Turkey: Situation Analysis (SWOT) .... 106
The Importance of Karstic and Tectonic-Karstic Depressions in the Formation of Agricultural Lands of Mediterranean Region in Turkey ............................................. 107
Assigning Indicator Plant Species for Site Productivity of the Red Pine Stands in Ovacık Mountain (Antalya) District .............................................................................. 108
Flea diversity (Insecta: Siphonaptera) on Erinaceus concolor Martin, 1837 in Turkey .......... 109
Aluminum Stress Induced Physiological and Genotoxic Alterations in Bryophyllum daigremontianum Raym.-Hamet & H. Perrier ......................................................... 110
Comparison of Needles Ecophysiology of Anatolian Black Pine in Shaded and Sunny Conditions ...................................................................................................... 111
Regional Paradigm for Studying Ecosystems Conservation in Baja California Peninsula (Central Desert Region) ................................................................. 112
Plecoptera (Insecta) Fauna of Demre Stream (Antalya) .............................................. 113
Determination of Chemical Compositions, Antimicrobial, Antioxidant and Phytotoxic Activities of Some Medical and Aromatic Plants ..................................... 114
Effects of Municipal Wastewater Treatment Sludges on some of the Biochemical Properties of Soil and Yield of Wheat in Greenhouse Experiment ......................... 115
Survey and Fate of Metals in Urban Wastewater of Tekirdağ City ............................. 116
Biosorptive Removal of Cadmium (Cd^{2+}) from Aqueous Solutions Using Eco-Friendly Adsorbent: Laurus nobilis L ................................................................. 117
Youth Unemployment Rate And The Effects Of Global Economic Crisis In 2008: An Application To Turkey ........................................................................... 118
Development of an Urban Tranformation Criteria from a Gephyysical Perspective: A Case study from Bursa, (Turkey) ...................................................... 119
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecosystem Services</td>
<td>120</td>
</tr>
<tr>
<td>Biochemical Indicators (Biomarkers) in Liver of European Eel (Anguilla anguilla L., 1758) Caught from Different Regions of Ceyhan River (Adana, Turkey)</td>
<td>121</td>
</tr>
<tr>
<td>Intensive Tree Mortality of Taurus Fir (Abies cilicica) in Mediterranean Forests of Turkey</td>
<td>122</td>
</tr>
<tr>
<td>Mapping Forestland Using Different Satellite Images and Various Classification Techniques: A Case Study from Şavşat-Karaköy</td>
<td>123</td>
</tr>
<tr>
<td>Habitat Suitability Modeling of Wild Boar with Sentinel-2 Satellite Data</td>
<td>124</td>
</tr>
<tr>
<td>Effects of Short-time Heavy Metal Application on Some Physiological and Biochemical Parameters in Wheat (Triticum aestivum L.) Plant</td>
<td>125</td>
</tr>
<tr>
<td>Investigation of Antifungal and Phytotoxic Effect of Laurel (Laurus nobilis) and Myrtle (Myrtus communis) Plant Essential Oils</td>
<td>126</td>
</tr>
<tr>
<td>Morphological and Morphometric Characterization of Rimaleptus mucronatus (Ciliophora, Litostomata, Rhynchostomatia), from soils of Tekirdağ, Turkey</td>
<td>127</td>
</tr>
<tr>
<td>Use of Alginate-Clinoptilolite Beads for the Treatment of a Synthetic Heavy Metal Mixture: pH Effect</td>
<td>128</td>
</tr>
<tr>
<td>Microalgae Cultivation in Broiler Chickens Fertilizer and Gaining the Biomass to The National Economy by Using It in Agriculture as Natural Fertilizer</td>
<td>129</td>
</tr>
<tr>
<td>The Role of Riparian Countries in the Black Sea Fisheries</td>
<td>130</td>
</tr>
<tr>
<td>Histological Examination of Liver Tissue Two Different Methods of Wild and Aquaculture Originating Gilthead Sea Bream (Sparus aurata L.,1758)</td>
<td>131</td>
</tr>
<tr>
<td>The Amelioration of Chromium stress by Humic Acid in a Bread Wheat (Triticum aestivum L. cv. Delebrad-2)</td>
<td>132</td>
</tr>
<tr>
<td>Mitigating Effects of Forage Legumes on Greenhouse Gases Emission and Some Pollutants</td>
<td>133</td>
</tr>
<tr>
<td>Somali Agriculture and Forage Cowpea (Vigna unguiculata L.Walp)</td>
<td>134</td>
</tr>
<tr>
<td>Spermathecae Morphology of Some Terellinae (Diptera: Tephritidae) Genera and Species: An Electron Microscope Study</td>
<td>135</td>
</tr>
<tr>
<td>Dicranella staphylina H. Whitehouse and Weissia multicapsularis (Sm.) Mitt. New Bryophyte Record from Floodplain Forest in Turkey</td>
<td>136</td>
</tr>
<tr>
<td>The Use of Antioxidant Biomarkers in Gammarus pulex to Determine the Treatment Efficiency of Slaughterhouse Wastewater by Electrocoagulation Process</td>
<td>137</td>
</tr>
<tr>
<td>The Using Possibilities of Medical and Aromatic Plants in Areas Exposed to Erosion</td>
<td>138</td>
</tr>
<tr>
<td>The Effects Of Different Solid Biogas Fermentatiton Residue Doses as Organic Fertilizer Source on Forage Yield and Quality of Common Vetch</td>
<td>139</td>
</tr>
<tr>
<td>The Effects Of Different Solid Biogas Fermentatiton Residue Doses as Organic Fertilizer Source on Forage Yield and Quality of Common Vetch</td>
<td>140</td>
</tr>
<tr>
<td>Histomorphological Structure of the Male Reproductive System of Tanymecus dilaticollis Gyllenhal, 1834 (Coleoptera: Curculionidae)</td>
<td>141</td>
</tr>
<tr>
<td>Determination of Growth Performance and Biochemical Composition of Sea Bream (Sparus aurata L., 1758) Cultured in Net Cages in Central Black Sea Region</td>
<td>142</td>
</tr>
<tr>
<td>Effect of Irrigation Regimes by Mini Sprinkler on Chemical Composition of ‘Tombul’ Hazelnut Kernels</td>
<td>143</td>
</tr>
</tbody>
</table>
The Effects of Vermicompost Tea on the Root Growth and Mitosis of Onion (*Allium cepa*) .................................................. 144
An Overview of Soil Mites (Acari) in Nazilli District Center, Aydın-Turkey ................................................................. 145
Determination of Izmir Bay Pollution by Using Micronucleus Test in the Mussel (*Mytilus Galloprovincialis*) Taken from the Natural Environment ............................................................ 146
The Impact of Color Change on Bleaching, Impregnation and Water Based Varnish of Pine (Pinus sylvestris L.) ................................................................. 147
Poisonous Macrofungi Determined in Gaziantep Province (Turkey) ..................................................................................... 148
Possibility of Using Spent Mushroom Compost in Nursery Industry: A Case Study on *Celtis australis* Seedling ...................................................................................... 149
Determination of Monthly Condition Values of Fish Meagre (*Argrosomus regius* Asso, 1801) From Fish Farm in Aegean Sea, Turkey ........................................................................... 150
Determination of Toxicity of Lipopolysaccharides with Antioxidant Capacity in Rat Pancreas ........................................... 151
In Vitro Biological Activity Assessment of *Ranunculus gracilis* Rhizome’s Ethanolic Extract ................................................. 152
Visual Landscape Quality Assessment for Historical Urban Texture: The Case of Safranbolu Historical Old Bazaar ........................................................................................................... 153
Preliminary Research on Dye Decolorization by Recombinant Laccase from *Bacillus subtilis* ................................................. 154
Vitamin C Effectively Ameliorates Glycidamide-Induced Cellular Damage and Apoptosis in Mouse Leydig Cells ............................................................................................................. 155
Environmental Performance of Wood-Framed Constructions ............................................................................................. 156
Examination of Environmental Policies in Case Study: Aksaray Municipality ........................................................................... 157
Age-dependent Changes of Some Chemical Components in Leaves of Monumental Plane (*Platanus orientalis* L.) Trees ........................................................................................................ 158
An Investigation of the Natural and Artificial Environmental Problems of Converting Urban Settlements into Industrial Areas ........................................................................................................... 159
Effects of Beauveria bassiana Isolates on *Sitophilus oryzae* L. Under In vitro Conditions ................................................................. 160
New species of Erpobdellid leeches: Molecular Phylogeny and Description of *Dina, Erpobdella* and *Trocheta* ................................................................................................................ 161
Identification of ectoparasitic *Trombidium holosericeum* larvae (Acari: Trombidiidae) on *Rhagio* sp. (Diptera: Rhagionidae) from Ordu Province ........................................................................ 162
The Investigation of Light Stress on Various Cellular Responses in *Chlamydomonas reinhardtii* .................................................... 163
Preliminary Investigation of the Quality of Surface Waters of Bakırçay Using Growth Inhibition Test Using Green Algae *Scenedesmus dimorphus* ........................................................................................................ 164
Efficient Batch and Continuous Dye Removal Using Alginate-Kaolin-Graphene Nanoplate Adsorbent .......................................................................................................................... 165
Synthesis of Chitosan/Perlite Biocomposites for the Removal and Recovery of Copper from Aqueous Solution ................................................................. 166
To the Monitoring the Marine and Coastal Protected Areas in Turkey: What Needs to be Done For Improvement .......................................................................................................................... 167
Monitoring of Great Bustard (*Otis tarda*) in Ankara Province period of 2016-2017 ................................................................................................................................. 168
Research on the Fauna of Tephritinae (Diptera: Tephritidae) in Çorum Province ........................................................................... 169
Determination of Some Flavonoids and Antimicrobial Behaviour of *Peganum harmala* .......... 170
Ecotourism and the Protection of the Environment ................................................................. 171
Possibility of Using Natural Material Gyttja for Improving Quality of Soils Derived on Serpentinit and Peridotit Parent Material .......................................................... 172
Alternative Sources Of Funding In Special Provincial Administrations: Carbon Certificates ....... 173
Comparison of Forewings of *Cerceris* (Insecta: Hymenoptera: Crabronidae) species by Landmark Based Geometric Morphometric Method ......................................................................... 174
Investigation of Bacterial Flora in River Lumëbardhi Prizren (Kosovo) during Spring Season 2014 Year ........................................................................................................................................ 175
Landscape Architecture in Turkish Regional Development Plans .............................................. 176
Monitoring of Black Vulture *Aegypius monachus* in 2015-2017 Distributed in Soğuksu National Park Kızılcahamam (Ankara) .......................................................... 177
Phrygana Vegetation of Azerbaijan ......................................................................................... 178
Does Wood Ants Interfere with Soil Biological Quality (QBS-ar)? ........................................ 179
A Literature-Based Survey on the Arthropod Biodiversity in Samsun Province, Turkey ........ 180
*Brevibacillus laterosporus* a Biological Control Agent Against Foliar Diseases of Pistachio ..... 181
Genetic Diversity of Endemic *Astragalus argaeus*, and Implications for its Conservation ....... 182
Effect of Bacteria and Methyl Amine Treatments on Growth of Squash Seedlings Grown under Different Water Deficit Levels ........................................................................... 183
Effects of Some Entomopathogen *Beauveria bassiana* (Balsamo) Vuillemin Isolates on *Holotrichapion pullum* (Gyllenhal) (Coleoptera: Apionidae) Adults .................................. 184
Estimation of Size at First Maturity of Pontic Shad (*Alosa immaculata*) ................................. 185
The Ecological Factors on the Effects of Number and Development of Youth of the *Fagus orientalis* Lipsky .......................................................... 186
A Hydroponic Study: Physiological Responses of Heavy Metal Impact in Different Crop Varieties .................................................................................................................. 187
Cu/Zn SOD Immunoreactivity in the Gastric Mucosa of Rats Feeding with Mussel (*Mytilus galloprovincialis*) .......................................................... 188
Evaluation of Visitor Management Tools in Kûre Mountains and Ilgaz Mountain National Parks 189
The Need of Environmental Cooperation in Turkic World and The Role of Turkey ................ 190
Evaluation of Antimicrobial Effect of *Zosima absinthifolia* (Vent.) Link ............................... 191
Carotenoid Composition of two *Scenedesmus* Species from the Saline Water of Kapulukaya Reservoir by HPLC-DAD .......................................................... 192
A Preliminary Evaluation on the Bird Fauna of the Mount Zûlkûf (Ergani / Diyarbakîr) .......... 193
An Approach to Conserve Natural Fish Populations: Egg White Powder as Dietary Protein Source for Rainbow Trout (*Oncorhynchus mykiss*) ................................ 194
Biodiversity of Spiders in the Kütahya Province of Turkey ......................................................... 195
Detection of Some Heavy Metal Levels in the Yeniçağa Lake .................................................. 196
Analysis Coastal Ecosystem Services: The Case of Eastern Black Sea (Trabzon, Turkey) .......... 197
No Genetic Evidence of Habitat Fragmentation on *Juniperus excelsa* M. Bieb Populations in Turkey: Its Implication for Conservation .................................................. 198
Wastewater Characterization and Chemical Treatability for a Waste Paper Industry .......................... 199
Systematics and Ecology of Keban and Ağın (Elazığ) Districts Spiders (Ordo: Araneae) .................. 200
The Effects of Different Cutting Treatments on the Sprouting Ability in Anatolian Chestnut (*Castanea sativa* Mill.) ................................................................. 201
On the Relationship Between Ecological Tolerance-Optimum Levels and Co-occurrence Patterns of Shallow Water Ostracoda from Central Texas (USA) .................................................. 202
Developing A System for Walnut Husking to Reduce Wastewater Formation and Its Comparison with Industrial Husking System for Environmental Perspective .................................................. 203
Production of Granular Formulation from Local Fungal Strains ...................................................... 204
Impacts of Riparian Zone on Some Soil Properties in Different Land Use Types (Aladağ Catchment, Turkey) ................................................................. 205
Effect of NADP·H₂ and NaF on the Oxygen Absorption of Barley Roots Under NaCl Stress .............. 206
Effects of Different Organic Fertilizer Sources on Wheat Yield ...................................................... 207
Biomass Equations for Natural *Pinus Nigra* Arnold. Trees in Kızılcakamam ..................................... 208
Variations in Leaf N and P Contents in *Olea europaea* based on Leaf Position and Traffic-Based Pollution ........................................................................................................... 209
Use of Environmentally Friendly Bacterial Cellulose Films as Food Packaging Materials ............ 210
Electrodeionization Processes in Heavy Metal Removal from Wastewater – Effect of Applied Voltage ............................................................................................................. 211
Determination of Water Quality of Kirazlı Stream (Çatalzeytin, Kastamonu) .................................. 212
The Endemics of Amasya and IUCN Conservation Status ................................................................. 213
Eastern Mediterranean Region of Turkey, Lagos Fish; [*Epinephelus aeneus* (Geoffroy Saint-Hilaire, 1817) and *Epinephelus costae* (Staindahner, 1878)], Nutrition Characteristics, Hunting and Growth Rates Analysis ................................................................. 214
Hydrogen as a Fuel and Its Impacts on Environment ......................................................................... 215
The Use of Naturalness Concept to Identify Natural Forest Landscapes (Çakırlar Watershed Case, Antalya) ........................................................................................................ 216
Damaging Factors and Solutions of Biodiversity in the Area of Ayvalık Coastal Line (Balıkesir) 217
Seasonal Variation of Cladocera in Hamsilos Bay, Sinop ............................................................... 218
Records of Sea Turtles Strandings Between 2002 and 2017 in the Samandağ Beach on the Eastern Mediterranean Coast of Turkey ................................................................. 219
Antibacterial Concrete Mortar Production for Sustainable Building Design Using Graphene Oxide Powders ........................................................................................................... 220
The Effects of Boron particles on Pigment Content in Submerged Macrophyte (*Myriophyllum spicatum*) .................................................................................................................. 221
Use of Pruning Wastes in Improving Soil Productivity Parameters Under Mediterranean Climate Conditions ........................................................................................................ 222
Isolation and Characterization of Rhizobia from Root Nodules of Some Wild Legume Taxa .... 223
Research on the Geometridae (Lepidoptera) Fauna of Adıyaman Province ........................................ 224
Agroforestry Applications in the Home Gardens in Trabzon and Rize Provinces .............................. 225
Ecological Characterization of Non-Marine Ostracods (Crustacea) from Kırşehir Province, Turkey ................................................................. 226
Determination of Bioaccumulation Responsibility for Heavy Metals of Some Plant Examples in the Bafa Lake .................................................................................. 227
The Evaluation of the Opportunities for Improving Forest Villages (The Case of Kastamonu Regional Directorate of Forestry) .................................................................. 228
Chorology of Subgenus Cyanus (Mill.) Hayek (Asteraceae) Growing in Turkey ................................. 229
The Protection of Animals as Property in Turkish Criminal Law ....................................................... 230
The Sensory, Nutritional, Chemical and Microbiological Properties of Frozen Stored (-22°C) Anchovy (Engraulis encrasicolus, Linnaeus 1758) and Bonito (Sarda sarda, Bloch 1793) Meats 231
Masting of Seven Oak Species in Turkey ......................................................................................... 232
Effect of Broiler Chicken Manure on Corn (Zea mays) Yield and Some Macro Element Contents 233
Morphological Studies on Trichomes of Alyssum (Brassicaceae) in Turkey ........................................ 234
Preparation and Characterization of Activated Carbon Produced from Eriobotrya japonica Seed by Chemical Activation with ZnCl₂ .................................................................. 235
Role of Plants in Heavy Metal Contaminated Land Remediation .................................................... 236
Examination of Changes in Land Cover around Settlements: The Case of Drahna Forest Sub-District Directorate .......................................................................................... 237
Toxicological Effects of Antibacterial and Antiviral Drugs on Model Organism Galleria mellonella L. (Lepidoptera: Pyralidae) ................................................................................ 238
Mineral Contents of Two Rhizopogon Species Growing in Gaziantep ............................................. 239
The Effects of Seasonal Variations on The Succession of Some Species of Calliphoridae (Diptera) in Eskisehir Province .................................................................................... 240
Being a Change Maker Traveller and Helping Communities Grow Through the Black Sea Sustainable Rural Tourism Program ................................................................. 241
Fruit Morphological Examination of Eight Grape (Vitis vinifera subsp. vinifera) Cultivar ................... 242
A Recent Contribution to Snow Hydrology: Subpixel Snow Cover Mapping Through Support Vector Regression Analysis of MODIS Reflectance Data ...................................................... 243
Development of New Seedless Grape Varieties (Vitis vinifera L.) via in vivo Chromosome Doubling ............................................................................................................ 244
Zooplankton Community Structure of Eğirdir Lake (İsparta, Turkey) ............................................. 245
The Ecotoxic Effects of ZnO Nanoparticles on Raphidocelis subcapitata .......................................... 246
Bacterial Biopesticide in Agricultural Pest Management ..................................................................... 247
Glassy Art Around Kastamonu and Sinop ....................................................................................... 248
Effects of NeemAzal -T/S Chitin Synthesis Inhibitor Activity Against Galleria mellonella (L.) (Lepidoptera: Pyralidae) ....................................................................................... 249
Effect of Different Phosphorus Levels on the Forage Yield and Some Yield Characteristics of Pea (Pisum sativum L.) ...................................................................................... 250
The Concept of Permaculture in Turkey and The World ................................................................. 251
Enhanced Antibacterial Activity of Magnesium Oxide Nanoparticles with Chlorhexidine on
Staphylococcus aureus ......................................................................................................................... 252
The Effect of Corn Flour and Wheat Flour on Ephesia kuehniella’s Lipid Percentages ................. 253
The influence of leaf pack on the Distribution of Odonata and Isopoda (Insecta) fauna in Tunca
River (Edirne/Turkey) ....................................................................................................................... 254
Effects of the Quaternary Climatic and Environmental Fluctuations: A Case Study on Cynips divisa
................................................................................................................................................................ 255
Synthesis of Fluorescent Macrocyclic Complexes for Environmental Studies .............................. 256
Prediction of Evaporation From Class A Evaporation Pan with the Use of Penman and Priestley-
Taylor (PT) Models .......................................................................................................................... 257
Notes on the Aleocharinae (Coleoptera: Staphylinidae) Fauna and Their Ecological Importances in
Turkey ................................................................................................................................................ 258
Applied Nature Education ................................................................................................................ 259
Review of the Oxytelinae (Coleoptera: Staphylinidae) fauna of Turkey ........................................ 260
Evaluation of Mercury and Arsenic Parameters in Underground and Surface Waters of Sinop
Boyabat Gökçemak Underwatershed in Terms of Water Quality ....................................................... 261
DNA Barcoding and Phylogenetic Characterization of Anopheles (Diptera: Culicidae) Species in
Sultan Marshes Ecosystem ................................................................................................................ 262
Molecular Characterization of Poultry Red Mite, Dermanyssus gallinae Lineages in Central
Anatolia Region of Turkey .................................................................................................................. 263
An Analitical Approach to Salinity Problems of Coastal Turfgrass Areas ........................................ 264
Bank Erosion in Response to Different Stream Orders (1st, 2nd) and Precipitations ........................ 265
Design and Analysis of Species-Specific Artificial Reef Models to Determine Shelter-Preference
Behaviour of Homarus gammarus in Erdek-Çaklar, Turkey .............................................................. 266
Rearing Larvae of Trichoptera (Insect) Collected From Swift Flowing Waters in the Laboratory
Temporal and Spatial Trends of Growing Degree Days in the Western Black Sea Region, Turkey
................................................................................................................................................................ 267
................................................................................................................................................................ 268
Invertebrates that Get on Noah’s Ark: Kayseri Example in National Biological Diversity Inventory
Studies ................................................................................................................................................ 269
Determination of the Green Turtle Mortality Rate at Yumurtalık Bay (Northeast Mediterranean) in
Pelagic Bluefish Longline Fishing ..................................................................................................... 270
Usage of Detoxification Enzyme Glutathione-S-Transferases over Galleria mellonella L.
(Lepidoptera: Pyralidae) as Biomarkers of Insecticide Resistance .................................................... 271
Development of Ecoregion-Based Taper Systems for Taurus Cedar ................................................ 272
Comparison of Fatty Acids and Amino Acids Profiles of Whiting (Merlangius merlangus euxinus
Nordman 1840) Meat and Roe During Fishing Season ...................................................................... 273
The Effects of Different Altitudes on Some Biochemical Parameters of Ricana japonica (Melichar,
1898) (Hemiptera: Ricanidae) Eggs .................................................................................................. 274
Morphological Characteristics of Males of Culicoides alazanicus Dzhafarov, 1961 and C.
griseidorsum Kieffer, 1918 (Diptera: Ceratopogonidae) from Sinop Province ......................... 275
Making of Landscape Planning of Amasra’s Bioclimatic Comfort Area for Using Thermal Band 276
Preliminary Results of Litterfall and C&N Contents of Litterfall in Black pine (Pinus nigra Arnold.)
Forests at Different Development Stages in Çankırı........................................................................277
Water Quality Characteristics of Orubük Reservoir (Çorum, Turkey) based on Phytoplankton
Community Structure ..................................................................................................................278
Oppioiod Oribatid Mites (Acari) of Erciyes Mountain (Kayseri) .........................................................279
Assessment of Stone Pine (Pinus pinea L.) Forest Fragmentation in the Western Anatolia Using
Landscape Metrics and Typology .................................................................................................280
Examing of Perceptions of Middle School Students for Environmental Awareness and Social Values.................................................................281
Demographic Analysis of Cynips quercusfolii Reveals Population Size Changes During the Last Ice
Ages..............................................................................................................................................282
Contribution of Cynips quercus to the Turkish Biodiversity ............................................................283
Assessing the Relationship of Honey Bees Fed with Syrups Containing Platinum Group
Nanoparticles to Toxicity ...............................................................................................................284
A Hypothetical Study on Smart Neighborhood Design: “A+ Neighborhood” .................................285
Current Situation of Medicinal and Aromatic Plants and Swot Analysis in Konya .........................286
Reproductive Markers under Heat and Cadmium Stress in Wistar Rats .........................................287
Determination of Heavy Metal Accumulations in Some Macrophungi Growing in Seydişehir (Konya)
District........................................................................................................................................288
Catch Composition and Efficiency of the Trammel Nets in Artificial Reefs in the Aegean Sea... 289
The Biogeochemical Factors Which Control the RSi Fluxes from Resuspended Sediments in the
Aegean Sea (İzmir Bay) ................................................................................................................290
Length-Weight Relationship and Exploitation of Whiting, Merlangius merlangus in Ordu Coasts,
Black Sea.................................................................................................................................291
Infections of Kudoa niluferi and Kudoa anatolica (Cnidaria: Myxozoa) in Fishes in the Black Sea ...292
The Impact of Environmental Degradation on Happiness: Sample of Selected Islamic Countries 293
Effect of Biochar and Amendments on Ailanthus altissima Capacities to Remediate a Pb and As
Contaminated Mining Soil ...........................................................................................................294
Behavioral Effect of Arsenic, Cobalt and Chrome in Gambusia holbrooki........................................295
Effects of Hydrochars Obtained from Different Organic Wastes on Soil Enzyme Activities ......296
Current Distribution of Mycastor cyopus in Gala Lake, Environmental Problems Caused and
Suggested Solution.......................................................................................................................297
In-Situ Conservation: An Evaluation of Protected Area Planning and Management, Sultan Marsh,
Kayseri ........................................................................................................................................298
Characterization and Growth of Autochthonous Hydrocarbonoclastics Bacteria Isolated From the
East-Algerian Littoral.....................................................................................................................299
A Research on the Vegetation Structures of the Mountain Pastures in District Adana .............. 300
Color-Pattern Variation in Cercops vulnerata (Hemiptera: Cercopidae) Distributed in Sinop and
Kastamonu (Turkey) Provinces..................................................................................................301
Microanatomy of Venom Apparatus of Maimuna vestita (C. L. Koch, 1841) (Areneae: Agelenidae) .......................................................... 302

The Trichoptera Fauna of Eastern Part of Kure Mountains National Park (Kastamounu, Turkey) ......................................................... 303

Genome-Wide Verification of Isogenic Nature of Clonal Fish Lines in the Atlantic salmon (Salmo salar) through Next Generation Sequencing Technologies .......................................................... 304

Investigation of Bacterial Species Belonging to Enterobacteriaceae in Lettuce .......................................................... 305

Degradation Caused by Run-of-the-River Hydroelectric Power Plants on Forests and Local Communities in Turkey .......................................................... 306

A Review on the Protected Area Qualification of Nature Parks ...................................................................................................................... 307

Feeding Strategies and Resource Partitioning of Cyprinid Fishes in an Impounded River System ................................................................................ 308

Ecological Tolerance and Habitat Types of Ostracoda (Crustacea) in Malatya .......................................................................................................................... 309

Estimation of Sediment Pollution Status in a Spring Originated Shallow Pond .............................................................................................. 310

Analyzing Relationship Between Vegetation and Rainfall Using SPOT VGT Data .......................................................................................... 311

Gender And Age Dependent Distribution of Klebsiella pneumoniae Strains In Various Culture Samples Collected From Hospitals In Konya ................................................................................................................ 312

Some Biological Characteristics of Crayfish (Astacus leptodactylus Eschscholtz, 1823) in Lake Yenicağa (Bolu) ......................................................................................................................... 313

Investigation of Antimicrobial Effect of Vitis vinifera subsp. vinifera cv. Boğazkere .................................................................................................................. 314

Flora of Kizilcasiu (Kastamounu) Forest Planning Unit .......................................................................................................................... 315

The Effect of Sowing Time on Some Yield and Quality Traits of Buckwheat (Fagopyrum esculentum Moench) in Yozgat Ecological Conditions ............................................................................. 316

Seed Orchards of Required to be Used According to the Regions and Altitude Levels in Turkey .......................................................... 317

The Evaluation of Seasonal Water and Sediment Heavy Metal Pollution Levels of Turnasuyu Stream (Ordu, Turkey) .................................................................................................................. 318

Biochemical Effects of Naringin and Naringenin Flavonoids Against Malathion Toxicity on Saccharomyces cerevisiae .................................................................................................................. 319

Investigation of Radiological Cancer Risk in Baby Clam (Chamelea gallina) and Sediment Samples in the Coastal Area of Sinop Province, Turkey .......................................................... 320

The Effects of Zinc on Growth Parameters of Epilobium hirsutum .......................................................................................................................... 321

Taxonomic Status of Turkish Vincetoxicum Wolf (Apocynaceae: Asclepiadoideae) Taxa ................................................................................................................ 322

Histology and Ultrastructure of the Testis in Pseudochorthippus parallelus parallelus (Orthoptera, Acrididae) .................................................................................................................. 323

Determination of Hay Yield of Common Vetch + Cereal Mixtures Grown Under Hazelnut Orchards .......................................................................................................................... 324

Identification of Late Embryogenesis Abundant (LEA) Proteins in Jujube ................................................................................................................ 325

Characterization of Hsp70 (Heat shock proteins) Proteins in Genome of Ziziphus jujube Mill .................................................................................................................. 326

Temporal Variations of Elements Stocks in Fine Roots Under Different Tree Species .......................................................................................... 327

The Inhibitory Effect of Silver-Palladium Nanoparticles on Cervical Cancer Cells .......................................................................................... 328

Ecological Quality of Two Coastal Lagoons with a Combination of Submerged Macrophytes and Water Quality Indices; a Study from Kizilirmak Delta, Turkey .................................................................................. 329
A Preliminary Study of Assesment of Riva Stream (İstanbul) Water Quality by Using Benthic Macroinvertebrates and Some Physico-chemical Parameters ................................................................. 330
Adsorption of Cerium (III) Using Magnetite Pumice Composite ......................................................... 331
The First Maturity Length and Some Reproductive Characteristics of Red Mullet (Mullus barbatus) in the Middle Black Sea ........................................................................................................... 332
Macrophungal Biodiversity of Pazar (Tokat) District .................................................................................. 333
Species Composition and Seasonality of Leaf Beetles (Coleoptera: Chrysomelidae) in Uşak Province, Turkey .......................................................................................................................... 334
New Habitat Records for Invasive Atherina boyeri, Carassius gibelio and Pseudorasbora parva (Teleostei) from Turkey .................................................................................................................................. 335
Effects of impoundments on feeding and body condition of Squalius cephalus ........................................ 336
The Effect of Streptomycin on Survival and Development of Drosophila melanogaster ......................... 337
Investigation of toxic effect of cerium (III) to Rocket plant (Eruca vesicaria subsp. sativa and Artemia salina) ........................................................................................................................................... 338
The Bryophyte Flora of Zihni Derin Campus in Recep Tayyip Erdoğan University (Rize-Turkey) ............. 339
Fenton-Like Oxidation Using Magnetite Pumice Catalyst for Removal of COD and Color in Wastewater from a Textile Chemicals Producer Industry ......................................................... 340
Ecology and Conservation of Skinks Distributed in Southwest Anatolia ..................................................... 341
Combined effects of Methylparaben and Propranolol on the Growth of Green Algae Scenedesmus dimorphus ........................................................................................................................................... 342
Investigation of Kombucha Tea by Phytopathological Study ...................................................................... 343
Investigating Microbial Load of Mytilus galloprovincialis from Two Stations of İzmir ....................... 344
Species Composition, Abundance and Temporal Variations of Fish Larvae around Gökçeada Island, Turkey ........................................................................................................................................... 345
Investigation of Antimicrobial Activity of Narince Cultivar of Grape (Vitis vinifera subsp. vinifera) .................................................................................................................................................. 346
Rumen Ciliate Fauna (Ciliophora, Protista) of Turkish Domestic Sheep Living in Kastamonu, Turkey ................................................................................................................................................ 347
Determination of Effect of Hypochlorous Acid on Bacterial Populations in Putrefied Chicken Meat ................................................................................................................................. 348
Relationships Between Plant Species Diversity of Black Pine Forests and Site Factors in The Sütçüler District of Turkey ............................................................................................................. 349
Applied Soil Science Education for Primary School Students .................................................................... 350
Determination of Cytotoxic Effect of Novel 2,4-Dihydroxyquinoline Dyes on Cancer Cell Lines 351
Ground Characteristic and Ground Improvement in a Solid Waste Landfill ........................................... 352
Relationship between Root Carbon and Soil Organic Carbon: Case Study of Semi-Arid Grasslands of Olur Sub-Basin, Turkey ................................................................................................. 353
Improvement of Sedimentation in an Activated Sludge System ............................................................... 354
T-2 Mycotoxin Triggers Apoptosis in SerW3 Cells by Caspase-3 and Caspase-9 Dependent Pathway .......... 355
Preliminary Results Of Small Scale Aquaponic System ................................................................. 356
Freshwater Hydrobiidae (Gastropoda: Rissoidea) Fauna of the Mount Kazdağ (Çanakkale; Biga Peninsula) with Some Ecological Data ................................................................. 357
Importance and Role of Phytophthora Species on Some Park Tree Decline Occurring in Ankara 358
Importance of Immune System in Galleria mellonella ............................................................... 359
Some Water Quality Properties of Meke Lake (Konya/Turkey) ..................................................... 360
Effects of Plant Growth Promoting Rhizobacteria on Phytopathogen Fungi ............................... 361
Change in Some Soil Properties with Erin Drought Classes in the Grassland Areas of Coruh River Basin ....................................................................................................................... 362
Zerconid Mites (Acari: Zerconidae) of Turkish Thrace, with Some Ecological Preferences of the Species .......................................................................................................................... 363
Distribution, Ecologic Interactions and Invasions of the Pumpkinseed (Lepomis gibbosus) an Exotic Fish in Turkey with the Studies in Büyük Menderes River Basin ......................................................... 364
Cultivation of Spirulina platensis by Using Layer Manure and its Potential to Use in Layer Feed as A Feed Additive .................................................................................................................. 365
A Research Study into Consumers’ Attitudes to Mussel Consumption ........................................... 366
Carbon Nanotube Applications in Wastewater Treatment: Case Studies in Activated Sludge Process ................................................................................................................................. 367
The Relationships Between Otolith Dimensions- Fish Length and Otolith Features of Common Carp, Cyprinus carpio Sampled from Samsun Province ............................................................ 368
Otolith Features and the Relationships Between Otolith Dimensions-Total Length of the Pike (Esox lucius) Inhabiting Lakes Ladik and Simenlik (Samsun, Turkey) ................................................. 369
Investigation of the Effectiveness of Some Entomopathogenic Nematodes (Steinernema feltiae-Balikesir isolate and Heterorhabditis bacteriophora-Çanakkale isolate) Against Potato Moth (Phthorimaea operculella (Zeller) (Lepidoptera: Gelechiidae) by Greenhouse-Potting Experiments ................................................................. 370
The Impact of Meteorological Parameters on Urban Air Quality (PM10 and SO2) in Kastamonu Province ................................................................................................................................. 371
Determination of Weed Species, Their Frequency and General Coverage Areas in Kiwifruit Orchards in Eastern Black Sea Region of Turkey ................................................................. 372
Glucagon and Somatostatin Immune reactive Cells in Stomach and Intestines of the White Bream (Blicca bjoerkna L., 1758), in Lake Uluabat ................................................................. 373
Culture in the Context of Sustainable Planning Approach: Case of Bolu ................................................................................................................................................................................................. 374
Life-History Traits of the Eastern Spadefoot (Pelobates syriacus) from Kızılırmak Delta, Samsun Province ................................................................................................................................. 375
Age and growth of in a Turkish population the Balkan Green Lizard, Lacerta trilineata (Bedriaga, 1886) ...................................................................................................................................................... 376
Investigation of Antibacterial Properties of Thymus praecox ................................................................ 377
The Role of Botanic Gardens for Raising of Environmental Awareness, Case Study: Çukurova University Ali Nihat Gökyiğit Botanic Garden ............................................................................ 378
Pollen Morphology of Eight Alyssum L. (Brassicaceae) in Turkey ..................................................... 379
Hydrothermal Processing of Algal Biomass ................................................................. 380
Changes in Some Soil Properties According to Different Land-Uses in Artvin ................. 381
Smut Fungi of Aladağlar and Bolkar Mountains of Turkey ........................................... 382
Chemical Composition and Biological Activities of the Essential Oils of Vaccinium myrtillus L. (Bilberry) in the Northernmost of Turkey ................................................................. 383
An Assessment Regarding Postgraduate Theses About "Green Buildings" in Turkey .......... 384
Effects of Some Stand Parameters and Physiographic Factors on Above-Ground Biomass of Calabrian Pine Stands .................................................................................... 385
Assessment of the Environmental Factors Affecting on the Productivity of (Pinus nigra J. F. Arnold subsp. pallasiana (Lamb.) Holmboe var. pallasiana) Species in the Yenişarbademli Region of Isparta .................................................................................................................. 386
Bryophyte Diversity of the Eastern Part of the Küre Mountains .................................... 387
Effect of Insecticide on Pollen Germination in in-vitro Conditions On Pear (Pyrus communis) Plant ............................................................................................................ 388

The Use of Rosemary (Rosmarinus Officinalis) Tomato Canned Bonito (Sarda Sarda) .......... 389
The Effect of Quinine, Tannic Acid and Nicotine Mixtures on Feeding and Development of Female Lymantria dispar L. (Lepidoptera:Lymantriidae) Larvae ......................................................... 390
Reproductive Strategy and Gonad Development of Alien Species Pacific Oyster (Crassostrea gigas Thunberg, 1793) from Bandırma Bay, Marmara Sea–Turkey ........................................ 391

Macrgeographic Population Structure of the Olive Fly, Bactrocera oleae (Diptera : Tephritidae) .................................................................................................................. 392
Determined Ant and Aphid Mutualism from Adıyaman, Malatya and Şanlıurfa Provinces .... 393
Final State and Distinctive Characteristics of Genus Astragalus L. (Fabaceae) ................. 394
Effects of Physicochemical Parameters on Zooplankton in a Brackish Coastal Lagoon (Uzungöl, Kizılirmak Delta) .................................................................................. 395
Green Crimes: Intercontinental Comparative Evaluations ............................................... 396

Nocturnal activity of Darevskia rudis in Central Black Sea Region, Turkey ................. 397
Does altitude effect erythrocyte morphology of European Pond Turtle Emys orbicularis (Linnaeus, 1758) in Mediterranean Turkey? .......................................................... 398
Relation of Phosphorus Fertilization and Yield Performance of Garlic ............................. 399

Effects of Exogenous Enzyme Supplementation in Diets on Growth Performance of Siberian Sturgeon, Acipenser baerii .............................................................................. 400
Effect of Chemical Fertilizers Used in Tea Farming on Nitrate Pollution in Groundwater .... 401
Evaluation of Biological control potentials of Local Beauveria bassiana Isolates Against Strawberry Root Rot Pathogens .............................................................................. 402

Determination of Cicadellidae (Insecta, Hemiptera) Species Distributed in Apple Orchards in Amasya, Turkey ......................................................................................... 403
Investigation of Mosquito (Diptera: Culicidae) Species with Vectorial Importance in the Central District of Edirne ..................................................................................... 404
Removal Of Cr(VI) By Adsorption on a Mesoporous Silica Nanoparticle Mag-MCM-41 From Waste Water ........................................................................................................ 405
Nesting Activity of Sea Turtles (Chelonia mydas and Caretta caretta) in Davultepe 100. Yil Beach (Mersin) in 2017 .................................................................................................................. 406
Nesting Activity of Sea Turtles (Chelonia mydas and Caretta caretta) on Alata Beach (Mersin) in 2017 ........................................................................................................................................ 407
The Effect of Different NaCl Doses on Germination and Plant Growth of Buckwheat (Fagopyrum esculentum Moench) ........................................................................................................ 408
Spatial Differentiation of Population Change in Rural Settlements: The Case of Kastamonu ...... 409
Genome Wide Identification of Hsp100 Protein Family Members in Jujube Plant .......................... 410
Post-Fire Regeneration Strategies of Mediterranean Region Pines .............................................. 411
Determination and Bioinformatics Analysis of Hsp60 Genes in Jujube Genome .......................... 412
Re-Evaluation of Some Endemic Taxa in Terms of Risk Categories ........................................... 413
Ecological Wood Anatomy of the Field Maple Taxa (Acer campestre-Sapindaceae) Naturally Growing in Turkey ................................................................................................................ 414
Determination of Flea Beetle Species Which is Harmful on Rocket and Cress in Ankara, Konya and Eskişehir Province of Turkey ...................................................................................... 415
A Checklist of the Solifugae (Sun-spiders) of Iraq (Arachnida: Solifugae) ..................................... 416
Roles of WRKY Transcription Factors on Biotic Stress in Wild Potato ........................................ 417
Assessment of Zonguldak Province’s Potential Scope of Ecotourism by GIS Method .................. 418
Some Population Parameters of Golden Grey Mullet (Chelon aurata) ........................................... 419
Alpha Species Diversity and Ecological Site Factor Relations in Brutian Pine Forests: A Case Study From Göllhisar District ........................................................................................................ 420
Evaluation of the Heavy Metal Pollution in Bishkek-Kyrgyzstan Using Mentha longifolia As Biomonitor Organism .............................................................................................................. 421
An Unrealized Dream: Homo Economicus and Environmental Awareness .................................... 422
Comparison of Invertebrate Soil Fauna in Fir Ecosystems in Different Sites ................................. 423
The Morphological Comparison of Darevskia rudis (Bedriaga, 1886) and Darevskia bithynica (Mehely, 1909) from Turkey ........................................................................................................ 424
Fur Colour and Hair Structure of Canis lupus (Grey Wolf) in Turkey ............................................ 425
Production and Characterization of Edible Films from Two Different Plant Proteins .................. 426
Al and Cd Accumulation in Kalanchoe Clones and Their Impact on Plant Mineral Nutrition .......... 427
A Review of Microplastics and Additive Chemicals ................................................................. 428
An Overview of the Tracks of Some Wild Mammals ...................................................................... 429
Superoxide Dismutase and Catalase Activities in White Rot Fungus Phanerochaete chrysosporium exposed to Municipal Landfill Leachate from Elazığ, Turkey .............................................. 430
The Evaluation of Turkey’s Air Quality and Its Effects Between 2009-2016 ................................. 431
The Effects of Potassium Applications on the Growth, Mineral Element Concentrations and Some Quality Parameters of the Garlic Plant .............................................................. 432
Identification of Vibrio spp. in Black Mussels Harvested from Different Locations of İzmir Bay in Aegean Sea During Summer Months by Using Real-Time PCR Method .......................... 433
Benthic Habitat Mapping With Multi Beam Echo Sounder System .................................................. 434
Investigation of Pesticides Used in Plant Production in Niğde Province (2006-2016) ...................... 435
Investigation of Industrial Areas in Urban Spaces in Terms of Landscape Urbanism ................. 436
Effect of the Scorpion (Scorpionidae) Poison Against Nosocomial Bacteria that Constitute Biofilms and Having Multiple Drug Resistance ................................................................. 437
Numerical Variations in the Body Setae of Stigmaeus elongatus Berlese (Acari: Stigmaeidae) .... 438
The North Marmara Robber Flies (Diptera: Asilidae) ................................................................. 439
Amphibian Diversity of Kastamonu .......................................................................................... 440
Analysis of matK and rbcL Loci of Chloroplast DNA in Tertiary Relict Endemic Phoenix theophrasti Populations in Turkey and the Other Palm Species ......................................................... 441
Assessment of Ecological Adaptations of Plants Using Genome Size Data .................................. 442
Liability For Damages Caused By Animals ............................................................................. 443
Estimating Surface Soil Erosion Using Coupled RUSLE and GIS Methodology in the Coruh River Basin, Turkey ................................................................................................................................. 444
Supplementary Studies and the First Molecular Identification of Myxobolus arrabonensis (Myxozoa) in Chondrostoma angorensis (Cyprinidae) from the Northeast Turkey .............................................. 445
Determination of Distribution and Density of Seedhead Weevil, (Bangasternus planifrons) Harmfull on Safflower in Ankara Province .................................................................................. 446
Changing of the site index in conjunction with some environmental factors in the pure Scots pine (Pinus sylvestris) Forests of Giresun-Espiye ............................................................................. 447
High Prevalence of Hysterothylacium aduncum Larvae in Marketed of Anchovies (Engraulis encrasicolus) from the Black Sea ........................................................................................................... 448
Exotic and endangered fishes from Edremit Bay (Northern Aegean Sea) .................................. 449
Large Mammal Inventory of Ilgaz Mountains (Çankırı): One of the Most Important Ecological Corridors in Anatolia .................................................................................................................. 450
Investigation of the Strength Properties of the Red Pine (Pinus brutia Ten.) in the Garden Of Ertokus Madrasah .................................................................................................................. 451
Flap the Wings to the Nature! ...................................................................................................... 452
Nereididae (Polychaeta) Fauna of Rocky Shores along the Middle and Western Black Sea Coast 453
A Framework Based on Urban Metabolism Approach for Sustainable Urban Planning .......... 454
Some Biological and Acoustic Features of Pipistrellus pipisrellus, Pgymy Bat (Mammalia: Chiroptera) in Turkey ................................................................................................................................. 455
Drought Analysis in Western Black Sea Region Using Standardized Precipitation Index ........... 456
Some Properties of Gas Concrete Produced by Pumice Aggregate .............................................. 457
Petroleum Biodegradation by Bacterial Consortia Isolated from Mud Pit .................................... 458
Microbial Cellulose Production and Its Usage in Cyanide Removal ........................................... 459
An Investigation of the Post Fire Sucession in Blackpine ........................................................... 460
Investigation of Cytochrome-b Gene Variations in Three Sparrow Species Passer domesticus, Passer montanus and Passer hispaniolensis .................................................................................. 461
Effects of Different Site Conditions on Fiber Morphology of Black Alder (Alnus glutinosa subsp. barbata) wood ................................................................. 462

Discovery at Nezahat Gokyigit Botanical Garden, İstanbul ........................................ 463

Production of Industrial Enzymes by Nocardiosis sp. Strains Isolated from Lake Sediments .... 464

Determination of The Contents of Some Heavy Metals in Endemic Plants in Salt Lake Surroundings: in Case Study Salvia halophila and Hypericum salsugineum ....................................... 465

Investigation of Phylogenetic Relationship in Some Trifolium species from Istanbul/Turkey by Using Cpdna Regions ................................................................. 466

Effects of Acetamiprid on Allium cepa ........................................................................... 467

Science and Nature in Kızılırmak Delta .......................................................................... 468

Protective effect of Osage Orange on Cisplatin-Induced Toxicity in Drosophila melanogaster .... 469

Evaluation of UAV Usage Possibility in Determining the Environmental Impacts of Construction Activities of Forest Roads: Preliminary Results ................................................. 470

Invasive Flora of Artvin .................................................................................................. 471

The Plant Taxa and Communities with Priority at Conservation in Karaman Province (Turkey) .. 472

Use of Artificial Neural Networks in Forest Road Network Planning ................................ 473

Effects of Silver Nanoparticles on In Vitro Adventitious Shoot Regeneration from Upper Half Leaf Explant of Water Hyssop (Bacopa monnieri L. Wettst.) .................................................. 474

Evaluation of ORKÖY Activities of Support for Forest Villagers in Rural (A Case Study of Kastamonu Province) ......................................................................................... 475

Aquatic Invertebrate Diversity of Eskişehir Province and First Record from Eskişehir Surface Waters ............................................................................................................. 476

Environmental Impact of Priority Pollutants on Ecosystem at Low Concentrations ............ 477

Biomonitoring of heavy metal status in Bishkek-Kyrgyzstan using Salix fragilis (Oral Presentation) .................................................................................................................. 478

Molecular Fingerprinting of Some Isoetes members using ITS and trnL–trnF sequences; a case study from Istanbul/Turkey ................................................................. 479

Reptile Fauna of the Kastamonu City (Northern Turkey) ..................................................... 480

On the Definition, Distribution Area and Phenology of Local Endemic Ranunculus munzuresis 481

Taxonomic Revision of the Genus Barbus Cuvier & Cloquet, 1816 in the Turkish Black Sea Drainages ...................................................................................................................... 482

Present Situation of genus Alburnus Rafinesque, 1820 from, the Southern Black Sea Basin, Turkey .................................................................................................................. 483

Blue Sac Fry Syndrome in Trout Alevins .......................................................................... 484

Virulence Determination of Entomopathogenic Fungi Against Beauveria bassiana (Balsamo) Whitefly, Bemisia tabaci (Gennadius) (Hemiptera: Aleyrodidae) .............................................. 485

Effects of Alternative Dietary Protein Sources on Growth, Survival and Proximate Composition of Green Tiger Shrimp (Penaeus semisulcatus) .................................................. 486

Egg Development Stages of Mud Shrimp Upogebia pusilla ............................................ 487

Investigation of Myxomycetes (Myxomycota) in Kumlu and Reyhanlı (Hatay-Turkey) ......... 488
Life Strategies of *Escherichia coli* And Clinical Isolates In River Water In The Presence of Different UV-A Sources and Photosensitizer............................................................489
Spat Availablity of Bivalve Species at the Coast of Urla-Özbek ........................................490
Investigation of Corrosion Inhibitor Effects of 2-((thiazole-2-ylimino)methyl)phenol ..............491
Regeneration of Anatolian Black Pine (*Pinus nigra* subsp. *pallasiana*) with Seed Tree Method in Tandır, Eskişehir .................................................................492
Ecotourism Opportunity in Bursa City And It’s Swot Analysis: Bursa Province Example ........493
Multiple Antimicrobial Resistance of *Escherichia coli* Isolated From Fish Farms ...............494
Risks Related to Land Application of Wastewater Treatment Plant Sludge on Ecosystem ........495
Determination of the Population of Wild Sheeps Using Unmanned Air Vehicles...............496
Fabrication of BSA Incorporated Hybrid Nanoflowers with Their Antimicrobial and Enzyme Mimic Activities .................................................................497
Effects of Quercetin on Longevity of Parasitoid *Bracon hebetor* Say, 1836 (Hymenoptera: Braconidae) .....................................................................................498
Pollen, Leaflet and Seed Morphology of two close endemic *Astragalus* species of Turkey (*Astragalus victorlae* and *Astragalus melanophrrarus*) ............................................................499
Determination of Aerosol Acidity in Heavily Polluted Industrial Region (Dilovasi, Kocaeli)......500
Lichenicolous Fungi Species From Çamlık National Park (Yozgat) .......................................501
Comparison of Ammonium Nitrate and Ammonium Sulfate Fertilizers’ Deleterious Effects on *Rana macrocnemis* Tadpoles........................................................................502
Possible Effects of Global Warming on Vegetation Zones in the Case of Forestry Region of Bartın, Turkey .........................................................................................503
Green Synthesis of Magnetite Nanoparticles Using *Camellia sinensis* Extract for the Removal of Nonylphenol Ethoxylates from Water......................................................504
Recreational Fishing Competitions in Turkey .........................................................................505
Changes in Urease and Catalase Enzyme Activities Depending on Shadow Conditions in the Soil where *Pinus nigra* Arnold. Is Grown ..........................................................506
A Sustainable Campus Strategy-Ege University ....................................................................507
Comparative Analyses of Chemical Contents of Ostracod Carapace from Shallow Aquatic Habitats of Giresun .........................................................................................508
Physiological Alterations of Strawberry Plant Under PhotoSelective Nets ..........................509
Deadwood Bryophytes of Western Black Sea Region Pine Forests ........................................510
Comparison of Different Purification and Isolation Methods for Cryptosporidium Oocysts from Fecal Samples .......................................................................................511
Determination of Anticancer Properties of Protein Extracts Obtained from Some Insect Species of Helophorus (Coleoptera:Helophoridae) Species ..............................................512
Garlic (*Allium sativa*) Cultivators of Applications in Ecological Context ............................513
Foliar Nitrogen and Phosphorus Resorption in *Betula medwediewii* .....................................514
Investigation of Anti-Cancer Properties of Protein Extracts Obtained from Some Insect Species of Hydrophilinae Subfamily .................................................................515
First Report of *Chloromyxum partistriatus* (Cnidaria: Myxozoa) from *Raja clavata* in Turkish Coastal Areas of the Black Sea ................................................................. 516

Effects of Different Photoperiod Applications on Kisspeptin in Zebrafish (*Danio rerio*) .......... 517

Detected Exotic and Invasive Species in Susuz and Aygir Lakes (Kars), Cildir and Akta Lakes (Ardahan) .......................................................................................................................... 518

Evaluation of Antibiofilm and Cytotoxic Potential of Exopolysaccharides from ZZ40 *Enterobacter sp.* and ZZ47 *Rhodococcus pyridinovorans* Strains .................................................................. 519

Effect of castor bean (*Ricinus communis* Linn (Euphorbiaceae)) and dieffenbachia (*Dieffenbachia maculata* (Araceae)) of root-knot nematode (*Meloidogyne incognita*) on greenhouse tomatoes ... 520

Species Composition of Culicoides Latreille 1809 (Diptera: Ceratopogonidae) in Northeastern Anatolian Region of Turkey ........................................................................................................... 521

Biological Struggle *Elaeagnus angustifolia* with *Phragmites australis* at Van Yüzüncü Yıl University Campus .................................................................................................................... 522

Comparative Anatomy and Ecology of *Potamogeton praelongus* (Potamogetonaceae), a Recently Rediscovered Species from Turkey ..................................................................................... 523

Local Ecological Conditions of Oriental Beech (*Fagus orientalis* Lipsky) Ecosystems in Artvin Province ........................................................................................................................................... 524

Research of Annual Movements of Crane (*Grus grus*) Breeding in Sivas, Erzincan, Erzurum and Ardahan ........................................................................................................................................ 525

Land Cover-Use Change Analysis for Bursa Karacabey Karadağı-Ovakorusu Wildlife Development Area with Using Pixel-Based Classification Method ................................................................. 526

Distribution and Abundance of Eggs and Larvae of *Sardina pilchardus* (Walbaum, 1792) in the Sığacık Bay (Aegean Sea) ........................................................................................................... 527

Vegetation and Ecological Differentiation of Forest Communities in Küre Mountains National Park (Bartin Section) ................................................................................................................ 528

Models Used in the Estimation of Carbon Accumulation in Forest Ecosystems ...................... 529

Permaculture for Ecological Design .......................................................................................... 530

Assessing the Water Quality of Brook Soğanlı (Karabük) ....................................................... 531

Relationships between Plant Diversity and Soil Characteristics in Aksaz-Karagöl Dune (Sinop) ............................................................................................................................................ 532

Evaluation of Landscape Designs of Irem Rehabilitation Center in Kocaeli ......................... 533

Two Gonad-Infecting *Philometra* Species (Nematoda: Philometridae) in Marine Fishes in the Sinop Coasts of the Black Sea ........................................................................................................... 534

The Bryophyte Flora of Kocaçay River Delta, Karacabey Floodplain Forest, and Their Environs 535

A New Record of Phantom Flies (Diptera: Ptychopteridae) from Turkey ................................. 536

Arsenic Removal by Electrocoagulation Process Using Iron Plate Electrodes from Groundwater’s of the Western Anatolia, Turkey ........................................................................................................ 537

Age and Growth of of false scad, *Caranx rhonchus* (Geoffroy Saint-Hilaire, 1817) (Pisces, Carangidae) from İzmir Bay (Central Aegean Sea) ................................................................. 538

Lessespanian Fish Species Composition in the Mediterranean Coast of Turkey in 2014-2015 ... 539

Removal of Congo Red From Aqueous Solutions by Adsorption With the Use of Illite Mineral. 540

The Endemic and Rare Plants of Keltepe .................................................................................... 541
Medicinal and Aromatic Plants in Organic Agriculture in Turkey .......................................................... 542
Evaluation of the Magnitude of the Environmental Pollution Caused by the Former Soviet Uranium Facility Located at the Kaci Say Village I the Isik-Ton Region in Kyrgyzstan Using *Perovskia abrotanoides* Kar. as Biomonitor Organism ......................................................................................... 543
The Evaluation of Perennial Herbaceous Plants used in Planting Designs Grows in Coastal Areas in Eastern Black Sea.................................................................................................................. 544
Examination of the legal status for protection of Truffles: Case of Thrace .............................................. 545
Determination of *Necrophagous* (Diptera: Sarcophagidae) Species in Yozgat, Turkey ....................... 546
Micropropagation of *Salvia siirtica* by Temporary Immersion System...................................................... 547
New Data for the Genus *Limnephilus* Leach, 1815 (Trichoptera: Limnephilidae) from Macedonia ............ 548
Determination of Vitamins and Mineral Contents at Natural and Cultured *Pleurotus ostreatus* and *Agaricus bisporus* ......................................................................................................................... 549
Protected Areas in Gümüşhane District: Case Study of Spider Forest Nature Conservation Area. 550
Effects of Urban Development on the Gastropod Diversity in Kastamonu City ............................................ 551
An Evaluation of Artvin's Monumental Trees ............................................................................................. 552
Impacts of Climate Change on the Upper Tree Line in the Eastern Blacksea Region, in Turkey .. 553
Levels of PM$_{2.5}$ Bound Metals at two Different Stations in Ankara (Turkey) ........................................... 554
The Morphology, Anatomy and Palynology Study on Turkish Local Endemic Species *Saponaria karapinarensis* Vural & Adıgüzel (Caryophyllaceae)............................................................................ 555
Antifungal Activity of *Arbutus unedo* L. (Strawberry tree) and *Laurus nobilis* L. (Laurel) Leaf Extracts against Some Plant Pathogens .......................................................... 556
The Effects of Invasive Tree Species on Forest Ecosystems in Turkey ...................................................... 557
Exploring the Little Known Spider (Arachnida: Araneae) Community of the Olive Grove Ecosystem from Southern Foothills of Kaz Mountains, Çanakkale & Balıkesir, Turkey ........ 558
Rapid Mapping of River Inundation Areas with Sentinel-1 Data: A Case Study of the 2015 Flood in Edirne, Turkey .............................................................................................................................. 559
Evaluation of *Abies nordmanniana* subsp. *bornmülleriana* Mattf. on Adsorption of Crystal Violet from Aqueous Solution .......................................................... 560
The Evaluation of Lenght-Weight Relationship of Mosquitofish (*Gambusia holbrooki*) in Freshwaters of Turkey .......................................................................................................................... 561
The Legal Regulations About Urban Green Spaces and Accessibility ...................................................... 562
Turkey at the Crossroads of Bird Migration Between Asia, Africa and Europe ........................................ 563
Sex and Age Related Migration Phenology of Red-backed Shrike (*Lanius collurio*) in Kızılırmak Delta ........................................................................................................................................ 564
Biochemical Composition of Smooth Scallop (*Flexopecten glaber* Linnaeus 1758) from Çardak Lagoon in Çanakkale, Turkey ........................................................................................................... 565
The Problem of Man and Environment in the Context of Otanticity of Existence ..................................... 566
Investigation of Aerobic Bacterial Flora of *Acipenser gueldenstaedti*, *Acipenser stellatus* and *Acipenser baerii* Juveniles on Indoor Aquaculture System .................................................. 567
Antibiotic Resistance Genes In The Anthropogenous Contaminated Soils .......................... 568
Ecological Characteristics of Cladonia foliacea Group Lichenes Distribution in Turkey ........ 569
A Review of Climate Type Variability from Bartin Region .............................................. 570
A Research on the Effect of Organic Fertilizer Applications on Yield and Yield Components in the Production of Organic Cotton (Gossypium hirsutum L.) under Harran Plain Ecological Conditions ................................................................. 571
The Spider Fauna of Eastern Part of Küre Mountains National Park (Arachnida: Araneae) ...... 572
A Qualitative Research on Ecology and Mental Health ......................................................... 573
Seed Germination Studies on Critically Endangered Endemic Campanula aktascii and Campanula yaltirikii .......................................................... 574
Macrobenthic composition in Tatlıca Waterfall (Sinop) ..................................................... 575
Comparative Pollen Morphology of Centaurium serpentinicola Carlström and C. maritimum (L.) Fritsch (Gentianaceae) in Turkey .............................................................. 576
All Creatures Constituting Ecosystem from the Ecological Law Point of View ..................... 577
The Use of Some Plant Wastes as Pelleting Treatments in Onion (Allium cepa L.) Seeds ...... 578
The Impact of Irrigation Practices on Drainage Water Salinity: Soil column experiments with alfalfa (Medicago sativa) cultivation ......................................................... 579
Water Balance In Amphibians: The Role of Hyaluronic Acid in Skin and Kidney of Frog ....... 580
Physiological Determination of Reactions Formed by Different Boric Acid Applications in Some Safflower (Carthamus tinctorius L.) Types ......................................................... 581
Environmental Reflections from Ideas of Stakeholders in Terms of Mediterranean Model Forest Network: Case of Yalova Model Forest ......................................................... 582
The Endemic Species of the Genus Bellevalia Lapeyr. (Asparagaceae) in Turkey ................. 583
The Research of Changes in the Superoxide Dismutase, Catalase and Glutathione Peroxidase Activities in Aspartam and Vitamin E Injected Mice ......................................................... 584
The Important of the Biological Invasions in Turkey Forests ................................................ 585
Mean Stand Height Estimation Using Stereo Aerial Images ................................................. 586
Faunistic Composition, Ecological Properties and Zoogeographical Evaluation of the Cerambycidae (Coleoptera) of the Eastern Black Sea Region of Turkey ........................................ 587
Net Primary Productivity of Ilgaz Reservation Area Forests as Affected by Climate Anomalies Between 2000 and 2010 ................................................................. 588
Faunistic, Ecologic and Zoogeographical Evaluations on Staphylininae (Coleoptera: Staphylinidae) Fauna of Northeastern Anatolia ......................................................... 589
Eco-physiological Responses of Drought Tolerant Woody Species to Desert Conditions in Karapınar/Konya ....................................................................................... 590
Chromosomai Identification in Rattus rattus (Linnaeus, 1758) (Rodentia: Muridae) from Western Anatolia using Banding Techniques ......................................................... 591
Evaluation of UNESCO Candidate Wetland Ecosystems: Kızıhlırmak Delta as a Case Study .... 592
Parasitoids of the Most Important Pests in Turkey Forests and Opportunity to Use Biological Control ........................................................................................................... 593
Using the Organelles of *Acer* Pseudoplatanus as a Bioindicator for Heavy Metal Pollution

Investigation of Crude Oil Yield and Fatty Acid Composition of Buckwheat (*Fagopyrum esculentum* Moench) Cultivated in Turkey

First Chromosome Studies on the Genera *Calchas* Birula, 1899 and *Neocalchas* Yağmur, Soleglad, Fet & Kovarik, 2013 (*Scorpiones, Iuridae, Calchinae*)

Determination of Vertical Distribution of Ant Fauna (*Hymenoptera: Formicidae*) of South Aegean Region of Turkey Using Pitfall Traps

Marketing of Organic Products through Local Organic Bazaars

Effects of Environmental Pollution on Honey Production in Turkey

Local Seed Usage and Producer Awareness in the Protection of Agricultural Biodiversity (*Kastamonu Taşköprü Garlic*)

The Trichoptera (*Insecta*) Fauna of Beyler Reservoir (*Devrekâni, Kastamonu, Turkey*)

Determination of DNA Damage Caused by Different Salt Concentrations in Safflower Types with ISSR-PCR

An Evaluation on Views of Local People about Tourism Activities in Rural Area Interaction with Agriculture: The Sample of Sapanca - Taraklı

Building Panel Production from Waste Ashes: A Constructional Solution for Environmental Pollution

Determination of Pollens Content in The Atmosphere of Kars Province in 2016

Atmospheric Pollen Diversity of Ardahan Province in 2016

Pollen Calendar of Ardahan Province 2015

Winter Birds of Obruk Dam Lake (*Çorum*)

Slow City Movement: A Case Study Cittaslow Perşembe-Ordu

The Effect of Low Temperature Degrees on Pedunculate Oak (*Quercus robur* L.) Seeds

Fungi Associated with Pedunculate Oak (*Quercus robur* L.) Acorns Exposed to Low Temperatures

Mapping Seagrass in Gökova Bay Using Optical Satellite Images

The Possible Link between Cytosine Methylation and Z-Form DNA in Heavy Metal-Acclimated Freshwater Bacterial Isolate

Cultural Landscape Assessment Approach of the Tourism Sector in Turkey: Malatya Case

Moth Acoustics: Structure and Function of Ultrasound Producing Tymbal Organ

Biobarrier Formation on Natural Zeolite For Sustainable Bioremediation

Effects of Urban Construction on Human Comfort: Case of Iğdır City Center

Spatial and Temporal Variation of Soil Pollution across Mega-city İstanbul (Turkey)

Impact of Traffic Emissions on PM$_{2.5}$ Chemical Composition in Mega-city İstanbul (Turkey)

Effects of an Insect Growth Regulator, Fenoksicarb, on 7th instar larvae of Greater Wax moth, *Galleria mellonella*

Phytase: A New Aspect For Environmental Phosphorus Pollution

Suitable Site Conditions for the Distribution of Black Pine in Gölhisar District, Turkey
Investigation of In Vitro Microbial Growth Possibilities of Lavender Plant Grown in Diyarbakır Province ................................................................. 623
Effects of Different Organic Fertilizers on TTS and Vitamin C Parameters of Cherry Tomato Cultivars .................................................................................. 624
Validity of WEPS Model for Mass Transport from Two Adjacent Dunes .............................................................. 625
Spleenworts Family (Aspleniaceae) in Turkey ........................................................................................................... 626
Examination of Teacher Candidates’ Awareness Towards Climate Change ............................................................ 627
An Experimental Tourism Approach to Eco-Tourism: The Example of Malatya Apricot Orchards ........................ 628
Effects of Sublethal Lambda Cyhalothrin Concentrations on the Glutathione and TBARS Biomarkers in Astacus leptodactylus (Eschscholtz, 1823) .................................................................................................................... 629
Is Livable City Possible under the Focus of Economy and Ecology Discussions ..................................................... 630
Algal Flora and Water Quality of Birecik Dam Reservoir ......................................................................................... 631
The Use of Expanded Vermiculite for Removal of Zinc from Industrial Sludge ......................................................... 632
An Evaluation of the Cinereous Vulture (Aegypius monachus L.) Population in Turkey ........................................ 633
Determination of Ecological Footprint Awareness of Landscape Architecture and Environmental Engineering Students ................................................................................................................................. 634
We Know About The Level Of Microplastic Pollution, The Methods Of Treatment And Impacts 635
Broad bean (Vicia faba L.), A New Host of Root-Knot Nematode [Meloidogyne javanica (Treub)] in Turkey .......................... 636
Bioavailability, Microbiologic and Bioactive Properties of Tarhana Produced with Alternative Cereals and Legumes ........................................................................................................................................ 637
Sea Cucumbers: Their Ecological Importance and Problems Caused by Overfishing .................................................. 638
Green Synthesis of Ag and Ag@GO Nanocomposite Using Rose Extract and Evaluation of It’s Antimicrobial Activities .......................................................................................................................... 639
Evaluation Of Internal Bacterial Microbiota of Neodiprion sertifer (Geoffr) (Hymenoptera: Diprionidea) for Possible Biotechnological Applications .................................................................................. 640
Niche Modelling Study on Synaptus filiformis (Fabricius, 1781) (Coleoptera: Elateridae) in Turkey ........................... 641
Environmental, Socio-Cultural and Economic Value of Olive Growing ........................................................................ 642
Cationic Dye Decolorization through a Visible Active Photocatalyst Promoted by Aluminum Oxide .................. 643
The Relationship between Trichoptera Species and Water Quality ........................................................................ 644
Preparation of Folic Acid-Copper(II) Containing Hybrid Nanostructures and Investigation of Its Catalytic and Antimicrobial Activity ................................................................................... 645
Analyses of Sea Surface Temperature by Wavelet Methodology .............................................................................. 646
Molecular Characterization and Phylogenetic Analyses of Culicoides pulicaris Complex Species 647
Eco-Friendly Practices in Operating Room .................................................................................................................... 648
A Review on Ecological Design in The Hospitality Sector in Asia ............................................................................. 649
The Impact of Tourism on the Natural Environment Case Study on Ajloun Forests ...................................................... 650
Change of The Biotic Cycle of Substances and their Influence on The Health of Animals .......... 651
A New Record of the Lacewing Fauna of Turkey (Neuroptera: Hemerobiidae), with some Notes on Morphology, Ecological and Distributional Notes ................................................................................. 652

POSTER PRESENTATIONS ..................................................................................................................... 653

Use of Molecular Markers to Assess the Environmental Risk to Three Plant Species Exposed to the Pollutants of Bazian Cement Factory in Bazian\Sulaimani\Iraq ................................................................. 654
Metal Concentrations in Water and Sediment of Şığırça Lake (Edirne, Turkey) ......................... 655
Biomonitoring of Air Pollution by Using Antioxidant Parameters in Plants Collected from Different Regions in Diyarbakır Province ......................................................................................................................... 656
Changes in Some Antioxidant Enzymes Activities in Gammarus pulex Exposed to Methyl Orange Textile Dye ........................................................................................................................................ 657
Adverse Effects of Environmental Pollution on Lung Tissue of Euraisan Marsh Frog (Pelophylax ridibundus) ........................................................................................................................................ 658
Comparison of Some Nutrient Contents of Garlic Grown In Greenhouse and Open Field in Taşköprü of Kastamonu Province ......................................................................................................................... 659
Superoxide Dismutase Activity in Blood of Rats Exposed to Non-Ionizing Electromagnetic Radiation ....................................................................................................................................... 660
Exploration of Microbiological Contamination in Karasu River of Sinop (Black Sea) ............... 661
A Revision of the Plant Pathogenic Phyllosticta Species on Trees in Azerbaijan ............................. 662
Biological activities and chemical analysis of phenolic and flavonoid components of Thymus hirtus Willd., and Thymus lanceolatus Desf. extracts from Algeria ...................................................................................... 663
Survey of Phytoseiidae mites from garlic crops in Kastamonu/ Turkey ........................................ 664
The Abdomen Meat Yield and Biochemical Composition of Freshwater Crayfish (Astacus leptodactylus Eschscholtz, 1823) in Ulugöl, Samsun, Turkey ......................................................................................................................... 665
Economic Analysis and Household Behaviours of Agricultural Enterprises Which Are Placed in Garlic Production in Kastamonu Province ........................................................................................................ 666
Economic Importance of Non-Wood Forest Products in Turkey ......................................................... 667
The Relationship Between Ecological Conditions and The Samples of Juvenilities in Natural Regeneration Areas of Quercus frainetto Ten. and Quercus petraea (Matt.)......................................................................................................................... 668
A preliminary Study on Determination of Yield and Some Plant Characteristics of Chia (Salvia hispanica L.) ............................................................................................................................................. 669
New Occurrence of the Mite Genus Columbiccheylea (Acari, Cheyletidae) in Turkey ...................... 670
Cryptognathid Mites (Acari: Cryptognathidae) of Harşit Valley and Örümcek Forests (Turkey) .......... 671
Effect of copper exposure on sperm motility of brook trout (Salvelinus fontinalis) ....................... 672
Effect of Cobalt on the sperm quality of Salmo coruhensis ................................................................. 673
Determination of Antioxidant Capacity of Scot Pine (Pinus sylvestris L.) Seeds Depends on Age 674
Determining of Between Erosion and Plant Diversity on Grassland and Pastures of Samsun (Turkey) ......................................................................................................................................................... 675
Comparison of Air Pollution Effect on Prunus laurocerasus L. in Kastamonu ........................................ 676
Eco-physiological Responses of Spirulina sp. to Heavy Metal and Salt Stresses ............................... 677
Essential Oils Compounds of Some Macrofungi (Lactarius deliciosus and Pleurotus ostreatus) Grown in Kastamonu, Turkey .......................................................... 678

Determination of Relation Between Fish Size and Heavy Metal Content in Muscle of Pike (Esso lucius) .................................................................................................................. 679

Ecological Properties of Sorbus (Rosaceae) Taxa Distributed in Rize ......................................................................................................................... 680

Variation in Chemical Compounds of Chestnut Leaves Infected by Blight Disease .......................................................... 681

Determination of PCDD Levels in Milk, Meat, Cheese And Butter Samples by HR-GC/MS .................. 682

Resistance and bioaccumulation of Mn(II) by Thermophilic Bacillus cereus ........................................................................................................ 683

The Therapeutic Effects of Gilaburu (Viburnum opulus L.) Seeds Extracts on Growth Hormone (GH) and Insulin Like Growth Factor 1 (IGF-1) of Carp Fish (Cyprinus carpio L. 1758) Exposed to Ammonia .................................................................................................................. 684

HR-GC/MS Monitoring of PCDF in Meat Samples .......................................................... 685

Heavy metals in the coastal sediment of some the beaches of Al-Jabal Al-Akhdar (Libya) .............. 686

Chromosome Studies on Origanum × intermedium (Lamiaceae) and Its Parents (O. sipyleum and O. onites) ......................................................................................................................... 687

A Preliminary Study on Simuliidae Fauna of Isparta Stream ......................................................................................................................... 688

A Preliminary Study on Epilithic Diatom Flora of Ulupınar Stream (Antalya) ............................................ 689

Some Biological Features of Tinca tinca Population in Asartepe Dam Lake (Ankara).............. 690

Some Biological Features of Vimba vimba Population Living in Asartepe Dam Lake ............... 691

Some Biological Characteristics of Carassius gibelio (Bloch, 1782) Living in Ankara Asartepe Dam Lake ........................................................................................................................................ 692

Reflection Of Changed Catch Composition On Characteristics Of Fishing Gear; Gökova Bay Case Study ........................................................................................................................................... 693

Effect of Lipopolysaccharide on Antioxidant Capacity of Rat Brain ..................................................... 694

Determination of Mercury in Human Blood and Hair Samples from the People Living Environment Adjacent to Petrochemical Industry Zone in Libya ......................................................................................................................... 695

A Preliminary Study on Ephemeroptera (Insecta) Fauna of Demre Stream ........................................ 696

Determination Toxicity of Lead Nitrate With Antioxidant Capacity in Allium cepa .................. 697

Linear Alkyl Benzene Sulphonic Acid Exposure Cause to Delay Gonadal Differentiation in Zebrafish (Danio rerio) ............................................................................................................................................. 698

Developmental Toxicity of Linear Alkyl Benzene Sulphonic Acid on Zebrafish (Danio rerio) Embryos ............................................................................................................................................ 699

Protective Effect of Sodium Selenite Against H₂O₂ in Allium cepa ........................................................................................................................................................................................ 700

A New Record for the Turkish Oribatid Mite (Acari) Fauna from Yozgat Province: Eremulus flagellifer Berlese, 1908 ...................................................................................................................... 701

Investigation of Shells Structure of Pacific oyster (Crassostrea gigas Thunberg, 1793) by Scanning Electron Microscope (SEM) and Energy Dispersive Spectroscopy (EDS) Analysis ........................................................................................................ 702

Histopathological Effects of Endothall (7-Oxabicyclo[2.2.1]Heptane-2,3-Dicarboxylic Acid) on Heart Tissue of Zebrafish (Danio rerio) .......................................................................................................................... 703
Histopathological Effects Of Endothall (7-Oxabicyclo[2.2.1]Heptane-2,3-Dicarboxylic Acid) On Liver Tissue Of Zebrafish (Danio rerio) ................................................................. 704
Histopathological Effects of N-Ethyl-N-Nitrosourea On Gill Tissue of Zebrafish (Danio rerio) ................................................................. 705
Histopathological Effects of Tau-Fluvalinate on Intestine Tissue of Zebrafish (Danio rerio) ................................................................. 706
Histopathological Effects of Tau-Fluvalinate on Ovary Tissue of Zebrafish (Danio rerio) ................................................................. 707
Growth Period Protein Yield and Amino Acid Composition of Meagre (Argyrosomus regius) ................................................................. 708
A contribution to the knowledge on flea (Insecta: Siphonaptera) diversity in Turkey: the first record of Chaetopsylla (Arctopsylla) hyaenae (Kolenati, 1846) ........................................................................................................ 709
Histopathological Changes in the Stomach Tissue of Rats Fed with Great Scallop (Pecten maximus) Containing Heavy Metal Salts ........................................................................................................ 710
Known as Super Vegetable Purslane (Portulaca oleracea L.), Can It Be Possible Antigenotoxic Effect? ........................................................................................................ 711
Effects of Municipal Wastewater Treatment Sludges on Some Soil Properties in Field Experiment ........................................................................................................ 712
Ozonation of Three Personal Care Products in Synthetic Samples ........................................................................................................ 713
Copper Removal from Aqueous Solution Using a Wetland Plant as Biosorbent ........................................................................................................ 714
Seed Mucilage Contents in Some Taxa of Draba L. (Brassicaceae) And Their Significance from Systematic and Ecological Aspects ........................................................................................................ 715
Examination of Cytotoxic and Genotoxic Properties of Teflubenzuron Insecticide on Allium cepa Somatic Cells ........................................................................................................ 716
City Cluster and Difference in Air Quality in Ergene Basin: Urban Livability ........................................................................................................ 717
Use of Composite Alginate Beads for Heavy Metal Removal by Continuous Flow Reactors: A Literature Review ........................................................................................................ 718
The effects of different proportions of the 17α-methyltestosterone and 17β-estradiol on growth, sex reversal and skin coloration of electric yellow cichlid (Labidochromis caeruleus Fryer, 1956) ........................................................................................................ 719
Histopathological Effects of Thiourea Dioxide on Zebrafish (Danio rerio) Heart Tissue ........................................................................................................ 720
Effect of Medium pH on Copper Removal and Kinetics of Adsorption by Alginate-Clinoptilolite Beads ........................................................................................................ 721
Effect of Clinoptilolite Size and Alginate-Clinoptilolite Ratio on Copper Removal by Alginate-Clinoptilolite Beads ........................................................................................................ 722
Determination of PCBs in Red Mullet (Mullus barbatus) and Annular Sea Bream (Diplodus annularis) Collected from Izmir Gulf (Eastern Aegean) ........................................................................................................ 723
Reducing Effects of Humic Acid on Chromium Stress in a Bread Wheat (Triticum aestivum L. cv. Huseyinbey) ........................................................................................................ 724
Effects of humic acid against chromium stress in a Bread Wheat (Triticum aestivum L. cv. Syrena Odeska) ........................................................................................................ 725
Wild Captive Solea senegalensis Sperm Quality Analysis and Improvement ........................................................................................................ 726
Evaluation of The Effects of Odor Pollution Occuring in Some Entomological Studies ........................................................................................................ 727
Investigation of oxidative response of malonaldehyde levels of Gammarus pulex, a non-target organism exposed to dimethoate pesticide ........................................................................................................ 728
The Study of SHE Plant Diversity Analysis of Rangelands with Different Slopes in Aydın Province ............................................................. 729
Histology and Morphology of Female Reproductive System of *Tanymecus dilaticollis* Gyllenhal, 1834 (Coleoptera: Curculionidae) ................................................................. 730
Effect of Skiffing at Different Times on Harvest Date and Yield in Tea (*Camelia sinensis*) ...... 731
Variation of Mineral Matter Contents According to Sunshine Conditions and Shooting Periods in Fresh Tea (*Camelia sinensis* L.) Leaf .............................................. 732
Plant parasitic mites of weed plants from garlic growing areas of Kastamonu ................................................................. 733
Retinol-Induced Aging in Female and Male Populations of *Drosophila melanogaster* Oregon R (wild-type) ................................................................................................. 734
Mechanical Soil Cohesion Measurements with Fluidized Bed Approach ............................. 735
Evaluation of Lignocellulosic Waste in Wood Composite Production .................................. 736
*Hydnobolites*, A New Genus Record for Turkish Pezizaceae ........................................... 737
Gamasid Mites (Acari) of the Honaz District (Denizli/Turkey) .................................................. 738
Comparison of Methods Used in Slaughterhouse Wastewater Treatment: A Review .................. 739
Lipopolysaccharide Toxicity on DNA Damage in Blood of Rats ............................................. 740
Ascertain of Radiotoxic Elements and Heavy Metals of Kangal Lignite Coal and Its By-Product 741
Visual Landscape Quality Assessment of Amisos Hill, Samsun-Turkey .................................... 742
Malondialdehyde Levels in *Gammarus pulex* Exposed to Slaughterhouse Wastewater Treated by Electrocoagulation Process ......................................................... 743
Enzymatic Decolorization of Textile Dyes by Laccase from *Bacillus subtilis* ...................... 744
Effect Of Temperature on Brilliant Green Removal from Aqueous Solutions Using Poly(1-vinyl-2- pyrrolidone-co-acrylonitrile)/Zeolite Composite Polymer .................................................. 745
A New Locality Record of *Emitrombidium giocondi* (Acari: Trombidiidae) from Turkey ...... 746
Urban Air Pollution Study in Baku (Azerbaijan) Using Moss Bags with NAA and AAS Analytical Techniques ............................................................................................................ 747
Production Of Extracellular Polymeric Substances (EPS) by Thermophilic *Bacillus licheniformis* B18 ........................................................................................................................... 748
Effects of Pesticides on Aquatic Biodiversity in Gediz River: General Evaluation, Sample Case, Warnings and Precautions ........................................................................... 749
Research on the Fauna of Terellinae (Diptera: Tephritidae) in Samsun Province .................... 750
Potential Use of Crab Species in Turkey for the Marine Aquariums ........................................ 751
Morphometric Characteristics in the Marbled Crab (*Pachygrapsus marmoratus*) .................. 752
An Overview of the Different Contents and Types of Pesticides in Cyprinidae ................. 753
A Study of Ecological, Anatomical and Morphological Features of Endemic Two Related *Barbarea* Species *Barbarea duralii* and *Barbarea anfractuosa* .......................... 754
Limb loss in the European Edible Crab (*Cancer pagurus*) ..................................................... 755
Cases of Defective Wing Vein Anomalies in Two species of *Ammaphila* (Hymenoptera: Sphecidae) ...................................................................................................................... 756
Determination of Some Flavonoids and Antimicrobial Behaviour of Some Plants Extracts...... 757
Mathematical Model of Behavior of Marine Ecosystem Sediment Transported to Eastern Black Sea
................................................................................................................................. 758
Comparison of Black-Scholes Models and Linear Regression Model in Maritime Transportation for
Financial Risks ............................................................................................................ 759
Cytotoxic and Genotoxic Effects of Flupyradifurone on Human Lymphocytes.......................... 760
Determination of Essential Elements and Heavy Metals of Groundnuts by XRF Spectrometric
Method ......................................................................................................................... 761
Cytotoxic Effects of Mixture of Deltamethrin and Thiocloprid on Human Bronchial Epithelial Cells
........................................................................................................................................ 762
The Study of Morphological Structure of Medicinal Leech Species (Hirudo sulukii and Hirudo
verbana) of Turkey...................................................................................................... 763
The first record of Ixodes inopinatus Estrada-Peña, Nava & Petney, 2014 ticks (Acari: Ixodidae)
from Turkey ................................................................................................................ 764
Pollen and Seed Morphology of Onobrychis argaea ................................................................ 765
The Role of Soil Beneficial Bacteria in Organic Vegetable Production: A Review................. 766
Importance of Fishing Pots and Traps in Ecosystem Based Fisheries ................................. 767
Contributions to genus Platystoma (Diptera: Platystomatidae) of Turkey .............................. 768
Ground Air Quality for Ankara, Turkey, Monitored from Space and City Mortality for the Interval
2009 – 2016 ................................................................................................................. 769
An Evaluation on the Current Bird Diversity of the South-eastern Anatolia Region .......... 770
The Stigmaeid Mites (Acari: Stigmaeidae) From Yedigöller, Esence Mountains (Turkey) ...... 771
The Effect of Water Temperature and Body Size on Predation Capacity of Gambusia on Mosquito
Larvae ......................................................................................................................... 772
Larvicidal Activity of Acetone Extract of Sideritis ozturkii Against Culex pipiens ............... 773
Palpimanus orientalis Kulczyński,1909 (Araneae: Palpimanidae) is new record for Turkish Spider
Fauna ............................................................................................................................... 774
Effects of Dietary Fish and Vegetable Oils on the Growth and Feed Utilization of Rainbow Trout
Fingerlings (Oncorhynchus mykiss) at the High Temperature, and Recovery of Survival and Growth
by Using Fish Oil Finishing Diets ............................................................................. 775
The Germination Speeds of Oriental Hornbeam (Carpinus orientalis Mill.) Seed Depending on
Different Pre-Treatments and Altitudes ....................................................................... 776
Oribatid Mites of Laçin District in Çorum Province (Turkey) ............................................... 777
Description of A New Species of Cavernocypris from Texas, U.S.A ................................. 778
Isolation, Characterization and Pathogenicity of an Effective Entomopathogenic Fungi From White
Grubs (Coleoptera: Scarabaeidae) in Turkey .................................................................. 779
Effects of Different Vermicompost Fertilizer on Corn (Zea mays L.) Antioxidant Activity Under
Different Irrigation Levels ......................................................................................... 780
Investigation of The Plant Extracts of Brassica oleracea var capitata f alba L., Brassica oleracea var.
capitata f. rubra and Brassica oleracea L. var. acephala on Some Microorganisms ............ 781
Electrodeionization and Electrodeionization Reversal Processes And Operating Parameters .... 782
Contribution to the inventory of Macrophytes of the Upper Oum-errbia river Basin........................................ 783
Bioaccumulation of Cu by aquatic plant Azolla filicoides ................................................................. 784
Investigation of Antimicrobial Effect of Some Species of Euphorbia (Euphorbiaceae) .................. 785
Determination of Genotoxic and Cytotoxic Effects of Zinc Oxide Titanium Dioxide Nanocomposite ................................................................. 786

A Compilation on the Phytosociological and Phytoecological Structure of Pinus nigra subsp. pallasiana var. pallasiana Associations in the Transition Region of Middle Black Sea and Central Anatolia ................................................................. 787
Toxicity of Pittosporum tobira Acetone Extract on Culex pipiens Larvae .................................................. 788
Damaging Factors and the Solutions of Biodiversity in the Delta of Gonen (Balikesir) .................. 789
Research on Crambidae (Lepidoptera) Fauna of Adiyaman Province ........................................... 790
Investigation of the Meat Yield and the Length–Weight Relationships of Freshwater Crayfish (Pontastacus leptodactylus Eschscholtz, 1823) Population in Kocahıdır Reservoir (Edirne, Turkey) ................................................................. 791
Assessment of Antimicrobial effect of Remazol brilliant orange 3r ................................................. 792
Observations on the Ecology and Flora of the Serpentine Soils in Kahramanmaraş .................................. 793
The Characteristics of Serpentine Soils in Kahramanmaraş ................................................................. 794
Research on Pyralidae (Lepidoptera) Fauna of Malatya Province ..................................................... 795
Investigation of Heavy Metal Contamination in Cubuk II Reservoir .................................................... 796
Observation of Morphological Variation in Haplodrassus dalmatensis and Haplodrassus signifer (Araneae: Gnaphosidae) ................................................................. 797
Determination of the Biological Properties of Some Wild Fruits Grown in Bayburt ......................... 798
Distribution and Ecology of Ancient Asexual Ostracod Darwinula stevensoni From Different Aquatic Bodies of Turkey .................................................................................. 799
Micromorphological Properties of Endemic Onobrychis hueytiana (Fabaceae) from Turkey .......... 800
The Crime of Releasing Animals in a Risky Way ...................................................................................... 801
Glutathione and Malondialdehyde Levels in White Rot Fungus Phanerochaete chrysosporium exposed to Municipal Landfill Leachate from Elazığ, Turkey ................................................................. 802
Investigation of The Minerals of Various Bulgur Cultivated in Karaman with FAAS .................. 803
Determination of Ascorbic Acid content of The Grand Naine Banana Grown in Alanya with HPLC Method .................................................................................. 804
Antimicrobial Activity of Essential Oils from Pinus nigra and Cedrus libani Grown in Kahramanmaraş .................................................................................. 805
Antimicrobial Activity of Plantago major Grown in Kahramanmaraş Against Bacteria Causing Hospital Infections .................................................................................. 806
A Biological Approach to Some Rarely-Observed and Frequently-Observed Fish Species of the Akmermer Coast in Çandarlı Bay (Aegean Sea, Turkey) ................................................................. 807
Effect of Coating on Germination Characteristics in Alfalfa (Medicago sativa L.) Under The Drought Conditions .................................................................................. 808
Metal status in the Kesik Köprü Dam Lake .................................................................................. 809
Application of Taguchi method for optimizing the delta-endotoxin production from the indigenous isolate of Bacillus thuringiensis Se13 ................................................................. 810
A Study on Distribution of Chlorophyll-a Amount in the Stream, Sinop (Turkey) ......................... 811
Antibacterial effects of Multi-walled Carbon Nanotubes and Nanosilica Against Oral pathogens Associated with Human Periodontitis In Vitro ................................................................. 812
The Morphological Variation of Nomisia ripariensis (Araneae: Gnaphosidae) .............................. 813
Assessment of Organochlorine Residue Levels in Edible Fish from the Eastern Coast of Aegean Sea, Turkey .................................................................................................................. 814
Design of Fluorescently Labeled Molecular Sensor and Investigation of Spectroscopic Behaviour ................................................................................................................................. 815
Determination of Saline Water Interference in Samsun Bafra Plain by Conductivity .................... 816
Management of Köyceğiz-Dalyan Lagoon System, Muğla ........................................................ 817
Stock Signals from Fish Market Prices; Common Solea (Solea solea Linnaeus, 1758) Example .. 818
Molecular Characterization of Moth Flies (Diptera: Psychodidae); A Causative Agent of Myiasis ................................................................................................................................. 819
Morphological Traits of Some Natural Population’s Fruit Of Myrtus Communis L. From Morocco .................................................................................................................................... 820
The Effects on Standard Microorganisms Strains by Activities of Some of the Disinfectant Used in the Pharmaceutical Industry in Classified Areas ............................................................... 821
Control of Cittaslow Membership Criteria ..................................................................................... 822
Determination of Accumulation, Elimination and Ion Release Rates in Daphnia magna Organisms Exposed to Alpha and Gamma Fe2O3 Nanoparticles .............................................................. 823
Examination of Water Samples Taken from Fountains in Kartal (Yakacik) District in Istanbul for Coliform Bacteria and Escherichia coli .......................................................................................... 824
Remote Sensing for Historical Change Detection of Wetlands at the Göksu River Delta, Turkey 825
Erythrocytes Glutathione of Young Rats Exposed to Non-Ionizing Electromagnetic Radiation in the Prenatal Period of Development ................................................................. 826
The Occurrence of Sea Turtles in Trawl Operations Conducted in the Western Coasts of İskenderun Bay ........................................................................................................................... 827
Hotspots Analysis of Hedgehog (Erinaceus concolor)-Vehicle Collisions on Ankara-Samsun Highway ................................................................................................................................. 828
Three New Records of the Genus Culicoides (Diptera: Ceratopogonidae) for the Fauna of Samsun Province .......................................................................................................................... 829
Influence of Pseudomonas sp. Isolates on Pea Growth and Soil Enzyme Activities ....................... 830
Soil Microbial Biomass Carbon and Dehydrogenase Activity in Salt Effected Soil ...................... 831
Effects of Some Organic Materials on Soil Biological Properties and Barley Growth .................. 832
Effect of Glomus mosseae on Soil Microbiological Properties and Growth of Vicia Sativa Under Salt Stress .................................................................................................................... 833
Gustavioid Orbatid Mites (Acari) of Çat Forest (Sivas) ................................................................. 834
Histology and Morphology of Male Reproductive System of Tabanus bromius Linnaeus, 1758 (Diptera: Tabanidae): A Scanning Electron Microscopy Study .................................................. 835
Morphology and Histology of the Spermatheca of *Tabanus glaucopis* Meigen, 1820 (Diptera: Tabanidae): A Scanning Electron Microscopy Study ................................................................. 836

Effects of Engineering Nanoparticles on Honey Bees (*Apis mellifera*) ......................................................... 837

Micromorphological and Anatomical Properties of *Platyspermum* Section Species of *Gagea* (Liliaceae) in Turkey .................................................................................................................................................. 838

Influence of Bee Venom Production on *Apis mellifera* L. Behaviour ................................................................. 839

Determination of Environmental Effects and Contribution on Diving Tourism of Wrecks Used as Artificial Reefs .................................................................................................................................................. 840

Some Kudoid Parasites (Cnidaria: Myxozoa) of Fish and Their Impacts on Fisheries and Human Health ............................................................................................................................................................ 841

Algae: Biosorbents for Heavy Metal Polluted Waters ................................................................................................. 842

Mollusca Species Distributed in Shallow Waters of Foça Coast (Izmir, Turkey) ................................................. 843

Socio-Economic Situation of Inland Water Fisheries Cooperatives Partners and Views on the Problems of Cooperatives .................................................................................................................................................. 844

Enteric Red Mouth Disease in a Fish Farm at Keban Dam Lake ............................................................................. 845

Determination of Antibiotic Resistance Sensitivity of *Yersinia ruckeri* Isolated from a Trout Farm in Keban Dam Lake ........................................................................................................................................... 846

The Effects of Climate Change on Sustainable Agriculture ........................................................................................ 847

Intraspecific Diversity of *Philaenus spumarius* (Hemiptera: Aphrophoridae) in and around Kastamonu .......................................................................................................................................................... 848

Gene Transfer in Insects and Transgenetically Improved Biological Control Agents ............................................. 849

The Ecological, Morphological and Anatomical Features of Endemic Two *Barbarea auriculata* Varieties and Their Distributions .............................................................................................................................................. 850

Investigation of Graphene Oxide on Removal of Heavy Metal in Industrial Wastewater ........................................ 851

Web Structure and Morphology of Spinnerets of *Maimuna vestita* (C. L. Koch, 1841) (Areneae: Agelenidae) ................................................................................................................................................. 852

Using of Carbon Nano Tube in Electrocoagulation Treatment of Chemical Oxygen Demand (COD) in Leachate ....................................................................................................................................... 853

The Status of *Lernaea cyprinacea* (Linnaeus, 1758) Infestation in Endemic Species: Anatolian Minnow (*Pseudophoxinus anatolicus*, Hanko 1925) ...................................................................................... 854

Leaflet Anatomy of *Astragalus* Belonging Section *Macrophyllum* (Fabaceae) of Turkey ................................ 855

Harvest Amounts and Ethnobotanical Uses of the Oriental Sweetgum (*Liquidambar orientalis*) in Turkey ............................................................................................................................................................ 856

First Record of *Mirasema morosum* (McLachlan, 1876) in Turkey (Trichoptera Brachycentridae) and A List of The Trichoptera Fauna in Araç Creek ........................................................................................................ 857

Characterizing Trophic Interaction between Native and Exotic Fish Species in the Lake Zinav ................................ 858

First Evidence of Relationship between Ostracod and Green Hydra ..................................................................... 859

Importance of Swimming Setae and Reproductive Modes on the Stream Ostracoda (Crustacea) ... 860

Lignocellulolytic Fungal Isolates and Determination of Their Ethanol Producing Capabilities .... 861

Genital Structure of *Lycosidae* Family Spider Species in Nevşehir Province ....................................................... 862
Monitoring Vegetation in the Eastern Mediterranean (Turkey) Using SPOT VGT Satellite Data..................863
A Quantitative Analysis of Ephemeroptera Fauna of Turkey by Geographical Regions and Provinces.................................................................864
Eğirdir Lake Water Mite (Hydrachnidae, Acari) Fauna.................................................................865
Carbon and Nitrogen Storage in Litter of Forest-Steppe Transition Zone in Çankırı..................866
Heavy Metals and Potential Availability of Artvin Flora Plants for Phytoremedial...........867
A New Method for Reducing Barotrauma Injuries on Physoclistous Fishes: A Preliminary Result on Sciaena umbra.................................................................868
Assessment of Metal Concentrations in Some Human Teeth Samples Living in Rize Province, Turkey .................................................................869
Chromosome Counts of Vincetoxicum (Apocynaceae: Asclepiadoideae) Taxa from Turkey ......870
Morphology and Histology of the Malpighian Tubes in Pseudochorthippus parallelus parallelus (Orthoptera, Acrididae)..........................................................................................................871
Harvest Amounts and Ethnobotanical Uses of the Oleander (Nerium oleander) in Turkey.......872
Characterization of sHsp Proteins in Jujube Plant (Ziziphus jujube Mill.).................................873
Determination and Bioinformatics Analysis of ZjuHsp90 Genes in Jujube...............................874
Temporal Variations of Microbial Parameters of Forest Floor in Black Pine (Pinus nigra Arnold.) Forests in Çankırı .................................................................875
Determining Effects of Habitat Variation on Length-Weight Relationship of Squalius cephalus Along Lower Part of Yeşilırmak River .................................................................876
Evaluation of Ahern- Sustainable Ecological Planning Model....................................................877
Comparison to Pathways of Lipid Metabolism between Model Organism Drosophila melanogaster with Mammals........................................................................................................878
Cytotoxic Activity Screening of Vitis vinifera subsp. vinifera Extracts........................................879
A Preliminary Bryophyte List of Artvin Province, Turkey..........................................................880
Ethnoherpetological View of Snake Conservation..................................................................881
Population Parameters of the Pontic Shad, Alosa immaculata, in the Fatsa Coast of Black Sea....882
The Scientific Conceptual Framework of the Land Degradation Neutrality and Interpretation of the Process on behalf of Turkey.................................................................883
Morphological Development and Temporal Variations of Mediterranean Sand Eel Larvae, (Gymnammodytes cicerelus) in Gokceada Island, Turkey.................................................................885
Some Properties of the Product Formed By Composting Of Cattle and Sheep Manures by Windrow Method ........................................................................................................886
Molecular Barcoding of Biodiversity: DNA Barcoding Status of Turkish Leaf Beetles (Coleoptera: Chrysomelidae).................................................................887
Application of Bacteriophages against Food Pathogens..........................................................888
Infraciliature Patterns of Ophryoscolecid Rumen Ciliates, Diplodinium quinquespinosum (Dogiel, 1927) and Metadinium tauricum (Dogiel and Fedorowa, 1925)..................................................889
Determination of HKR1 Gene Expression Depend on Life Cycle in *Chlamydomonas reinhardtii* P.A.Dangeard 1888 ................................................................. 890
How To Choose The Right Aquaponics System ................................................................. 891
First Record of Natural Infection of *Xerolenta obvia* (Mollusca: Pulmonata) by Dicrocoeliidae (Digenea) Larval Stages in Turkey ................................................................. 892
Cytological Features of *Raabena bella* Wolska, 1967 (Blepharocorythidae, Entodiniomorphida) from Asian Elephants in Gaziantep Zoo, Turkey ................................................................. 893
DNA Protection Activity of Different Quinoline Derivatives ................................................................. 894
Comparison of Plant Cover and Diversity Indices in the Grassland of Velikoy, Bicakcilar and Kilickaya Sub-Basins, Artvin ................................................................. 895
Aquaponics: Sustainable and Environmental Friendly Solution for Water Pollution Problems Related with Aquaculture In Turkey ................................................................. 896
Determination and Evaluation of Life Strategies of Quince (*Cydonia vulgaris*) and Persimmon (*Diospyros kaki*) according to Grime’s C, S, R Strategies ................................................................. 897
Parathion-Methyl, Chlorpyrifos-Ethyl, Endosulfan and Methamidophos Existence in Groundwater in Gökşu Delta and Its Human Health Risk Assessment ................................................................. 898
Advantage of Insect Cell Culture in Entomology and Other Research Areas ................................................................. 899
Acute and Chronic Toxicity Evaluation of Water Samples Taken From the Ergene River ................................................................. 900
Change in Some Soil Properties with Land Use Type in Semi-Humid Climate Zone of Coruh River Basin, Turkey ................................................................. 901
Harvest Amounts and Ethnobotanical Uses of the *Juniperus drupacea* Cones in Turkey ................................................................. 902
Investigation of HKR1 Gene Expression Depend on Medium Differences in *Chlamydomonas reinhardtii* P.A.Dangeard 1888 ................................................................. 903
Characters Used in The Diagnosis of Trichoptera (Insecta) Larvas Which was Grown up in The Lab ................................................................. 904
First record of males of *Zercon montanus* from Turkey (Acari: Zeronidae) ................................................................. 905
Investigations on Phytochemistry and Radical Scavenging Activity of Fern, Golden Herb (*Asplenium ceterach*) Distributed in Different Altitudes ................................................................. 906
Mussel’s Amino Acids and Umami Taste ................................................................. 907
Evaluation of Mammalian Species in Area of Wind Power Plant in Mordoğan (İzmir) ................................................................. 908
Length-Weight and Length-Length Relationships of the Common carp, *Cyprinus carpio* Inhabiting Altınkaya Dam Lake and Bafra Fish Lake (Samsun, Turkey) ................................................................. 909
Oncholaimids (Nematoda: Enoplida) at the Southern Black Sea with three new records for Turkey ................................................................. 910
Determination of Length-Weight and Length-Length Relationships of Pike, *Esox lucius* Inhabiting Lakes Ladik and Simenlik (Samsun, Turkey) ................................................................. 911
*Beauveria bassiana* (Balsamo Vuillemin Against Two Spotted Spider Mite [*Tetranychus urticae* Koch (Acarina:Tetranychidae)] ................................................................. 912
Seed morphology of eight Alyssum L. (*Brassicaceae*) in Turkey ................................................................. 913
Immunohistochemical Evaluation of Endocrine Cells in Alimentary Tract of the Roach (*Rutilus rutilus* L., 1758), in Lake Uluabat ................................................................. 914
Is the Northern Banded Newt, *Onnmatotriton ophryicus* (Berthold, 1846) active all year? ........ 915
Environmental and Biodiversity Management in Good Aquaculture Practices Certification: Benefits and Faced Challenges in Turkey ................................................................................................................. 916
Limoniidae (Diptera) Species Determined in Ihlara Valley with a New Record from West Palaearctic ............................................................................................................................................... 917
Determination of Antioxidant Capacity of Thyme Extracts ..................................................................... 918
Study on Determination Diversity of Species in Order Rodentia (Mammalia) and Carnivora (Mammalia) in Delta of Yeşilırmak (Samsun) ........................................................................................................ 919
The Unusual Winter Activity of Some Amphibian and Reptile Species from Gümüşhane Province of Turkey ...................................................................................................................................................... 920
Effects of Tree Species on Some Soil Properties and Litter Accumulation in Adjacent Oak and Black Pine Forest in Western Black Sea Region of Turkey .............................................................................. 921
Mutagenic and Antimutagenic Evaluation of *Ferula elaecobytris* Stem Methanol Extract .............. 922
*Heracleum sphondylium* L. subsp. *ternatum* Extracts: Antimicrobial Activity Evaluation Against Pathogen Microorganisms ...................................................................................................................... 923
Some Physical and Chemical Properties of Soils in Where Different Spring-Flowering Colchicum (*Colchicum* spp.) Species Naturel Grown in Flora of Turkey ............................................................................................ 924
*In vitro* Antifungal Activity of *Trichoderma harzianum* Strains Against Gray Mold and White Mold in Eggplant Growing Greenhouses ............................................................................................................. 925
*Asteroma padi* DC.; A New Record of Microfungi for Turkey ................................................................. 926
Chemical Composition of the Essential Oils of *Laurus nobilis* L. from Turkey ............................................ 927
Phylogenetic Relationships Between the Genera *Opopanax* and *Crenosciadium* Based on nrDNA ITS Sequences ............................................................................................................................................. 928
Diversity and Abundance of Microcrustacea (Cladocera, Copepoda) In Kadıköy Reservoir of Turkey .................................................................................................................................................... 929
The importance of Marine Protected Areas (MPAs) in the continuation of biologic diversity in the southern Black Sea ............................................................................................................................................ 930
Current Red Data List of Species in the Southern Black Sea ......................................................................... 931
Diatom Composition in Şahinbey of Gaziantep (Turkey) ............................................................................ 932
Assessments of Aquatic Ecosystem in Şahinbey of Gaziantep by Using Diatoms Indices ................. 933
Morphological, Anatomical and Micromorphological Studies on Turkish Endemic *Trinia scabra* (Apiaceae) ..................................................................................................................................................... 934
Home-Made Canned Produce Using Traditional Methods From The Atlantic Bonito......................... 935
Worldwide Population Genetic Structure and Colonization of Mediterranean Fruit Fly *Ceratitis capitata* (Diptera : Tephritidae) ......................................................................................................................................................... 936
Does the erythrocyte morphology of Western Caspian Turtle (*Mauremys rivulata*) change depend on longitude? .......................................................................................................................................... 937
Comparison of Medical Waste Management by Years for Sinop Case ......................................................... 938
Evaluation of the Amphibian Fauna in Amasya Province, Turkey with New Locality Records ........ 939
Morphology of *Emys orbicularis* (Emydidae, Testudinata) Captured from Lake Mogan (Ankara) 940
Morphological Abnormalities in *Galleria mellonella* Force-fed with Aluminium chloride ................................. 941
Nesting Activity of Sea Turtles (*Chelonia mydas* and *Caretta caretta*) in Kazanlı Beach (Mersin) in 2016 ................................................................. 942
Highly Efficient Adsorption of Congo Red Dye by Acid Activated Walnut Shells ........................................... 943
Determination of Fungal Storage Rots of Pomegranates .................................................................................. 944
Effects of Zinc Oxide Nanoparticles on *Galleria mellonella* Larvae ............................................................ 945
Effects of Silver Nanoparticles on the Encapsulation Response of *Galleria mellonella* .................................. 946
Comparison of Egg Properties of Rainbow Trout *Oncorhynchus mykiss* (Walbaum, 1792) Farmed Under Photoperiod-Controlled and Natural Conditions in Different Fish Farms of Muğla .............. 947
The Comparison of Morphometric Analysis and Meat Yield of Freshwater Crayfish, *Pontastacus leptodactylus* (Eschscholtz, 1823) caught from Apolyont, İznik, Manyas, Terkos and Küçükçekmece Lakes ........................................................................ 948
Determination of Antimicrobial Effect of Schiff Bases Derived from Different Pyrazole Chemicals .......... 949
Meat yield and length-weight relationship of Freshwater Crayfish, *Pontastacus leptodactylus* (Eschscholtz, 1823) in Some Dam Lakes (Altinyazı, Karpuzlu, Kadıköy) from Edirne ......................................... 950
Ecological Assessment of Çağlayan Brook in the Eastern Black Sea Region of Turkey ................................. 951
Allelopathic Mechanisms in the Fire-Prone Ecosystems .................................................................................. 952
Molecular Characterization of *Hsp40* Gene in *Ziziphus jujuba* .................................................................. 953
Influence of Transposable Elements on Sesame Fertility .............................................................................. 954
Impact of Conventional Wastewater Treatment Plants on Dissemination of Sulfonamide Resistance Genes .............................................................................. 955
Impact of UV Treatment for the Removal of Bacterial Genes during Wastewater Treatment .................. 956
Removal of *Giardia* through UV Treatment in Wastewater Treatment Plants ........................................... 957
A Research on the Vegetation Structures in Kodallı Village Kırıkhan – Hatay ................................................. 958
The Amounts of Litter and Soil Carbon in Bolu Fir Forests ........................................................................... 959
Occurrence of the Alien Spider *Mermessus denticulatus* (Banks, 1898) (Araneae: Linyphiidae) in Turkey ........................................................................................................... 960
The Removal of Cu (II) ions from Aqueous Solutions by Adsorption ............................................................. 961
A New Species of the Genus *Zodarion* Walckenaer, 1826 from Turkey (Araneae: Zodariidae) ........................ 962
 Contributions the Jumping Spider Fauna of Turkey (Araneae: Salticidae) ......................................................... 963
Two New Records of Little-known Spiders from Turkey (Araneae: Clubionidae, Agelenidae) .................. 964
The Effects of Zinc, Boron and Sulphur Applications on the Development, Mineral Element Concentrations and Some Quality Criteria of the Garlic Genotypes Collected From Different Regions .................................................................................. 965
Meat quality of beard-horse mussel (*Modiolus barbatus*, Linnaeus 1758) from Ayvalık Bay, Balıkesir -Turkey ......................................................................................................................... 966
Landscape Features Associated to Road Mortality, Parasitism Rate, of *Sclerophrys mauritanica* in El Haouaria: Impact on Population Size and Breeding Season .................................................................................. 967
Determination of Microbiological and Chemical Status of Sardines (*Sardina pilchardus*) in Different Sales Areas (Market and Bazaar) of İzmir .................................................................................................................................................. 968

Developments of Organic Raisin Market in Turkey ................................................................................................................................................................................................................. 969

The Regulation of Fertility in *Sesamum indicum* L...................................................................................................................................................................................................... 970

Population Genetics in Fragmented Populations of Plants ................................................................................................................................................................................................ 971

Removal of Total and Volatile Solids in Ozone Pretreated Anaerobic Digesters ................................................................................................................................................................................................ 972

Civil Liability of Polluter Person under the Environmental Act ................................................................................................................................................................................................ 973

Marine Litter Pollution of the Black Sea Coasts: A Review ..................................................................................................................................................................................................... 974

Design for Sustainable Urbanization and Environment ........................................................................................................................................................................................................ 975

The Relation Between Head Rot Disease and The European Sunflower Moth Causing Damage in Sunflower ........................................................................................................................................................................................................................................... 976

Ecological Assessment of Windthrow in a Urban Forestation: the Case of Karadeniz Technical University Campus ........................................................................................................................................................................................................................................... 977

Biosurfactants Enhanced Kerosene Degradation Approved Through Microbial Adhesion to Hydrocarbon .......................................................................................................................................................................................................................... 978

Molecular Characterization of *Dactylogyrus* spp. (Monogenea) in *Capoeta tinca* (Heckel, 1843) from the Northeast Turkey ...................................................................................................................................................................................................................... 979

Physiological Interactions of *Pimpla turionellae* (Hymenoptera: Ichneumonidae) and *Galleria mellonella* (Lepidoptera: Pyralidae) in Biological Control Studies ................................................................................................................................................................................................... 980

Aminoglycoside Resistance Genes Monitored in Hospital Wastewaters ............................................................................................................................................................................................................................................ 981

A Waste Lignocellulosic Material: Tree Barks .................................................................................................................................................................................................................. 982

Steppe Roadsides as Environmental Corridors of Expansion and Conservation of Zonal Species of Rodents (Rodentia) of Ukraine ............................................................................................................................................................................................................. 983

The Sublethal Effects of Fluoxetine-HCl on Stress Parameters of *Danio rerio* ........................................................................................................................................................................................................ 984

The Lipid Peroxidation in the Gill Tissue of Rudd (*Scardinius erythrophthalmus*, Linnaeus 1758) During Lake Sapanca Natural Condition ...................................................................................................................................................................................................... 985

Determination of Oxidative Stress Parameters After Exposure to Tribenuron-Methyl in The Zebrafish (*Danio rerio*) Heart ................................................................................................................................................................................................................ 986

Ultrasonic Irradiation Effects of Horn-type Sonicator on Gill Tissue of Goldfish (*Carassius auratus*) ........................................................................................................................................................................................................ 987

Data on Reproductive Ecology of the Western Caspian Turtle, *Mauremys rivulata* from Mediterranean Turkey ............................................................................................................................................................................................................ 988

Some Geophytes of Kocaaliler Town ............................................................................................................................................................................................................... 989

Effects of Low Temperature on the Encapsulation Reaction in *Galleria mellonella* (Lepidoptera: Pyralidae) Larvae .............................................................................................................................................................................................................. 990

An Evaluation on the Turkish Notifications Regulating Commercial Fishing ................................................................................................................................................................................................................... 991

Studies to Prevent Adverse Ecological Effects of Forest Roads ......................................................................................................................................................................................................................................................... 992

Toxicity Assessment of Oleuropein against Larvae of Fruit Flies Exposed to Carboplatin ........................................................................................................................................................................................................... 993

Identification of Freshwater Fishes Species and Preliminary Study About Water Resources for 2017 in Balikesir ...................................................................................................................................................................................................... 994
Phytoplankton Composition of the Black Sea Turkish Coasts in 2015 Cruise ........................................ 1023
Morphological and Micromorphological Characterizations of Two Hypericum (Hypericaceae) Species from NE Anatolia .......................................................... 1024
Relation of Biotechnology with Environment: A Review ............................................................... 1025
Effect of Phosphate Solubilizing Microfungi Penicillium canescens PSF77 on Growth and Development of (Zea mays L.) Plants in the Presence of Mazidagi Rock Phosphate ................. 1026
Distribution of CSR strategy types in floodplain forest in Aksaz-Karagöl Wetland .................... 1027
The First Data on Presence and Morphology of Capillaria (Procapillaria) gracilis in Marine Fish from the Turkish Black Sea Coast ........................................................................... 1028
Micropropagation of Pistacia Hybrids ......................................................................................... 1029
Metacercariae of Condylocotyla pilodora (Digenea: Heterophyidae): New Geographical and Intermediate Hosts Records ................................................................. 1030
Three species of Phyllodistomum (Digenea: Gorgoderidae) from Black Sea Marine Teleost ..... 1031
Length-Weigh Relationship of Pomadasyx stridens (Forsskål, 1775) (Actinoptyrygii: Haemulidae), from İskenderun Bay (Eastern Mediterranean) ......................................................... 1032
The Geophytes of Keltepe ........................................................................................................ 1033
Macrobiological Assesment of Tilikicik Bay, Bodrum, Muğla Province ........................................ 1034
Forage Crops and Erosion Control .............................................................................................. 1035
Pyracantha sp. Aqueous Extract Mediated Biosynthesis of Zinc Oxide (ZnO) Nanoparticles from Zinc Nitrate Precursor .............................................................................. 1036
The Kleptoparasitism in Flesh Flies (Sarcophagidae: Miltogramminae) ................................... 1037
Two First Records for the Caddisfly Fauna (Insecta: Trichoptera) of Kosovo ............................ 1038
Endemic Element in the Arthropod and Mollusk Faunas of Kastamonu Province .................... 1039
Assessment of water quality of the Morava e Binçës River based on the physico-chemical parameters and Water Quality Index .............................................................................. 1040
Anatomy and Palynology Features of Cousinia foliosa Boiss. & Bal. ( Section Stenocephalae Bunge., Asteraceae) and their taxonomic implications ......................................................... 1041
Desert Dust Transport and Rainfall Relation: Marmaris Case ..................................................... 1042
Determination of the Biological Activity of Verbascum Spp. L. Leaf and Seed Extracts against Four Different Plant Pathogens .......................................................................... 1043
Investigation of Fumigant Effects on Rhzopertha dominica (Coleoptera: Bostrichidae) and Oryzaephilus surinamensis (Coleoptera: Silvanidae) at Different Concentrations of Essential Oils in Laurel (Laurus nobilis L.) and Zahter (Thymbra spicata L.) ..................................................... 1044
The Bioherbicide Effects of Cincidotus pachylomoides (Bryophyta) Extracts on Wild Oat and Wild Mustard ................................................................................................. 1045
The Effect of Palustricollis decipiens (Bryophyta) on Antioxidant Enzymes and Total Phenolic Compounds in Pepper and Corn Plants ......................................................... 1046
Invisible Danger in a Subterranean Stream: Microbiological Contamination ............................ 1047
Landscape Character Analysis and Recreational Design ............................................................ 1048
The state of Kosovo biodiversity 2011 - 2017 ............................................................................ 1049
CO₂ Emission Reduction in Atmosphere Using Pebax/ZSM-5 Composite Membrane
Assessment of Çardak Lagoon for Fisheries and Aquaculture Production
Influence of Reactive Oxygen Species Generated By Microorganisms on the Processes of Hydrocarbon Pollution Remediation
Comparative Morphology of Endophallus (Male Genitalia) on Some Species of Lixus (Coleoptera: Curculionidae: Lixinae) Genus: A Scanning Electron Microscope Study
Updated Checklist of the Solifugae (sun-spiders) of Greece (Arachnida: Solifugae) with Nomenclatural Notes and New Synonyms
Cytotoxic Effects of Methanolic Extracts from Different Cladonia Species on Human Colon Cancer Cell Line
Antibacterial Effects of Alyssum L. Against Some Gram-Positive and Gram-Negative Bacteria
Rain Gardens in Landscape Architecture
Determination of Relations Between Factors Affecting to Yield by Correlation in Organic Cotton (Gossypium hirsutum L.) Produced by Application of Organic Fertilizers in Harran Plain
A New Record for Spider Fauna of Turkey (Araneae: Linyphiidae)
A Study on Pollen Morphology of Centaurium erythraea Rafn. subsp. rhodense (Boiss. & Reut.) Melderis (Gentianaceae) in Turkey
Investigation on Ecotoxicity of Green-synthesized Magnetite Nanoparticles on the Aquatic Plant Azolla filiculoides of anzali District, Guilan Province, Iran
Natural Regeneration of Caucasian maple (Acer trautvetteri Medv.) in Hendek, Sakarya
Skeletochronological Analysis of Lacerta trilineata (Balkan Green Lizard, Bedriaga 1886) From Bolu
Morphological and Age Structure Variation Between Populations of Bufo bufo from Turkey
Health Benefits of Urban Forestry
Eco-friendly Fabrication of La/ZnO Nanocomposites as An Efficient Semiconductor by using Fruits of Rosa canina plant of Mahabad District, West Azerbaijan Province, Iran
Salt Leaching Characteristics Under The Effect of Irrigation Water Salinity And Leaching
The Impact of Small Hydropower Plants in Republic Of Macedonia on Macroinvertebrate Communities
A Histological Study on Heart of Pelophylax bedriagae (Anura: Ranidae)
The Spider Fauna of the Türkmen Mountain (Eskişehir, Turkey)
Effect of Biofuels on Vehicle Emissions
Comparison of Soil Ammonium and Nitrate Contents of Citrus sinensis (L.) Osbeck cv. Valencia and Citrus reticulata Blanco cv. Fremont, Çukurova University, Adana
A Palynological Evidence to the Current Generic Status of Schenkia spicata (L.) G.Mans. (Gentianaceae)
Pollination Strategies of Jasione supina at subspecies level
Determination of Potential Plantation Areas of Turkish Sweetgum in Turkey
Developments of Organic Viticulture in Turkey
Species Richness of Zooplankton in Aksaz-Karagöl Wetlands ................................................................. 1078
Zooplankton Fauna of Lake Kaz ................................................................................................................. 1079
Should We Use Commercial or Local Bombus Species for Pollination? .............................................. 1080
EUNIS Habitat Types and Mapping of Bayburt ......................................................................................... 1081
Some Biological Parameters of Long-spined sea urchin Diadema setosum (Leske, 1778) in Iskenderun Bay .................................................................................................................................................. 1082
Investigation of Crude Protein Yield and Amino Acid Composition of Buckwheat (Fagopyrum
esculentum Moench) Cultivated in Turkey .................................................................................................. 1083
Present Status of the Genus Euscorpius of Turkey (Scorpiones: Euscorpiidae) ................................. 1084
The Importance of Natural Species as Environmental Community: In the Light of Islamic
Inheritance .................................................................................................................................................... 1085
Culture of Mussel: Solution for Environmental Pollution generated by Solid Wastes of Fish Farming Cages ............................................................................................................................................... 1086
Determination of the Poaceae Pollens 2016 Monthly and Intradiurnal Changes in Agri Atmosphere ......................................................................................................................................................... 1087
Determination of Intradiurnal Variation of Fraxinus sp. Pollens in Agri Atmosphere 2015............ 1088
Determination of Intradiurnal Variation of Artemisia sp. Pollens in Kars Atmosphere 2015........ 1089
Effects of Cadmium and Lead on Total Hemocyte Counts of Lesser Wax Moth, Achromia grisella
Fabr. (Lepidoptera: Pyralidae) ..................................................................................................................... 1090
Optimized Fish Protein Hydrolyzates Using Commercial Enzymes Trace Element Contents ..... 1091
Determination of Cold Hardiness using Visual Observation Techniques in Anatolian Black Pine
(Pinus nigra Arnold. subsp. pallasiana) Seedlings of Different Provenances .............................................. 1092
Effects of Sulfur Applications on Some Soil Properties and Micronutrient Concentrations ...... 1093
Assessment of Some Climate Parameters in the Eastern Black Sea Basin in Terms of Climate
Change Process .................................................................................................................................................. 1094
Ecological Factors Affecting Productivity in Oriental Beech Ecosystems in Akkuş Region ...... 1095
Isolation and Molecular Characterization of Bacteria from Contaminated Soils with Industrial
Waste ............................................................................................................................................................ 1096
The Effects of Heavy Metal Stress on the Leaf Relative Water Content in Some Poplar Taxa ... 1097
Determination of the Synthesis and Activity of CoO Nanoparticles Showing Antimicrobial
Properties by the Green Synthesis Method .................................................................................................. 1098
Vegetation Geography of Berit Mountain (Kahramanmaraş) ................................................................. 1099
Anthropogenic Reactive Nitrogen Sources of Agricultural Activities in Turkey ............................ 1100
Determination of Morphological Properties of Plexippus paykulli with Scanning Electron
Microscope (Arachnida: Araneae) .................................................................................................................... 1101
Comparison of the Efficiencies for the Removal of Congo Red and Methylene Blue from their
Aqueous Solutions by Adsorption with the use of Illite Mineral ................................................................ 1102
Comprehensive Assessment of the Environmental Quality of Soil in an Industrial Area (Dilovası) of
Turkey ............................................................................................................................................................ 1103
Determination of Levels of Indoor Nano Particles in Different Buildings of an University Campus ................................................................. 1104
The Risk Area and Transformation: Case of Van/ Erkis ................................................. 1105
Identification and Characterization of Intestinal Probiotic Bacteria in Wild Adult Sea Bream (Sparus aurata) ................................................................. 1106
Determination of Biofilm Formation by Thermophilic Bacteria from Hot Water Spring ........ 1107
Characterization of Some Local Green Beans (Phaseolus vulgaris L.) Genotypes .................... 1108
Plant Parasitic Nematodes of Onion (Allium cepa L.) Planting Area in Tokat .......................... 1109
Evaluation of Effectiveness of Some Environmentally Friendly Products on Hazelnut Powdery Mildew Caused by Erysiphe corylacearum ......................................................... 1110
The Effect of Different Sowing Dates on Yield and Quality of Anason (Pimpinella anisum L.) in Diyarbakir Ecological Conditions .......................................................... 1111
Physicochemical Properties of Some Stream in the Lower Çoruh River Basin (Artvin) ............. 1112
Effects of Some Indigenous Medicinal Aromatic Extracts [Mentha xipherita L. (peppermint), Artemisia absinthium L. (wormwood) and Ricinus communis Linn (castor bean)] On Hatching and Mortality of Root-Knot Nematode [Meloidogyne incognita (Kofoid and White)] ......................... 1113
Comparision of Einkorn Wheat (Triticum monococcum) Harvested From Ihsangazi and Devrekani Districts of Kastamonu: Morphological Properties and Mineral Contents ........................................... 1114
Green Synthesis of Ag Nanoparticle Using Hibiscus sabdariffa and Its Antimicrobial Activity. 1115
Wood Decay Fungi of Urban Trees; Importance and Recent Advances in Molecular Identification Tools ......................................................................................... 1116
Sector of Medicinal and Aromatic Plants In The World .......................................................... 1117
Biodiversity Changes in Ece Lake's Drying Process .............................................................. 1118
Evaluation of Heritage Olive Trees in terms of Visuality to the Environment ....................... 1119
The Effects of Pesticides on the Environment ................................................................. 1120
An Overview of Olive Mill Wastewater Problem in Turkey and in the World, Treatment Methods of it, and Alternative Approaches to Evaluation and Disposal of Olive Mill Wastewater .......... 1121
A New Record of the Micromus (Neuroptera: Hemerobiidae) Species for the Turkish Fauna.... 1122
A Review on Insecta Fauna of Muğla-Turkey ..................................................................... 1123
Phenological Evaluation of the Number of Fractured Crimean-Congo Haemorrhagic Fever (CCHF) Cases in Kastamonu Province ......................................................... 1124
Innovative Scientific and Educational Center for Protection Health of Human And Animals In Chuy Region of Kyrgyzstan .............................................................. 1125
First Molecular Identification of Myxobolus ichkeulensis (Myxozoa) in Mugil cephalus (Mugilidae) off the Turkish Black Sea Coasts ................................................................. 1126
Rotifera Fauna and Community Structure of Kadıköy Reservoir (Edirne-Turkey) .................. 1127
Anatomical Properties of Some Woody Species in Ecological Conditions of Central Anatolia .. 1128
The characteristics of the development of the Varroa destructor mite in local bee colonies Apis mellifera intermissa in the semi-arid zone of Algeria ......................................................... 1129
Contributions to subfamily Otitinae (Diptera: Ulidiidae) of Turkey ..................................... 1130
Using Natural Adsorbents as Filtration Material in Aquaculture ................................................... 1131
Heavy metal detection in *Scorpaena porcus* Linnaeus, 1758 from Sinop coast of the Black Sea and potential risks to human health ........................................................................................................ 1132
Effect of Salt Stress to Germination and Seedling Growth in *Sorghum*×*Sudangrass* .............. 1133
Metal levels in two fish species from Eastern Mediterranean Coast of Turkey .............................. 1134
Determination of Vitamins A, C, E and Total Protein of Wild Edible *Laetiporus sulphureus* .... 1135
Qualitative Determination of Biodegradation in Diesel Contaminated Water and Soil Samples from Newly Isolated *Bacillus* sp. Strains .................................................................................................. 1136
Heavy Metal Contamination of Irrigated Areas and Accumulation by Some Species of Dytiscidae (Coleoptera) ................................................................................................................. 1137
KEYNOTE SPEAKERS
Alarming and continue increase in human populations precipitate the vicious cycle of environmental degradation, disease and poverty. Population influx from rural to urban areas leads to over crowding and related problems. This unprecedented population growth directly increases the risk of disease by increasing the probability of susceptible host, parasite and vector encounter. Human welfare primarily depends on clean air, water, nutrition and shelter. Man has over exploited the bio-resources to provide basic amenities for welfare of mankind and this has led to quick and fast environmental degradation.

The use of newer technologies as welfare measure for mankind without giving any attention to ecological, environmental, epidemiological consequences created a chaos in nature’s balance mechanism. Inadequate solid waste and water management in town is another major cause of vector proliferation, especially mosquitoes, houseflies, cockroaches and rodents. Deforestation is common factor in all developmental activities and resulted in change of feeding behavior of various vector species. Global warming will in future and is in all likelihood already triggering an expansion in the range and incidence of vector borne diseases. Hot climate make pests, vectors and pathogens spread over a wider range and increase their survival rate. WHO’s goal “HEALTH FOR ALL” eluded the 20th century but if it becomes reality in 21st it would be a great accomplishment.
Express assessment of environmental objects contamination is a necessary component of ecological control. Development and application of easy to use, inexpensive, highly sensitive and specific methods for the detection of xenobiotics play an important role in the task of environmental monitoring. Intense study of the analytical capabilities and practical application of biosensor systems are characteristic for the last decade. One of the most promising methods used in conducting environmental monitoring is the analysis using whole-cell lux-biosensors. Luminescent bacterial sensors, in which genes of bacterial luciferase are used as reporters, provide powerful capabilities for their usage in environmental toxicology.

A battery of rapid tests with response time not exceeding 2 hours based on bioluminescent bacteria allows to determine the integral toxicity, genotoxicity, prooxidant activity of environmental samples and to assess the presence of mercury, arsenic, and substances that cause damage to proteins and membranes. This kit of bacterial lux-biosensors (*E. coli* MG1655 (pRecA-lux), *E. coli* MG1655 (pSoxS-lux), *E. coli* MG1655 (pKatG-lux), *E. coli* MG1655 (pIbpAlux), *E. coli* MG1655 (GrpE-lux), *E. coli* MG1655 (pFabAlux)) can be applied for a wide range of ecotoxicological tasks.

Currently, the battery of bioluminescent tests is used to monitor the toxicity of water, bottom sediments and hydrobionts, soil, animals, plants, air and atmospheric precipitation, wastewaters, and also for screening of biological activity of natural and synthetic compounds.

Bacterial lux-biosensors are highly sensitive for identifying compounds that may be toxic to humans and the environment. The preliminary bioassay based on bioluminescent bacteria will greatly reduce the research time and help to select the most contaminated samples for examination by chemical analysis.

For effective monitoring of ecosystems a battery of bioluminescent tests with the ability to detect toxicity due to the presence of individual classes of compounds should be applied. Using a battery of lux-biosensors allows not only to detect the presence of toxic substances in the environment, but also to assume its mechanism of action. The opportunity of targeted search, identification and elimination of possible contamination sources originates from the obtained results. There is a possibility to detect unstudied substances among the objects of expertise for which there are no existing detection methods. There is no need to separate multicomponent mixtures. The relatively low cost of tests allows a greater number of analyses.

It is necessary to choose the optimum combination of bioluminescent tests to obtain the most detailed information on each investigated sample. Both natural and genetically engineered lux-biosensors must be included into the battery. Application of the luminescent tests allows to monitor the contamination in a quick, simple and inexpensive way.

**Acknowledgements** This study was funded by the Ministry of Education and Science of the Russian Federation (grant № 6.2379.2017/PCh), RFBR (grant № 17-04-00787 A).

**Keywords:** whole-cell lux-biosensors, biotesting, toxicity, ecotoxicological analysis
Past, Present and Future of Endangered Sea Turtle in Turkey

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Sea turtles have been protected according to the IUCN criteria for a long years all of the world. The first records of sea turtles from Turkey coast were given by Hathaway, 1972. Among the marine turtle species around the world, *Chelonia mydas* and *Caretta caretta* nest in the Mediterranean. 21 important nesting areas for sea turtle have been identified on the beaches of Turkey. The Mediterranean coast of Turkey are very important for sea turtles. Especially Mediterranean coast of Turkey is very important because it holds 80% of the Mediterranean population of *Chelonia mydas*. *Caretta caretta* population of Turkey are significant for the genetically divergence. The researches found primarily females were born in Turkey nesting area because of climatic changes. It is considerable risk of sea turtle population in the future. Today sea turtle research groups are carrying on valuable conservation and research activities on sea turtle in Turkey. Marine areas of Turkey Mediterranean is very important but there is very limited information about marine areas of Turkey. It must be study on marine areas for the future of sea turtles.
ORAL PRESENTATIONS
Changes in Adobe Construction Technology as a Contemporary Building Material

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Introduction: Adobe is a building material which is obtained by mixing clayey and suitable earth with straw or other additives and impasting them by using water and pouring this blend into molds and kippering. Adobe has served as a building material for human beings for a long time. There are structures made of mudbricks which is obtained from the earth in the whole around the world since the early periods of history. Clay soil used in the construction of adobe materials has been used throughout history as a building material for reasons such as economy, availability in all areas, ease of application and being suitable to produce for the people living in rural areas besides agricultural activities. Today, soil building material has become one of the most studied topics in the various parts of the world, from the least developed countries to the most advanced industrial countries.

Material and Methods: In the scope of the study, literature search were used as methods. Within the scope of the study, field studies done and taken place in literature were investigated. Sampling construction techniques and buildings from the very early periods to recent times are compared by minding contemporarial technological advances.

Results: Adobe is an important ecological and sustainable building element supplying the human needs by meeting the existence and the future of natural resources without risking. Adobe which protects and improves the health and comfort of the users, does not annihilate nature and environment during its construction and use, or is a resource for other constructions after its demolition or forms waste not to harmful for nature may be one of the most contemporarial building material.

Discussion: In addition to all these positive properties of adobe building materials, adobe has also some problems and disadvantages such as other building materials do. These can be either completely eliminated or minimized by taking the necessary precautions and following the prescribed conditions. Defects such as low pressure resistance, weak resistance to water and high weight of unit volume can be solved in mud brick as a building material.

Keywords: adobe, mudbrick, ecologic building material, soil, clayey.
Treatment of Wastewater by Electrocoagulation Combined with Ultrasonic Waves

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Introduction: Renewed interest in the electrocoagulation (EC) technology has been appeared recently due to request of alternative treatment technologies. EC justifiably has several similarities with chemical coagulation technique but also noteworthy differences. In EC system there are multiple electrochemical reactions occurring concurrently at the anodes and cathodes. Recent investigations show many encouraging applications of EC in the treatment of many industrial wastewaters. EC method offers two key rewards over the conventional chemical treatment. These are lower coagulant ions are required and minimum sludge is produced. Consequently, further process, such as the ultrasonic, may be attached to the EC technique to enhance water quality by increasing the removal rates of contaminants from the wastewater.

Material and Methods: The EC reactor (1000mL) was located in ultrasonic bath. Each home-made circular metal electrode was Ø95mm×1mm. Power supply (0~16V/2A output power) was used. The anode and cathode electrodes were fixed horizontally paralleled in the bottom of the reactor, and then 800ml of wastewater was poured into the reactor. Samples of treated water were synthetically prepared in the lab. Turbidity was determined by using Turbidity Meter.

Results and Discussion: One of the vital factors that may enhance the efficiency of the EC processes is the current density to test its effect with ultrasonic wave on the turbidity removal at fixed pH, electrode distance of 9mm and operating time of 5-25min. Experiments includes studying bentonite suspension wastewater, oily wastewater and Zinc wastewater. Results show that the falling rate of turbidity increased as applied voltage increased for all three systems. The applied voltage controls not only the coagulant dosage rate, but also the bubble production rate and thus the floc growth. Therefore, increasing the applied voltage would give rise to an increase in charge loading causing an increase of contaminant removal. In addition, smaller bubbles provide more surface area for the attachment of polluted particles and so denser and larger floc formation, resulting in higher efficiency of separation. Data also show a dramatic decrease in removal efficiency without mixing, this reached to about 50% at about 15min operating time. Mixing is important because the process was found to improve conductivity and thus the current density was increased. With mixing, flocs in solution were formed and sedimentation became easier. However to prevent the flocs break down and the release of metal, it was better to use lower low mixing rate. For bentonite suspended and oily wastewater, the results showed a dramatic deterioration in the turbidity of the wastewater with ultrasonic whereas the story was different for zinc wastewater where an improvement in removal efficiency was obtained.

Keywords: bentonite; electrocoagulation; oily; ultrasonic; wastewater; zinc.
Oribatid mites (Acari: Cryptostigmata) from the weed plants of garlic growing plantations in Kastamonu

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Introduction: Weeds are the cosmopolitan plants that can be adapted to the different climate and soil conditions, have the ability to resume your life under the hard ecological conditions and reproductive ability. Oribatid mites (Acari) play a role from the fragmentation process of organic matter in the soil and are made mision as biyoindicator organisms. In this study Cryptostigmata species were determined from weed plants of garlic cultivation areas in Kastamonu.

Material and Methods: This study was realized with the weekly sampling were made on garlic cultivation areas in Taşköprü, Hanönü and Central Districts of Kastamonu Province in 2015-2016. The samplings were made from March to July. For this purpose, the weekly samplings were made from weeds of garlic cultivation areas in 2015-2016. Totaly, six Oribatid mite species that belong to Cryptostigmata. The samples were taken from (Cirsium arvense), (Sinapis arvensis), (Convolvulus arvensis), (Medicago sativa), (Vicia sativum), (Agropyrum repens) and (Lolium rigidum).

Results: In total 91 sampling were made for two years. Oribatid mites have been found in 24 of these samples. As a result, six mite species that belongs to Liebstadiidae, Oppiidae, Tectocepheidae, Protoribatidae and Euphytiracaridae family of Cryptostigmata were determined.

Discussion: In this study six Cryptostigmat mites have been found in weed plants. Weeds are the habitats where came across to Cryptostigmats the most intensive according to head, leaf part of garlic and the storage garlics in the study. Cryptostigmats are soil weldings mites so they were determined on the weeds intensively in this study. Because weeds are low-lying plants and close to soil. Cyptostigmats are soil-borne mites, the weeds are ground cover position in the field. The weeds are reservoir plant for beneficial mites. The members of Cryptostigmata mites plays are played roles at the decomposing of organic matter which have been found densely from the samples of garlic cultivation area in Kastamonu. Oribatids can gave limited reaction to short period environmental changes as food insufficiency, toxic efficients and climate alterations. Oribatids are shown sensitive reaction for he polluted and their populations were fallen quickly.

Acknowledgement: We would like to express our appreciation to the TUBİTAK TOVAG, which supported this study (Projet No: 114O416). We would like thanks to Maka MURVANİDZE from Georgia Agriculture University who identified to Oribatid mites.

Keywords: Oribatida, Acari, weed, garlic, Kastamonu
ORAL PRESENTATION

Accumulation of Toxins in Human Adipose Tissue

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Introduction: Lipophilic substances are widely distributed in nature and products of human activity. Lipophilic toxins can accumulate in organs with a high fat content, including fatty tissue and the brain. The increase of the fat content in the body leads to the increased lipophilic toxic substances accumulation. But an increased fat content can be detected not only in obese people. The purpose of this research was to determine the main groups of lipophilic toxins and to measure the fat content in healthy non-obese people in order to forecast the presumptive risk of poisoning.

Material and Methods: The analysis of literature is used to collect the data on toxins, which can accumulate in fatty tissue. The fatty tissue volume is measured with a usage of four-electrode bioelectrical impedance in 60 healthy non-obese adult people (30 men and 30 women) aged by 37.1±9.2.

Results: Lipophilic toxins get into the body mainly with food, enter the fat depot and accumulate until the mobilization of fat begins; in that case toxins enter the bloodstream and can cause poisoning of the body. The group of polyaromatic hydrocarbons (PAH) includes benz(a)pyrenes, naphthalene and phenanthrene. PAHs are widely distributed in the industry associated with hydrocarbon components, and also are determined in tobacco smoke and some food, such as tea and coffee. They have a genotoxic effect, beta-cell dysfunction, insulin resistance and presumably breast cancer. Benz(a)pyrenes cause a DNA mutation, a dose-dependently inhibit lipolysis, resulting in an increase of body weight, they have a carcinogenic effect, in particular, on the organs of the gastrointestinal tract. Their accumulation can occur without increasing the calorie content of food. The main source of - smoked and fried products. The group of particularly persistent organic pollutants includes dioxins and polychlorinated biphenyls (PCBs). PAHs and dioxin-like substances transmit to a child with mother's milk. They accumulate in the fat tissue of animals and transmit along the food chain to humans. They cause neurotoxicity, immunotoxicity, diabetes mellitus, infertility and oncological pathology. The number of PCBs increases with an increase of the volume of adipose tissue. Recent studies found a correlation between the number of PCBs and the percentage of triglycerides in adipocytes. However, the greatest effect on the concentration in fatty tissue has the appearance of a toxin: the higher its lipophilicity, the greater its concentration. The volume of fatty tissue in 60 healthy people was 31.5±6.7%, from 17.0 to 50.6% (normal fat content is 11-33%). This amount calculated in kilograms was 20.7±7.1 kg, varied from 5.3 to 35.9 kilograms.

Discussion: The main toxins that can be absorbed and accumulated by human fat tissue are PAHs, benz(a)pyrenes, PCBs and dioxins. The volume of fatty tissue in healthy adult non-obese people, according to our data, can vary from 17 to 50%. The weight loss can lead to mobilization of fat depot, which can cause intoxication by lipophilic toxins. To reduce the risk of accumulation of toxins in adipose tissue, it is recommended to eat eco-friendly foods, stop smoking and choose a place of residence, study or work in areas remote from refineries. It can be assumed that weight loss can be a risk factor of mobilization of lipophilic toxins, but this bold assumption needs an additional analysis.

Keywords: lipophilic toxins, obesity, fat, fatty tissue, adipose tissue
**Introduction:** Garlic is especially tolerant opposite to weather conditions, suitable for export because of its head is big and it has quality. It is adapted to Kastamonu and its surrounding. It is the one of the important agriculture product of Turkey that is characterized to Taşköprü and Kastamonu. Therefore it has grown to the most quality garlic of the world. According to the studies that were materialized in our country and the world, it has reported that mites are caused the important problems for onion, garlic and bulbous ornamental plants. For this purpose this study was realized with the weekly sampling were made on garlic cultivation areas in Taşköprü, Hanönü and Central Districts of Kastamonu Province in 2015-2016.

**Material and Methods:** This study was realized with the weekly sampling were made on garlic cultivation areas in Taşköprü, Hanönü and Central Districts of Kastamonu Province in 2015-2016. The samplings were made from Marc to July. For this purpose, the weekly samplings were made from weeds of garlic cultivation areas. The samples that were collected were brought to laboratory. After extraction of the samples, their diagnostics were realized. The mite families of predatory, phytophagous and neutral and its distribution according to districts were determined.

**Results:** The weekly sampling were made on garlic cultivation areas for two years and In total 972 sampling were made from 57 points. The mite dish ratio in the areas where samples were taken is 93.11% percentage. The results of diagnosis operations, 25 mite families were determined. 5 (20%) of these are phytophagous and 20 (80%) of these are predatory ant neutralization species. The mites were determined in head of garlic the most intensive (38.27%). Acaridae was determined as the most intensive family in this study. Considering to the distribution of identified species according to districts, 78.58% of the identified species belong to Taşköprü, 18.63% of them belong to Hanönü and 2.79% of them belong to Merkez District of Kastamonu.

**Discussion:** A detailed and comprehensive study targeting marsh biodiversity in direct garlic in the world and in our country is scarce. Move from here the mite biodiversity of garlic were put forth in Turkey first time. According to results of this study Taşköprü is ahead according to the other districts with regard to mite biodiversity. Because cultivation areas of Taşköprü is more than the other districts, using of chemical fertilizer and pesticide on this are and practices of industrial agriculture are more than the others. In this study, the benefit species increased to the mite biodiversity on head anf green parts of garlic. The height of benefit mite species and mite biodiversity on this area supported to the alternatives of biological fighting with phytophagous mites. Finally Turkey garlic mite fauna were determined first time by this study.

**Acknowledgement:** We would like to express our appreciation to the TUBİTAK TOVAG, which supported this study (Projet No: 114O416).

**Keywords:** Allium sativum L., Acari, garlic, biodiversity, Kastamonu
**Introduction:** Heavy metals are being intensively accumulated in aquatic ecosystems and adhered strongly for a long time in sediments in rural and industrial lands. It is known that toxic metals can be reached to the fishes, birds and human by means of food chain. Therefore, the toxic metal pollution threatens both for the aquatic life and also the human health. Gala Lake National Park that has a global importance is one of the most significant wetland ecosystems for Turkey. As same as many aquatic habitats, Gala Lake National Park is under a significant anthropogenic pressure originated especially from agricultural activities conducted around the lake and from industrial discharges by means of Ergene River. The aim of this study was to determine the toxic element accumulations in water and sediment of Gala Lake.

**Material and Methods:** Water and sediment samples were collected from 5 stations selected on the Gala Lake in spring season of 2017 by using polyethylene bottles and Ekman Grab. Total of 9 inorganic pollution parameters including Cd, Pb, As, B, Cu, Zn, Cr, Ni and Se contents were investigated in water and sediment samples by using Inductively Coupled Plasma – Mass Spectrometer (ICP – MS). Also Geographic Information System (GIS) were used in order to make the distribution maps for present the detected element levels recorded in water and sediment of Gala Lake.

**Results and Discussion:** As a result of this study it was determined that although toxic element levels detected in sediment of Gala Lake were not exceeded the lowest effect level (LEL) and threshold effect level (TEL) according to the sediment quality criteria, water of Gala Lake has II. Class quality in terms of copper, chromium, arsenic and lead concentrations and has IV. Class quality in terms of nickel and zinc concentrations in general according to the Water Pollution Control Regulation in Turkey.

**Acknowledgement:** We would like to express our appreciation to the Trakya University Scientific Research Project Commission, which supported this study (TÜBAP 2016/247).

**Keywords:** Gala Lake, toxic metals, water quality, sediment quality, GIS
A New Epiphytic Bryophyte Community (-isothecietosum alopecuroidis)

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Introduction: There are few studies on epiphytic bryophyte flora and their vegetation in Turkey. Despite these studies, there are important gaps on the epiphytic bryophyte vegetation in Turkey. With this study performed in Akyazı (Sakarya) district which is located between Marmara and Central Anatolian Regions and allowing the living of a very different epiphytic bryophytes due to the different climate types, has been made a contribution to the epiphytic bryophyte vegetation of our country and scientific world by defining a new epiphytic bryophyte subassociation for the scientific world.

Material and Methods: The research materials were composed relevés and bryophyte specimens belonging to these relevés taken from various trees occurring in the different localities and habitats of Akyazı (Sakarya) district, in different vegetation periods of 2017. These relevés have been evaluated using the classical Braun-Blanquet method as well as DECORANA (Detrended Correspondence Analysis) and TWINSPAN (Two-Way Indicator Species Analysis).

Results: The Orthotrichetum pallentis Ochsn. 1928 -isothecietosum alopecuroidis Alataş, Ezer, Uyar & Ören subassociation has been identified as new for the scientific world with 14 relevés taken from the bases and trunks of Fagus orientalis and Carpinus betulus trees in between 835-1120 meters of the study area. 6 of the 24 taxa which form the epiphyte subassociation are liverworts, 18 of them are mosses, and 7 of the mosses are acrocarpous and the other 11 are pleurocarpous.

Discussion: Syntaxonomically, because of the fact that, Orthotrichetum pallentis Ochsn. 1928 -isothecietosum alopecuroidis Alataş, Ezer, Uyar & Ören subassociation has the characteristics which belong to the class of Frullanio dilatatae-Leucodontetea sciuroidis Mohan 1978, the order of Orthotrichetalia Hadac in Klika and Hadac 1944 and the alliance of Ulotion crispae Barkman 1958, this subassociation is classified according to the order and the alliance. The characteristic of the subassociation mesophyte Isothecium alopecuroides is the taxon with the highest repetition and its permanence in the relevés is 100%. While the general cover of the subassociation differs between 90% and 98%, the closure of the vegetation alters 70% and 100%. In terms of ecological characteristics; the subassociation is spread in mesophytic, acidic and semi neutral shaded areas.

Acknowledgement: We are very grateful to the Scientific and Technological Research Council of Turkey TÜBİTAK (Project Number: 114Z337) for financial support.

Keywords: Bryophyte, Epiphytic, vegetation, Sakarya, Turkey
**ORAL PRESENTATION**

**Oxidative Stress Related to the Organophosphate Insecticide Chlorpyrifos Exposure in Endangered Trout Salmo coruhensis Spermatozoa: Alterations in Sperm Quality**

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**Introduction:** The use of insecticides has been increased along with increasing the agricultural activities and is caused environmental impacts deleteriously. In particular, non-target organisms, including fish, are affected by toxic effects of pesticides. Therefore, the effects of Chlorpyrifos (CPF) on oxidative stress and sperm quality were investigated in vitro.

**Material and Methods:** Fish spermatozoa were exposed to sub-lethal concentrations of CPF (50, 100 and 125 µg/l) for 2h. Reduced glutathione (GSH), Superoxide dismutase (SOD), catalase (CAT), malondialdehyde (MDA) and glutathione peroxidase (GSH-Px) in spermatozoa were examined for determination of oxidative stress status.

**Results:** Our findings showed that motility and survival of sperm cells significantly decreased with exposure to CPF. Biochemical assays revealed that activity of and MDA, CAT and GSH levels increased in spermatozoa based on concentration while GSH-Px and SOD activity decreased (p<0.05).

**Discussion:** This may be explained by rupture of the cell membrane and cell apoptosis and, destroying the functional integrity of the axosome and mitochondria of the sperm cells as a consequence of LPO. Consequently, spermatozoa were highly sensitive to CPF exposure. CPF has the potential to disrupt sperm quality and caused to oxidative stress in spermatozoa.

**Keywords:** Chlorpyrifos, endangered trout, oxidative stress indices, *Salmo coruhensis*, spermatozoa.
Comparison of Oxidant and Antioxidant Status of Çoruh Trout (Salmo coruhensis), Anatolian Trout (Salmo rizeensis) and Rainbow Trout (Oncorynchus mykiss) Spermatozoa in Wild

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Introduction: Antioxidant defense system includes antioxidant enzymes [catalase (CAT), glutathione peroxidase (GPx), glutathione-S-transferase (GST)] and other low molecular weight substances such as glutathione (GSH), vitamins and proteins located in different tissues. They can inactive the harmful effects of Reactive Oxygen Species (ROS). The aim of present study was to compare oxidant and antioxidant status of Çoruh trout (Salmo coruhensis), Anatolian trout (Salmo rizeensis) and rainbow trout (Oncorynchus mykiss) spermatozoa.

Material and Methods: Fish were obtained from Uzungöl. Enzymatic antioxidant activities (superoxide dismutase, catalase, glutathione peroxidase), glutathione and lipid peroxidation (malondialdehyde) were determined in spermatozoa of three trout species.

Results: Results indicated that catalase, glutathione peroxidase, glutathione and malondialdehyde levels were highest levels in Anatolian trout (S. rizeensis) spermatozoa (p<0.05)

Discussion: The antioxidant response to stress can be explained by the sensitivity of high sensitivity of this endangered species (S. rizeensis). S. rizeensis naturally inhabits in cold streams, rivers and lakes and, spawns in rivers and streams with swift water. In conclusion, differences among species caused alterations in the antioxidant and malondialdehyde levels.

Keywords: Oncorynchus mykiss, oxidant and antioxidant status, Salmo coruhensis, Salmo rizeensis.
Pollen Morphology of Some Taxa of *Aegilops* Genus in Triticeae (Gramineae) Tribe

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**Introduction:** The Gramineae (Poaceae) family, which is found in the monocotyl of the Angiosperms, is a large family with 6 subfamilies, more than 50 tribes, 650 genera and 10,000 species worldwide. In our country, 142 genera, 520 species, 19 subspecies and 52 varieties are represented. In this study, pollen morphology of 7 *Aegilops* taxa was examined in detail.

**Material and Methods:** Pollen samples of 7 taxa used in this study were gathered from their natural habitats in Turkey. For light microscope (LM) investigations, pollen grains were taken from the herbarium materials and prepared according to the methods of Wodehouse (1935) and Erdtman (1960). SEM studies were conducted by direct mounting of pollen samples on stubs attached with sticky tape. The specimens were coated in a sputter coater with Gold-Palladium using Polaron SC502 trade gold coater. The specimens were then studied and photographed by a Jeol JSM.

**Results:** Common characteristics of the pollen of the investigated taxa; monoporate, prolate-spheroidal, subprolate, symmetric heteropolar. The pore was surrounded by an annulus and it was also covered by an operculum. According to SEM investigation, the exine sculpture is scabrate with groups in *Aegilops*.

**Discussion:** The result indicate that the *Aegilops* has stenopalynous pollen grains thus the value of pollen characters for taxonomic implications is limited. Faegri & Iversen and Perveen alson mentioned about the uniformity of grass pollen causes one of the greatest difficulties in pollen analysis.

**Acknowledgement:** The authors would like to thank to Central Laboratory personel of Middle East Technical University for their assistance in coating the pollen samples and taking their photographs during the SEM studies. We also wish to thank to the Scientific and Technical Research Council of Turkey (TUBITAK-TBAG-105T171) for their financial assistance.

**Keywords:** Aegilops, Gramineae, pollen morphology, SEM
Environmental Impacts of Hydroelectric Power Plants and Landscape Restoration Process on Damaged Areas in Alabalık HEPP Case

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Introduction: Stream type HEPP projects are several kilometers long between the beginning and end points and include facilities such as water intake structure, transmission line, pressure pipe line and power plant. The projects also include other units such as construction site, excavation storage areas and service roads. The highest damage risk in the stream type HEPPs occurs during the excavations conducted during the construction of the pressure pipelines, roads and channels. Destruction rate is directly correlated with the size of the excavation and the slope of the land. The present study aimed to reveal the destruction caused by Kalecik Regulator and Hydroelectric Power Plant (HEPP) constructed near Alabalık village in Artvin province central district in Turkey and to determine the methods that should be used in the restoration process. A possible action plan that should be implemented to restore the ecological and aesthetic value of the natural landscape, which was destroyed by dumping the excavation waste created by the road and tunnel construction in the area designated as forest land, was determined in the study. Furthermore, methods to design a field morphology that is suitable for the environment and plant the destroyed surfaces (Bio-restoration) to restore the land to its original state.

Material and Methods: The disposal site for the excavation conducted during the construction of the access road, the riverbed and the tunnel at Kalecik regulator was located at Alabalık village in central district of Artvin province. In the study, field data were collected, and current status was analyzed with land survey and determination of the vegetation. In determination of the environmental effects of the constructions carried out at the Kalecik Regulator and Hydroelectric Power Plant (HEPP) and landscaping proposals, several studies were used.

Results: The leading environmental impact caused by the HEPP projects is the destruction of the natural landscape, ecological and aesthetic values. The study is significant in determining the damages and effects caused by HEPPs and contributing to future studies and providing recommendations. Excavation waste generated during these construction work, the areas where the natural structure is destroyed and resulting danger of erosion should be investigated in detail and permanent solutions should be introduced. The selection of landscape restoration approach and plant species and distribution and selection of indigenous plant species for use in the Biological Restoration methodology affect both the success and duration of the restoration.

Discussion: Today, different professional disciplines collaborate in studies on restoration and future use planning for the damaged areas after energy and mining activities. Restoration plans and applications should be conducted with a multidisciplinary approach and soil mechanics experts should contribute to stabilization, soil scientists should join in for soil fertility, hydrogeologists for surface and ground waters, ecologists for basic sciences and landscape architects for planning of the are use (Ulusoy and Ayasligil, 2012). The size of the restoration and the restoration work should be monitored by the relevant institutions. Planting and surface cover processes should also be initiated to speed up the process.

Keywords: landscape restoration, biological rehabilitation, hydroelectric power plant, environment environmental impacts, Artvin
Karyotypic Characteristics of *Pelophylax ridibundus*

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**Introduction:** *Pelophylax ridibundus*, an amphibian species are distributed in Karasu Basin. The karyotypic characteristics of *Pelophylax ridibundus* from the basin have been investigated by examining metaphase chromosomes spreads obtained from bone marrow and intestine epithelium.

**Material and Methods:** The frogs used in the study were caught from three locations of Karasu Basin. Total 12 frogs (5♀, 7♂) were transported to the laboratory as live, and kept in aquarium before the analysis. Bone marrow and intestine of frogs were used for karyotype analysis. The best treatment parameters for preparing good metaphase chromosome spreads from the cells were optimized as hypotonic 1 hour (0.075 M KCl) treatment, fixation with carnoy solution (3 methanol: 1 acetic acid) and stained 10% Giemsa for 20 minutes. The prepared mitotic chromosomes were also analysed silver staining (AgNOR) and C-banding techniques.

**Results:** It was determined that *Pelophylax ridibundus* had 2n=26 chromosomes by investigation of the chromosome spreads. *Pelophylax ridibundus* karyotypes were determined as being composed of 6 metacentric, 6 submetacentric and 1 subtelocentric chromosome pairs (12M+12SM+2ST).

**Discussion:** The fundamental arm numbers of chromosomes were determined FN=52 and Ag-NOR positions located in the long arm of chromosome pair 10. The C-banded karyotypes showed C-positive heterochromatin bands at the telomeric regions of the chromosomes. Karyotype symmetry/asymmetry index was 1.61. This is the first study on the karyotype of the Karasu Basin frogs. The karyotypic characteristics in Karasu frogs are similar to the studies on *P. ridibundus* in Turkey (Göksu river), Armenia, Ukraine and Russia.

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**Keywords:** *Pelophylax ridibundus*, Karasu Basin, chromosome, karyogram, ideogram.
A New Epiphytic Bryophyte Community for Turkey (Pterigynandretum filiformis-leucodontetosum sciuroidis)

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Introduction: The phytosociological studies were given a start by Walther and Leblebici in 1969 with the bryophyte vegetation of Yamanlar Mountains in Turkey. The following studies were on the bryophytic vegetation concentrate on the southern and western regions of Turkey and majority of other parts of Turkey remain unfortunately unstudied until now. That’s why, this study was performed in Akyazı (Sakarya) district which is located between Marmara and Western Black Sea regions for contribution to the epiphytic bryophyte vegetation of our country. As a result of this study, a new epiphytic bryophyte subassociation for Turkey was described and characterised.

Material and Methods: Research materials were composed of 85 relevés were taken from the lower (0-0,5 m), middle and upper (0,5-2m) parts of the trunks of trees which exist in the different localities of the Akyazı district with varying ecological characteristics in different vegetation periods of 2017. These relevés were selected depending on the minimal area concept. For the relevés, abundance-coverage scale of Frey and Kürschner was used. These relevés have been evaluated using the classical Braun-Blanquet method as well as DECORAN (Detrended Correspondence Analysis) and TWINSPAN (Two-Way Indicator Species Analysis).

Results: The Pterigynandretum filiformis Hil. 1925-leucodontetosum sciuroidis Grgić 1983 subassociation has been identified as epiphytic with relevés taken from the bases and trunks of Fagus orientalis Lipsky trees in between 475-1121 meters of the study area. 4 of the 10 taxa which form the epiphyte subassociation are liverworts, 6 of them are mosses, and 2 of the mosses are acrocarpous and the other 4 are pleurocarpous. The number of taxa per sampling relevé varied in the subassociation from 4 to 10.

Discussion: Syntaxonomically, because of the fact that, Pterigynandretum filiformis Hil. 1925 -leucodontetosum sciuroidis Grgić 1983 subassociation has the characteristics which belong to the class of Neckeretea complanatae Marst. 1986, the order of Neckeretalia complanatae Jez & Vondr. 1962 and the alliance of Neckerion complalanatae Sm. & Had. ex Kl. 1948, this subassociation is classified according to the order and the alliance. The characteristic of the subassociation mesophyte Leucodon sciuroides (Hedw.) Schwägr. is the taxon with the highest repetition and its permanence in the relevés is 100%. The general cover of the subassociation is about 90%, and the closure of the vegetation in the area alters between 90% and 100%. In terms of ecological characteristics; we can say that the subassociation is distributed in mesophytic, acidic and semi neutral shaded areas.

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Keywords: Bryophyte, Epiphytic, vegetation, Sakarya, Turkey
A Study on Some Morphometric Parameters of Freshwater Crayfish (*Astacus leptodactylus* Eschscholtz, 1823) in Ulugöl, Samsun, Turkey

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**Introduction:** Crayfish are ecological, economically and socially important species. Generally, they are traditionally consumed as a luxury food as well as consumed at special occasions in some countries [Hogger, 1988, Momot 1995, Harlıoğlu and Holdich 2001]. *Astacus leptodactylus* belonging to Astacidae family naturally exist in Turkey [Balık et al., 2005]. Crayfish stock in Ulugöl, one of the Bafra Fish Lakes, Turkey, is natural and the commercial fishing is based on renting of lakes by commercial enterprises. Since there is no study done in that area before, it is aimed to determine crayfish, some morphometric properties in this study.

**Material and Methods:** The *A. leptodactylus* samples used in this study were chosen randomly among healthy population, caught with pinter nets by fishermen monthly between July 2010 and July 2011. A total of 378 crayfishes (180 male, 198 female) were used in the study. The samples were brought to a laboratory in Faculty of Aquaculture, University of Sinop with a humidified styropor container. Morphometric measurements were done according to [Rhodes and Holdich, 1984].

**Result:** Total length and carapace length of crayfishes were ranged between 80-156 mm and 22-83 mm, respectively. Average carapace length in females, in males and in all samples were 50.96±0.46 mm (min: 30.66 mm, max: 82.03 mm), 51.31±0.66 mm (min: 22.17 mm, max: 78.28 mm) and 51.13±0.40 mm, respectively. The average length of the abdomen of females was 52.36±0.49 mm, whereas it was 49.26±0.62 mm in males with an average of 50.87±0.40 mm for all specimens. The weight of crayfish samples changed between 14.38 - 105.03 g and the average weight was 38.26±0.73 g.

**Discussion** In the present study, male *A. leptodactylus* was heavier than females, chelae length and width were longer than females but abdomens of females were wider and longer with a similarity of previous studies [Balık et al., 2005]. In this research, a strong linear relationship between length and weight was found. A negative allometric growth was detected in female and in male + female *A. leptodactylus* (b values for female and male + female crayfish were 2.76, 2.92, respectively). There was a positive allometric growth in male crayfish (b value was 3.04).

**Keywords:** Crayfish, *Astacus leptodactylus*, morphometric parameters, Bafra fish lakes
Introduction: Water resources all over the world are rapidly depleting due to climate change, global warming, misuse of land, rapid population growth in cities. Water is one of the most important natural resources that cannot be created for living. In recent years, design approaches have been preferred in use to effectively of water to reduce of water consumption in landscape arrangements, especially in urban areas. One of these approaches is the Xeriscape.

The "Arid Landscaping " known all over the world as "Xeriscape" is a landscaping scheme that adopts the principle of protecting the water resources and the environment with minimum use of water. Xeriscape definition was first introduced by the Denver Water Department in order to provide savings for water use in landscaping in 1981. It was formed by combining the words "xeros" meaning dry and "landscape" meaning landscape.

Material and Method: The material of the study constitutes the efficient use of water in urban landscaping practices and the literature reviews on the concept of Xeriscape. The study's method constitutes the analysis, synthesis and evaluation of the data obtained by the literature reviews made on the Xeriscape.

Results: The findings of the research, effective use of water in landscape applications and the concept of xeriscape, xeriscape planning and design principles, xeriscape plants, soil preparation and soil improvement, drought resistant plant selection, reduction of lawn areas, effective irrigation, use of mulch and proper care of these elements shows.

Conclusion and Discussion: As a result of the research, it has been suggested that importance should be attached to the concept of "Xeriscape" which provides efficient use of water in ecological approaches for urban sustainability in landscape designs made in urban areas.

Keywords: Effective use of water, landscape, xeriscape, water
An Ecological Approach to Roadside Barriers: Green Barrier

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Introduction: Passive safety structures, called as barrier, are used on the edges and in the middle of the highways and designed to protect vehicles, leaving the road for any reason, against roadside obstacles by keeping them in the road. Barriers are classified as flexible (steel, rope, plastic), semi-rigid (W-beam) and rigid systems (concrete) depending on the deflection characteristic at impact. Concrete and steel barriers are the most used ones in the world. Concrete, steel and plastic are not renewable materials. They contribute to CO₂ emissions indirectly as they are made from fossil fuels. The countries that produce iron and steel, use the most amount of energy and also cause the biggest increase in CO₂ emissions that means contribution to global warming. Countries producing iron and steel are the first to be affected by climate change as a consequence of global warming. In the past, some countries that produced a large amount of iron and steel have foreseen the climate change risk, reduced iron or steel production or abandoned the sector. These countries have been continuing to meet some of their iron and steel needs by replacing them with various renewable materials or by importing. The main inputs in concrete production are cement, aggregate, water, chemical additives and in some cases mineral additives. Among these inputs, the component that causes the most amount of emissions is cement. Almost one unit CO₂ is emitted for one unit cement production. Chlorofluorocarbon gases, which consist of chlorine, fluorine, carbon and mostly hydrogen, are used in the production of plastics. Recent studies have proved that these gases cause significant climate and weather changes by destroying the ozone. The share in the increase of global warming is 22%. Wood is one of the most important carbon stocks in the world. Carbon, stored by plants except for the tree, released to the nature in a very short time (3 to 12 months), when it is consumed by rotting or by people or animals. The release of carbon stored by wood in the form of CO₂ can last up to 3 – 4 centuries depending on the place of use and the time of production. Increasing use of wood materials means storing more amount of CO₂ in the atmosphere.

Results and Discussion: One of the approaches to increase carbon balance contributions in the world is to increase the use of biomass from forests. For this reason, the demand for forest products needs to be increased in order to reduce CO₂ emissions. The forest products industry has constantly been changing. New products which are made from wood, wood chips and wood wastes and which will store carbon for long periods of time have been developing. The use of forest products instead of steel, concrete and plastic will also reduce the fossil fuel consumption when producing these raw materials. This indirect effect on storing carbon may be more effective than storing carbon directly in forest products.

Barriers used today are usually made from materials such as concrete, steel and plastic. Fossil fuels are widely used in the production of these materials. Replacing them with wooden materials will both contribute to stop global warming and provide an opportunity to produce renewable and sustainable barriers rather than current ones.

Keywords: roadside barrier, CO₂ emission, global warming, green barrier
An Urbanization Theory that Supports the Superiority of Landscape: Landscape Urbanism

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Introduction: Landscape Urbanism is a new theory of urbanization that argues that landscape is more capacious in urban organization and in enhancing urban experience than architecture. This theory entered to the literature in a conference held in Chicago in 1997. Charles Waldheim was one of the architects who first introduced landscape architecture. Charles Waldheim describes landscape architecture with giving the example of Parc de la Viletta. Landscape Urbanism has been proposed to cities of North America, which has suffered from population loss and become small after industry. James Corner has suggested that both modernist and new urbanism models should be taken as a basis in landscape urbanism. Fresh Kills Park, which has been converted into a park after being dumped, is James Corner’s most up-to-date landscape urban project.

Materials and Method: The material of this work constitutes of 12 sample designs that are completed or incomplete, which can be accepted as an example of landscape urbanism concept, its emergence and landscape urbanism. The method of this study consists of the analysis, synthesis and evaluation of the data obtained by the literature reviews made in this subject.

Findings: Findings obtained from these studies have showed that importance given to the landscape has increased and contribution to the urban identity has gained more importance with landscape urbanism. It has made many contributions such as reclamation of previously used areas, introducing a new identity, increasing the amount of green space, and designing recreational spaces. Known as urbanization model in Europe and North America, this concept has brought two different concepts together. Twelve different examples of this term have been examined in terms of completed and incomplete ideas.

Results and Discussion: The emergence of the concept of Landscape Urbanism, which architects or landscape architects have embraced it, and which projects are being constructed or in the process have been discussed with this study. Contributions made to the city, visual/aesthetic and functional benefits, and the evaluation of idle areas in the city with the implementation of Landscape Urbanism have been evaluated with this study.

Keywords: landscape, landscape urbanism, urbanization, urbanization theory
Estimation of Growth of Pedunculate Oak (Quercus robur L.) Individuals by Using Ecological Based Models

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Introduction: For the sustainable management of forest resources, the growth dynamics of species must be closely monitored depending on the ecological conditions. In this context, the usual and unusual changes in ecological conditions must also be closely examined in terms of their impact on the development of trees. Today, many ecological based and multidimensional models are used in this context. This model contains many ecological factors, mainly rainfall and temperature, which are effective on growth. In this study, the growth trends of the pedunculate oak (Quercus robur L.) individuals in Yenice-Balıkıskı province where tried to be estimated by using the eight years height and diameter (RCD) values obtained from the measurements made every year and it was aimed to make the selection of the best growth models for the same species in the applied local conditions.

Material and Method: The research was carried out in the area of natural regeneration of 10.5 ha size belonging to the pedunculate oak located in the 28th compartment of the Yenice-Balıkıskı Forest Range District in Karabük. The natural regeneration studies were started in 2010 with the establishment cutting due to the year of mast seeds. Canopy has been reduced to 0.5-0.6. Measurements and counts were carried out in oak juvenilities during the period covering 2010-2017 in fixed sample plots of 25x40m. The elevation of the study area is 775 m, the aspect is northwest and the location is the upper side. Soil is sandy-clay and is crumbled structure. Soil has deep soil conditions. Vegetation duration is to 6 months. The mean temperature is 14.2°C and the mean annual precipitation is 603.7mm. Kernel Nearest Neighbor (kNN), Support Vector Machine (SVM) and Random Forest (RF) ecological based algorithms are used to estimate the growth performance of pedunculate oak individuals. The R statistic program was used to implement the models.

Results: According to this research, it was determined that at the end of the 8-year research period, the number of natural oak juvenilities varied between 25.6-9.3 item/m², mean height growth was between 2.3-58.4cm and mean RCD was between 3.66-42.7mm. In comparison with models, SVM model was best predicted by 63.4% for the development of oak individuals. This model followed RF ecological models (59.2%), with kNN (48.5%) with respectively.

Discussion: In order to study the effects of ecological factors on growth in forest trees with a dynamic life cycle, some ecological based prediction models are widely used in many researches and modern technology in Turkey by making use of periodic measurements made on various quantitative characters. This contributes significantly to the sustainable management of forest resources that continue to develop in open-air conditions and to the implementation of these benefits.

Keywords: pedunculate oak, natural regeneration, growth, ecological based model
Introduction: Turkey is considered a bridge between Europe, Asia and Africa, and possibly played an important role in the distribution of many crops including common bean. Hundreds of common bean landraces can be found in Turkey, particularly in farmers’ fields, and they consistently contribute to the overall production.

Material and Methods: To investigate the existing genetic diversity and hybridization events between the Andean and Mesoamerican gene pools in the Turkish common bean, 188 common bean accessions (182 landraces, and 6 modern cultivars as controls) were collected from 19 different Turkish geographic regions. These accessions were characterized using phenotypic data (growth habit and seed weight), geographic provenance, and 12,557 high-quality whole-genome DArTseq markers; and 3,767 novel DArTseq loci were also identified.

Results: The clustering algorithms resolved the Turkish common bean landrace germplasm into the two recognized gene pools, the Mesoamerican and Andean gene pools.

Discussion: Hybridization events were observed in both gene pools (14.36% of the accessions) but mostly in the Mesoamerican (7.97% of the accessions), and was low relative to previous European studies. The lower level of hybridization witnessed the existence of Turkish common bean germplasm in its original form as compared to Europe. Mesoamerican gene pool reflected higher level of diversity, while the Andean gene pool was predominant (56.91% of the accessions), but genetically less diverse and phenotypically more pure, reflecting farmers greater preference for the Andean gene pool. We also found some genetically distinct landraces and overall, a meaningful level of genetic variability which can be used by the scientific community in breeding efforts to develop superior common bean strains.

Acknowledgement: We would like to express our appreciation to the Scientific and Technological Research Council of Turkey (TÜBİTAK) under scientific research project (TOVAG-215O630).

Keywords: bean, GBS, DArTseq markers, diversity, Turkey
Study to Assess the Quality of the Coastal Waters of Some of the Beaches of Al-Jabal Al-Akhdar (Libya)

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Introduction: The Sea is the source of life on earth. Due to the need for energy sources and progress in the means of transport and the dangers of sewage and dumping of waste of all kinds which adversely affected and changed the shape of the beach. The aim of this study is to examine the chemical properties of the waters of some of the beaches of Al-Jabal Al-Akhdar in Libya and specifically the beaches of Derna city the most important of these estimates is the estimation of the level of the chemical ions in the coastal waters of the study area and to clarify some of the negative effects of chemical elements and identify the causes of the problem of pollution.

Material and Methods: The study was conducted in Al-Jabal Al-Akhdar area, of Libya, where the city of Derna was chosen as the main location of the study. Some field tests were estimated such the water temperature was measured by the field at the moment of sampling directly and before moving to another location using a mercurial thermometer (0 - 100). The pH of the water samples was measured directly in the field using pH Meter Model Sension 2TM HACH. The device was calibrated and adjusted using buffer solutions (Buffer Solution PH = 4, 7, 9). The salinity was measured at sites directly using Standard-Conductivity cell device. The dissolved oxygen was measured using a measuring device (DO) of the type Oxygen Meter Model 9090 Jenway. As well Sulphate concentration (SO₄⁻) was measured for water samples at the wavelength (450 nm), using Spectrophotometer (HACH) using the reagent (Sulpha. Ver. IV. Powder Pillow). The concentration of nitrates (NO₃⁻) was measured for water samples at the wavelength (500 nm), using a Spectrophotometer (HACH) using the reagent (Nitri. Ver. 5 Nitrate Powder Pillow). The concentration of Phosphate was measured for water samples using the SnCl₂.2H₂O method using the Spectrophotometer DU 800 BECKMAN and the absorption strength was measured at a wavelength (690 nm) by comparing the absorption intensity with the standard graph of standard phosphate solutions known as concentration.

Results: Through the results of the study, we found that the temperature was in the range (19.8 - 26.9 °C). While the value of pH was between (6.80 - 8.15). Salinity was in the range (29.44 - 38.20 ‰). The values of dissolved oxygen concentrations were (2.38 - 8.70 mg/l). The study also recorded estimates of sulphate, nitrate and phosphates ions (2.52 – 3.80 g/ l),(0.20 - 2.70 mg/ l) and (0.01 – 4.5 mg/l) respectively.

Discussion: Temperatures estimates of water samples are considered natural changes. The rise in pH values is observed, due to the increase in photosynthesis. Found the effect of sewage waste on salinity values in some sites, especially location (I). The dissolved oxygen recorded decrease in the most polluted areas such as location (I) on the eastern coast of the city of Derna, due to the discharge of sewage. Sulphate ion recorded lower values in the more polluted areas such as site (I) on the eastern coast of Derna. Phosphate ion recorded the highest results in the location number (I) this was due to the effect of wastewater and the potential effects of washing powders containing phosphate. Nitrate ion showed the highest results in the location (I) and may be due to the large increase in sewage at this site.

Keywords: Libya, marine pollution, heavy metals, water
Stem Anatomy of Potamogeton (Potamogetonaceae) Species in Turkey

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Introduction: Potamogeton (Potamogetonaceae) is one of the most diverse and taxonomically difficult plant genera in the aquatic environment. The members of this genus are found in freshwater and brackish lakes, marshes, ponds, rivers and streams. The genus Potamogeton was represented by 13 species and 4 hybrids in Turkey. Especially stem anatomical characters have useful information with respect to the taxonomic arrangement of the species. The stem anatomical characters of 13 Potamogeton species distributed in Turkey have been determined with the present study and the results have been compared to each other.

Material and Methods: The plant specimens were collected between 2014 and 2018 during the field trips in Turkey. Live samples were fixed in 1:1:1 mixture of ethyl alcohol, glycerin, distilled water and stored in falcon tubes. Transverse sections ± 0.05 mm thin were cut from the middle of the internode region of the main stem. This was done under a stereomicroscope using reflected light and the sections were stained in a drop of water with toluidine blue. After 1–3 minutes, the sections were washed in distilled water and studied under a light microscope.

Results: In the genus Potamogeton, two morphological groups have been recognized, broad-leaved species and linear-leaved species. The stele type of the linear-leaved species in Turkey is typically circular and their endodermal cell walls show “O” type thickening. The broad-leaved species of this genus in Turkey have different type of the stele: trio type in P. natans, P. nodosus, P. gramineus; proto type in P. alpinus, P. coloratus, P. lucens; oblong type in both P. acutifolius and P. crispus. Apart from the stele type, the cell shape of endodermis, presence and number both of interlacunar bundles and subepidermal bundles, and presence of the pseudohypodermis, including number of cell layers for each species were determined.

Discussion: The majority of the species have “O” type endodermis cells except from P. natans, P. gramineus, and P. lucens. The both of pseudohypodermis layer and subepidermal bundles are not present all of the linear-leaved species. The linear-leaved species can be easily distinguishable from the broad-leaved species with respect to their stem anatomy. The pseudohypodermis is present in the broad leaved species except from both P. alpinus and P. nodosus.

Acknowledgement: We would like to thank the Scientific and Technological Research Council of Turkey (TUBITAK) for financially supporting this study (Project no.: KBAG-113Z759).

Keywords: Potamogeton, stem anatomy, Turkey
Evaluation of the Effect of Some Climatic Parameters on Time-Dependent Spatial Variation of Lake Burdur; 1975-2017

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Introduction: Lake Burdur, Turkey's the Lakes Region list of international importance and located in the region, is protected by the Ramsar Convention. Despite national and international importance, Burdur is decreasing day by day. The reason for this decrease is considered to be the increase of ponds and small dams built in the Burdur lake basin, tectonic fissures and separation of water from the environment, erroneous agricultural production pattern and irrigation-drinking water used in industry water consumption and global and regional climate change. In particular, the reason for the dramatic instability observed in Burdur Lake in recent years has not been clearly revealed by scientific research. The purpose of this study is the evaluation of some climatic parameters over the last 42 years (1975-2017) on the decrease of Burdur Lake level.

Material and Methods: In the study, mean annual evaporation, temperature, precipitation and relative humidity parameters were used to establish the relation between the decrease in the lake level and the climatic parameters. Satellite images belonging to 1975, 1987, 2002 and 2017 were used for areal changes of Lake Burdur.

Results: Results revealed that Burdur Lake level with climatic and other reasons have decreased by -2% (13.74 m), while the lake area has declined by -38 % (from 211 km$^2$ to 130 km$^2$).

Discussion: Thus, it was determined that the most important climatic parameters on the decrease of the lake level are mean annual temperature (°C) and evaporation (mm).

Keywords: Climate parameters, RAMSAR wetland, Burdur Lake, Lake level
Effect of cutting intervals and cutting heights on the forage yield and some yield characteristics of Napier grass (Pennisetum purpureum Schumach.)

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Introduction: Napier grass (Pennisetum purpureum) also known as “Elephant grass” is a perennial forage grass with a high growth rate, high productivity and good nutritive value and it is mostly used for ‘cut and carry’ system in the tropical and sub-tropical areas of the world. It can withstand repeated cutting and regrows rapidly, producing a high biomass that is palatable in the leafy stage. The various studies on cutting Napier grass reveal that both the choice of a cutting interval and height of cutting are crucial to their performance and it has been found that the main factor affecting growth, yield and persistence of swards is the defoliation intensity. This study was designed to determine the effect of different cutting intervals and heights on the forage yield and nutritional value of Napier grass.

Material and Methods: Dwarf variety ‘Mott’ of Napier grass was grown outdoors in a pot experiment from May to November in 2015 in an experimental area of Field Crops Department, the Faculty of Agriculture, University of Ege, Izmir/Turkey. Two individual experiments were conducted. In the first experiment, 9 different cutting intervals (30-45-60-75-90-105-120-135-150 days) and in the second experiment, 4 different cutting heights (5-10-15-20 cm) were tested on Napier grass. The experiments were arranged by a completely randomized block design with four replications. Characteristics such as plant height, number of tillers, dry matter (DM) content and yield, content of crude protein (CP), NDF and ADF were measured in the studies.

Results: In the first experiment, cutting intervals affected DM yields and nutritive values of Napier grass. As the inter-cutting interval increases the percentages of leaf in the harvested material declined and stem percentage increased, with a concomitant decrease in CP concentration and increases in cell wall contents. Plant DM yield significantly increased with plant age at cutting, with age at cutting of 60 days yielding highest, followed by 75 days. In second experiment, cutting height affected the fresh and dry matter yields and nutritive values of Napier grass. Total dry matter yield was significantly higher at a 15 cm cutting height than at 5 or 20 cm cutting height. There were significant differences in CP, NDF and ADF content among the treatments, CP ranging from 11.6 to 12.9%. Cutting height of 15 cm above ground level could be the optimal level for harvesting Napier grass in a coastal part of the Aegean region under Mediterranean climate.

Discussion: It could be concluded that cutting interval significantly affect the plant growth, forage yield and quality. Cutting at 60 or 75 daily interval seem to provide maximum DM yield with acceptable leaf ratio and nutritional quality. The high level of cutting can improve not only dry matter yield, but also forage quality of Napier grass. The effect of greater cutting heights tended to reduce ADF and NDF. These findings have important implications for the use of Napier grass as a livestock feed. A cutting height of 15 cm above ground level could be the optimal level for harvesting Napier grass. However, field experiments in the coastal part of the Aegean region under Mediterranean climate still need to confirm practical recommendations to farmers.

Keywords: Pennisetum purpureum, cutting interval and height, forage yield and quality
Effective Use of Water in Urban Landscape Applications

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Introduction: Water is one of the most essential natural resources for all living things and it has no alternative and is irreproducible. The threatening level of climate change and global warming, industrialization and uncontrolled urbanization together with wrong land uses have resulted in water scarcity in urban areas where more than half of the world population lives today. The negative impacts of such state of affairs that threatens the whole world brought the effective use of water resources into the agenda as an important issue. As a result, new approaches are introduced into landscape applications, in particular, for water-saving in the irrigation of ornamental plantations in urban areas. The aim of this study is to present design proposals for effective use of water in urban landscape applications.

Material and Method: The material of the study composed of data obtained from the literature review on the effective use of water in urban landscape applications. As for the method, it involves the analysis, synthesis and evaluation of those data.

Findings: The findings of the literature work involve applications that can be listed as; the limited irrigation methods in certain seasons for the ornamental landscape areas consuming large amount water; the works on creation of green networks in cities; xeriscape landscape designs; use of natural vegetation; the resolutions used in cities for sustainable rain-water management models such as rain gardens, permeable pavements, drywells, rain ditches, seepage pits, roof gardens, rain barrels and cisterns.

Results and Discussion: In conclusion, it has been discussed and suggested that a fundamental change in urban landscape design approaches is required to achieve effective use of decreasing water resources, and that importance should be placed on ecological approaches for the sustainability of cities and on the landscape designs and applications such as limited irrigation, xeriscape landscape, use of natural vegetation, rain gardens, permeable pavements, drywells, rain ditches, seepage pits, roof gardens, rain barrels that enable such use of water in this context.

Keywords: effective use of water, landscape, urban landscape, landscape design, landscape application
A New Approach (Subsurface-Drip) to Irrigating Turf Areas

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Introduction: In this article; the establishment of the subsurface drip irrigation system, the use of this system in lawn areas, its applicability and its advantages and disadvantages compared to other irrigation methods were discussed in general and some examples were given. One of the methods that can be used to reduce water use in our country and world, where the effects of the drought are beginning to be felt quickly, is subsurface drip irrigation. This system, which is used for long periods in other agricultural fields, is still considered to be new in turf areas.

Results: According to the results of different researchers, subsurface drip irrigation system can be used in turf areas. For example, leinauer et. al. (2014) is stated that studies were conducted with warm and cool climate grasses in California, subsurface drip irrigation can be used to irrigate turf areas efficiently also in combination with saline water and is a viable alternative to traditional sprinkler systems if installed, monitored, and maintained properly. This system of fighting with drought can be save water on turf areas. It is beneficial to increase the number of investigations on the use of subsurface drip irrigation in turf areas in Mediterranean countries.

Discussion: There is insufficient research on subsurface drip irrigation system, the lack of water scarcity yet, the high establishment costs, germination problems, are some of the reasons for the low use of this system. Subsurface drip irrigation systems have many advantages. The advantages of this system include more efficient water consumption, better fertilization and spraying through the system, a uniform distribution of water throughout the area, better health of plants, sufficiently availability of quality water, reduced soil compaction, water and energy savings and longevity. On the other hand, the system has some disadvantages such as germination problems, impossibility of observing irrigation, limitation of soil treatment and root development, installation cost and repair work.

Keywords: subsurface drip irrigation system, drought, turf
Microalgae Growth in Anaerobic Digestate For High-Value Product Recovery

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Introduction: Anaerobic digestion is one of the most common methods used to generate energy from renewable sources. During anaerobic digestion, organic nitrogen is converted to ammonia nitrogen and total phosphorus to orthophosphate. For this reason, high concentrations of ammonia and phosphorus are present in the anaerobic digestion effluent Therefore, the application of agricultural land without treatment may constitute a risk. Microalgae can assimilate nutrients especially nitrogen and phosphorous from wastewater for their growth and produce valuable biomass. In this study, large scale experiments were carried out to investigate the effect of the anaerobic digestate effluent on microalgal lipid, protein, carbohydrate, chlorophyll and carotenoid amount while scaling up raceway ponds to 1000 L.

Material and Methods: The ponds had been operated in a manner to be gradually increased so that microalgae can adapt to large volume operation. Firstly, the pools filled up to 250 L and nutrient removal experiments were followed by according to Standard Method. Growth of microalgae has been monitored through the amount of chlorophyll-a, not optical density because of the dark colour of the wastewater. After the desired quantity of microalgae and nutrient removal, the system was gradually completed to 500 L; then to the final volume of 1000 L.

Results: Based on the results of the biochemical composition, the mixed cultures starting with Chlorella sp. dominance became Scenedesmus sp. dominant by reaching 1000 L; resulting in high protein but low fat content. Dimensioning of the scale started with 250 litters; at 1000 L, protein and carbohydrate amounts increased by 33% and 12.5%, respectively; while lipid amounts decreased by 77%. Moreover, according to the results of the carotenoid and chlorophyll relation, it was observed that with nitrogen starvation and the low light penetration, carotenoid content was increased 15 fold.

Discussion: Results gives a suggestion that cultivating microalgae in dark wastewater in large scale system, carotenoid amount can be increased. Carotenoids can be used as a food and feed additive and a health supplement since they have very high antioxidant properties. In addition, it is also used as natural colouring agents.

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Keywords: carotenoids, microalgae, scale-up, treatment, wastewater
ORAL PRESENTATION

Economic Chain Analysis of Cyclamen Species

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Introduction: The genus Cyclamen was included in Appendix II of CITES, when the Appendices to the Convention were first drawn up in Washington in 1973. The rationale for including the genus is not well-documented but reflected concern about the collection of the newly re-discovered Cyclamen mirabile. European legislation brought in “stricter domestic measures” for Cyclamen spp. that occur within the EU countries – Cyclamen graecum, C. creticum, C. balaericum and C. persicum. Increasing attention was being paid to the conservation status of threatened plants within Turkey and mechanisms for their protection and sustainable use. Discussions between scientists and government officials in 1982 led to the production of a regulation manual for the trade in wild-collected bulbs. Between 1981 and 1984 a survey of the economic geophytes of Turkey was carried out for the Turkish Government. Legal controls on bulb exports came under the General Nature Protection Law of 1923. This was modified in 1986 to set quotas for certain species and to ban export of species that could not withstand the trade.

Material and Methods: A literature review focused on livelihood impacts of the CITES-listed bulb trade. The findings of the review are woven into this report, principally in the Introduction. This study has evaluated the Cyclamen species that are among the geophytes growing in Turkey from the Economic chain analyses and emphasized their contribution to economy. The study was conducted in Turkey-Antalya region and the data were acquired from the questionnaire applications and was economic value analysis.

Results: Analysing the shareholders in the economic chain; according to the acquired data, the annual export of 4.9 million Cyclamen bulbs in Turkey provides an annual income of $ 1.5 million Collectors and producers produce a total income of $ 750-1000/per household income. The Intermediaries income more than villagers that is $ 2000-2500/per year.

Discussion: The export quantity is determined according to the regulations of natural flower bulbs and rotation is applied while collecting them in the nature. Analysing the shareholders in the economic chain, it is observed that the group $2000-2500 earning the minimum income from this commerce is collectors and producers, whereas the intermediate group and the firms have a 3-4 times greater income, which is remarkable. Collectors and producers produce a total income of $ 750-1000/per household income. The Intermediaries income more than villagers that is $ 2000-2500/per year. Even though this income is not so profitable for villagers, they find both this commerce and the income earned from this commerce attractive as this business is a habit with a high social yield and additional income. In this respect, the inclusion of these plants in commerce provides an economic, social and cultural benefit and makes a contribution to stronger social relations.

Keywords: Cyclamen sp, Geophytes, economic value analyses export of natural, flower bulbs, Turkey
Comparison of phenotypic plasticity in ecotypes across habitats

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Introduction: Ecotypes are locally adapted populations of the same species in a particular environment. Formation of ecotypes can be affected by low gene flow, environmental conditions, and the interaction of the environment by genotype that is called phenotypic plasticity. In favorable (benign or high resource) habitats, plants benefit from abundant resources and express better performance (e.g., higher values in size or fitness traits) than ancestral forms. However, in relatively unfavorable (harsh or resource poor) habitats, ecotypes from favorable habitats tend to express lower performance than the ancestral genotypes because the traits associated with high resource acquisition are maladaptive in resource poor environments where investment in stress tolerance traits (i.e., nutrient retention and defense structures) should be prioritized. Specifically, I asked the following question: Do ecotypes specialized in relatively favorable habitats express greater plasticity than those specialized in unfavorable habitats?

Material and Methods: I collected data from databases such as ISI Web of Knowledge and Scopus in 2017, using keywords ‘reciprocal experiment’, ‘transplant’, ‘field’ and ‘plants’. I included studies only with herbaceous plant species conducted in field conditions. In total, I extracted reproduction or performance data from tables and figures of 50 empirical studies. Plasticity index – PI\textsubscript{V} was used as an effect size to analyze the plasticity of ecotypes across habitats. One-way ANOVA tests were applied by using JMP version 13.2. Graphs were prepared using SigmaPlot software v.12.5.

Results: I found that there were no significant differences among ecotypes. Plasticity index of ecotypes from favorable and unfavorable habitats were 0.46 and 0.52, respectively. That is, habitat of origin did not affect the expression of phenotypic plasticity in ecotypes.

Discussion: Phenotypic plasticity was mostly detected as an active response to treatments, not as a by-product of natural selection. The relationship and balance between phenotypic plasticity and evolution of ecotypes are important to understand how plants adapt to variable environments.

Acknowledgement: I would like to thank Assoc. Prof. Stephen Bonser and Dr. Justin S. H. Wan for their contributions.

Keywords: phenotypic plasticity, plasticity index, reciprocal experiments, meta-analysis, herbaceous plants
ORAL PRESENTATION

Usage of Different Poplar (Populus sp.) Clones at the Determination of Heavy Metal Pollution Levels

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Introduction: Because of the increasing population and industrialization, air, soil and water resources are becoming increasingly polluted day by day. This threatens the future of natural resources and community health. The heavy metal pollution that has emerged in recent years is one of these environmental problems. The heavy toxic effects of heavy metals on the soil, in the drinking and use waters, are damaging to animals and plants, especially to humans. In this study, the possibility of using some American black poplar (Populus deltoides Bartr.) and hybrid poplar (Populus x euramericana (Dode) Guinier) clones was investigated to determine the levels of heavy metal pollution.

Material and Method: In the study, 3 clones (Izmit, Samsun and Lux) belonging to American black poplar and 3 clones of hybrid poplar (Bl. Costanzo, Cima and I-214) were used as biomonitoring. For this purpose, by means of vegetative production with steel, a total of 180 species of poplar saplings were cultivated as 3 repetitions provided that each clone had 10 saplings each time. Zn, Cu and Ni solutions were applied to each of the 25 individuals in each case as 30% solution. Heavy metal solutions were applied early in the morning for one month except for each vegetation period. In the vegetation period, in order to determine the levels of heavy metal species from each clones, the leaves in the middle part of the crown of the trees were collected as 3 replications. The leaves were analyzed on the ICP-OES instrument. One-way ANOVA was applied to the detected heavy metal amounts in order to reveal the differences between the poplar clones determining the pollution levels of heavy metal species. The Duncan Range Test was used to group the clones. For this purpose, SPSS packet statistics program was used.

Results: According to the results of the one way ANOVA analysis applied to the findings obtained from the analyzes made, there was a statistical difference in P <0.01 confidence level among the clones. As a result of the Duncan test, Samsun, I-214, Cima and Izmit clones have the highest heavy metal values for Zn and Izmit, I-214, Samsun and Bl. Costanzo clones. The highest heavy metal values for Ni were found in Samsun, İzmit, I-214, Cima and Lux clones. Accordingly, when clones of both poplar species were evaluated together, it was determined that Samsun, İzmit, I-214 and Cima clones were the best biomonitoring feature leaves for Zn, Cu and Ni heavy metal species.

Discussion: Heavy metal accumulation, which poses a significant threat to living life, should be monitored periodically in all natural sources. In this sense the use of very good monitoring tools will be helpful. In this sense, plants can be a good monitoring tool because they are an organic component and because of the different reactions they produce in different situations. In this respect, leaves, branches and crusts of forest trees, which are perennial and have high renewal ability, constitute a good biomonitoring environment.

Keywords: biomonitoring, poplar, clone, heavy metal, leaves, pollution
Quantitative Comparison of The Species Diversity of Earthworm (Clitellata: Annelida) Turkey with Other Countries

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Introduction: Turkey is a vast and extraordinary country in terms of biodiversity. It is also rich in terms of earthworm fauna. In this study, the quantitative richness of the earthworm fauna of Turkey was explained compared with the earthworm fauna of neighboring and also some other countries on different continents.

Material and Methods: Up to now, comprehensive studies such as monographs and checklists conducted so far in Turkey and other countries and some data bases which show general aspects of the earthworm fauna of the countries in the world have been examined.

Results: So far, 83 earthworm taxa have been identified in Turkey. It is the richest country among the bordering adjacent countries: Greece (67), Georgia (62), Bulgaria (50), Armenia (31), Azerbaijan (29) Iran (28), Syria (16) and Iraq (no confident data). Among the registered Turkish taxa, two of them Balkan-Anatolia, twelve of them Caucasian-Anatolian, three of them Circum-Mediterranean, three of them East Mediterranean, five of them Levant-Anatolia, two of them Levant, six of them are Trans-Aegean and twenty of them are Peregrine species. The earthworm fauna of Turkey is characterized by the high rate of endemism (34%). Twenty-nine of the registered species in Turkey are endemic to Turkey.

Discussion: Eighty-three earthworm taxa have been registered from Turkey until now and it is fairly high for the earthworm fauna of a country. It is one of the highest number in terms of earthworm species diversity among the European countries after Spain (up to 160), France (up to 155) and Italy (up to 100). In addition, there are unstudied areas in many regions of our country such as East and South-East region of Anatolia. With the studies to be done in these areas, it is thought that the number of species of earthworm fauna of Turkey will increase to numbers expressed by hundreds like the countries South Africa (Up to 325), Brazil (up to 305), China (up to 250), New Zealand (up to 220) etc.

Keywords: Annelida, diversity, Clitellata, earthworm, fauna
The Determination of Ecotourism Areas Using Network Systems and Analysis Case Study of Burdur

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Introduction: Development of tourism is dependent mainly on cultural, historical and natural attractions. Ecotourism, in the context of valuing natural and cultural resources, is the most important subcomponent of sustainable tourism. The aim of the study was finding and classifying the ecotourism capability of the area using GIS and the difference of this study between former studies was calculating with GIS and found the real ecotourism capability.

Material and Methods: In this study, the common systematic approach in Burdur city. as well as Multilayer Perceptron (MLP) neural network were used to evaluate ecological capability of the area for ecotourism. The performance of artificial neural network (ANN) and linear discriminant analysis (LDA) method in prediction and ranking of areas with ecotourism capability were also compared.

Results: Based on the obtained results, ANN with an overall accuracy of 92% outperformed the LDA (had an overall accuracy of 75%) in terms of prediction and classification of recreational areas. Therefore, for each class, ANN with an accuracy, precision and sensitivity of 91%, 89%, and 84% respectively, outperformed the LDA with the corresponding values of 75%, 62%, and 39%, respectively. Based on the ANN-modeled map, 1%, 5%, and 10% of the area were shown to belong to intensive recreation-class 2, extensive recreation-class 2, and not suitable for recreation, respectively. Therefore, ANN functions well with higher accuracy for modelling and classification of areas with ecotourism capability compared to LDA.

Keywords: ecotourism, GIS, ecological capacity, plan decisions
Occurrence and composition of Copepodes in Tigris River southern Baghdad, and impact of Al-Rasheed Power Plant on its Biodiversity

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Introduction: Al-Rasheed power plant (RPP) on south of Baghdad at Al-Zafaraniya City was polluting the water of the Tigris River as a result of hot water effluents which containing organic compounds, also it disposed of 430 m$^3$/h for each unit with high water temperature that causing a damage to aquatic organisms in the environment of the Tigris River. So it is necessary to study the biological composition, especially Copepoda fauna of the Tigris River near Al-Rasheed power plant to see the impact of this power plant on its biodiversity. Also the current study is the first study after the war of 2003, so the current study was designed to determine the effect of the Al-Rasheed power plant in the quantity and the biodiversity of Copepoda community.

Material and Methods: Quantitative and qualitative composition of Copepoda communities was studied during the period from January to December 2012 at four stations that were selected on the Tigris River in Baghdad Province.

Results: Thirty-nine taxonomic units were identified including 17 taxonomic units belonging to Cyclpoida, 13 taxonomic unit's belonging to Calanoida, 6 taxonomic units belonging to Harpacyicoida and 3 taxonomic units belonging to Parasitic Copepoda. This study found that at station below RPP recorded the highest Copepoda density during winter season. While, at stations near RPP showed the lowest zooplankton density during summer season. Also the results showed that stations below RPP was included the most constancy species. Generally the result of biodiversity indicators shows the negative effect of RPP on the Copepoda community.

Discussion: It was clear that Copepoda distribution affected with two stresses, summer season and thermal effluents of RPP that increasing water temperature in addition; other factors which disposal from RPP itself. The presence of the few species with high frequency in the current study was incompatible with the description of Proto-Neto (2003) to clean environment. Also the low values of the Shannon-Weiner index were recorded at station near RPP, may be due to the direct impact of RPP, increased turbidity and TSS at this station. Whereas the decline of uniformity index value due to depletion of DO, increasing OM and nutrient that allowed to dominate by few species with high densities of it.

Keywords: biodiversity, Copepoda, Tigris River, power plant
Introduction: Livestock has been an important issue for ages in Anatolian culture. For this reason, Rangelands is quite significant for our society and in our geography. Although there have been grazing in the meadow-rangelands over centuries, this lands are not studied for technical and science purpose, and used in the fatal way.

Material and Methods: The aim of study is to qualify the current situation of meadow-rangelands, and to offer suggestions for solutions of problems. In this paper, it was selected 61 grassland and pastures which is representative to each geographic area in Gümüşhane province which has a meadow-Rangelands of 2799 km², and was collected data from the study area. ArcGIS 9.3v programs were used for descriptive statistical geostatistic models used for produce distribution maps of parameters.

Results and Discussion: In according to results, land has approximately 35% very slight and slight erosion, 45% middle degree erosion and 20% highly erosion. In addition, it is indicated that land has very shallow and shallow depth, and it is generally grazed on the slight and middle level in meadow rangelands. There are 12 parcels which has intensely been grazed. The classification of meadow rangelands shows that condition of land is good and middle-good level in general. Ten diverse the meadow rangelands have very weak condition. Even though it is not necessary to improvement the 20% of the meadow rangelands, 13% of it needs to improve.

Keywords: meadow-rangelands, erosion, improvement
Biosorption of Heavy Metal Ions Using Waste Seaweed Biomass: A Phycoremediational Approach to Environmental Pollution

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Introduction: Heavy metal pollution is a serious global environmental problem. Biosorption is one of the most promising remediation technologies for aquatic areas polluted with heavy metal ions. Seaweeds (marine macroalgae) are important natural biomass resources. They are available in abundance, renewable, non-toxic and low in cost. In this study, a coastal seaweed community composed of Chaetomorpha sp., Polysiphonia sp., Ulva sp. and Cystoseira sp. species was used as natural biosorbent material for the bioremediation of zinc-containing synthetic wastewater.

Material and Methods: The effects of various process parameters including solution pH, biosorbent amount, zinc ion concentration and reaction time on the heavy metal removal ability of biosorbent material were investigated in batch conditions. The equilibrium and kinetic data of zinc biosorption process were modeled using several isotherm models and kinetic models.

Results and Discussion: The biosorption capacity of biosorbent for zinc ions was highly affected by the operating conditions. Kinetic studies showed that the biosorption process was multistep, fast and diffusion controlled. The pseudo-second-order rate model well described the biosorption kinetics. The equilibrium data of zinc biosorption fitted best with Sips isotherm model and the maximum biosorption capacity of biosorbent from this model was calculated as 115.198 mg g⁻¹. Thermodynamic parameters indicated that the biosorption process was physical and spontaneous. The results showed that the used material could be used as a green and efficient biosorbent for zinc removal from aqueous effluents.

Keywords: biosorption, heavy metal pollution, phycoremediation, waste seaweed biomass
Usage of Backyards as Urban Agricultural Area in Balıkesir City: Modernity or Tradition?

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Introduction: According to the United Nations, 65% of the world's population will live in cities in the next fifty years due to immigration, where food prices will also be higher compared to rural areas. At this point, however, the backyards in the cities are the living spaces that people have created with the aim of being integrated with and closer to nature. The purpose of this study is to examine the agricultural activities in the front, side and back gardens of Balıkesir. Balıkesir is on high demand for migrants in recent years, but the difficult living conditions and the migrants are also bringing rural activities to urban areas. Within this scope, agricultural activities continue in limited areas within the city. These gardens with limited space also offer an economic contribution to the residents.

Material and Methods: For this purpose, every garden in Balıkesir was visited and agricultural activities were noted. This information was combined with Geographic Information Systems and map based data to obtain spatial data. Statistical clustering and spatial distribution on spatial data were determined by geo-statistical methods. Moran I and Getis -Ord G statistics were used to test whether clustering was present or not.

Results: The results of the analysis show that from the centre to the periphery the use of gardens for agriculture is increasing. This shows that most of these urban areas are the ones with migrants from rural areas. To the inner of the city centre and the areas with different social and economic characteristics, the number of gardens decrease and the functions of usage change. This shows that it is concentrated in the regions that receive the most immigration in the city. However, the agricultural use of the gardens is not a temporary phenomenon or only brought by migrants from rural areas, but rather a complementary part of the ecological and economic system of the city, using typical urban opportunities.

Discussion: In recent years, it has also provided practical solutions to poverty, unemployment and food security as a method of urban development. Eventually, urban agriculture can provide countless economic benefits to a community. For this reason, plans should be made for their development of these gardens when agricultural areas within the city of Balıkesir are still present. The map-based existing agricultural lands and clusters of agricultural gardens in the city will have a guiding role for urban agriculture planning.

Keywords: backyards, Balıkesir, geographical information systems, geo-statistics, urban agriculture
Zoonotic Fish Pathogens in Fish Farm of Kastamonu, Turkey

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Introduction: Importance of zoonotic diseases are day by day increasing owing to its risks and effects. For this reason, careful evaluation, examination and monitoring of foodstuffs in terms of human health is important. The microbial flora of processed and fresh aquatic organisms should be carefully examined in the evaluating stage. Also the bacterial flora of the aquatic organisms is determined by the environment in which it lives. According to, this the objective of the study was to research of the zoonotic fish pathogens in the fish farms of Kastamonu, Turkey.

Material and Methods: Samples collected from 5 fish farms for the bacteriological analyses at 2015 and 2016. Farm I, II and III based in different streams, farm IV and V established in a dam lake. Dissolved oxygen, pH, salinity, temperature, conductivity and resistivity are measured in these farm. Ten fish and water samples were taken in duplicate from each fish farm for the bacteriological investigations. Bacteria were isolated from samples with dilution plate methods. Gram staining, catalase, oxidase and motility were using for presumptive identification of the bacterial strains. Biochemical characteristics of bacteria were determined with API test kits.

Results: Four zoonotic fish pathogen were isolated from fish farm. Aeromonas hydrophila can be find in fresh water, aquatic plants, fish and fish eggs, which is a pathogenic bacterium for both human and fish. It causes gastroenteritis, vomiting, fever, epigastric pain, septicemia, arthritis, meningitis and peritonitis in humans. Pseudomonas aeruginosa causes various lesions and fever in the body for human. Vibrio fluvialis may be dangerous for human health with produces toxins. It is known that this bacterium, which causes gastroenteritis, diarrhea, lesions and bacteremia in humans, causes diseases in shellfish and their eaters. Burkholderia cepacia, which is pathogenic for human, can be found in the water and sediment, also cause cystic fibrosis in human.

Discussion: Unsurprisingly, Aeromonas hydrophila, Pseudomonas aeruginosa, Vibrio fluvialis and Burkholderia cepacia were isolated from these farms on account of its natural living environments. These bacteria can be cause zoonotic infection for human. For this reason, fish producers must pay attention to hygiene rules and monitoring the aquaculture environment.

Keywords: zoonotic fish pathogens, Aeromonas hydrophila, Pseudomonas aeruginosa, Vibrio fluvialis, Burkholderia cepacia
Introduction: Growing World population increases urbanization and population density in cities. This change also increases the production and consumption that is necessity to provide needs of people live in cities. Increased consumption growing brings about to increase solid waste and environment problems along. Solid waste management which one of important issue in point of human and environment health has several risks for workers’ health in process steps. Environmental problems based on urbanization also pose a danger to human and the environment. The aim of this work is to explain the environmental problems which depend on urbanization, urbanization and risks and problems that solid waste workers face to face in terms of occupational health by increasing of solid waste that depends on urbanization and to present solution proposals.

Material and Method: The study was formed by examining the results of previous research about impact of urbanization on environment, urbanization and problems of environment, solid waste and solid waste management, occupational health problems on solid waste workers. It has been analyzed articles and reports from 2006 to 2017 for collection of research results.

Results: Urbanization brings about to negative environment effects on water, soil and air due to consumption. Generation of solid waste is increased by urbanization and, so exposing to risks for solid waste workers increases. It has been observed various occupational diseases which occurred in solid waste workers on process of collection, transferring, separating, incineration of solid wastes. It has determined that this diseases emerge from physical, infectional and microbiological factors and led to serious harmful results in workers’ health.

Discussion: Environment and human health are at risk due to increasing urbanization. Unless environment that has vital importance for human life are not protected by taking necessary protection or editing, human life will remain at risk. In addition, increasing of solid waste that caused by urbanization has also diverse risks for human health. In this context, it is obligatory to take necessary precautions for workers in solid waste sector.

Keywords: urbanization, enviromental problems, solid waste workers, occupational health
The Impacts of Urbanization on Environmental Sensitivity: A Case Study in the Gulf of Edremit, Balikesir-Turkey

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Introduction: Land degradation and desertification are global phenomenon indicate that loss in the biological and economical productivity of land caused by natural processes and human activities. There is a close relationship between urbanization and the increasing environmental sensitivity of Mediterranean landscapes to degradation at either regional or local scales. The increase in the grade of land sensitivity in the Mediterranean region was not distributed homogeneously over time and space while impacting especially natural landscapes around the urban areas. The Gulf of Edremit is rich in natural resource and cultural heritage and also very important in terms of olive production. The aim of the study is assessing environmental disparities caused by urbanization in the Gulf of Edremit and discussing of the relation between the environmental sensitivity and the recent boundaries determined as the new residential areas in the territorial plan.

Material and Methods: In this study, Environmental Sensitivity Area Index (ESAI) was chosen to determined land vulnerability. A total of 18 parameters related to soil, climate, vegetation and land cover properties were utilized in the creating of this index. The parameters that used to calculate ESAI were obtained from field studies and data's provided by the relevant institutions. Multi-Criteria Decision Analysis used to assess the value of ecological sensitivity, using environmental parameters in the Gulf of Edremit and Inverse Distance Weighting used to interpolate all data's to field.

Results: Results show that large settlements such as Altinoluk, Akcay, Edremit, Havran and Burhaniye in the Gulf of Edremit were determined as critical level in terms of environmental sensitivity. Another important indicator in this regard is the determination of the situation around the settlements. It has been determined that environmental sensitivity was high at the around urban settlements except for Edremit and Altinoluk. The most important reason for this is the presence of Ida Mountain in the north of Edremit and Atinoluk. The olive groves in the south of the Edremit worst affected from settlement pressures because of these areas have been identified to very high environmental sensitivity.

Discussion: Processes resulting land vulnerability to degradation are regarded as constantly changing variables. In this study, the high majority of the urban areas appear to be mostly critical sensitive like most Mediterranean Countries. Based on these results and literature adverse effects of urbanization were found to be a relevant cause of environmental sensitivity in Mediterranean Region.

Keywords: urbanization, environmental sensitivity, land degradation, environmental sensitivity area index
Predicting the Height to Crown Base in *Pinus brutia* Based on Tree Characteristics

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**Introduction:** Forest fires are an important ecological factor affecting on vegetation dynamics. Forest fires generally initiate as surface fire and turn into crown fires under suitable fuel and weather conditions. In transition from surface fire to crown fire, crown base height (CBH) which is defined as vertical distance from ground surface to live canopy base is a critical parameter. The greater the height of the crown base, the more intense the surface fire must be to induce a crown fire. CBH is rarely measured in the field, because the measurements involved are very time-consuming. It is necessary to estimate CBH depending on the tree parameters which is and easily obtainable (measurable, determinable) and existing in management plans. The aim of this study is to develop models that predict CBH for *Pinus brutia* depending on parameters obtained from management plans like, tree height and diameter at breast height (DBH, 1.3 m above ground).

**Material and Methods:** The study area is located in Adalar in Istanbul, north-west of Turkey. *Pinus brutia* forest stands were selected in this study, because this species are sensitive to crown fire. 21 plots were taken and 367 trees were measured. For each of the 367 trees, diameter at breast height, tree height and crown base height were measured. Prior to the regression analysis, the normal distribution of the data was tested by Kolmogorov-Smirnov analysis and it was determined that the data distributes as normal. Thereafter, we developed the regression models to estimate CBH for *Pinus brutia* and also the success of the model was tested using root mean square error (RMSE).

**Results and Discussion:** For *pinus brutia*, determined tree characteristics ranged between 8-39 cm for DBH, 3-15 m for H, and 0.4-10.10 m for CBH. As a result of correlation analysis, we found 74% correlation between CBH and DBH, 90% correlation between CBH and H. When the DBH and H together were used as independent variables, the developed model was able to account for 82.2% ($R^2_{adj}=0.822$) of variance in CBH and RMSE were found as 1.07 m. We achieved a good correlation between the estimated and measured CBH values for *Pinus brutia*. The regression models developed for predicting CBH explained a high percentage of the observed variability. It is clear that DBH and H parameters provided by forest management plans can be used to predict CBH. Thus, the developed CBH model can be utilized for the prediction of crown fire potential and behavior.

**Keywords:** forest fire, *Pinus brutia*, crown fire, crown base height (CBH).
**Introduction:** The ecology of the forest vegetation is one of the key factors in the classification of forests and application of silvicultural application for the sustainable forest utilization and productivity. On the other hand, the competition occurring among the trees and shrubs enlighten by means of ecological conditions of trees in the given area. Forest successions also determine depending on ecological conditions. The main aim of this study is to explain the forest trees ecology and composition of the tree species of each forest belt and to depict the main spreading areas of forest trees and pioneer species occupying the abandoned fields.

**Method and Materials:** The ecological conditions such as parent materials, topography especially altitude and aspects, climate, soil and vegetation distribution were examined in the study area. The ecology of the beech (*Fagus orientalis*), black pine (*Pinus nigra*), scots pine (*Pinus sylvestris*) and Calabrian pine (*Pinus brutia*) were mainly obtained. The forests were divided into belts in terms of ecological conditions. Vegetation profiles were drawn to show vertical and horizontal spreading of the forest belts.

**Results:** The forests of the study area can be divided into four main belts. Broad leaved deciduous forest belt is common on the lower belt of the Kure Mountains lying parallel along the Black Sea coast which extends up to 1200 m. The climate of area favours growth of forest of *Fagus orientalis*, *Tilia* sp., *Alnus glutinosa*, *Castanea sativa*, *Carpinus betulus*, *Tilia tomentosa* and *Quercus* sp. Yearly relative humidity is more than 70%, and fog formation is common during the vegetation period. Coniferous forest belt of Küre Mountains occurs between 1200 and 2000/2200 m elevation and is divided into two belts according to conifer tree species: a. North facing slopes of the Küre Mountain are mainly covered by fir (*Abies nordmanniana* subsp. *Bornmuelleriana*) that grow under the foggy conditions. b. South facing slopes of Küre and Balli mountains are covered by the scots pine (*Pinus sylvestris*) forests that grow under the direct solar radiation. On the other hand, mixed forest composed of *Pinus sylvestris* and *Abies* trees is found in the southern part of the Black Sea Mountains. *Quercus* and *Pinus nigra* forest belt is the main spreading areas of *Quercus* sp. and *Pinus nigra* forests that grow under the semiarid-subhumid with sunny conditions. Coniferous forest belt of Ilgaz Mountains is mainly composed of *Pinus sylvestris* and *Abies nordmanniana* subsp. *Bornmuelleriana* depending on direct solar and diffuse solar radiation. *Pinus sylvestris* forests both pure and mixed with *Carpinus* sp. and *Pinus nigra* grow not only on the northern lower edges of Ilgaz Mountains but also on the area that receive direct radiation on the lower slope of Küre Mountains. *Abies* forests are common on the north facing slopes that receive high amount of fog.

**Discussion:** The ecological conditions of study area are responsible for the formation four main forest belts composed of many trees and shrubs. Human impact also plays an important role in the distribution of forests. With the growing of native broad leaf trees such as *Fagus*, *Tilia*, and *Castanea* and so on these coniferous clusters disappear at the ends of a felling cycle. The oak stands are also widespread where *Pinus nigra* forests have been completely destroyed.

**Keywords:** forest ecology, forest belts, Black Sea Region, Turkey
Phytosociological Characteristics of Aquatic Forest Association in Azerbaijan

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Introduction. In addition to other vegetation types, aquatic forest troops are also encountered in the Azerbaijan landscape. These units are in order; especially in the coastal areas of the Kür and Araz rivers, around the Kizilagac Bay and Lake Candar.

Materials and Methods: During 2010-2016, plant samples collected from these areas were collected and herbarium specimens were collected. Herbarium specimens are stored in the Azerbaijan MBA Botanical Institute herbarium laboratory. In many coastal waters of stagnant water and lakes, these troops are spread in the form of stains on different types of vegetation (desert, semidesert, steppe, meadow, etc.).

Results & Discussion: Taxa belonging to the family Poaceae, Cyperaceae, Ranunculaceae, Fabaceae, Potamogetonaceae, Juncaceae, Salicaceae, Chenopodiaceae and Brassicaceae were dominant. in these units that love the aquatic environment habitats; 12 tree-bodied plants were encountered. It has been determined that there are 8 plant associations belonging to 2 classes, 2 ordos and 3 wedding rings in the aquatic forest troops where hydrohalofit, psammohalophite and mesophytic plants predominating predominantly around the sweet watery river and lakes. From these troops: Verbasco thapsus-Hippophaetum rhamnoidesae ass. nova, Rubieto-Elagnetum angustifoliae ass. nova, Pterocaryo pterocarpa-Fraxinetum exselsa ass. nova, Tamaricetum ramassimae ass. nova, Phragmeto-Tamaricetum ramosissimae ass. nova has been introduced for the first time in the world of science.

Keywords: aquatic habitat, forest troops, diversity, Azerbaijan
Identification and Biodiversity of Genus Padina Distributed on Coast of Black Sea, by the Molecular Methods

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Introduction: Identification and biodiversity of Padina species found in Turkey’s Black Sea coast was determined by conventional methods. However, there is no study carried out with molecular methods in this respect. For this reason in this study, we aimed to determining species of the genus Padina along Black Sea coast of Turkey, and the biological diversity using conventional and molecular methods.

Material and Methods: Between April 2015 and October 2017 samples were taken from stations along the Black Sea coast. Seven of these stations were found examples of genus Padina. The rbcL and cox3 base sequences of the obtained samples were determined and analyses were performed on these sequences.

Results: The phylogenetic, morphological and anatomical analyses of the obtained samples show that these samples belong to the Padina pavonica. This study is the first work on the molecular identification of the genus Padina in the Black Sea, and it contains the first molecular records of this species in the region.

Discussion: As a result of this study, it is seen that the genus Padina is represented by Padina pavonica in the Black Sea and the species have begun to separate from the Mediterranean lineage, while showing no morphological differentiation. It has also been found that these spread areas of Padina pavonica that contained in the Black Sea during the last 20 years have decreased.

Acknowledgement: We would like to express our appreciation to the scientific and Technical Research Council of Turkey which supported this study with 115Y462 project.

Keywords: Padina, Black Sea, rbcL, cox3
Introduction: Topographical factors, especially aspects, can play a significant role on the site quality. Changes in organic layers, soil organic carbon and total nitrogen contents and stock capacities in soils strongly influence soil properties, litter quality, plant growth and developments, so unsuitable environmental conditions lead to degradation of soil and poor environmental quality. South-facing slopes, which receive the greatest amount of solar radiation, are typically hot, dry and subject to rapid changes in seasonal and diurnal microclimate. In contrast, north-facing slopes, which receive the least amount of insolation are cool, moist, and subject to slow changes in seasonal and daily microclimate. Therefore, we set up a study to investigate the effects of aspect on soil properties, soil organic carbon (SOC) and total nitrogen (TN) contents and stock capacities of Scots pine and Black pine at higher altitude in Daday, Kastamonu.

Material and Methods: For this aim, soil samples of Scots pine and black pine stands were collected from the altitudes of 1150 m on the north- and south aspect. The soil samples were taken randomly from 0-5 cm, 5-10 cm, 10-15 cm, 15-20 cm, 20-25 cm and 20-30 cm soil depths and analyzed for soil pH, soil texture, bulk density, SOC and TN contents.

Results: Soil properties showed significant variations with aspects and soil depths, but these differences varied with tree species. Soil organic C and total N content and stock capacities of Scots pine and Black pine stands showed significant variations with the aspects. Mean SOC and TN contents for Scots pine on the north aspect (3.11% and 0.126% respectively) was higher than on the south aspect (2.29% and 0.101% respectively). Similarly, for black pine, mean SOC and TN contents on the north aspect was higher (4.42% and 0.240% respectively) than on the south aspect (2.67% and 0.172% respectively). As for the SOC and TN stock capacities for Scots pine, mean SOC and TN stock capacities were higher (128.7 Mg C ha⁻¹ and 4.94 Mg N ha⁻¹) on the north aspect than on the south aspect (83.9 Mg C ha⁻¹ and 4.30 Mg N ha⁻¹). For black pine, mean SOC and TN stock capacities were higher (113.1 Mg C ha⁻¹ and 6.12 Mg N ha⁻¹) on the north aspect than on the south aspect (86.4 Mg C ha⁻¹ and 5.67 Mg N ha⁻¹).

Discussion: The results indicate that topographical factors, the aspect in this present study, can significantly affect soil properties and SOC and TN content and stock capacities. Therefore, these factors should be considered in the future studies. However, more studies are needed to reach a general conclusion.

Keywords: aspect, carbon, nitrogen, stock capacity
Magnetized Fungal Bio-Solid Phase Extractor for Enrichment Of Co(II) from Food Samples

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Introduction: Until now, some processes like column solid-phase extraction (SPE), liquid–liquid extraction, and magnetic solid-phase extraction (MSPE) have been widely employed for the preconcentration of Co(II) from natural substances. Among these processes, MSPE seems to be one of the most powerful selections because of its ease of high extraction efficiency, automation and rapid phase separation.

Material and Methods: The presented investigation studied application of magnetized fungal bio-solids phase extractor as a biosorbent for magnetic solid phase extraction and enrichment of trace amounts of Co(II), from environmental food samples using inductively coupled plasma-optical emission spectrometry (ICP-OES). Magnetized Coprinus micaceus was characterized by FT-IR, SEM and EDX analyzes before and after extraction. After extraction and collection of magnetized bio-solids phase extractor, the analyte was desorbed utilizing 0.5 mol L−1 of HCl.

Results: Effects of pH, flow rate, amount of magnetic nanoparticles and fungal biomass, type of eluent type, volume and concentration, interfering ions, and sample volume on extraction yield of Co(II) were examined and optimized. The biosorption capacities were obtained as 24.7 mg g−1. Under the optimized conditions, LOD and LOQ for Co(II) were determined. Certified reference materials were applied to find out the accuracy of the prepared bio-MSPE method and and good recoveries (97–102%) with low RSDs were obtained.

Discussion: This novel bio-MSPE method was accomplished by being applied to real food and water samples for determination and enrichment of Co(II).

Keywords: biosorbent; magnetic solid phase extraction; Co(II); trace analysis
Investigation of Changes in IL-1β, IL-6 and TNF-α levels in Permethrin-Exposed Carp Fish (Cyprinus carpio L. 1758)

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Introduction: Permethrin is a pyrethroid insecticide. It is used to control pest and insect invasion in large scale, in agriculture and animal breeding industry. Permethrin which is flowing from the agricultural area to the aquatic environment has a high toxic effect on fish. Proinflammatory cytokines (interleukins 1β and 6, tumor necrosis factor α) are important regulators released by the immunological system. We aimed to investigate the effect of permethrin on carp fish (Cyprinus carpio L. 1758) IL-1β, IL-6 and TNF-α levels.

Material and Methods: In this study, the effect of synthetic pyrethroid permethrin on the IL-1β, IL-6 and TNF-α of carp (Cyprinus carpio L. 1758) at acute (4 days) and subchronic (21 days) duration and at different doses (control, vehicle, 10 ppm and 20 ppm) was researched. The carps used in the experiment were transported from Yedikır Fisheries Farm (Samsun, Turkey). They had the weight of 50-60 g and length of 12-14 cm. The experiment was carried out with a semi-static system in natural light (12h light-12h dark). During the experiment, fish were nourished with Pinar pellet feed (45% protein, 19% fat, 3% crude fiber) once a day. Hormone analysis was performed by using commercial ELISA kit. IL-1β, IL-6 and TNF were tested in this context.

Results: As a result of the analysis, the increases in IL-1β, IL-6, TNF-α levels were found statistically significant in both acute and subchronic duration according to the control and acetone. In comparison between the periods; statistically significant increases were found in IL-1β, IL-6, TNF-α levels in the permethrin 10 ppm and 20 ppm dose groups.

Discussion: Many studies have reported that synthetic pyrethroids interfere with biosynthesis, metabolism and the effects of hormones. Our study also showed that permethrin, a synthetic pyrethroid, has an induced effect on proinflammatory cytokines. If our work will be supported by other studies, people should be aware of the use of permethrin in the agricultural area and they should avoid using it there.

Acknowledgement: We would like to express our appreciation to the Amasya University Scientific Research Project Commission, which supported this study (Project no: FMB-BAP-17-0285). Approval of the Ethics Committee of the study was taken at the Ahi Evran University Ethics Committee for the Local Use of Animals in Experiments (approval letter dated 16.12.2016 and numbered 4).

Keywords: permethrin, Cyprinus carpio, IL-1β, IL-6, TNF-α
Determination of dl-PCB and indicator PCB levels in meat samples by HR-GC/MS

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Introduction: PCBs are not a single compound, but a class of chlorinated organic compounds comprised of a biphenyl backbone with substitutions of from one to 10 chlorine atoms. Although there are 209 possible unique patterns in which these chlorines can be substituted onto the biphenyl rings, in practice there are about 100 to 150 individual compounds (termed congeners) that are present in the PCB formulations that have been in use and found in environmental samples. PCBs are now considered the most widespread pollutant on the planet. In industrial countries, the contamination originates from inadequate disposal and leaks from equipment. In remote areas where PCBs were not used, the contamination resulted from atmospheric transport. PCBs readily adsorb to organic materials, sediments, and soils. Consequently, PCBs are widespread in the environment, whereby humans are exposed through multiple pathways. Levels in air, water, sediment, soil, and foods can vary over several orders of magnitude, often depending on proximity to a source of release into the environment.

Material and Methods: Samples were prepared by considering the Bligh & Dyer and by using the PowerPrep Multi-Column Sample Cleanup System (total prep extraction and clean-up system for rapid analysis of dioxins, PCBs, and other POPs in food and other environmental samples). Milk, meat, cheese and butter samples were bought from local markets in Mardin, Turkey.

Results: PCB 123, PCB 118, PCB 114, PCB 105, PCB 167, PCB 156, PCB 157, PCB 189, PCB 81, PCB 77, PCB 126 and PCB 169 as dl-PCB, PCB 28, PCB 52, PCB 101, PCB 153, PCB 138 and PCB 180 as indicator PCB were measured in all of the samples.

Discussion: Results from validation and routine monitoring of dl-PCB and indicator PCB levels by HR-GC/MS in meat, milk, butter and cheese samples were presented and compared with regulated values. It was clear from the results that dl-PCB and indicator PCB levels meet the related requirements.

Acknowledgement: We would like to express our appreciation to the Mardin Artuklu University Scientific Research Project Commission, which supported this study (MAÜ -BAP-16-SHMYO-07).

Keywords: dl-PCB, indicator PCB, foods, HR-GC/MS
Introduction: Today, urban transformation is one of the most important urban issues in all around the world, and a very rich literature has emerged in this subject. Urban transformation duties are defined as significant tasks also for the local governments in the European Green Capitals. However, a holistic study of urban transformation practices in these capitals which are characterized with “green” has not yet been identified in the related literature. In this direction and from an ecological perspective, the aim of this paper was to investigate the urban transformation projects in the European Green Capitals. The research covered whole European Green Capitals that were Stockholm, Hamburg, Vitoria-Gasteiz, Nantes, Copenhagen, Bristol, Ljubljana, Essen, Nijmegen and Oslo in a chronological order.

Material and Methods: In the study, firstly the conceptual framework was briefly explained by reviewing the related literature of urban transformation and European Green Capitals. Then, the outstanding transformation projects in European Green Capitals were investigated by using the application forms and reports presented by Green Capitals to the European Commission.

Results: Hammarby Sjöstad Project in the first Green Capital Stockholm; $ 10 billion budgeted Harbor Region Transformation Project in Hamburg; industrial transformation projects in Vitoria-Gasteiz which could protect its medieval urban pattern; a series of small-scale conservation projects in Nantes; the Nordhavn Transformation Project in the City of Copenhagen that was considered as very successful model for the green economy; the Temple Quarter Transformation Project in Bristol; various transformation and rehabilitation projects for the solid waste repositories and the abandoned industrial zones in Ljubljana; the Zollverein Project in the old mining and industrial city Essen; the Heijendaal, Hatert and Ecopolis Waalsprong Projects in Nijmegen; and finally the Fjord City Project in the last Green Capital Oslo were identified as outstanding urban transformation projects in European Green Capitals.

Discussion: European Green Capitals’ projects, centered on sustainability in the environment and economy, were good examples of urban transformation since they regenerated the urban space and stimulated the green industry. These projects used new and green technology, and created attractive, healthy and environmentally friendly housing and working areas by transforming corrupted areas - such as old harbor and industrial areas, old solid waste disposal sites, abandoned housing areas. Further, new areas of work were offered through these projects. It was recommended that the further researches - as a single case or multi-case study - focus on the green transformation projects in Turkey.

Keywords: European green capitals, sustainable urban environments, urban transformation
ORAL PRESENTATION

Identify to Cows/Sheep Herd near Forest Area with High Resolution Digital Aerial Photographs: A Case Study Tercan, NE of Turkey

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Introduction: Remotely sensed data can provide researches good information in natural phenomena. Researches focused on pastoral migration cows and sheep herds in near the forest area using high resolution remote sensing data. Especially cows and sheep herds can be damaged forested area in Turkey. In this study determine herds number, animal count and how long forest area. The interaction between number of herds and forested area is the near pasture migration land. Ecological and socio-economic factors determine the current cows and sheep such as intensity of the ecosystem. It can be tested GIS with RS to analyze environmental variables cows and sheep pasture migration in Tercan, Erzincan. A remotely sensed data was determine to herds identify areas capable of nearest of forest area. There are 102 domestic farming and 27 pasture migration in study area.

Material and Methods: Tercan Forest Planning unit is the district of and its proximity, governed by the city of Erzincan, eastern part of Turkey. It is located in 39°50’14”–40°06’61”northern latitudes and 39°60’80”–40°74’61”eastern longitudes WGS 1984 UTM zone 37 with an average altitude of 1050 m from sea level. The surface area is 323950.2 hectare.

After all the photographs from the digital cameras have been downloaded individually into the computer, image measurement is carried out. All the photographs of the test field were measured semi automatically using close range photogrammetric software (Match AT Inpho). This software can be used to determine the 3D coordinates of the points on the object (i.e retro-reflective targets) and the camera calibration parameters.

Results: Animal herds can be harmful when they are close to forest areas. When the number of animals in the past increases, the soil is squeezed, the seedlings are damaged, and the seeds that are falling are damaged. The main problems are caused by animals’ herds that like to browse on the shoots of young plants i.e. sheep, deer, cows and occasionally wild goats. These damages can result in stunted, forked and dead trees causing failure of a plantation which is costly to replace. Cows can also cause serious damage by seedling and young trees. The animals in the study area have farmers around the forests or the extraterrestrials. Externally introduced droplets caused more damage to forests. There are 102 domestic cows and sheep herd that is majority of cow herds in study area. Sheep herds are mostly located closer to the forests. The majority of these rides are from outside.

Discussion: If the intensity of animal husbandry work is done in a planned way, it will not harm forests. Controlled animal husbandry is one of the building blocks of rural development. It is also important to continue the plan with the support of the airy and the forestry activities in the province of Tercan.

Acknowledgement: We would like to express our appreciation to the General Directories of Forestry in Turkey which supported this study.

Keywords: digital image, forest, animal herds, Erzincan, Turkey
Karyotypes on Ssection Anthylloidei of Astragalus (Fabaceae) from Turkey

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Introduction: The genus Astragalus L. (Fabaceae) has approximately 3000 taxa around the world. The genus is known to spread vigorously in cold, semiarid, and arid regions of the Old World (approximately 2400 species); in western regions of North America (about 450 species); and especially along the Andean Mountains in South America (about 100 species). The section Anthylloidei has 9 taxa represented in Flora of Turkey. The purpose of this study was to identify somatic chromosome numbers and karyological features of Astragalus taxa belonging to section Anthylloidei from Turkey.

Material and Methods: All samples were collected from wild populations from Turkey. Karyotype Analysis was defined with squash preparation method.

Results: The chromosome numbers of genus Astragalus (Fabaceae) section Anthylloidei DC. which grows naturally in Turkey are determined; Astragalus szowitsii, A. ermineus, A. zederbaueri, A. anthylloides, A. halicacabus, A. dictyophysus, A. mesites, A. wagneri are 2n = 16, A. surugensis is 2n = 48 and detailed chromosome morphology are revealed. The karyotypes of the species involved in the study are primary for the scientific world. It is a study which contributes in terms of cytogenetic to the revision of the section Anthylloidei.

Discussion: Among the taxa in the Anthylloidei section, the smallest and the largest chromosome size were found in A. wagneri with 1.59 μm and 4.18 μm. The smallest value for total haploid chromosome length was in A. anthylloides with 19.26 μm and the highest value was in A. surugensis with 62.97 μm. The smallest value for arm ratio length was A. surugensis with 1.00 μm and the highest value was in A. surugensis with 1.66 μm. The smallest relative length were found in A. surugensis with 2.99 μm and the highest value is in A. wagneri with 18.15 μm. The smallest value of the centromeric index was found in A. surugensis with 1.33 μm while the largest value was measured as 7.93 μm in A. wagneri. Total lengths of somatic chromosomes were 2.92-4.09 μm in A. szowitsii, 2.05-3.70 μm in A. ermineus, 1.88-3.43 μm in A. surugensis, 1.99-3.83 μm in A. zederbaueri and 1.85-3.13 μm in A. anthylloides, 1.89-3.49 μm in A. halicacabus, 1.89-3.13 μm in A. dictyophysus, 1.93-3.11 μm in A. mesites and 1.59-4.18 μm in A. wagneri.

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Keywords: Anthylloidei, Astragalus, Fabaceae, karyotype, Turkey
Introduction: Turkish red pine (Pinus brutia Ten.) is one of the main forest tree species in the eastern Mediterranean region. The species has relatively wide altitudinal distribution area, ranging from sea level up to 1500 m on the Taurus Mountains. The aim of this study, by applying quantitative genetics methods, is to investigate genetic variation in diameter growth among six different P. brutia populations coming from different altitudes and planted on two test sites within its natural distribution range.

Material and Methods: Provenance + progeny trials were established by the second author in 1979 at four test sites. Two of these test sites were located at Kepez (90 m above sea level) and Duzlercami (350 m above sea level) near Antalya city, Turkey. Each of the test sites included the same sets of seedlings from six different populations (and 10 families within each population), coming from different elevations from sea level up to 1100 m. Diameters at breast height (dbh, with bark) were measured on the total of 990 trees when the trees were 35 years old in 2012. Statistical analysis was performed by using SAS 9.3 program. Broad-sense (family means) heritability value for dbh character was also estimated.

Results: At age 35 years, populations coming from middle altitudes exhibited generally better diameter growth than either of the lower and higher altitude populations at Duzlercami test site, which is located within middle elevation zone. However, at Kepez test site, which lies in lower elevation, lower altitude populations were more successful than both middle and higher elevation populations. One of the most notable and significant differences was observed between a mid-altitude population (Murtbeli) and a high-altitude population (Hacibekar) when data from both test sites were pooled. We also observed significant differences between the two test sites. Broad sense (family means) heritability was estimated to be 0.282 for dbh character.

Discussion: Diameter growth of P. brutia exhibits a considerable variation among (and within) natural populations coming from different altitudes. Broad-sense heritability value points out that variation among populations and among families (within populations) have a moderate genetic base. Populations coming from low altitudes perform better than the other populations at the low elevation test site, while middle altitude populations become more successful than the others at the middle elevation test site. This also refers to a statistically significant Genotype × Environment interaction on P. brutia. Therefore, altitudinal genetic variation, as well as plantation site qualities, should be taken into consideration for forestry practices such as selection of seed sources, determination of seed transfer zones, and planning of genetic resource conservation programs concerning P. brutia.

Acknowledgement: This study is a part of a larger research project supported by The Scientific and Technical Research Council of Turkey (TUBITAK-Project No: 112O251). TUBITAK also supported Dr. Yusuf KURT as a post-doc researcher during the certain period of the project. Field works were carried out through logistic support provided by Southwest Anatolia Forest Research Institute in Antalya. We acknowledge the contributions of all involved persons and institutions.

Keywords: altitude, diameter, genetic variation, Turkish red pine
Antioxidant Response in *Gammarus pulex* After Exposure to Secondary Effluent from Municipal Wastewater Treatment Plant, Elazig, Turkey

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**Introduction:** In general, biomarkers have gained much attention, since they generate an alternative to chemical determinations and can be assayed supplementary for the evaluation of the environmental effects of wastes. Among the invertebrates, amphipods of the genus Gammarus, and particularly the freshwater amphipod *Gammarus pulex* (Crustacea, Amphipoda), are widely used for the assessment of toxic effects of contaminants. This genus is known as a suitable organism for ecotoxicological studies of aquatic ecosystems due to its ecological and ecotoxicological importance, and high level of sensitivity; this organism is a food source for organisms such as frogs, fish and birds. In this study, selected biomarkers of antioxidant system of *G. pulex* were investigated in vitro for the assessment of effluents quality. Biomarkers in *G. pulex* included the determination of SOD, CAT, GPx, GST and MDA.

**Material and Methods:** The wastewater of Elazig City was collected and then treated in the conventional activated sludge process. The effluent from the city treatment facility is discharged into Keban Dam Lake. Five liters of the effluent and reference water (Munzur River) were collected from 1 day before the experiment and stored at 4 °C. All chemical measurements were measured according to standard methods. Individuals of *G. pulex* were collected with handnets in Munzur River from Tunceli, Turkey. SOD, CAT, GPx, GST and MDA activities in *G. pulex* were determined by using ELISA kit in the groups of control and the groups exposed to secondary effluent. One-way ANOVA and T test were used to determine the significance of differences in oxidative stress biomarkers.

**Results:** The level of MDA and the activities of SOD in *G. pulex* varies depending on the exposure time. GPx activities increased in *G. pulex* exposed to the effluent compared to the control during 24 h and 96 h. CAT activities in secondary effluent group were found lower than the control in *G. pulex* during 24 and 96 h. GST activities in secondary effluent group were not changed to the control in *G. pulex* during 24 and 96 h. Current experimental results suggest that SOD, CAT, GPx activities and MDA level in *G. pulex* are sensitive and suitable responses for assessing the effects of anthropogenic contaminants on the aquatic ecosystems, particularly effluent complex mixtures.

**Discussion:** Our results suggest that wastewater caused a significant oxidative stress by disregulation in the antioxidant system. Different toxicants may induce different antioxidant/prooxidant responses depending on their ability to produce reactive oxygen species and antioxidant enzymes to detoxify them. Furthermore, more biochemical biomarkers should be tested against the wastewaters before valid interpretations could be made.

**Keywords:** MDA, antioxidant enzymes, wastewater, *G. pulex*
Investigation of Oregano (Origanum L.) Genetic Diversity in Turkey

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Introduction: *Origanum* L. is one of the most important herbaceous plants. It is commonly used in traditional medicine and for culinary purposes. For decades, the classification of *Origanum* species has depended on Ietswaart’s (1980) categorization. This classification was based on morphology and described ten sections composed of different taxa. In Turkey, there are *Origanum* individuals from eight of Ietswaart’s sections. Turkey is rich in these *Origanum* species and they are widely distributed throughout the country. There are several *Origanum* taxa with diverse biochemical profiles and most of them are endemic to Turkey. However, their genetic diversity has not yet been clearly understood. Therefore, there is a need to evaluate the genetic diversity in natural oregano populations in Turkey. In this work, the genetic diversity and population structure of eight oregano sections were be investigated with SRAP (Sequence-related Amplified Polymorphism) and EST-SSR (Expressed Sequence Tag-Simple Sequence Repeat) markers.

Material and Methods: Herbarium specimens composed of 46 individuals from 24 populations (22 species) were provided from İnönü University herbarium collection. Turkish oregano populations were screened with SRAP (25 primer pairs) and EST-SSR (6 primers) markers. Data was scored according to the presence (1) and absence (0) of an allele. Data matrix was used for determination of gene diversity (GD), dendrogram divergence, principle coordinates (PCoA) and population structure.

Results: A total of 325 alleles was obtained from genetic screening of the populations. The highest gene diversity value for SRAP markers was observed as 0.39 for em4-me3 marker. The highest gene diversity for EST-SSR markers was evaluated as 0.49 for OR09 marker. The dendrogram analysis and principle coordinate analysis resulted in three main clusters. Population structure analysis not only resulted in the highest $\Delta(K)$ value for $K=3$ but also gave the highest likelihood value for $K=8$.

Conclusion and Discussion: All biostatistical and bioinformatic analyses supported that cross-taxon hybridization is ongoing in the genus *Origanum*. Also, restricted geographical locations might have an effect on low gene flow and generation of isolated populations.

Acknowledgement: We are grateful to Inonu University (Faculty of Pharmacy) for providing herbarium specimens.

Keywords: oregano, genetic polymorphism, SSRs, SRAPs
Importance of Some Ecological Factors in Farming Animals

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Introduction: Almost all of the economically important characteristics of farm animals are more or less affected by the environment. Climatic factors such as ambient temperature, light, humidity, air movement, precipitation, along with factors such as nutrition, breeding, maintenance and housing are important ecological factors for livestock. These environmental factors affect the breeding, productivity and other biological functions of animals. However, even when a very good environment is provided, some animals can not deliver the expected and desired benefits. In this case, there is a problem of inadequacy of the genetic structure which constitutes high efficiency ability in animals.

Physical Environment: In the climatic environment as the optimum value for cattle and sheep, it is desired that solar radiation is 13-18 ° C in the air temperature, 60-70% relative humidity, 5-8 km/h in wind speed and medium level. Such an environment occurs in the subtropical latitude region in spring and autumn. Besides all this, regular rain is desirable to get quality products from efficient soil. In addition, the environment should be free from parasites and diseases. Such a natural environment is not found anywhere in the world.

Climatic factors: Climatic factors are temperature, humidity, solar radiation, precipitation distribution and air movements, which are related to animal production performance and which will keep this production at the highest level.

a-Temperature: Current farm animals try to maintain a constant body temperature. They are homeothermic. During all the yield functions (meat, milk, eggs, etc.), the heat comes to the fore. In addition, in the summer months or in tropical regions, solar radiation affects the efficiency of animals by making it difficult to lose heat from the body. Essentially the normal temperature for humans disturbs farm animals. Farm animals are comfortable in the cool rather than the hot, or even in the cold. As the weather cools, the animals’ appetite increases and on the other hand their productivity increases. The temperatures that can be considered suitable for cattle according to various studies are between +22 ° C and -10 ° C.

b-Moisture: The effect of humidity on farm animals is mostly indirect, increasing the effect of temperature and cold, and even harming non-harmful air temperature. Moisture reduces resistance to cold in cold animals and reduces their yield. Research has shown that in hot or cold animals with dampness there are harmful effects on health, life, fertility, early development of feed utilization, meat and milk yields. Many pasture herbs grow rapidly when the temperature and humidity are high. With this growth, the lignin content of the plants increases rapidly while the nitrogen and carbohydrate portions decrease.

Result: Many environmental factors affect the breeding, yield, anatomical, morphological and physiological functions of animals. However, even when a very good environment is provided, some animals can not deliver the expected and desired benefits. The best indication of the suitability of the animals raised in a herd is the performance of the animal. This is a basic requirement for adaptation. The likely performance of the animal in the future will be accelerated by genetic progressive selection with an index in the early stages of life. It is also beneficial to determine whether the seasonal changes in the environment will cause stress to occur properly and whether any changes will be made in the maintenance and feeding work.

Keywords: farm animals, physical environment, climatic factors, biological functions
Effectiveness of Horizontal Separator Panel in Demersal Trawl Net
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Introduction: In this study, it was evaluated that effectiveness of horizontal separator panel in demersal trawl net.

Material and Methods: A modified trawl net, 900 fishing circle, divided into two separate panels as lower and upper panel from the beginning of trawl mouth. Experiments were carried out in the Gülbahçe Bay/İzmir/Turkey between 29.04.2013 – 08.05.2013 with R/V “EGESÜF”. Trawl hauls are standardized at 45 minute. Lower (LB) and upper bag (UB), which have polyamide 20 mm mesh sizes, were constructed for obtained the species in lower and upper parts. After hauling up the gear, the catches from the LB and UB were emptied onto the deck separately, sorted by species, and weighed. In addition, total lengths were measure for red mullet (Mullus barbatus), annular seabream (Diplodus annularis), Common pandora (Pagellus erythinus) and Blotched picarel (Spicara maena). T test was utilized for differences between LB and UB catches. The Kolmogorov–Smirnov (K–S) test was used to compare length distributions of the LB and UB specimens for red mullet, annular sea bream, common pandora and blotched picarel

Results: A totally 21 hauls were performed. In total 790.1 kg belonging to 51 species was caught. As weight 80 % of species retained in LB and 20% in UB (P <0. 05). While most of red mullet (96%), annular sea bream (87%) and common Pandora (65 %) were caught in LB, Blotched picarel (69%) was obtained in UB.

Discussion: Further developments should be explored; with square mesh codend, sorting grid and multi selective system considering behaviour of species

Acknowledgement: We would like to express our appreciation to the Ege University Scientific Research Project Commission, which supported this study (Project No: 2012/SÜF/024).

Keywords: horizontal separator panel, trawl net, red mullet, annular sea bream, common pandora, blotched picarel
Steppe Flora and Its Reflection to Urban Area (Ankara)

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Introduction: Inner Anatolian steppe flora is very rich from floristic composition and endemic species point of view. Topographical and edaphic factors play an important role for this diversity. Especially halophytic vegetation around Salt Lake and the vegetation on gypsum host unique flora and many endemic species. Today this enormous diversity of species in steppe, are exposed to massive destruction gradually owing to reasons; grazing, burning, industry, herbicide, urbanisation, afforestation, construction and widening of roads, land clearings, biotic factors etc. A different version of steppe in urban areas is observed which is called ruderal flora. But on the other hand, this flora also damaged by various factors in city of Ankara.

Material and Methods: Plant specimens collected during field excursions performed inside and outside of urban areas form the materials of this article. For evaluation of steppe flora in both region, results of the related articles and literature were considered. Situation of steppe flora and its reflection to urban areas were tried to explain with these data.

Results: The inner Anatolian steppe shows an anthropogenic character and known as secondary vegetation type. Only the area around the Salt Lake with its sandy soil covered by halophytic vegetation is known as primer steppe due to the unique conditions. It is very rich in terms of flora and endemic species owing to the special factors like sandy soil, geographical position and climatic conditions in the inner Anatolia. Steppe flora can penetrate into urban areas as ruderal flora in empty places, roadsides, and edge of parks, etc. This flora consists of 2389 species outside of cities in total. Of these, 264 (11%) are endemic. 1245 taxa (52%) are peculiar to the outskirts of urban areas and 156 taxa (6%) are peculiar to urban areas, and, 988 (41%) are common for both regions. Distribution of endemic species is composed of 24 taxa (1%) specific to urban areas, 240 (10%) specific to outside of urban areas and 122 common (5%) for both areas. The proportion of the total number of taxa and endemic species to the total number of species in urban areas in the steppe area, is 48% for taxa and 6% for endemics.

Discussion: Comparison of the steppe flora and the endemic species in inside and outside of the city reveals that the city flora is affected by the flora surrounding it to a great extent. Half of the species can be observed in the city. Further, the appearance of the vegetation is also found to be the same in both areas. Although, the city flora has a peculiarity with a small ratio of 6%, it is rich in the number of endemics with the ratio of 9%. For an urban area, this figure represents a significant variety. Protected small areas and microclimatic habitats in the city play important role for the endemics and peculiarity of city. While preparing urban development plans and recreational activities, it is very important to protect those species as in-situ or ex-situ for maintaining the biological diversity.

Keywords: Ankara, urban flora, ruderal flora, steppe
The Bryophyte Diversity and Ecological Characteristics of Samanlı Mountains (Sakarya-Kocaeli-Yalova-Bursa) in Northwest Turkey

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Introduction: Turkey has very different ecosystem types because it locates at the intersection of three phytogeographical regions such as; Euro-Siberian, Irano-Turanian and Mediterranean. So this geographic location enriches the flora and vegetation of the country. On the other hand, the investigations of fern and flowering plants in Turkey have been thoroughly researched in 11 volumes, but the studies on bryophyte are inadequate. That's why it is necessary to increase the number of studies on the bryophytes in order to find out bryofloristic composition of Turkey. In this study, our main aim to determine the bryophyte flora of Samanlı Mountains, where are located in the southern Marmara Region extend from the western edge of the Armutlu Peninsula in Yalova Province to Geyve Gorge in Sakarya Province, and to provide more data about bryophyte flora of Turkey, which will be written in the future.

Material and Methods: The bryophyte specimens were collected from Samanlı Mountains between 2013-2016. Collected specimens were identified using relevant literature. According to field observations and the relevant literatures, life forms, life strategies and the ecological characteristics of the collecting specimens were also determined. Vouchers are deposited in private herbarium of Uyar (GAZI BRY).

Results: In this study, 2512 bryophyte specimens were examined. As a result of the evaluation of the bryophyte specimens; 2 from Anthocerotophyta, 53 from Marchantiophyta and 277 from Bryophyta, which is totally 332 bryophyte taxa were determined.

Discussion: In this study, a floristic list based on bryophyte specimens collected from Samanlı Mountains were presented. In this list, Fissidens curvatus Hornsch., Thamnobryum neckeroides (Hook.) E.Lawto, Riccia beyrichiana Hampe and Scapania scandica (Arnell et H.Buch) Macvicar are second records for bryophyte flora of Turkey. In addition, several rare bryophyte records for Turkey such as; Buxbaumia viridis (Moug. ex Lam. & DC.) Brid. Ex Moug. & Nestl., Ephemerum crassinervium (Schwägr.) Hampe subsp. sessile (Bruch) Holyoak, Cinclidotus vardaranus Erdağ & Kürschner, Sphagnum auriculatum Schimp., S. inundatum Russow, S. palustre L. and S. fuscum (Schimp.) H. Klinggr. were determined. As a result of ecological evaluations, most of bryophyte taxa in this area prefer acidophytic, hygrophytic and sciophytic conditions. At the same time, according to life forms and life strategies analysis of these species; turf life form and colonist life strategy were determined as dominate.

Acknowledgement: This research was financially supported by TUBITAK (Project Numbers: 114Z337).

Keywords: bryodiversity, flora, liverwort, Marmara Region, moss
Antifungal and Bioherbicidal Activity Of Natural Distributed Salvia absconditiflora Greuter&Burdet Essential Oil in Kırşehir Province

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Introduction: Diseases, pests and weeds in agricultural areas are cause significant losses. To reduce these losses, intensive pesticides are used. Increased pesticides use has brought many problems. Therefore, alternative control methods have become obligatory. One of these methods is the use of essential oils and secondary metabolites of plant origin. This study was conducted to determine the antifungal effect of Salvia absconditiflora Greuter&Burdet (Synonym:Salvia cryptantha Montbret et Aucher ex Benth.) essential oil spread across Kırşehir on Sclerotinia sclerotiorum (Lib.) de Bary, Alternaria solani (Ell. & Mart.) Jones&Grout. and its phytotoxic effect on Lepidium sativum L., Amaranthus retroflexus L. plants.

Material and Methods: Essential oils were applied by impregnation with a micropipette on filter paper adhered to the covers of petri dishes. In the antifungal study 0 (Control), 0.5, 1, 1.5, 2, 5, 7, 10 μl/petri dish doses were used while in phytotoxicity studies 0 (Control), 0.5, 1, 5, 10 and 20 μl/petri dish doses were used. In the antifungal study, mycelium diameters in the petri dishes were measured by automatic calliper at the end of the 7- days incubation period, while in the phytotoxicity study, immediately after the essential oils were applied, the petri dishes were tightly sealed with parafilm and were incubated for 12 hours under light and 12 hours under dark at 25±2 °C.

Results: As a result, it was found that 10 μl/petri dose of S. absconditiflora essential oil inhibited the mycelium development of S.sclerotiorum by 9.30%, while inhibiting the mycelium development of A. solani by 54.40% compared to the control. S. absconditiflora essential oil inhibited A. solani and S.sclerotiorum mycelial growth by 100%, at 20 μl/petri dish doses. In the phytotoxicity study, seed germination of L. sativum and A. retroflexus was completely inhibited at a dose of 20 μl/petri dish. A similar situation has been observed in root and shoot development of test plants.

Discussion: These findings showed that the S. absconditiflora essential oil has high bioherbicidal and antifungal activity. This result shows that S. absconditiflora essential oil has potential to replace synthetic pesticides.

Acknowledgement: This work was supported by the ZRT.A3.17.005 numbered project of Ahi Evran University Scientific Research Projects Unit.

Keywords: Salvia absconditiflora, antifungal, bioherbicidal, essential oil, Kırşehir
Surface Modification of Fish Bones Using 3-(Methacryloyloxy) propyl-trimethoxysilane and Acrylamide

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Introduction: The waste products in many different areas are lately raised as increasing population, technological developments and uncontrolled industrialization. It is know that many different methods are used for eliminating wastes but most of these methods are both expensive and insufficient. The aims of this study, the fish bones as waste in fish production and similar waste products have been investigated to be converted useful and functional materials of economic value.

Material and Methods: The polymer modification of the apatite surface was carried out in two steps. In the first step, the apatite surface was silanized with 3-(Methacryloyloxy) propyl-trimethoxysilane (S₃). In the second step, the surface of the silanized apatite was polymerized with acrylamide (P₂). The synthesis steps are given in Figure 1(A) and 1(B).

Figure 1: (A) Silanization of Apatite Surfaces (HS₃) (B) Surface Polymerization (HS₃P₂)

Results: The element compositions of H, HS₃ and HS₃P₂ are given in EDS spectrums of Figure 2. As it is seen in EDS analysis, Si for HS₃ and HS₃P₂ was clearly observed as 0.3% and 0.1% by weight on the surface, respectively. Also, it is seen that nitrogen (N) of acrylamide was clearly determined as 10.9% by weight in HS₃P₂ molecules in EDS spectrum. According to the results, the element ratios in the EDX analysis give the percentages by weight of the determining elements such as Si, N, S, O in the surface of modified bone.

Figure 2: EDS spectrums of Fish Bone (H), Silanization (HS₃), Polymerization (HS₃P₂)

Discussion: The results show that the expected elements have been clearly determined in the EDX analysis and that there is modification on the surface. As a result, this study has shown that fish bones are suitable for chemical modification. Thus, fish bones and many waste products can be transformed into materials of economic value using the necessary methods.

Acknowledgement: We would like to express our appreciation to TUBITAK; this study was supported by TUBITAK Project No: 213M200.

Keywords: fish bone, surface modification, 3- (Methacryloyloxy) propyl-trimethoxysilane
Sustainability of the Limited Land Resources in Turkey: Situation Analysis (SWOT)

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Introduction: The ability to effectively maintain the functions of the ecosystem is closely related to the assessment of basic land resources such as soil and water within a conservation-utilization balance. Land degradation is one of the most significant environmental treats on arid region ecosystems. In this study, it was aimed to the attention land degradation processes in Turkey, analysed the conditions in terms of policy-science interaction by performing situation analysis (SWOT) and developed the effective strategies for sustainable use of land resources.

Material and Methods: Strengths, weaknesses, opportunities and threats (SWOT) analysis is defined as the strategic planning method used to summarize the key elements of your strategic environments. And, it is thought as the first step in the strategic planning and helps planners to identify the strategies of achieving goals by concentrating the key subjects. Within the scope of this analysis it was assessed both the strengths - weaknesses and opportunities - threats as the internal and external effects on developing strategies on Land resources and Sustainability in Turkey to make compressive evaluation on sustainability of the limited land resources.

Results: In this context, unsuitable land conversation practices such as deforestation etc. and its effect on soil functions (soil organic carbon stocks, carbon sequestration etc.), unsuitable land management strategies and results (salinization, soil erosion), climate change and its relation with water scarcity, drought and productivity and insufficient legal regulations subjects were evaluated in details. And, in the light of the performed SWOT analysis for “Land resources and Sustainability in Turkey”, six threats and six weaknesses were identified and to overcome their effects six significant strategies were recommended.

Discussion: Turkey is at the point of breaking for sustainability of its natural resources. Insufficient topographic and soil conditions, administrative problems and negatively changing climatic conditions made the condition adversely. The defined significant strategies were mainly explained under the headings of deficiencies in legal regulations in Turkey, the necessity of making comprehensive land use plans not only at the agricultural purposes but also at the regional and national scale, renewal of insufficient and unreliable databases of natural resources in terms of monitoring land degradation and climate change processes, supplying of the coordination and integration among governmental, academic, private, non-governmental organizations and land users and, dissemination of environmentally sound management practices. Finally, it is concluded that sustainable resource management must be ecologically, economically, politically and socially integrated in fragile ecosystems such as Turkey.

Keywords: land degradation, sustainable resource management, SWOT analysis, Turkey
The Importance of Karstic and Tectonic-Karstic Depressions in the Formation of Agricultural Lands of Mediterranean Region in Turkey

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Introduction: Karstic lands have special environmental importance in terms of the soil formation, forest growth and agricultural activities. In the sloping areas of karstic lands, soils are only found along the cracks and among the layers forming soft thin zone. While soil that developed in situ process is found on the tectonic-karstic. Moreover, the lake deposits form the main agricultural lands. In this study, the formation of soil and karstic-tectonic depression on the agricultural properties of Taurus Mountains will be explained.

Material and Methods: Soil formation processes were examined during the field works since 2000’s. Texture, CaCO₃, pH and organic matters of soil and parent materials samples were analysed at the soil laboratory of department of Soil Science and Plant Nutrition of Akdeniz University. The spreading of geological parent materials, the geomorphological evolution of topography and soil formation on topography were explain with geologic cross-section and topographic profile.

Results: The agricultural land in the Mediterranean Region covers small area, except alluvial plain, due to the existence of Taurus Mountain range that mostly composed of limestone. The flat lands with red Mediterranean soil and soft Neogene marly material of karstic and tectonic-karstic depressions are one of the main agricultural areas of Mediterranean Region. For instance, most of the green houses and citrus gardens are found on the karstic depressions having red Mediterranean soils extending along the coastal belt of Mediterranean Sea. The large tectonic depressions that formed because of collapse of the vertical faulting movements form main agricultural area in the upland part of the Taurus Mountains. Bucak and Korkuteli depressions, for example, containing soft marly deposits and red Mediterranean soils with granular structure and clayey texture is one of the apple and cereal crops production areas. The dejection fans composed of fine materials in the Korkuteli depression are suitable for the growth of apple and some vegetables. The terraces, made up of fine marly deposit, are formed according to old Neogene lake levels in the Elmalı basin correspond to agricultural areas. On the other hand, some karstic plains (poljes), that are found between 800 and 1200 m of elevation on the Taurus Mountains containing considerable red Mediterranean soils, form main cereals growing areas notably wheat and barley. Some depressions that occupied by the shallow lakes and swamps as found in the Elmalı depression, form the wetlands of the Taurus Mountains. Shortly, the existence of the karstic depressions contributes to the formation of main agricultural lands in the rocky appearance of Taurus Mountains. In addition, the soils and the soft marly deposits that easily plough on the karstic depressions contribute to agricultural activities and to set up the settlements.

Discussion: The landforms and their formations in the karstic lands of Mediterranean Region are one of very important factors in terms of soil assessment, land classification and sustainable agricultural production. For instance, sloping karstic areas form good habitat for the growth of forest and marquis vegetation, and soil erosion is very low due to high infiltration capacity of limestone cracks, while chemical erosion is dominant due to dissolution of limestone which one of the chemical rocks. The intense soil erosion showed on the map prepared by Topraksu in the karstic land of Taurus Mountains is not appropriate determination.

Keywords: Karstification, Taurus mountains, agriculture, land-use
Assigning Indicator Plant Species for Site Productivity of the Red Pine Stands in Ovacık Mountain (Antalya) District

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Introduction: Red pine (Pinus brutia TEN.) is one of the major forest tree species that are ecologically and economically important for Turkey. Therefore, sustainable and effective use of the red pine is important. In order to be able to acquire this, it is a key role to evaluate with the right ecological approaches. In terms of such ecological approaches, the determining of indicator plant species and including these species into ecological assessments are often preferred for practical and accurate ecological planning. It is foreseen that plant species distributing the same site may be indicative for each other. In addition to the ecological outputs, determining of the indicator species for the target species is important in terms of Turkey forestry (socio-economic, etc.).

Material and Methods: This study was carried out in 92 sample areas in order to determine indicator plant species of productivity in the Ovacık Mountain (Antalya) which is one of the important areas for red pine. In each of these sample areas, the upper stand height values were indexed to 75 years old using the site class table, and the site index classes (I to V) were obtained. In the statistical evaluation process, relationship between plant species and site classes were associated with using interspecific correlation analysis.

Results: As a conclusion, it was determined that Cistus creticus L. and Smilax aspera L. are positive indicator plant species, Dryopteris pallida (BORY) FOMIN, Abies cilicica (ANT. ET KOTSCHY) CARR., Colutea cilicica BOISS. ET BAL. ve Cedrus libani are negative indicator plant species.

Discussion: It is considered that the areas where the species which are detected as positive indicators in terms of productivity are intensively distributed, will allow the determination of high yielding stands. In addition, this study is an example for similar studies that will carry out later about both the method used and Ovacık Mountain District.

Acknowledgement: We would like to express our appreciation to the Süleyman Demirel University Scientific Research Project Commission, which supported this study (SDUBAP-3552-YL1-13).

Keywords: forest ecosystems, indicator species, interspecific correlation analysis, red pine
Flea diversity (Insecta: Siphonaptera) on *Erinaceus concolor* Martin, 1837 in Turkey

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**Introduction:** Fleas are one of the most important blood-feeding ectoparasites of mammals and birds. Hedgehogs can be infested by numerous flea species; therefore hedgehogs and their fleas may an important role in the natural cycle of many zoonotic agents, such as *Bartonella*, *Yersinia* and *Rickettsia*. Species identification of fleas is a fundamental step for understanding of their role in transmission of flea-borne zoonoses to humans and animals. In the present study, we investigated flea infestations on *Erinaceus concolor* Martin 1837 in Zara district, Sivas province of Turkey. Here, we reported some new flea-host associations for Turkey.

**Material and Methods:** A total 21 hedgehogs (10 females and 11 males) were caught by hand in Zara region, Sivas province during summer 2012. Hedgehogs were put in the plastic bags and anesthetized with ether. Fleas on hedgehogs were collected by forceps and preserved labeled tubes including 70% ethanol. After the flea collection, hedgehogs were immediately released in the natural habitats, without any damage. Fleas were cleared 20% solution of potassium hydroxide (KOH) in 1–2 days and mounted with Canada balsam. All fleas were identified based on their morphological characters under a stereo-microscope.

**Results:** A total of 661 flea sample were collected from 21 hedgehogs. Fleas were identified as *Archaeopsylla erinacei erinacei* (Bouché, 1835) (391 females, 261 males), *Ctenocephalides canis* (Curtis, 1826) (3 females, 2 males), *Leptopsylla algira costai* Smit, 1955 (2 females) and *Nosopsyllus fasciatus* (Bosc, 1800) (1 female, 1 male). To the best of our knowledge, *L. algira costai* and *N. fasciatus* on *E. concolor* were new host records for Turkey. In addition, all flea species were reported from the Sivas province, for the first time.

**Discussion:** Fleas are blood-sucking ectoparasites of many birds and mammals. Currently, more than 115 species and subspecies of fleas have been recorded from Turkey; however, there is still a big gap in information about distribution and host associations of many flea species in Turkey. Hedgehogs are suitable reservoirs for many zoonotic diseases agents. Moreover, fleas infested on hedgehogs may play an important role in the transmission of these zoonoses to humans and domestic animals; therefore, the results of the present study may also have epidemiological significance.

**Keywords:** fleas, new flea-host associations, hedgehogs, Sivas.
Introduction: Al toxicity, as a leading environmental stress factor adversely affects the global food production. Thus, elucidating the molecular mechanism involved in Al-resistance could potentially grant to the breeding programs in production of Al-tolerant plants. Herein work therefore aimed to investigate the effects of Al on some physiological parameters and genotoxic changes in *Bryophyllum daigremontianum* plants.

Material and Methods: Bulbiferous spurs were used as young plantlets. For 75 days, plants were irrigated on alternate days with 20ml of Hoagland solution, containing 0 (normal and acid controls), 50, 100 and 200 μM of AlCl₃. Test groups - following the day of irrigation- were sprayed with 0.2% sulfuric acid. At the end of experimental period, plants were cropped to analyze the effects of Al exposure on photosynthetic pigments, including chlorophyll a, b, a/b, total chlorophyll and carotenoids, and total protein contents. Al levels in roots, stems and leaves were analyzed using ICP-OES. Using RAPD and ISSR methods, genotoxic analysis was done.

Results: Inferring to control groups, the acid control, 50, 100 and 200 μM applications respectively slightly decreased the contents of chlorophyll a (~6.57, ~3.61, ~8.88 and ~8.22%), chlorophyll b (~22.11, ~21.60, ~21.60 and ~1.00%), total chlorophyll (~11.76, ~11.96, ~21.60 and ~11.37) and carotenoid (no change, ~7.03, ~6.25 and ~7.81). However, chlorophyll a/b (~4.19, ~15.05, ~12.75 and ~12.29) contents were increased. The total protein content was also increased in relation to the applied Al-concentrations. In plant parts, Al was most abundantly accumulated by the roots. RAPD and ISSR methods also showed the emergence of new band formations and variations in band intensities particularly at high Al-treatments.

Discussion: Herein study revealed that *B. daigremontianum* plants are affected by Al-stress but nevertheless they could manage to survive by coping with this stress. However, some changes in some physiological parameters were also identified. The changes in RAPD and ISSR bands, particularly at high concentrations, also showed the genotoxic effects of this element at the molecular level.

Acknowledgement: This work was supported by Düzce University Scientific Research Projects Unit (BAP) under the title of "Physiological and Genetic Investigation of Changes in Al-Stressed *Bryophyllum daigremontianum* Raym.-Hamet & H. Perrier Plant" and under the project number of “DÜBAP 2015.05.01.376”.

Keywords: Kalanchoe daigremontiana, genotoxicity, photosynthetic pigments, molecular markers
Comparison of Needles Ecophysiology of Anatolian Black Pine in Shaded and Sunny Conditions

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Introduction: Anatolian Black Pine (Pinus nigra J.F.Arnold subsp. pallasiana (Lamb.) Holmboe) is the second most widely distributed forest tree species after (Pinus brutia Ten.) in Turkey forests thanks to its low environmental requirements. It grows transitional region extending between maritime climate and continental climate generally. However, it can be seen in the inner Anatolian steppe. This tree species is important because of large natural distribution and its commercial value. Light is an important factor among many factors that determine litter amount and its chemical content. In this study; the effects of light on the chemical content of Anatolian Black pine needles have been tried to be revealed.

Material and Methods: Needles sample were collected from six Anatolian black pine trees by taking into consideration the crown closure density and whereat light intensities in the stands, Kastamonu. Then, the amount of photosynthetic pigments (chlorophyll a, chlorophyll b, total chlorophyll and carotenoid), β-carotene, lycopene, proline, glucose, sucrose, total soluble sugar, starch content was analysed.

Results: The levels of chlorophyll a, chlorophyll b, total chlorophyll, and β-caroten (0.293 mg, 0.165 mg, 0.460 mg, and 1.255 µmol) were higher in low light conditions. However, in the sunny areas, the ratio of chlorophyll a/b (2.32) and lycopen (2.10 µmol) are much more than shaded area. While proline content was found higher in shaded conditions (155.75 µmol); Glucose, sucrose, total soluble carbohydrates and starch content were determined higher as 177.11 µg for sucrose, 281.03 µg for glucose, 320.66 µg for total carbohydrate, and 18.62 µg for starch in the trees exposed to fully light.

Discussion: Our collective results showed that chemical compositions of Black pine needles were influenced differently depend on light conditions. Excessive light reduced photosynthetic pigment and proline content, but it enhanced sugars and starch content which supporting high respiration rate. These results; it can be assessed practically to adjust the interventions doses in maintenance and regeneration implementation.

Keywords: Anatolian black pine, chemicals, light condition, chlorophyll.
Regional Paradigm for Studying Ecosystems Conservation in Baja California Peninsula (Central Desert Region)

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Introduction: Ecosystems conservation especially in the groundwater related environments (wetlands and groundwater discharge areas) cannot be achieved without the integration of new approaches that adapt groundwater flow systems framework which involves the basin-scale environmental agency of groundwater that triggers a wide range of species and ecosystems. Various studies have shown the groundwater role in controlling ecological functioning and scatter vegetation, especially in groundwater discharge areas. This study was conducted in the northern part of Baja California in the Playas de Rosarito district within the protected area of Valle de Los Círios; which spreads over a large area and contains 164 endemic species that were subject to mapping by other studies. The study aims can be summarized as follow: i) to differentiate groundwater flow patterns and distribution and to understand the regional hydrogeology, ii) to make a preliminary study for the groundwater-dependant ecosystems in the study region.

Material and methods: Groundwater samples were collected in November 2013 from wells and springs in the protected area of Valle de los Círios and a physico-chemical and isotopic analyses have been carried out.

Results: Results indicated the existence of three different groups of waters which have travelled under different conditions (residence time, depth). The analysed samples have been classified as fresh, brackish and thermal alkaline groundwaters; this was indicated by the pH, temperature, TDS, minor trace elements (As, Li, Sr, Ba, U, Br), and stable isotopes. The chemical age proxies (As, Sr, Cl, Li, U) and δ¹⁸O indicate the occurrence of long residence groundwater. The thermal springs present low content of minor and trace elements and the temperature at depth suggest deep travelling conditions.

Discussion: Groundwater flow hierarchy in Baja California Peninsula is the factor contributing to the conservation of many succulent and desertic species; the dominance of alkaline (discharge in spring) and shallow brackish groundwaters types is sustaining the preferential growth of these species; where some of them (i.e. Blue Fan Palm tree) are creating a microclimate under the general arid climate, enabling the survival of a variety of fauna and flora in Central Baja California. This condition of groundwater-dependent vegetation was confirmed by the Blue Fan palm phenology of growth.

Acknowledgements: The authors wish to thank the personnel of the “Dirección del Área de Protección de Flora y Fauna (APFF) del Valle de los Círios”, for the invitation to conduct this work, and for providing financial support for the field activities, and facilities to access the sampling sites. This study was conducted in collaboration with the Research Centre for Biodiversity and Conservation of the Universidad Autónoma del Estado de Morelos (UAEM), and the Universidad Nacional Autónoma de México (UNAM).

Keywords: geochemical analyses, stable isotopes, flow systems, valle los círios, biodiversity, Northern Baja California, Mexico.
Introduction: Plecoptera is an order which is represented by more than 3497 species all over the world except Antarctic continent. In addition to that nearly 93 species determined in Turkey. They are so sensitive to pollution. The aim of this study was conducted between April 2015 and December 2015 to determine the Plecoptera fauna of Demre Stream.

Material and Methods: Plecoptera samples were collected from 12 stations on Demre Stream. This study was performed seasonally and Plecoptera communities along the stream were sampled at each and every one of the 12 stations using a standard hand net (30x50 size with 500μ mesh). The samples were taken from an area of 100 m in order to include all possible microhabitats at each station. Collected organisms were fixed in formaldehyde (%4) in the field and then transferred to fixed in 70% ethylalcohol. The larvae of Plecoptera were identified at the lowest possible taxon.

Results: As a result of this study, 7 species and 170 individuals that belong to Plecoptera were determined in Demre Stream. Protonemura meyeri and Nemoura sp. were only determined at first station, while Isoperla grammatica at 4th station, Leuctra sp. at 9th station and Leuctra inermis at 11th station. Brachyptera sp. was determined at 10th and 12th stations and while Leuctra hippopus at 2nd, 8th, 10th, 11th and 12th stations.

Discussion: At 3rd, 5th, 6th and 7th stations, no Plecoptera member had been determined. The fact that the stations mentioned are dry at some seasons, the presence of settlements and farming areas around the river bed, and the vulnerability of Plecoptera members to pollution may be shown as the reason for this situation. The highest number of individuals was determined at station 11. The reason for this is that the 11th station is less affected by pollutant and relatively cleaner than the other stations. According to the results obtained in this study, the samples belonging to the Plecoptera were found to be more common in clean waters while it was rare or not found in polluted waters.

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Keywords: Insecta, Plecoptera, Demre Stream, Antalya, Turkey
Determination of Chemical Compositions, Antimicrobial, Antioxidant and Phytotoxic Activities of Some Medical and Aromatic Plants

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Introduction: Scientists have focused on the increase of food production needed for the fast expansion of world population in recent years. Unfortunately, substantial yield losses occur due to insects and plant diseases caused by fungi, bacteria and viruses. Fungi and bacteria have also unfavourable effects on quality, safety and preservation of food. Synthetic chemicals are widely used in the control of plant diseases. However, these chemicals may cause toxic residues in treated products. Synthetic pesticides can also cause environmental pollution owing to their slow biodegradation. In addition, the risk of developing the resistance by microorganisms and the high cost–benefit ratio are other disadvantages of synthetic pesticide usage. This study was carried out to determine chemical compositions, antifungal, antibacterial, antioxidant and phytotoxic activities of the essential oil isolated from the aerial parts of Rosmarinus officinalis L., Salvia fruticosa Mill. and Lavandula × intermedia Emeric ex Loisel.

Material and Methods: Medical and aromatic plants such as Rosmarinus officinalis L., Salvia fruticosa Mill., and Lavandula × intermedia Emeric ex Loisel, were collected from cultivated areas in Yalova in 2017. The chemical compositions of essential oil isolated by hydrodistillation from the aerial parts of the species were analysed by GC–MS. Also, antifungal, antibacterial, antioxidant and phytotoxic activities of the oils were determined.

Results: Lavandula × intermedia showed low DPPH activity, total phenolic and flavanoid contents, but displayed a high mortality rate against Botrytis cinerea and Sclerotiorum sclerotinia fungi. Also, it was investigated antibacterial effects against Clavibacter michiganensis subsp. michiganensis, Xanthomonas campestris pv. vesicatoria and Pseudomonas syringae pv. Tomato. However, the oils of Lavandula × intermedia and Rosmarinus officinalis inhibited the seed germination and seedling growth of Solanum lycopersicum L. and also showed a potent phytotoxic effect against S. lycopersicum L.

Discussion: The findings of the present study suggest that antifungal and herbicidal properties of the oils have a potential to be used as fungicide, bactericide as well as herbicide.

Keywords: Rosmarinus officinalis, Salvia fruticosa, Lavandula × intermedia, antioxidant, antimicrobial, phytotoxic
Effects of Municipal Wastewater Treatment Sludges on some of the Biochemical Properties of Soil and Yield of Wheat in Greenhouse Experiment

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Introduction: Based on sewage sludge production data from 2002 until 2007, an increase from 5.5 million tons to an annual EU-27 sewage sludge production of 10 million tons is reported (European Commission, 2014). Prior to 1998, municipal sludge was primarily disposed at seawaters or was either used as a fertilizer on agricultural land (Ødegaard et al. 2002). Recycling of organic wastes within agriculture may help maintain soil fertility via effects on soil physical, chemical and biological properties.

Material and Methods: This study examines the effect of sewage sludge application on soil biochemical properties and yield of bread wheat. Three anaerobically digested sewage sludge (Ankara, Yozgat, and Çiğili respectively) with low, medium and high risk in terms of heavy metal content were used. Surface soils (0-20 cm) were also taken from the agricultural lands of Ankara, Yozgat, and Çiğili. We studied the effects of adding different doses (0, 2, 4 and 8 t dry matter (DM) da⁻¹) of sewage sludge with and without chemical fertilizers on soil biochemical properties and metabolic quotien.

Results: After the harvest of the wheat plant grown for 8 weeks in the greenhouse, the weights of wheat increased both in the DAP application and in the sludge application compared to the control. Application of the highest dose of 8 tonda⁻¹ sludge, significant decreases in wet weight and dry weights were observed. Betaglucosidase enzyme activity increased in sludge application, compared to control and chemical fertilizer application. The highest soil respiration observe at the highest sludge application dosage (8tonda⁻¹). Control and single chemical fertilizer treatment show lower soil respiration. Among all of soil amendment sewage sludge doses, the highest dose shows the highest microbial biomass carbon.

Discussion: The sewage sludge applications have made positive impact on soil respiration as well as microbial biomass. This impact arises from increasing of organic matter and nutrient content which stimulate the microbial activity. The stimulated microbial activity causes more microbial biomass cycle, and so more respiration in the soil.

Keywords: sewage sludge, soil enzyme activity, respiration, microbial biomass, metabolic quotient
Survey and Fate of Metals in Urban Wastewater of Tekirdağ City

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Introduction: Urban wastewaters contain a vast number of chemicals such as metals and organic pollutants. The fate of metals in whole sewage system including sewer system and wastewater treatment plants is tremendously important as the metals inhibit the activity of biosystems and bioaccumulate in aquatic species when the effluent is discharged into receiving waters. The biosolids occurring in the biological treatment plants would also contain critical levels of the metals. This study aimed to survey the metals in urban wastewaters and to evaluate their fate in the sewer system of Tekirdağ city.

Material and Methods: To monitor concentrations of metals in urban wastewater, five sampling points were selected along the coastal area of Tekirdağ city. This main collector direction collects the wastewater originated from the most populated areas of the city. The samples were simultaneously collected in July 2014, 10:00-12:00 am. Those sampling time were chosen to represent well the flow characteristics as 6-8 h later than last nutrition and water consumption time in the wastewater collection area. The grab samples were transferred to the related laboratories and were cooled without adding any conservative chemicals and were kept in refrigerator (+4 °C) until analysis. Metal analyses were performed according to USEPA method. Metals were measured using ICP-OES (Spectro Arcos, Germany). Samples were also submitted to acute ecotoxicity test using new born (<24 h old) daphnids exposed to samples for 24-48 h according to ISO6341 method. The immobilization percentage was recorded as the ratio of the total number of immobile organisms divided by total number of organisms tested. One way ANOVA test was used to evaluate independency among the samples using Duncan Equal Variances model. A multivariate analysis was performed among metals and ecotoxicity using PASW SPSS 18.0 data analysis program (p=0.025).

Results: Ag, As, Cd, Co, Mo and Zn were absent in all samples. The concentrations of Al, Cr, Cu, Fe, Mn and Ni were found to be significant considering the LOD values of each metal detected at ppb levels. The maximum concentrations of Al, Cr, Cu, Fe, Mn, Ni were detected among the sampling points, namely at 2a, 2a, 3a, 3a, 3, 3 and 1 sampling points respectively. A notable relation between toxicity and among the metals in the all samples was not found.

Discussion: The overall metal concentrations were not higher than similar studies in the literature. However, the fate of metals is important for surface water resources that discharge wastewater. In addition to the continuous entrance of those metals in the sewer system could cause the accumulation in sludge line in the case of treatment plant in operation. The wastewater treatment plant (WWTP) of Tekirdağ must be updated to integrate methods that provide metals removal.

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Keywords: urban wastewater, fate of metals, ICP-OES, ecotoxicity.
**ORAL PRESENTATION**

**Biosorptive Removal of Cadmium (Cd\(^{2+}\)) from Aqueous Solutions Using Eco-Friendly Adsorbent: Laurus nobilis L.**

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**Introduction:** The increasing concentration of heavy metals in waters is mainly due to effluent discharges from metallurgical industries. Discharge of such heavy metal containing wastewater results in a serious problem toward the environment and living things. Various methods have been widely used for the treatment of wastewater containing heavy metal. Biosorption is a very effective separation technique. In the present study, the effectiveness of *Laurus nobilis* leaf in removing the cadmium (II) from aqueous solution by biosorption was investigated and evaluated in competitive conditions.

**Material and Methods:** The batch biosorption experiments were conducted to investigate the influence of various parameters such as contact time, heavy metal concentration, adsorbent dosage, and pH on the cadmium biosorption. The concentration of the metal ions in the aqueous phase was measured by using inductively coupled plasma mass spectrometry (Agilent Technologies / 7700X ICP-MS). For each adsorption isotherm experiment was conducted at equilibrium time.

**Results:** The adsorbent was characterized using scanning electron microscopy (SEM) images and FT-IR. The SEM observation indicated that the surface of biosorbent had an irregular and porous surface texture containing a considerable number of pores, which might promote the heavy metal biosorption. The FT-IR showed the evidence of many functional groups such as O-H, C-H, C-O, capable of metal sorption. The effect of various parameters such as initial concentration, contact time, adsorbent dose and pH were examined. 180 minute is required for the equilibrium adsorption for Cd and 6.5 of pH generally favors biosorption for Cd. Maximum biosorption capacity of 10 mg L\(^{-1}\) Cd (q\(_m\)) onto *Laurus nobilis* was found and equilibrium data were best represented by Langmuir isotherm model among Langmuir, Freundlich, Temkin and Dubinin-Redushkevich adsorption isotherm models. The kinetic studies of the Cd(II) are best in accordance with the pseudo-second-order model.

**Discussion:** The results indicated that the natural biomass of *Laurus nobilis* is an effective biosorbent for the cadmium biosorption. The biosorption increased by the increase in contact time. The pH experiments showed that the significant biosorption occurs in 6.5 of pH. Consequently, the *Laurus nobilis* can be used as an effective natural biosorbent for the treatment of wastewater containing cadmium.

**Acknowledgement:** This study was supported by the Scientific Research Project of the Sinop University, under grant number of RBB -1901-16-28.

**Keywords:** Biosorption, cadmium, *Laurus nobilis*, kinetics-isotherm.
Youth Unemployment Rate And The Effects Of Global Economic Crisis In 2008: An Application To Turkey

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Introduction: Other developing countries such as Turkey in late 2008 and immediately emerged dramatically in the financial crisis in United States and other western economies have been affected by the crisis. Starting from the financial market and then under the influence of the real markets to examine the effects of this crisis, it is important in terms of the Turkey’s economy.

Material and Methods: In this study, the impact of the global economic crisis of 2008 will be examined to Turkey's labor market and a variety of statistical and econometric tests will be done about youth unemployment portfolio.

Results and Discussions: Credit markets have been adversely affected, the shocks emerged in these markets have led to a rapid increase in insecurity in the these markets and subsequent decline in investment. As a result of these shocks, which have led to a decline in investment, the producers in the markets have decreased production and the declining level of consumption of households.

This effect in the markets has not been limited to this extent, it has led to a rise in youth unemployment rates. Despite the fact that the states intervened in the markets, many countries in the world have experienced the problem of unemployment considerably in 2008. Despite the fact that the share of the young population is very important in the development of a country, the most affected population is unemployed as young people in the range of young population.

Keywords: youth unemployment, 2008 crisis, Turkey, statistics and econometrics models
Development of an Urban Transformation Criteria from a Gephysical Perspective: A Case study from Bursa, (Turkey)

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Introduction: In the past decade, a new law related to urban transformation called the “Law on Transformation of Areas Under the Disaster Risk” has been issued in Turkey. However, this law provides no clear definition for the solution of soil problems that are caused by natural hazards such as earthquakes. Furthermore, if these parameters are not available, the soil is classified as Z4, which is the worst-case assessment for risky buildings according to the Turkish Earthquake Code (1997). To achieve sustainable urban transformation, several factors should be taken into consideration, such as natural/artificial hazards, engineering problems, humanity, social and community requisitions, property rights and industrialization. The objective of the studies pertains to three aspects, which include liquefaction, amplification and landslide potential. In the literature, however, microzonation studies are generally focused on individual site effects, which is the effect of dynamic loads on the ground or geotechnical problems (such as shallow soil problems to a depth of 30 m). These two main foci should be considered together for a proper analysis and interpretation. However, recognizing and scaling a study area should be considered as a primary goal, regardless of the soil behaviour, which depends on previous studies and the probability for soil problems to occur. Independent of the size of the area, all information that is based on geophysical and/or geotechnical data must be considered comparatively.

Material and Methods: The methodology of the case study includes several stages: A- site characterization at a local scale of 250 x 250 m grid spacing, B- predicting seismic risk of the study area using probabilistic seismic hazard analysis, C- applying geophysical/geological/field and laboratory methods to find solution for soil problems, and D- soil classification and production of ground-level hazard parameter maps by subdividing areas using seismic microzonation criteria. From a geophysical perspective, the following methods were applied on equal grids and 75 points: seismic survey methods (including seismic refraction and surface wave analysis measurements) and the microtremor method. Vertical electrical sounding was used to predict the depth of groundwater and the lithological contents of the subsurface.

Results: A flowchart developed for application to urban transformation by using geophysical methods.

Discussion: Developed criteria’s play important role mitigation to earthquake disasters. Our developed criteria focus three mains objectives for urban transformation such as restoration of historical structure, generation of residential areas and mitigation of natural/artificial disasters. According to these focus points, we have to follow general features of the study area; regional tectonic and seismotectonic, characteristics of earthquakes and soils, site characterization and type of soil problems, data availability, and quality and evaluation of results and making a decision.

Acknowledgement: We would like to thank due to field performance to our teams.

Keywords: urban transformation criteria, geophysics, soil liquefaction, shear wave velocity, Bursa
Introduction: Ecosystem goods and services represent the benefits that human populations derive from ecosystem functions directly or indirectly. Ecosystem services include benefits such as regulation of floods, soil erosion, disease and outbreaks and immaterial spiritual benefits such as recreational opportunities in addition to products such as food and water in natural areas. The importance of ecosystem services is even better understood when it’s thought that producing these unique services which are offered to people by nature are limited. Understanding the ways in which ecosystems provide flows of “services” to humans is critical for decision making in many contexts; the classification of ecosystem services is challenging both conceptually and technically and the linkages between natural and human systems are complex and multifaceted. A well-defined framework for classifying ecosystem services is essential for systematically identifying and tracing these linkages.

Material and Methods: The study on ‘Ecosystem Services’ was informed by a review of the relevant scientific literature to providing a way to classify ecosystem services and intended as a reference classification that would allow translation between different ecosystem service classification systems, such as those used by the Millennium Ecosystem Assessment (MA), The Economics of Ecosystems and Biodiversity (TEEB), and the USEPA FEGS.

Results: The study provides the conceptual framework in which ‘Ecosystem Services’ is set. As a result a number of categories were formed: Provisioning services (biotic); Provisioning services (abiotic); Regulating and Maintenance Services (biotic); Regulating and Maintenance Services (abiotic); Cultural Services (biotic); Cultural Services (abiotic).

Discussion: The aim of this paper is to review whether ecosystem services remains sufficient both to support the development of integrated economic and environmental accounting frameworks, and to better ground such work in wider efforts to develop better decision support tools for the management of our natural capital.

Keywords: natural resources, ecosystem, classification
Biochemical Indicators (Biomarkers) in Liver of European Eel (Anguilla anguilla L., 1758) Caught from Different Regions of Ceyhan River (Adana, Turkey)

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Introduction: Ceyhan where the Ceyhan river (station II) is located is most important industrial town in the study area. It is a region that is exposed to domestic, industrial and agricultural wastes intensively during the four seasons. The other work area, the just under the dam’s crest of Aslantaş dam (station I), is built on the same river and is not exposed to any discharge source. In studies conducted in these two stations, the possible differences in water quality and the effects on the biochemical markers in the liver tissue were evaluated comparatively. The effects of water quality potential differences on biochemical markers in the liver have been evaluated comparatively for two stations.

Material and Methods: In the study, water and fish samples were obtained as monthly (June, July, August) from station I and II. In summer seasons was found agricultural and industrial wastes drainage higher than the other seasons. Water temperature, chemical oxygen demand (COD), pH, nitrate, nitrite, ammonia and soluble reactive phosphorus values were evaluated. The biomarkers included in the liver tissue of eels, catalase (CAT), glucose-6-phosphate dehydrogenase (G6PD), glutathione (GSH), superoxidedismutase (SOD), malondialdehid (MDA) levels on forty five fish were determined from each station.

Results were expressed as means±95% confidence interval, using t-test software by SPSS17. p-values <0.05 indicate significance.

Results: Water temperature (26.80±7.5) and physico-chemical parameters (COD (37.75±6.4), NH₃-N (0.45±0); NO₂-N (0.04±0); NO₃-N (1.26±0) (p (7.21±0) and SRP (0.03±0.1)) were found statistical higher in station II than station I (p<0.05). All oxidative stress biomarkers G6PDH .9±0); CAT (337.3±58.7); SOD (5.5±0.8); GST (701.5±102.0); GSH (0.06±0); MDA (8.2±1.3) were significantly greater in the Ceyhan River (station II) (p<0.05).

Discussion: All organisms contain substances called antioxidants that have the ability to trap and stabilize free radicals, preventing oxidation that is caused by free radicals. These are compounds which react with existing radicals to convert the min to more harmful forms and prevent new radical formation. The responses that can be seen in the tissues and organs of aquatic organisms are an indication that the ecosystem is very adversely affected Fish are defending themselves with increases in antioxidant enzymes to gain from the top of free radicals. It is believed that the biomarkers obtained in the study are beneficial as early warning agents for possible damage to eel fish living in a particularly pollution environment. It is there for emphasized that the oxidative stress biomarkers in fish are very important in terms of their biological markers of pollution in aquatic ecosystems.

Conclusions: During the study, morphological disorder, disease or death were not observed in the fishes caught from Ceyhan River and Aslantaş Dam Lake. The induction of antioxidant systems in liver tissue as well as their inhibition should be considered a clear indication of the presence of pollution and environmental health degradation.

Acknowledgement: This research was supported by the Academic Project Unit of Çukurova University (Project Number: FBA-2017-9597).

Keywords: European eel (Anguilla anguilla), biomarkers, liver tissue, Ceyhan river, pollution.
Intensive Tree Mortality of Taurus Fir (*Abies cilicica*) in Mediterranean Forests of Turkey

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**Introduction:** Global climate change has the potential to alter tree species composition, distribution area and the health of forest ecosystems especially in drought-prone regions. Thereby, many researchers have reported that high levels of tree mortality are being observed in some conifers, associated with rising temperature during recent decades. However, there is no known work focusing widespread selective tree mortality in fir (*Abies cilicica* (Ant. & Kotschy) Carr.) species both in Turkey and in the world. In this study, spatiotemporal changes and stand dynamics of fir were analyzed in Hadim Forest Enterprise located in a typical semi-arid Mediterranean environment.

**Material and Methods:** Remote sensing products, historical stand type maps and inventory data were used along with in-situ observations. Forest cover change was monitored using ArcGIS software over the past half a century.

**Results:** Preliminary results showed that there was a significant decrease in areas of pure and mixed fir stands despite a slight increase in total forest area in the region. Particularly, pure stands were more affected by tree mortality. In 1993, the area covered by pure fir stands was 1266 ha in Hadim, while it was 542 ha in 2016. Aside from area coverage, deadwood volume in these stands was measured to be 30% in 2016, which was less than 1% in 1970. Individual tree mortality was most commonly observed in middle-aged and mature stands.

**Discussion:** This was attributed to the canopies being exposed to sun radiation more by reaching the overstory over time. On the other hand, loosely closed stands (canopy cover <70%) were more vulnerable to mortality especially in poor sites. These results illustrate that there is serious tree mortality in fir forests across Taurus Mountain range and this insidious process is not only due to insect outbreaks, contrary to what is believed in Turkey until today, but also mainly due to climate-driven processes such as severe water and heat stress. As the Mediterranean basin is predicted to continue to warm up in the near future, reducing greenhouse gas emissions is of great importance for maintaining persistence of these forests. Otherwise, fir species may gradually disappear from Eastern Mediterranean and it will likely be replaced by *Pinus nigra* in the 21st century. Therefore, genetic diversity of Taurus fir should be strictly preserved by in-situ and ex-situ activities.

**Keywords:** climate-induced dieback, forest dynamics, satellite imagery, Konya
Mapping Forestland Using Different Satellite Images and Various Classification Techniques: A Case Study from Şavşat-Karaköy

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Introduction: The progress in remote sensing technology has increased the role of its use in natural resource monitoring and management. This study was carried out to examine the applicability of satellite images as an alternative data source to aerial photographs in forest area inventory.

Material and Methods: For this purpose, Şavşat-Karaköy forests were mapped based on supervised-, unsupervised-classification and interactive vectorization (on-screen digitizing) techniques using WorldView-2 (0.5 m) and Landsat 8 (30 m) satellite data in ENVI 5.2 software. Later on, the generated maps were compared with digital stand types map which was generated by General Directorate of Forestry (OGM) based on aerial photographs and field inventory data, as reference. Thus, accuracy levels of these maps were assessed using error matrix and Cohen's kappa (Khat) statistic.

Results: The best map was generated by supervised classification using WorldView-2 satellite data. Its overall accuracy was 89.3% (Khat=0.78), and the total forestland was found to be 1.4% (26.7 ha) lower than that of the reference map. On the other hand, Landsat 8 satellite data found the total forestland greater than the reference map, independently of the classification technique. Its classification accuracy was lower than that of WorldView-2.

Discussion: The slight difference within WorldView-2 data was attributed to the fact that pixel-based classification techniques focused on only tree crowns, thus, the small gaps in sparsely vegetated stands were detected as unforested area. The limitation regarding Landsat 8, on the other hand, could be explained by its low spatial resolution (30 m). In Landsat image, one pixel size on the ground is 30x30=900 m². Therefore, small areas (openness, agriculture, erosion sites, etc.) between forest stands frequently are mapped as forest class. The results showed that fine-resolution satellites such as WorldView-2 (0.5 m) can be used to map forestlands in detail while it is impossible with course-resolution data like Landsat. Aside from data source, maximum likelihood algorithm as a traditional supervised technique appeared promising for satisfied land cover classification in Şavşat-Karaköy. The present study is considered to be important for natural resource managers and forest planners as it reduces the field work and photo-interpretation efforts as well.

Keywords: land use mapping, image classification, accuracy assessment, remote sensing, Artvin
Habitat Suitability Modeling of Wild Boar with Sentinel-2 Satellite Data

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Introduction: Monitoring of habitat and wild animal populations is important to assess the effectiveness of conservation and management actions. These observations provide ideas about how wildlife species and ecosystems are changing through time and space either naturally or human impact. In this context, the use of satellite data providing continuous data for over large areas in such studies has become an increasingly significant issue. Relationships between the data obtained with these methods and wildlife species can be determined and mapped. For this reason, we aimed to create habitat suitability model and map of Wild boar by determining the relationships between this species and parameters derived from the satellite data in this study.

Material and Methods: This study was conducted in Akdağ (Simav) region. During the fieldwork, 444 Wild boar tracks and sign were detected. Normalized Difference Vegetation Index (NDVI) ratio image was calculated by using Sentinel-2 (resolution: 10 m) satellite data. Multiresolution segmentation was applied with the Definiens Developer software. And thus, NDVI was separated into different patches considering color values. After this process, image texture parameters (based on the grey level co-occurrence matrix (GLCM)), pixel-based parameters (edge contrast of neighbor pixels, border contrast, contrast to neighbor pixels), standard deviation of neighbour pixels and real border to brighter objects were extracted from NDVI. Finally, presence data of Wild boar and these parameters were analyzed by MaxEnt.

Results: As a result of the analysis, habitat suitability model and map (Training AUC: 0.759- Test AUC: 0.739) of Wild boar was created. When the model results are examined, contrast to neighbor pixels (69.9%), standard deviation of neighbor pixels (20.7%) and edge contrast of neighbor pixels (9.3%) are determined factors having impacts on distribution of Wild boar.

Discussion: According to parameters affecting the distribution of Wild boar, this species prefers areas with high complexity and different edges. Another important consequence of this study is that ecological variables affecting the distribution of wildlife species can be determined by using NDVI ratio image and potential distribution areas of species can be mapped with these variables.

Acknowledgement: We thank to project (5052-YL1-17) supported by the Coordination Unit for Scientific Research Projects, Süleyman Demirel University.

Keywords: habitat suitability model, MaxEnt, satellite data, wild boar, wildlife.
Effects of Short-time Heavy Metal Application on Some Physiological and Biochemical Parameters in Wheat (*Triticum aestivum* L.) Plant

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Introduction: Plants encounter many stress factors which affect their growth and development throughout their lifecycles. Metal toxicity occurs by binding metals to molecules and increasing formation of free radicals. The seed germination stage is more susceptible to metal pollution as some defense mechanisms have not yet developed. This work is planned, given that herbicide and pesticide use are common and unconscious in our country, and that industrial wastes involved in irrigation waters may contain arsenic, cadmium and lead compounds. The aim of this study was to investigate the changes of some physiological and biochemical parameters during the amelioration after period of short term treatment of wheat with arsenic, cadmium and lead.

Material and Methods: Wheat seeds were grown in the plant growth cabinet at 20ºC for 10 days by applying photoperiod. At the end of the 10th day, while the control group was watered with distilled water, among the other groups, the 1st day group and the 5th day group were watered with the freshly prepared solutions of the mixture containing arsenic, lead, and cadmium at the concentrations of 15 μM, 30 μM, and 60 μM for 1 day and 5 days, respectively. The germination percentages, root stem lengths, root stem wet and dry weights and heavy metal accumulations in wheat plants were measured. The germination of plants for the study was performed at Trakya Univ. Faculty of Science, Department of Biology. Heavy metal analyses in plants were carried out at Trakya University Research and Development Center (TUTAGEM).

Results: A decrease was observed in the experimental groups, in which 15 μM, 30 μM, and 60 μM (arsenic, lead, and cadmium) metal ion mixture was applied, in terms of the germination rate depending on the increased concentration, and a decrease was observed in the root and stem dry weights of the plants in all groups compared to the control group. It was determined that heavy metals accumulated by increasing in the tissues due to the increased concentration of heavy metals in the heavy metal ion-applied groups compared to the control group (p<0.05).

Discussion: As a result, it was determined in the study that there were significant changes in some biochemical and physiological parameter’s which are the primary response to oxidative stress in plants exposed to heavy metals, depending on the stress. This reason it can be concluded that arsenic, lead and cadmium contents in media can be the responsible for growth inhibition.

Acknowledgement: We would like to express our appreciation to the Trakya University Scientific Research Project Commission, which supported this study (TUBAP 2015-38).

Keywords: wheat, heavy metals, accumulation, germination
Investigation of Antifungal and Phytotoxic Effect of Laurel (*Laurus nobilis*) and Myrtle (*Myrtus communis*) Plant Essential Oils

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**Introduction:** Barley leaf stripe disease (*Pyrenophora graminea*) leads to high yield losses in barley production areas in our country as well as in the world. It is of great importance to combat the disease in order to minimize the loss of yields. Due to the adverse effects of chemicals on human beings and the environment, studies on the use of alternative combat methods have accelerated. This study was carried out to investigate the antifungal effect of essential oils obtained from laurel and myrtle plants against barley leaf stripe disease and the phytotoxic effect on wheat and cress plants.

**Material and Methods:** The essential oil of laurel and myrtle was obtained by hydrodistillation. In order to determine the activity of laurel and myrtle essential oils on the fungus, 0 (control), 0.5, 1, 2, 4 and 8 μL doses of these essential oils were administered.

Essential oils were applied by impregnation with a micropipette on filter paper adhered to the covers of petri dishes. In the antifungal study, mycelium diameters in the petri dishes were measured by automatic caliper at the end of the 7 day incubation period, while in the phytotoxicity study, immediately after the essential oils were applied, the petri dishes were tightly sealed with parafilm and were incubated for 12 hours under light and 12 hours under dark at 25±2 °C.

**Results:** As a result of the treatment, it was determined that 8μl dose of laurel plant inhibited the mycelium growth of *Pyrenophora graminea* by 82.26%. It was determined that the essential oil of myrtle plant at the same dose inhibited the mycelial growth of the disease by 100%. It was suggested that the essential oil of the myrtle plant is more effective than the laurel plant on the disease. In phytotoxic studies, laurel essential oil at 8 ml dose inhibited wheat seed germination by 14.8% and cress seed germination by 20.60%. On the other hand, myrtle essential oil at 8 ml dose inhibited wheat seed germination by 13.6 % and cress seed germination by 100%. It was determined that laurel and myrtle plants are also phytotoxic on root and shoot growth of the control plants.

**Discussion:** These findings showed that the laurel and myrtle essential oil has remarkable phytotoxic effect and at a high level antifungal activity. This result shows that laurel and myrtle essential oil has potential to replace synthetic pesticides.

**Keywords:** *Laurus nobilis, Myrtus communis*, antifungal, phytotoxic, essential oil
Morphological and Morphometric Characterization of *Rimaleptus mucronatus* (Ciliophora, Litostomatea, Rhynchostomatia), from soils of Tekirdağ, Turkey

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Introduction: Recently, interest in studying microbial biodiversity has increased in terrestrial ecosystems. One of the most important reasons for this is that soil microorganisms, such as dileptid ciliates, play an important role in terrestrial food webs, and also influence above-ground ecosystems. *R. mucronatus* (Penard, 1922) is dileptid ciliate with rather distinct tail. This species possibly has a wide or global distribution, which lives preferentially in soil and mosses but also occurs in limnetic habitats. The population identified here is the first record for our country’s soils. Attention was given on the ciliary pattern, the structure of dorsal brush, a dorsal row contractile vacuoles as well as the shape and size of extrusomes.

Material and Methods: Soil samples were taken between March-2016 and June-2017. Usually, 10 small sub-samples were collected with a shovel from an area of about 100 m² and mixed to a composite sample. The morphology and morphometry of *R. mucronatus*, isolated from soils (pH=6.32, unsalted) in Tekirdağ, were investigated using live observation and protargol impregnation.

Results: In the present work, the morphological description of *R. mucronatus*, isolated from soils of Tekirdağ was documented based on observations of specimens in vivo and protargol staining methods. This population is characterized by a size of about 261-466 X 38-83 µm; a typical dileptid body with proboscis occupying about 35% of body length; tail about 10% of body length; numerous dorsal contractile vacuoles; two size groups of rod-shaped extrusomes; about 16-22 kineties; a multi-rowed, staggered dorsal brush.

Discussion: The obtained data were evaluated and compared with original population (Geneva) and other descriptions in literature. Indeed, Tekirdağ specimens has remarkable similarities with other populations investigated, but have more contractile vacuoles.

Acknowledgement: We would like to express our appreciation to the Tekirdağ Namık Kemal University Scientific Research Project Commission, which supported this study (NKUBAP.01.GA.16.079).

Keywords: dileptid ciliates, *Rimaleptus mucronatus*, soil, Tekirdağ
Use of Alginate-Clinoptilolite Beads for the Treatment of a Synthetic Heavy Metal Mixture: pH Effect

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Introduction: Heavy metal utilization is increased with the improvement of industrial activities, which lead pollution. Due to their toxic nature, wastewaters containing heavy metals should be treated. Adsorption can be an option and usually activated carbon and fly ash are applied as adsorbents. Recently, studies are interested in natural sorbents from plants, microorganisms, etc. Alginate, a natural polymer, can form gel structure and by this way complex with metal ions. In this study, clinoptilolite, a natural zeolite, was used to make composite beads with alginate to improve treatment capacity of beads. The main purpose is to remove a mixture of metals from a synthetic solution by alginate-clinoptilolite (A-C) beads giving special attention to the effect of medium pH using batch reactors.

Material and Methods: Alginate (2%) was combined with clinoptilolite, from Manisa-Gördes, to form A-C beads by dropping into CaCl₂ solution. Adsorption kinetics were determined using 100 mg A-C beads subjected to a mixture of Cu²⁺, Cd²⁺, Pb²⁺ as 100 mg/L solution for each at pH 4 and 150 rpm by time dependent sampling during 48 hours. Next, experiments were conducted at pH values of 3, 4 and 5 at the same conditions except duration of 24 hours (equilibrium time in the previous run). For this case, sampling was performed at time 0 and 24 hours. All were acidified and cooled until analysis.

Results: Kinetic evaluations showed that Pb²⁺ was a fast adsorbate compared to the others. However, equilibrium might require longer time depending on the metals. Therefore, for all metals, equilibrium time was selected as 24 hours. Optimum conditions in terms of pH was found 5 and final metal concentrations were 27.2±3.2 mg/L, 45.5±2.5 mg/L, 8.6±4.2 mg/L for Cu²⁺, Cd²⁺, Pb²⁺, respectively. Preference of A-C beads seems in the order of Pb²⁺ > Cu²⁺ >Cd²⁺. Similarly, the highest removal can be achieved for Pb²⁺ about 90%.

Discussion: Since adsorption is an equilibrium process, depending on adsorbent and the metal, time of removal would change. These may lead differences in equilibrium time of the metals in the mixture. On the other hand, pH is one of the important parameters. Acidic pH values are not suitable due to protonation of carboxyl groups in alginate, aluminol and silanol in clinoptilolite. For these reasons, better removal of the metal mixture at pH 5 might be related to the higher number of available binding sites with the increase of pH.

Acknowledgement: We would like to express our appreciation to the Akdeniz University Scientific Research Project Commission, which supported this study (FYŁ-2016-2001).

Keywords: adsorption, biopolymer, heavy metals, zeolite
Microalgae Cultivation in Broiler Chickens Fertilizer and Gaining the Biomass to The National Economy by Using It in Agriculture as Natural Fertilizer

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Introduction: Bio-energy has become a very popular field of study in recent years. In particular, microalgae have a great biomass production potential with little area requirements and therefore they have been considered to be the most important bio-energy source with their natural oils and organic compounds. The aim of this study is to evaluate broiler chicken fertilizer as a rich organic content media to grow microalgae and gaining the biomass to the national economy by using it in agriculture as natural fertilizer. In this study an indigenous concept is contributed by developing new products by using "bio-fertilizer" which began to be used in organic farming activities in recent years as scenic and cheap way.

Material and Methods: 100s kind of microalgae culture collection was scanned and most effective isolates were first identified morphologically and then molecularly. Broiler chicken fertilizer (BCF) was obtained from chicken farm by a veterinarian and culture conditions were optimized as testing pH, temperature, initial biomass concentrations and light intensity. In the large scale studies 5000 mL erlenmayers were transferred into the 100 liters of open ponds. Once biomass was harvested greenhouse experiments with tomato plants were started. 3 different doses of algae as a test pattern in the greenhouse experiment, the control group of no substance and does not apply a nutrient solution was used as treatment groups. Algal biomass is directly used as natural fertilizer in the studies. Harvested plants and soils were used to show the potential of microalgal bio-fertilizer for agricultural use.

Results: According to the 18 S rRNA and 16 S rRNA analysis species are identified as \textit{Chlorella vulgaris} and \textit{Phormidium animale}, respectively. The C/N ratios of broiler chicken fertilizers (BCF) at different concentrations were determined. Directly used algal biomass showed effective growth rate in BCF media. This media showed positive effect on microalgal growth and can be referred as an alternative media to BG11.

Discussion: The selected species were cultivated in broiler fertilizer as a cheap designed fertilizer for the first time in the literature. As the result of optimization studies \textit{C. vulgaris} increased its biomass yield as 21 \% when compared to the initial studies. This yield was 33.3 \% for \textit{P. animale}. These microalgae should be used as important bio-fertilizers in agriculture.

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Keywords: microalgae, economic gain, microbial fertilizer, fertilizing, broiler
The Role of Riparian Countries in the Black Sea Fisheries

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Introduction: For riparian countries, fishing in the Black Sea is an important economic sector. However, due to the lack of a common fishing policy, each country implements a fisheries strategy that is appropriate for its own conditions. For this reason, the fishery in the Black Sea is unfortunately unsustainable. With this research, developments related to fisheries in the Black Sea from 1950 to the recent years were discussed.

Materials and Methods: In the study, from 1950 to recent years Turkey, Georgia, Russia, Ukraine, Romania and Bulgaria’s fishing fleets and catch data on the Black Sea were determined. Fishing fleets and catch values were taken from "www.seaaroundus.org" and FAO fishing statistics. In addition, it has been benefited by the official statistics of the countries and the results of the scientific researches. By using the data, the roles of the riparian countries in the Black Sea fisheries was evaluated.

Results: While the annual total fish catch obtained from the Black Sea by the six riparian countries were 400-500 thousand tons in the 1950s, increased to 1.3 million tons in the 1980s. However, at the end of the 1980s it showed a rapid decline and fell to below 500 thousand tons in the early 1990s. Production from the beginning of the 1990s to the recent years varied between 500 and 900 thousand tons. Until the late 1970s, the Soviet Union's share in this total catch was the highest and followed by Turkey and Ukraine.

Discussion: The results of this research showed that the Black Sea fisheries have changed significantly since 1950. Especially after the 1980s, the amount of catch obtained increased considerably. However, it has been a significant downward trend in recent years. In these developments, Turkey which caught the most fish from the Black Sea since the last 30 years, has played an important role. Therefore, the most important responsibilities for sustainable fisheries belongs to Turkey.

Keywords: Black Sea, Riparian countries, fishery, catch, fleet.
Histological Examination of Liver Tissue Two Different Methods of Wild and Aquaculture Originating Gilthead Sea Bream (Sparus aurata L., 1758)

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Introduction: Aquaculture that has been introduced around the world in the beginning of the century has become an important sector in the last twenty years in our country and reached to the potential to close the gap of animal protein. Development of aquaculture brings about certain problems as well. Fish feed and nutrition are the leading issues. Excessive fat deposition in the liver is an important problem and its identification is significant in terms of both quality of the feed and economy. In this project, liver tissues and dying methods that are used to determine excessive fat deposition in the liver that is seen in the winter period in fish fed with high-fat feed have been compared.

Material and Methods: The cultured fish that were used in the testing were obtained from a net cage private in the location North of İzmir and the ones which were examined naturally were obtained from the species that are captured in Bay of İzmir. According to this, live weights, length measurements, visceral organ, liver and gonad measurements of the fish were taken in the months that they were provided from the beginning. For histologic analyses, 10 samplings were made from the fish in each group (cultured and natural) and their livers were taken. In the process of dying, the dye; Hematoxilen - Eosin, was used to examine the general structure in the liver samples and the dye; Sudan Black (freezing microtome resections) was used. After the resections were taken, the preparates were prepared and they were photographed under the Olympus DP-20 digital camera attached CX-41 phase-contrast microscopy.

Results: The initial and final live weights of the fish have been calculated for cultured and natural fish respectively as 106,84±1,17 - 391,77±1,91 and 119,36±1,52 - 405,07±3,65 g. In addition to this, the values of VSI, HSI and GSI have been compared and better results were found in the natural fish groups according to the months. The assessment was conducted according to the possibility that fish may be in different age groups.

Discussion: Liver tissues of the sea breams that were cultured in the laboratory conditions, in the direction of the resection and drying methods accepted by international standard and that was provided naturally were examined. By means of these results, analyses and comparison between the dying methods and different resection methods were actualized. In this way, the assessment of the impact of cultivation fish feed quality has been provided.

Acknowledgement: We would like to express our appreciation to the Ege University Scientific Research Project Commission, which supported this study (2016-SÜF-022).

Keywords: histology, gilthead sea bream, Sparus aurata, liver
The Amelioration of Chromium stress by Humic Acid in a Bread Wheat (Triticum aestivum L. cv. Delebrad-2)  
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Introduction: Pollution of agricultural land with heavy metal is a trouble environmental worldwide. It compared to other heavy metals, chromium (Cr) causes serious problems in crops. It is known that chromium toxicity causes damage in photosynthetic pigments and in the activities of antioxidant enzymes. In addition, heavy metals are also known to directly inhibit an enzymatic step of chlorophyll synthesis. Carotenoids, an antioxidant molecule, interfere with reactive oxygen species and prevent the initiation of lipid peroxidation. At the same time, a decrease in carotenoid content was observed in wheat plants and in other crops under metal stress. Experiments conducted on various crops have shown that humic acid (HA) enhances plant growth both directly and indirectly. The present study was carried out to analyse the effects of HA on photosynthetic pigments and MDA content in a bread wheat exposed to Cr stress.

Material and Methods: As a plant material, a variety of bread wheat (Triticum aestivum L. cv. Delebrad-2) which is grown in Suluova Amasya, was used. After the wheat plants were germinated, they were transferred to pots and grown under the light/dark regime for 18/6 hours in the laboratory. Except of the control group, the wheat seedlings were divided into two groups and the first group was treated with 0.20, 0.40, 0.60 mM chromium solution. The second group was treated in the same concentrations with chromium solution and 2.0 mg/ L HA (Humic acid) solution. All groups were treated with Hoagland’s nutrient solution.

Results: In this study chlorophyll a, chlorophyll b, total chlorophyll and carotenoid content were found to be decreased in the chromium-treated group compared to HA+Cr treated group depending on the chromium stress application. However, only chlorophyll a/b ratio and MDA content were increased in chromium treated group compared to HA+Cr treated group.

Discussion: This study shows that HA has an important role against chromium stress in wheat plants. According to the obtained data, it was observed that the application of HA to wheat plants could reduce the harmful effects of chromium.

Keywords: heavy metal, photosynthetic pigment, carotenoid, malondialdehyde
Mitigating Effects of Forage Legumes on Greenhouse Gases Emission and Some Pollutants

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Introduction: It is a fact that CO\textsubscript{2} concentration of atmosphere about 100 ppm, average global temperature about 0.9 °C, and sea level about 20 cm increased in the last century. Some agricultural activities such as, enteric fermentation, agricultural chemicals, paddy farm, agricultural machines and burning of stubble causes highly greenhouse gases (GHG) emission. The demand for high quality food (especially dairy products) is increasing worldwide, due to population growth, urbanization and increases in disposable per capita income. It is anticipated that continuing population and consumption growth will further increase global food demand. Thus increased global food production is required and this increase must be achieved through environmentally sustainable production systems.

Material and Methods: To evaluate the topic and prepare the article, as probably as more studies were revised and assessed the subject as detailed considers the whole aspects.

Results and Discussion: Regard the results of studies, forage legumes used in crop rotation and livestock feeding decreases GHG emissions and pollute of natural sources. Currant agricultural production is highly N limited, while the provision of industrial N is largely based on fossil energy with its associated emission of greenhouse gases. Thus, substitution of industrial N fertilizer with N derived from legumes’ symbiotic N\textsubscript{2} fixation is an important contribution to more environmental friendly and resource efficient agricultural systems. In grassland, symbiotically fixed N\textsubscript{2} by legumes can arrange from 100 kg N ha\textsuperscript{-1} year\textsuperscript{-1} to 380 kg N ha\textsuperscript{-1} year\textsuperscript{-1}. Forage legumes, as components of mixed grass-legume swards, can provide multi benefits to agriculture by acting at different stages in the soil-plant-animal-atmosphere system. Livestock production is a significant source of GHG emissions, generating CO\textsubscript{2}, CH\textsubscript{4} and N\textsubscript{2}O from enteric fermentation, manure management and other production activities. Inclusion of forage legumes in ruminant diets can potentially improve productivity while at the same time reducing the C footprint of meat and milk production through reduced CH\textsubscript{4} and N\textsubscript{2}O emissions as well as enhanced C sequestration. On a global scale, enteric fermentation by ruminant by produces approximately 21%-25% of total anthropogenic CH\textsubscript{4} emissions. Several forage legumes possess plant secondary metabolites that include tannins and polyphenoloxidase. In the rumen, condensed tannins protect proteins from degradation and, consequently, ruminants excrete less urinary N but more fecal N. This is important because the urinary N is quickly converted to ammonia and N\textsubscript{2}O, a potent GHG, which induces environmental problems.

Keywords: GHG, forage legumes, global warming, pollution
Somali Agriculture and Forage Cowpea (*Vigna unguiculata* L. Walp)

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**Introduction:** Somali is take place the most eastern part of Africa that called African Horn. Its neighbours are Aden Gulf and Yemen in North, Indian Ocean in east, Ethiopia in West, Cibuti in North-west and Kenya in South-west. Capital city is Mogadishu. Ancient name of the country is “Spice Country”. Climatic conditions of country can describe as high temperature and drought. Thus, some plants such as cowpea are really important to meet food and feed demands in high temperature and drought conditions. To determine the production rate of forage cowpea and some important forage plants in Somalia was the aim of this paper.

**Material and Methods:** To prepare this manuscript we revised recent literatures about cowpea cultivation and regard the statistics about Somali agriculture, food and feed production and socio-economic parameters of the country.

**Results and Discussion:** Approximately 80% of the Somali economy is based on agriculture. 12% of the country's land is available for cultivation. However, 3% is planted and 55% is forested. Along river-side areas are the most cultivation and huge productivity. Majority of the Somalis are livestock keepers. Camel, sheep, goat, and cattle are main raised animals. In Somalia, there is a very noticeable point for food shortage for animals when both rangeland and the amount of harvested forage crops calculated. Especially at the dry seasons animals get lack of forage because of drought. Cowpea is an important source of protein in Somalia, while stable plants are sorghum and corn. In Somalia, semi-upright cowpea types are commonly grown. The maturation period of the plant for forage ranges from 55 to 60 days. Irrigated areas are harvested 2-3 times in a growing period. The final harvest is left for grain production. Residues of plant produced for grain are used in animal feeding. In dry seasons, cowpea grass and its residues are a very important feed source for animals. Considering the Somali ecological conditions, cowpea carries significant potential in terms of human and animal nutrition. It is necessary to develop varieties suited to these conditions and to increase production of seed.

**Keywords:** Somalia, agriculture, Forage Cowpea, *Vigna unguiculata* L. Walp
Spermathecae Morphology of Some Terellinae (Diptera: Tephritidae) Genera and Species: An Electron Microscope Study

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Introduction: Spermathecae (receptaculum seminis) is an ectodermal gland which opened to anterior portion of the oviduct of the female insects. The spermathecae plays a significant role in many functions e.g.: sperm storage, copulation, fertilization, oviposition. Morphology, then, is important in so far as it can change the evolutionary interpretation of paternity patterns in the context of sexual selection. The importance of morphological as the basis for appreciating adaptive aspects of many reproductive processes and for understanding and modeling sexual selection has been increasingly affirmed. Genera of Terellinae include two papillose spermathecae. Main purpose of this study, to be understanding differences of surface morphology, sizes and form of spermathecal structures between species and genera of Terellinae using SEM micrographs.

Material and Methods: Adult fruit flies were collected different regions of Turkey between 1998 and 2013 which were used in the study. Samples were steeped 3-4 days in %10 KOH solution and dissected for spermathecae in light microscopy (Olympus SZX12). Dissected spermathecae cleaned with %96 alcohol and stored glycerin for each species.

For scanning electron microscopy, cleaned spermathecae dehydrated with ascending alcohol series and air dried, were mounted using a double-sided tape on SEM stubs, coated with gold using a EMITECH SC7620 Au/Pd, and examined with a SEM operated at 10 kV. General spermathecae structure, spermathecal duct, pumping region and pores of bulb scanned in SEM and compared differences of Terellinae genera as systematical characters.

Results: In this study, spermathecae morphology of 11 species (Chaetorellia chartami Stackelberg, C. jaceae (Rob-Des), C. loricata (Rondani), C. succinaea (Costa), Orellia falcata (Scopoli), O. stictica (Gmelin), Terellia fuscicornis (Loew), T. quadratula (Loew), T. ruficauda, T. quadratula (Fabricius), T. serratulae Linnaeus, T. virens(Loew)) of Terellina was examined and evaluated as systematic character. As a result of study, spermatheca structures show some differences in terms of form and sizes between genera. Also many differences were determined on surface morphology, sizes and aspect ratio between species of same genus.

Discussion: Spermathecae morphology of species can be count as a definition criterion like morphological properties. And more accurate identification and classification can be made using this morphological criterion especially in similar genera. Particularly, the result of this study makes some significant contributions to demonstrate the character and distinction of similar types of genera.

Keywords: Fruit flies, Tephritidae, Terellinae, Spermathecae, SEM
Dicranella staphylina H. Whitehouse and Weissia multicapsularis (Sm.) Mitt. New Bryophyte Record from Floodplain Forest in Turkey

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Introduction: We have studied the bryophyte flora of Acarlar Floodplain Forest (Sakarya-Karasu) and Kocaçay Delta (Bursa-Karacabey) Floodplain Forest of Turkey in 2016-2017. Comprising deep spots, floodplain forests have a large coverage on the planet. Approximately, three percent of the planet's land area is estimated to be wetlands, of which 60% is covered by floodplain forests, host a very high diversity of plant species, including trees, shrubs, and many endangered plant species and provide habitats for a wide range of fauna. Thus, they are very important for global biodiversity. Many endangered plant species find suitable habitats for themselves in floodplain forest ecosystems. However, the acreage of these unique areas shrink and end up with great losses in the flora. Until now, no bryophyte flora studies have been done in these areas.

Material and Methods: This study was conducted in two important floodplain forests of Turkey between the years of 2016 and 2017 by the support of TUBITAK (Project No: 115Z364). Plant surveys were done in Kocaçay Delta Floodplain Forests (3 times in 2016-2017) and Kocaçay Delta Floodplain Forests (3 times in 2017). New records from the fields were sent to expert bryologists in Europe and the United States and the approval of species identification was obtained. Copies of the species are also available in the collections of these researchers. An herbarium number was given to each of the new records, and stored in the personal Herbarium of Serhat Ursavaş at Çankırı Karatekin University, Faculty of Forestry.

Results: Here, we reported the first record of Weissia multicapsularis (Sm.) Mitt. in Kocaçay Delta Floodplain Forest. In addition, we report Dicranella staphylina H.-Whitehouse for first record for both Acarlar and Kocaçay Delta Floodplain Forest in Turkey.

Discussion: Dicranella staphylina is a common widespread taxon in Europe. Because of the small size of the plant, it has not been spotted by Turkish bryologists until now. This taxon is also recorded for the first time in the South-West Asia continent. Weissia longifolia Mitt., first found in England in 1850, was regarded as Endemic for those times, but then lost this characteristic by being subsequently registered in Europe. This taxon is currently only registered in Italy and France from the Mediterranean and European countries. Giving the record of this taxon in Turkey, which is the UK distribution of critical levels and categories of danger is very pleasing. It was also recorded for the first time in Southwest Asia.

Acknowledgements. This study was financially supported by the TUBITAK (Project No: 115Z364). We would like to thank to Richard H. Zander for his help to confirm the determination of Weissia multicapsularis, to Marko Sabovljević for confirming the determination of Dicranella staphylina.

Keywords: Weissia multicapsularis, Dicranella staphylina, new, rare, moss record, Turkey.
The Use of Antioxidant Biomarkers in *Gammarus pulex* to Determine the Treatment Efficiency of Slaughterhouse Wastewater by Electrocoagulation Process

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**Introduction:** In this study, it is aimed to investigate antioxidant response of *Gammarus pulex* exposed to different rate of diluted slaughterhouse wastewater (SW) treated by using electrocoagulation process.

**Material and Methods:** Physiochemical parameters (chemical oxygen demand, electrical conductivity, total dissolved solid, pH, phosphate, turbidity and NH₃) were conducted before and after treatment. Slaughterhouse wastewater is treated by electrocoagulation process using aluminum electrodes. Superoxide dismutase (SOD), Glutathione peroxidase (GPx) and catalase (CAT) enzyme activity in *G. pulex* exposed to untreated, treated, and diluted rates (1/10) and (1/20) in both SW during 24 and 96 h were tested by using ELISA method. One-way ANOVA and the Duncan multiple range test were used to determine the statistical differences in parameters among the experimental groups. Two-tailed independent T test was used for the evaluation of differences in the control and same application of groups for each parameter and in different applications of each group in sampling hours for same parameter.

**Results:** SOD enzyme activities were increased but CAT decreased in untreated group compared to control (p<0.05). GPx activities were not statistically changed in untreated group compared to control (p>0.05). After treatment by electrocoagulation CAT and SOD activities were returned to control values but GPx were not changed.

**Discussion:** In conclusion, present study demonstrated the abilities of SW to induce oxidative stress. The results revealed that SOD and CAT are useful biomarkers to determine treatment efficiency of slaughterhouse wastewater by Electrocoagulation Process

**Keywords:** *Gammarus pulex*, oxidative response, slaughterhouse wastewater, electrocoagulation process
The Using Possibilities of Medical and Aromatic Plants in Areas Exposed to Erosion

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Introduction: Wind erosion is an important soil degradation process in semi-arid regions. Generally, it is more important in fallow area, where the vegetative cover is removed seasonally and soil surface horizons are disturbed by tillage operations. Turkey is threatened by wind erosion, especially the inner and south-eastern Anatolia regions. If it is not protected against erosion, a large part of the land can lose its productivity in these regions. On the other hand, farmers are not generally aware of the possible danger. Farmers can be easily convinced if the recommended crops are profitable and be in accordance with the region's conditions. The aim of this study is to investigate the using possibilities of Capers, Astragalus, Euphorbia, Thyme and Jojoba in areas exposed to erosion.

Material and Methods: Capers (Capparis spinosa L. ve C. ovata Desf.), Astragalus (Astragalus gummifera L.), Euphorbia, Thyme (Origanum) and Jojoba (Simmondsia chinensis) were examined in terms of climatic adaptations, erosion prevention capability and market value. Evaluation was made according to international literature data on the plants.

Results: Capers, Astragalus, Euphorbia, Thyme, Jojoba have been found suitable in point of climate and erosion prevention ability. Gum which obtained from Astragalus is used in making preparations such as emulsions, suspensions, lozenges and tablets in the production of medicines, and in the paper and textile industries. If the Thyme production is done by family members, the producers of it have a profit between 160-210%. Capers is mainly exported to EU countries, Australia, Canada, Bahrain, Brazil, Israel, Japan, Norway, Australia, America, England, Sweden, Canada and others. Euphorbia has also some medicinal properties. But, it has not of commercial value yet. Jojoba has a great potential for lubricated by machines, cosmetics, medicine, candle making. It has a market share of about $ 65 million per year and is growing by 7% per annum.

Discussion: Apart from their economic importance, according to which ecological characteristics, Capers, Astragalus, Jojoba, Thyme and Euphorbia is recommended for erosion zones. Economically, Capers, Astragalus, Jojoba and Thyme can be considered as market value plants. But, Euphorbia spp is not economically assessed in the current conditions. As a result, Capers, Astragalus, Jojoba and Thyme were evaluated as available in areas exposed to erosion.

Keywords: wind erosion, medical and aromatic plants, drought
ORAL PRESENTATION

The Effects Of Different Solid Biogas Fermentation Residue Doses as Organic Fertilizer Source on Forage Yield and Quality of Common Vetch

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Introduction: With the use of chemical fertilizers, different fertilizer resources are needed in order to protect our increasingly polluted soil and groundwater resources. In this context, the use of biogas fermentation residues, rich in plant nutrients, as a source of organic fertilizer in agricultural land, has emerged in biogas facilities which are increasing in number and importance. Common vetch, which is an intensive production in Aydın province, is one of the high quality roughage feed sources preferred by animal husbandry enterprises due to its high protein ratio. For this purpose, the effects of solid biogas fermentation residue doses on forage yield and quality of the common vetch (Vicia sativa L.) were investigated as a source of organic fertilizer in Aydın province where intensive livestock activities are carried out.

Material and Methods: In the experiment, solid biogas fermentation waste was applied at 5 different doses (0-0.5-1.5-2 t/kg) and Albayrak variety of common vetch plant was used as material. Plant height, stem diameter, fresh forage yield, hay yield, ADF, NDF, crude protein ratio and crude ash ratio were measured with the samples taken from the harvested plots during the flowering period of 50%. According to the results, crude protein yield, digestible dry matter, relative feed value and relative feed quality were calculated.

Results: According to the results, the highest plant height was obtained in 1 t/kg application. The highest fresh forage yield was obtained from 1 t/kg with 4006.67 kg/da. While the highest crude protein ratio was obtained from 1 t/kg with 19.40%, the highest relative feed value was obtained from 148.28 in 1 t/kg application.

Discussion: The results showed that the fertilizer application with the highest forage yield and quality was obtained from 1 t/kg application. It has been observed that the application of 2 t/kg, which is the highest dose in 5 different fertilization treatments, causes yield and quality declines, and it has been seen that excess fertilizer may cause adverse effects on yield and quality.

Keywords: common vetch, biogas residue, organic fertilizer, forage quality
The Effects Of Different Solid Biogas Fermentation Residue Doses as Organic Fertilizer Source on Forage Yield and Quality of Common Vetch

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Keywords: common vetch, biogas residue, organic fertilizer, forage quality
Histomorphological Structure of the Male Reproductive System of *Tanymecus dilaticollis* Gyllenhal, 1834 (Coleoptera: Curculionidae)

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**Introduction:** Histomorphological structure of the male reproductive system in *Tanymecus dilaticollis* which is economically important was described with light microscope and scanning electron microscope (SEM).

**Material and Methods:** Adult weevils were collected from maize plants in fields from Sakarya, in June-July 2017. The males were killed with ethyl acetate fumes and dissected in 70% ethyl alcohol under a stereo microscope. The gross morphology of the males were examined and photographed with stereomicroscope. For the histological analysis, samples were fixed in Formaldehit for 24 h.and washed, dehydrated in a grade series of ethanol solutions and finally embedded in paraffin. Sections were stained with Mallory’s Triple Stain and Hematoxylin-Eosin and photographed by using Olympus microscope. For SEM, samples were cleaned and dried with Hexamethyldisilazane and coated with gold in a Polaron SC 502 sputter coater, then examined with JEOL JSM 6060 LV SEM.

**Results:** The male reproductive system in *T. dilaticollis* consists of a pair of testes each with a seminal vesicle, a pair of accessory glands, two vas deferentia, a median ejaculatory duct. The testes are bean-shaped, yellowish structure. Each testis has a pair of testicular follicles which are three different development zones (growth zone, maturation zone, differentiation zone). The growth zone, where groups of spermatogonia become separated from the germarium. These groups of cells become enclosed by several cells which form the wall of the sperm cyst. Spermatogonia increase and allowing the occurrence of mitosis and differentiation into spermatids. The maturation zone, where two meiotic divisions occur and, these cells become spermatids. The differentiation zone, where spermatids enlarge and change shape thus forming spermatozoa. In the middle region of the testes, the spermatozoa are contained in cysts which are grouped together in bundles. The spermatozoa heads were spindle shaped. The testes are connected to the vas deferens by the seminal vesicle. Vas deferens are fine-long, cylindrical, whitish color and thick-walled with inner lining of large epithelial cells. The accessory glands connect to the vas deferens. The milky colored accessory gland wall has by cuboid to columnar secretive cells with large nuclei. The vas deferens is connected with ejaculatory duct. The duct wall is consisted of cylindrical epithelium and muscle layers.

**Discussion:** The male reproductive system of *T. dilaticollis* is histologically similar to the other Coleoptera species, but, in light and SEM examinations, some morphological differences are seen in detail.

**Keywords:** reproduction, testes, histology, light microscope, SEM.
Introduction: The high economic value of sea bream, one of the most produced Mediterranean fish species, with high salinity tolerance, increases the importance of this species in the aquaculture sector. The most intensive marine fish farming have been practicing in The Aegean Sea in Turkey, having very favourable condition for aquaculture. However, it is predicted that existing production areas could be transported to different places due to the presence of a great tourism potential and the development of the tourism sector in the same region and increasing water temperatures consequence of global warming. Compared to the other regions, the Central Black Sea region with appropriate physico-chemical structure can have the potential in this respect.

The aim of this study was to investigate the growth performance and biochemical composition of seabream cultured in Central Black Sea Region.

Material and Methods: The research was carried out in the open sea cage system of a commercial company located in Samsun-Yakakent. Fish having an initial average weight of 2.44±0.03g and length of 5.90±0.02cm were used. Fish were sampled monthly from July 2015 to October 2016 by random sampling method. Extruder feeds containing 45-55% protein and 14-20% lipid with sizes between 1 mm and 6 mm produced by a commercial feed company were used. The proximate composition of fish and feed samples with different sizes were analysed in triplicate following standard procedures AOAC (2005). Crude protein analyses were performed in TUBITAK.

Results: Fish reached to average 29.55±0.20cm in length and 474.60±8.64g in weight after 15 months. The survival rate was 94.26±0.60%. The average specific growth rate, thermal growth rate and feed conversion rate were 0.92±0.30%, 0.02±0% and 1.45±0.05 respectively. In harvested fish, crude protein, fat dry matter and ash value were 21.07±0.06%, 11.82±0.17%, 34.37±0.35% 3.64±0.17 %, respectively.

Discussion: It was determined that sea bream showed a good growth in 15 months period in the Central Black Sea Region. Water temperature and feed quality were considerably effective on the growth performance and biochemical composition of fish. The meat quality parameters were similar with fish cultured in the other regions. Furthermore, this is the first report showing that monoculture sea bream cultivation in The Black Sea was commercially achieved.

Acknowledgements: The authors thank Kızılırmak Aquaculture, Fisheries Ind. Tra. Lmt. Com. (Samsun) for supplying the fish and feed samples.

This study was approved by Sinop University Ethical Committee of Animal Experiments Committee (Decision Date and Number is 12.06.2015-2015/17)

Keywords: Sparus aurata, sea bream, central Black Sea, biochemical composition, growth performance
**Effect of Irrigation Regimes by Mini Sprinkler on Chemical Composition of ‘Tombul’ Hazelnut Kernels**

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**Introduction:** Hazelnuts have been grown in the middle and eastern Black Sea regions on high elevation and sloping land without irrigation. In order to grow hazelnuts without irrigation, the total annual precipitation should be over 700 mm, and rainfall should be well-distributed throughout the year. If rainfall is inadequate in July and August, irrigation must be done. Although the Black Sea Region has the highest rainfall in Turkey, rainfall is inadequate in June-July, when the hazelnut water need is the highest. Inadequate rainfall in July and August, coupled with high temperatures, affects hazelnut production negatively. The nuts need water very intensively from June to the first half of August so that the kernel may develop well and fill the interior. If the water need cannot be met by precipitation in the summer months, irrigation is appropriate. This study was carried out to determine the effects of irrigation by mini-sprinklers on chemical of ‘Tombul’ hazelnut kernels.

**Material and Methods:** This research was carried out in a ‘Tombul’ orchard about 100 years old in Barça village of Giresun province of Turkey in 2015. The treatments were full irrigation (100% of soil water depletion at a depth of 60 cm), 50% of soil water depletion applied on the same day as the 100% treatment, and rain-fed control. The orchards plots were irrigated by mini-sprinklers. Mean values were calculated for protein, fat and ash compositions.

**Results:** As a result of the analysis of variance, it was determined that the ash content was significant for the irrigation regimes, and the protein and fat contents were not significant. The ash content varied between 2.183% (0%) and 2.337% (100%), and water supply was increased this value.

**Discussion:** The effect of irrigation treatments on the fat content was found to be insignificant as in previous researches. The effect of irrigation treatments on the protein content was found to be insignificant, and this value is in parallel with the literature results. The effect of irrigation treatments on the ash content was found to be significant, and this value is in parallel with the literature results.

**Acknowledgement:** This is a part of Master Thesis. The authors would like to thank to the Ordu University Research Department (ODUBAP) for its financial support (project TF-1516).

**Keywords:** hazelnut, irrigation levels, chemical, ‘Tombul’
The Effects of Vermicompost Tea on the Root Growth and Mitosis of Onion (Allium cepa)

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Introduction: Increasing of yield in plants always have a great importance. The more population means the more foods are required. While the population is increasing, cultivation area is decreasing because of urbanization. Different treatments have been using to increase productivity of plants like pesticide and disease-resistant seeds. In this study, the effects of different concentrations of vermicompost tea on plant growth and mitosis will be examined and information about mechanism which lead to plant growth will be obtained.

Material and Methods: A. cepa were obtained from local market. Vermicompost boxes which include Eisenia foetida were provided from Ekosolfarm. Vermicompost tea were obtained in our laboratory. Obtained vermicompost tea regarded as 100% and diluted with distilled water to 75 %, 50 % and 25 %. Distilled water was used as negative control. Onion bulbs were treated with these four concentrations and at the end of 72 h root lengths were measured. For mitosis, onion roots were cut and placed in Carnoy solution for 24 h, then transferred to 70 % alcohol. Three replicates were done for each concentration. The statistical analysis of data was carried out using SPSS for Windows version 22.0 statistical software (SPSS Inc, Chicago, USA). Independent sample t test was performed and significant differences between treatments were calculated by Tukey test with a significance level of 0.05 (p < 0.05).

Results: Four different concentrations of compost tea were used in the study. Their effects were compared with control group which was treated with only distilled water. According to the results of our study, root length increased in 25 % and 50 % but decreased in 75 % and 100 % vermicompost tea treatment. The highest root length was recorded in 25 % whereas the lowest root length was in 100 % vermicompost tea treatment. Mitotic index also showed differences between treatment groups. The results of mitosis were in accordance with the results of root length. Maximum mitotic index was observed in 25 % whereas minimum mitotic index was in observed 100 % vermicompost tea treatment.

Discussion: The increase in the length of onion roots and mitotic index can be explained by several possible mechanisms. Vermicompost tea possess some beneficial microbiological and chemical characteristics like solid vermicomposts. It is known that solid vermicompost contain beneficial components like humic and fulvic acid, plants growth regulators, mineral nutrients and also beneficial microorganisms. These beneficial components can be the key factors that has positive effects on plant growth. However not all the concentrations had a positive effect on the onion root and mitosis. In this study, 25 % vermicompost tea concentration was the optimum value for onion. This optimum concentration may show differences for other plants. For the healthy growth and development of plants, it maybe recommended to find the appropriate vermicompost tea concentration for the each plant species.

Keywords: Allium cepa, Eisenia foetida, worm tea, vermicompost tea
Introduction: Soil mites are one of the richest invertebrate groups in terms of both species and number of individuals in soil ecosystems. Up to now, more than 500 or 550 different soil mite species were recorded from various parts of Turkey. The aim of this study is to determine the soil mites in parks and garden areas in Nazilli city center. Thus, the mite fauna of Turkey will have contributed.

Materials and Methods: The main material of this study carried out between September 2016 and April 2017 is litter and soil samples collected from the park and garden areas of the Nazilli district center. Samples with mites were placed into plastic bags, labelled and transferred to the laboratory. Samples were placed into combined Berlese funnels, and mites were extracted for 5–7 days according to their humidity. Mites were separated under a stereo-microscope (Nikon SMZ745T). They were placed in 60% lactic acid for clearing and mounted onto permanent microscope slides using a glycerin medium. The examination of mites were done using an Olympus CX41 microscope with DP25 camera and were photographed. Then, the samples were put in stock bottles containing 70 % alcohol and 1 - 3 drops glycine and labelled.

Results: The present paper provides an updated taxonomic list of soil mites species known from Nazilli city center. Of the mite samples examined, 9 species from the 5 families belonging to the Mesostigmata order, 14 species from the 12 families belonging to the Oribatida order and 7 species from the 6 families belonging to the Trombidiformes order were determined. Identification of detected mites has been tried at species level. Specimens that can not be diagnosed are given at the genus level. Examination of the detected species was carried out on a light microscope, the definitions were reviewed, photographs were taken, and the distributions in the world were given according to the literature.

Discussion: The diversity of soil mites has been revealed by determining mite species which living in litter and soil in park and garden areas of Nazilli district center. On this basis of the collected specimens, the descriptions of 30 species have been given and their geographic distribution have been discussed.

Keywords: Acari, soil mites, Nazilli, Aydın, Turkey.
Introduction: Studies reveal the fact that a number of chemicals contaminated to the environment have carcinogenic or mutagenic effects. The major sources for the mutagenic/carcinogenic substances are industrial and agricultural activities. Damage on the DNA by genotoxic pollutants is the first consequence in the aquatic organisms and thus, aquatic organisms are used in most of genotoxicity studies. Studying DNA damage at the level of chromosome constitute a necessary part of genetic toxicology because chromosomal mutation plays the most important role in cancer formation. In environmental mutagenesis, Micronucleus tests yield quite practical results in monitoring clastogenic/genotoxic effects of the pollutants. Variety of chemical wastes has been discharged into the Izmir Bay without treatment and in uncontrolled way because of rapidly increasing population of the city. Due to present situation of Izmir Bay, the aim of the present study was to determine the level of the mutagenic effect by the means of micronuclei test using mussel, Mytilus galloprovincialis.

Materials and methods: In order to determine whether pollution of mutagenic/carcinogenic origin existed at the cellular level in Izmir Bay, tests were carried out using, haemolymph of the mussel M. galloprovincialis obtained from 10 stations. For this purpose, haemolymph taken with thin-tipped syringe is mixed with a fixative (3:1 methanol: acetic acid) and centrifuged at x1000 rpm. The pellet was fixed with ethanol: acetic acid (3:1) (modified from Hayashi et al. 1998). The fixed pellet was smeared on slide and then stained with Giemsa (5%). The cells with MN and BN were counted at x100 magnification by light microscopy. MN/BN frequency was calculated as ‰ number of MN and BN.

Results and Discussion: The present study attempted to determine whether genotoxic potential existed in the environment of Izmir Bay using micronuclei test of indicator organisms. Frequency of BN and MN was determined. According to examinations of cells, MN frequency ranged between 23.7 - 38.5 ‰, and BN frequency between 0.2 and 0.8‰ higher MN frequencies were found in mussel taken from station 9 than those taken from others. Determined MN frequencies showed statistically significant differences when micronuclei and binuclei frequencies were compared statistically between locations (p<0.005). The present study indicates that Izmir Bay was found polluted by mutagenic and genotoxic compound.

Acknowledgement: The present study was conducted in the context of Scientific Research Project of Ege University Faculty of Fisheries, Hydrobiology Department (2016/SÜF/006).

Keywords: İzmir Bay, pollution, micronucleus, Mytilus galloprovincialis
ORAL PRESENTATION

The Impact of Color Change on Bleaching, Impregnation and Water Based Varnish of Pine (Pinus sylvestris L.)

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Introduction: Wood material is common to use in furniture and furnishing industry, because of being resistance although lightweight, easy processing and positive aspects in terms of human health. Impregnation process is done to prevent wood structure from wood pests. There is a need for bleaching to prevent color differences which resulted with metal oxidation of some chemical substances, contact with metals of tannic wood and growln defects. After this process, while varnishing procedures help the wood material look nice, it also provides protection for longer time. The aim of this study is to determine total color change properties of Scotch pine (Pinus sylvestris L.) on water-based varnishes application after applying bleaching and impregnation processes.

Material and Methods: These well-selected specimens were non-deficient, proper, knot-free, normally grown wood materials (without reaction wood and without decay, insect and fungal) according to the principles of TS 2470. In experiments, oxalic acid (H₂C₂O₄) as bleaching, Imersol Aqua and wood preservative as in the impregnation of the test samples were used. Single component primary resin branded Johnson from furniture sector, and double component polyurethane copolymer modified with acrylic provided from Kimetsan company used in varnishing of the test samples. Experimental samples prepared according to the TS 2471, bleaching, impregnation and varnishing operations were carried out in accordance with the manufacturers recommendations. Accelerated aging tests, according to ASTM G 151 and ASTM G 154, were applied to the samples with water-based varnish, and the results were compared with the control samples. Bleaching, impregnation equipment and water-based varnish are applied to the test specimen to determine the characteristics of total color change with respect to ASTM 2244 – 2.

Results: According to the results of the research, oxalic acid, wood preservative, impregnation agents, applied to the samples prepared from the scotch pine wood were effective in total color change, and the lowest values were determined in two component water based varnish applied with wood preservative after coloring with oxalic acid. The samples without color change and impregnation and the Imersol Aqua applied samples gave the lowest total color change in both varnish types.

Discussion: The lowest total color change (9,15) was determined in imersol-aqua treated Scotch pine samples after oxalic acid treatment, and the highest total color change (21,73) in imersol-aqua treated irregularly sampled samples. According to these results, it can be said that the coloring process with oxalic acid in the Scotch pine wood is the effect of decreasing total color change. In products manufactured from Scotch pine, if there are compulsory conditions to remove color differences, oxalic acid usage is recommended to the manufacturers.

Keywords: scotch pine, oxalic acid, imersol aqua, water-based varnish, total color change
Poisonous Macrofungi Determined in Gaziantep Province (Turkey)

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Introduction: Mushrooms are an important group of organisms in nature and can be found almost everywhere in terrestrial ecosystems. Since they have long been used as a source food for human, mushroom poisoning incidents had also been the reality of mankind. To be able to prevent inconspicuous or inexperienced mycophagy, something could be done like determining the poisonous macrofungi and preparing colour atlas of them. This study aims to determine the poisonous mushrooms growing in Gaziantep province (Turkey).

Materials and Method: Macrofungi samples were collected from suitable habitats within the boundaries of Gaziantep province between 2013 and 2015, and they were identified by using the data obtained from field and laboratory studies. The specimens were deposited at Karamanoğlu Mehmetbey University.

Results: Twenty-eight poisonous macrofungi taxa belonging to 2 orders, 15 families and 19 genera were identified. Two of them belong to Ascomycota and 26 to Basidiomycota.

Discussion: Poisonous mushrooms constitutes 7.8% of the total macromycota of the Gaziantep province. Amanita Pers., Inocybe (Fr.) Fr., Panaeolus (Fr.) Quél., Entoloma (Fr. ex Rabenh.) P. Kumm. and Omphalotus Fayod are found to be the most crowded genera to include poisonous taxa in the region. Since none of them are known in the region, all of the determined taxa are regarded as either poisonous or inedible by local public.

Acknowledgement: The authors would like to thank TUBITAK (Project No: 212T112) for its financial support.

Keywords: biodiversity, poisonous mushrooms, Gaziantep, Turkey
Possibility of Using Spent Mushroom Compost in Nursery Industry: A Case Study on Celtis australis Seedling

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Introduction: Recently, the majority of nurseries use peat as a growing medium in landscape plant production. The peat obtained from wetlands is consumed rapidly that causing environmental concerns, so mining of peat material is being restricted in some countries. The use of waste materials as growing media provides environmental and economic benefits by reducing the damage from removal of soil and peat materials. Researches on the possibilities of using spent mushroom compost as a growing medium in vegetable growing have shown positive results. It is needed to determine alternative growing media in ornamental plant production. In this study, results related to use of spent mushroom compost as a growing medium in Celtis australis seedling production will be presented.

Material and Methods: C. australis seeds harvested from a natural genotype (GT5) which has a potential for use in plant designs native to Serik District of Antalya, were sown in 3-liter plastic pots which were filled with growing media; loamy soil: well fermented manure: sand (2:1:1 by volume), peat: perlite (2:1 by volume), peat: sand (2:1 by volume) and spent mushroom compost: sand (2:1 by volume). During the experiment plant height, stem diameter, number of leaves and number of branches were measured every month. At the end of the experiment, leaf nutrient contents, root and shoot dry mass values were also determined.

Results: Results related to the growth characteristics considered in this study indicated that the highest values on plant height: 70.48 cm, stem diameter: 6.49 mm, number of leaf: 35.18 number/plant, side branches: 4.23 number/plant, root dry mass: 15.02 g, shoot dry mass: 8.14 g and leaf macronutrient contents N: % 2.12, P: % 0.24, K: % 0.43 were recorded in the growing medium consisting of spent mushroom compost: sand mixture (2:1 by volume).

Discussion: In this study spent mushroom compost: sand mixture (2:1 by volume) was evaluated the best growing medium among the growing media used in this study. This result indicated that the spent mushroom compost is not only an economic organic material for the mixture of growing media but also a suitable choice for the protection of the environment and natural resources. From this point of view, it has special importance that the mixture consisting of spent mushroom compost: sand is determined as the most suitable growing medium (2:1 by volume).

Acknowledgement: This research was supported financially by the Akdeniz University Research Fund (Project Number FYL-2014-173).

Keywords: Celtis australis, growing media, growth, seedling production, spent mushroom compost
Determination of Monthly Condition Values of Fish Meagre (Argrosomus regius Asso, 1801) From Fish Farm in Aegean Sea, Turkey

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Introduction: Meagre marine is a benthopelagic species and is distributed in the Mediterranean and the Black Sea. Although the fisheries statistics are not completely known, their populations are in the least concern (LC) category in Red List (IUCN Red List 2017). In the last decade, meagre has become an increasingly important fish species to Mediterranean aquaculture (Kružić et al, 2016). The production from capture fisheries in Europe is low, ranging from a few hundred tonnes to 1500 tonnes in different countries. In this study, the monthly condition results of the fish of the feed used were evaluated.

Material and Methods: In this study, 1327 fish specimens belonging to the species of meagre (Argrosomus regius Asso, 1801) were obtained from a special fish farm located in İzmir province between May 2013 and April 2014. The fish samples were fed with feed stuffs that were evaluated taking into consideration the constant crude protein (P%) and different crude fat (F%) ratio spready in 3 different groups. These are: P % - F % respectively; A (45-16), B (45-18), and C (45-20) feed groups considered as control feed in commercial feed value. The fish samples used in the study were taken under the conditions of normal aquaculture in 16 m diameter round cage sand 15 m net depths, and the measurements of length and weight under anesthesia were obtained by random sampling method every month.

Results: The mean length and weight values of the samples were examined as 31.85±20.3 cm and 657.8±21.05 g. Length weight relationship TL =0.0168*TL^2.9 was calculated for all samples as isometric growth (b≤3). But there was a difference in LW association (P<0.05). Fulton condition factor (K) values were evaluated according to feed rations containing 3 different crude fat and constant protein ratios (38%, 42%, 45%) and there was a difference between rations in terms of length and weight relation and condition values (P<0.05). According to the feed rations, the lowest condition value was calculated in commercial feed with control group 1.12 and the highest condition value was calculated in feed group 1.42 and B (45-18). By the results of t-test, statistical significance was found to be significant in group B feed ration in terms of condition values (P<0.05). The lowest condition (0.14±0.24) was in September in the control group, while the highest condition value (1.29±0.83) was found in B feed ration in January.

Discussion: In conclusion, our results could represent useful formation for aquaculture experts on feed rations and LWR and K results for meagre species. Also, such information could be important in aquaculture in order to optimize husbandry practices of fish.

Keywords: meagre, Argrosomus regius, fulton condition factor, length-weight relationships.
Determiniation Toxicity of Lipopolysaccharide with Antioxidant Capacity in Rat Pancreas

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Introduction: Lipopolysaccharide (LPS) is an important outer membrane component of Gram-negative bacteria and is a molecule isolated from E. coli bacteria. It is known that harmful effect to living organisms at certain concentrations. Spectrometric measurements were performed to determine the toxic effect of LPS on rats of the pancreas. The aim of this study is to determine the damage of determined dose of LPS on the rat’s pancreas using the FRAP-TEAC method.

Material and Methods: 10 mg/kg b.w. of LPS was given to 6 rats by gavage method. After LPS treatment, 6 hours were waited. FRAP-TEAC method was applied to the pancreas samples taken from the dissected rats and then were measured at 593-734 nm intervals by spectrophotometer. Permission for the study was taken from Erciyes University’s Animal Experiments Local Ethics Commitee (16/133) before the experimental process.

Results: As a result of the measurements made in the spectrophotometer, it was shown that the 10 mg/kg b.w. of LPS given by 6 individuals decreased in antioxidant capacity compared with control group. The significance was calculated using a one-way analysis of variance (ANOVA) followed by the Tukey multiple comparison procedure. A value of p < 0.05 was considered statistically significant.

Discussion: The toxic effect of lipopolysaccharides on rats has been proven so many times. The FRAP-TEAC method is one of the effective methods used to measure antioxidant levels. FRAP benefits the reducing antioxidant potentials to react with a ferric tripyridyltriazine (FeIII-TPTZ) complex and generate ferrous tripyridyltriazine (FeII-TPTZ) which is a colored form. TEAC assay predicated on the ABTS•+ radical scavenging via the antioxidants of a sample. The ABTS•+ radical has a bluish-green colour. This study demonstrates the damage of LPS on healthy rats’ pancreas. FRAP-TEAC value of tissue was decreased by LPS.

Keywords: LPS, antioxidant capacity, FRAP, TEAC, rats, pancreas
In Vitro Biological Activity Assessment of *Ranunculus gracilis* Rhizome’s Ethanolic Extract

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**Introduction:** It is known that some species of the genus *Ranunculus* have been using for rheumatismal disorders, tuberculosis and in order to support the immune system. In different geographical regions, due to different environmental conditions, the active substances in plants can vary in terms of content and density. After a literature survey, no study was found about antimicrobial susceptibility or antioxidant activity of *Ranunculus gracilis* Clarke. Because of that reasons, the aim of the study is to examine the total phenolic contents, antioxidant potentials and antimicrobial activities of *Ranunculus gracilis* rhizome ethanol extract.

**Material and Methods:** In this study, we attempted to assess the value of *R. gracilis* rhizomes from Yenice Forest in Turkey as an antimicrobial therapeutic agent. For this purpose, disc diffusion method was used to ascertain the antimicrobial activities of the *R. gracilis* rhizomes against eight microorganisms. The average phenolic content was determined according to Folin-Ciocalteu method. For evaluation of the ethanol extract’ antioxidant activity, total antioxidant capacity and DPPH radical scavenging activity assay were used.

**Results:** The differences between the means of the inhibition zones were tested with one way variance analysis followed by Tukey HSD test. Mean diameters of inhibition zones was found in the range of 16.27±0.7 mm to 24.45±0.6 mm. The total phenolic content of ethanol extract of *R. gracilis* rhizomes was determined as 0.414 mg GA/g dry extract. Total antioxidant activity value of the extract was calculated as 7.08 mg AA/g and DPPH free radical scavenging activity of the extract was calculated as 9.097 mg/mL.

**Discussion:** According to the obtained results, the analyzed *R. gracilis* rhizome ethanol extracts demonstrated antioxidant level can be considered noticeable. Our findings suggest that the ethanol extracts of the *R. gracilis* contain compounds with antimicrobial properties. These features promise hope for food and pharmaceutical industries as natural preservatives. Also, the species has not been evaluated against the criteria of the IUCN (NE).

**Acknowledgement:** We would like to express our appreciation to the Ordu University Scientific Research Project Commission, which supported this study (HD 1707).

**Keywords:** antibacterial activity, total phenolic content, antioxidant, Yenice forest, *Ranunculus gracilis*
**Introduction:** Historic city centers are fertile areas reflecting the spatial identity and revealing the memory of the community. It has great prescription for the sustainability of the cultural heritage of these areas and preservation of original spatial characteristics. In this context, in addition to the possibilities of using a historic urban touch with a protected area it is aimed in the study that visual quality assessment of the area.

**Material and Methods:** Safranbolu, which is a district of Karabük and take part in the UNESCO World Heritage list in 1994, is chosen as a study area. A photo survey study was conducted in order to evaluate the visual quality. In the visual quality assessment, the criteria of Naturalness, Diversity, Harmony, Openness, Complexity, Mystery, Perspective, Trust, Layout, Land Pattern, Landscape Beauty are used. Participants were asked to score points between 1 to 5 and the visual quality of the area is considered high in terms of the criteria above the average of 3 points.

**Results:** 67.4% of the survey participants are native to the city of Safranbolu and generally live in Safranbolu and Karabük. The area is mostly (41.9%) visited for holiday. 69.6% of the participants reach the area by private vehicles, 15% by bus and 5% by walk. At the site's preference historical beauty (78.3%), natural beauty (47.8%) and closeness (26.1%) are stands out. 34.8% of the participants visit the site about once a year, and 28.3% visit the site once a month. Participants assessed their inland time with historical visits (56.5%), landscape (54.3%), and shopping (32.6%) activities. It was found that basic problems are inadequacy of the parking lots (63%), the green spaces (63%), the urban furniture (62.2%), the resting areas (56.5%), the trees (39.1%) and the pedways. The natural and artificial elements in the vicinity were found to be compatible by 73.3% of the participants. It is thought that visual quality is high in terms of naturalness, harmony, perspective, trust, and landscape beauty criteria but visual quality is low in terms of diversity, openness, complexity, mystery, order and land shape.

**Discussion:** Safranbolu is a popular city in terms of cultural tourism with its different functions. This is due to the fact that the visual quality is high by the users in terms of naturalness, harmony, perspective, trust and landscape beauty criteria. Moreover, the fact that the materials are compatible with each other affects the visual quality of the city positively. Increasing the open-green areas that are inadequate in the field will enrich the criteria which the visual quality is low. Arrangements should be made to sustain the cities which are some the most important heritages from the micro scale in whole the country and to ensure cultural sustainability and visitor / user satisfaction considering the design criteria within the framework of the necessary legislation.

**Keywords:** visual quality, historical urban texture, Safranbolu
Preliminary Research on Dye Decolorization by Recombinant Laccase from *Bacillus subtilis*

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**Introduction:** Laccase is a copper-containing oxidase enzymes found in many plants, fungi, and microorganisms. Laccases act on phenols and similar molecules, performing one-electron oxidations, which remain poorly defined. It is proposed that laccases play a role in the formation of lignin by promoting the oxidative coupling of monolignols, a family of naturally occurring phenols. An important application for laccases is the bioremediation of contaminated soils as laccases are able to oxidize toxic organic pollutants, such as polycyclic aromatic hydrocarbons and chlorophenols. This study was aimed to investigation of the effect of recombinant laccase on five synthetic dyes.

**Material and Methods:** The laccase-producing bacterial strain was isolated from Petrol-contaminated soils in Istanbul. In this research, the laccase gene was cloned from *Bacillus subtilis* and efficiently expressed in *Escherichia coli* BL21DE3 in a biologically active form. A dye decolorization experiment was conducted using five dyes, phenol red ($\lambda_{\text{max}} = 560\text{nm}$), methylene blue ($\lambda_{\text{max}} = 665\text{nm}$), bromophenol blue ($\lambda_{\text{max}} = 590\text{nm}$), congo red($\lambda_{\text{max}} = 561\text{nm}$) and bromo cresol purple ($\lambda_{\text{max}} = 590\text{nm}$). The reaction mixture (6 mL) contained 0.1 M citrate phosphate buffer (pH 6.0), dye (5 mM), purified laccase (300 U). The reaction incubated at 50 °C under mild shaking conditions for 6 hours. The control samples were run in parallel without the addition of laccase. The decolorization percentage was determined spectrophotometrically as the relative decrease in absorbance at each maximal absorbance wavelength of the dyes.

**Results:** It was detected that the recombinant laccase could decolorize all the tested dyes at pH 6.0.

**Discussion:** Laccases are able to degrade various organic pollutants with different chemical structures via direct oxidation. We have shown that synthetic dyeing could be reduced by laccases. Further studies focusing on the effect of laccase on textile dyes and other phenolic compounds (with ecological toxicity) should be carried out.

**Acknowledgment:** The authors thank Pamukkale University, Scientific Research Project Funding (PAÜBAP) for their financial support [Project number: 2016FEBE043].

**Keywords:** *Bacillus subtilis*, dye decolorization, recombinant laccase.
**Introduction:** Acrylamide is a highly reactive and water-soluble polymer widely used in industrial and laboratory applications. In studies conducted in recent years, the presence of acrylamide in heat-treated food products has been reported. Acrylamide is metabolized in animals and in humans to epoxide glycidamide, which adducts to hemoglobin and DNA. This metabolite plays a primary role in the effects of acrylamide on the reproductive system. However, few studies have investigated the toxic effects of glycidamide in male reproductive system. Furthermore, the direct mechanism(s) by which glycidamide performs toxicity in the testis has not been fully understood. Vitamin C is a strong antioxidant, with an ability to neutralize free radicals, and is widely distributed throughout the body. It plays a protective role against oxidative stress and stimulates cell division and reproduction. It also protects sperm from harmful oxidative processes and improves fertility. The present study was conducted to investigate the effect of oxidative stress on the apoptosis of mouse Leydig (TM3) induced by glycidamide.

**Material and Methods:** Leydig cells were exposed to glycidamide (0.001, 0.01, 0.1 and 1 mM) and/or Vitamin C (50 μM) for 24 h. Following the exposure time, the Leydig cells were evaluated for measurement of cell viability, lactate dehydrogenase activity, lipid peroxidation, hydroxyl radical, hydrogen peroxide levels and apoptosis/necrosis rate.

**Results:** According to our results, a significant decrease in the Leydig cell viability and cytotoxicity was found with the high concentration of glycidamide (1 mM). The glycidamide also caused oxidative damage by increasing cytotoxicity, reactive oxygen species, and lipid peroxidation in a concentration dependent manner. The apoptosis/necrosis rate was significantly increased in glycidamide groups. Vitamin C has shown a protective effect against the glycidamide-induced damage in the Leydig cells, including the increased apoptosis/necrosis rate.

**Discussion:** This study is expected to help in understanding the molecular toxicity induced by glycidamide and the protective effect of vitamin C. The results obtained from this study showed that glycidamide exposure reduced cell viability and increased the production of reactive oxygen species by increasing the amount of lipid peroxidation, therefore lead to cytotoxicity and detriment of cellular function in Leydig cells. In addition, glycidamide induced apoptosis due to lipid peroxidation and formation of reactive oxygen species. Vitamin C may have protective effects against apoptosis by inhibiting the production of the reactive oxygen species and free radicals caused by glycidamide exposure. Consequently, further studies on the function of Leydig cells on the testicular tissues of animals induced with glycidamide will provide more definitive information on the cytotoxicity mechanism of glycidamide.

**Keywords:** oxidative damage, cell death, cytotoxicity, glycidamide, vitamin C
Environmental Performance of Wood-Framed Constructions

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Introduction: Wood construction represents a large part of the building industry in a number of areas around the world. In countries such as Europe, Canada and USA, wood constructions occupy about 80-90% of the whole constructions, and have become compulsory. In Turkey, the wood constructions occupy an area of about 2% within other constructions. Although higher energy consumption and CO₂ emissions are largely caused by reinforced concrete buildings in Turkey, there has not been any legislation and energy efficiency policies and measures for the wood and wood construction projects. Thus, for construction and building projects, apart from primary technical and economic criteria, it is possible to choose the energy, environmental or social aspects to which most attention is to be given. In this review study, the environmental benefits of wood-framed versus steel-framed houses as well as wood versus concrete were compared.

Results: According to the results, construction of the steel-framed home used 17% more energy than the matching wood-frame home. Construction of the concrete-framed home used 16% more energy than the matching wood-frame home. The global warming potential of the steel-frame home and the concrete-frame home were 26% and 31% higher than the wood-frame home, respectively. In addition, there were significant CO₂ savings to be made by using wood in the construction of housing and other buildings, both in terms of embodied energy and in-use energy efficiency. A steel-framed house accounts for the release of 3.5-tons of carbon, but the equivalent house framed in wood can store 3.1-tons of carbon. Wood stores up to 15 times higher amount of CO₂ than the amount released during its manufacture, whereas the amount of CO₂ stored by steel, concrete and aluminum is negligible.

Discussion: There are many advantages of the wood-frame residential buildings including their good building physical properties, their built-in materials showing environment excellence, lower energy consumption while preparing built-in materials, and the speed of construction and good seismic security. Due to the much lower weight of wood compared to concrete, a wood-based structural frame can reduce the total material consumption of construction by half. However, recently, it has been stated that the choice of building material are influenced by global warming, human health, and energy efficiency environment. Therefore, wood and wood-based materials are considered more advantages in the building industry.

Keywords: wood construction, environment, carbon storage
Introduction: Environmental problems have become one of the most important problems in Turkey as well as in every part of the world. Problems of air, water and soil pollution, global warming, destruction of flora and fauna, deterioration of ecological balance, solid wastes and urbanization are among the common environmental problems today. The emergence of these environmental problems locally leads to a universal dimension in the future. Local governments, especially municipalities, have important responsibilities in solving environmental problems. In this context, the importance of the local administrations was examined on the Aksaray Municipality example, in terms of achieving a global dimension starting from the local level.

Material and Methods: The basic material of the study is the various primary and secondary sources obtained from literature studies. During the process of constructing the data for the study, university libraries, various electronic library resources, some national and international search engines, domestic and foreign articles, and thesis studies on this subject were used.

In the study, firstly is evaluated the basic environmental policies and the development of environmental policies around the world. Later in place is given to environmental policies in Turkey. In another part of our work, the policies applied to solve environmental problems in Aksaray province is determined.

Results: In taking precautions against environmental problems, besides national and international studies, local-based studies are also very important. In this context, the problems that are particularly occur at the local level are closely related to the municipalities, which are the closest administrative units to citizens. In this direction, Aksaray Municipality are carried out activities and policies towards the environment. Among these policies and activities are the generation of potable water, urban transformation, forming green areas and the elimination of solid wastes.

Discussion: Aksaray province has a great importance with geographical location, natural, cultural and historical values. However, these characteristics, which Aksaray has should be used respect to the rights of future generations with sustainability approach. For this purpose, the Municipality of Aksaray, which is a local government unit, should take necessary precautions related to the environment and produce policies.

Acknowledgement: We would like to express our appreciation to the Aksaray Mayor Haluk Şahin YAZGI and Aksaray Deputy Mayor Mustafa KARAHANCI, which supported this study.

Keywords: Aksaray municipality, environmental policies, local governments
Age-dependent Changes of Some Chemical Components in Leaves of Monumental Plane
(Platanus orientalis L.) Trees
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Introduction: Monumental trees, both function as a gene pool for relevant tree species and give an idea to the planners as to the necessary physical administration times during the planning of forest resources with their individuals which have reached the upper limit of their natural lives. Furthermore, they also furnish natural material for dendroclimatological researches and shed light to retrospective climate estimates. The importance of monumental trees is increasing each and every passing day in as much as they have great significance in terms of national culture, local history and folklore.

Material and Methods: In this study development physiology of the 600-year-old ancient plane tree (Platanus orientalis L.) in Harmoson location which belong to central district Abana of Kastamonu province has been investigated. For this aim, photosynthetic pigments, proline, total soluble protein, glucose, sucrose, total soluble sugars, malondialdehyde (MDA), and hydrogen peroxide (H$_2$O$_2$) concentration, ascorbate peroxidase (APX), catalase (CAT) and superoxide dismutase (SOD) activities were measured in leaves collected from the monumental tree (over the age of 600 years) and the plane trees of different age groups in the vicinity (200-year old, 100-year old and 50-year-old and over).

Results: When the findings were examined, chlorophyll a, total chlorophyll, carotenoids, total soluble protein, sucrose content were found higher in the older trees (200 and 600 years old) but chlorophyll a/b ratio was the highest in younger trees (100 and 50 years old). APX activity was higher in the oldest tree while CAT and SOD were the lowest levels. The amount of MDA was determined lowest in older tree while H$_2$O$_2$ was the maximum. And also glucose level, CAT and SOD activity were higher in the over 200 years and 100 years old trees.

Discussion: When the results were evaluated in general, it was observed that chlorophyll b, total chlorophyll, total carotenoid, protein, sucrose, H$_2$O$_2$ levels and APX activity were highest in the monumental plane tree over the age of 600 years but the amount of chlorophyll b, total soluble carbohydrate, CAT and SOD activities were higher in the second older tree. In addition, chlorophyll a/b ratio were the higher in the younger trees. It was concluded that the high level of amount of chlorophyll a, chlorophyll b, total chlorophyll, carotenoids but lower MDA, glucose, total carbohydrate levels and also APX activity were effective on longevity of the monumental tree.

Keywords: monumental plane, chemicals, Abana, Kastamonu
Introduction: Site selection for industrial areas that have been formed or intended to be formed despite several disadvantages in order to create a workforce employment or a national economic resource in related settlements after the formation of the cities in Turkey disregarding the environmental problems has a negative effect on the environment and the people living in cities, which is one of the important national issues to be discussed. In Turkey, fragmented planning system that lacks a planning integrity creates environmental problems which may harm natural areas and habitats. Although urban settlements can be limited by threshold analysis which is the basic theory of planning, the rule of minimum intervention in the environment is neglected in industrial and mining areas. This study aims to examine the investments which do no cause environmental problems due to national economic development and regional, urban or rural planning, and take the current facilities under control.

Material and Methods: It is a fact that they create problems in land use, destroy natural habitats in the environment and cause environmental problems during their operations. Two dimensions of environmental problems will be tackled first, and their solutions will be discussed. Environmental problems, which generally have two stages will be tackled under the following headings.

1- environmental problems caused by site selection

2-problems that harm natural environment and urban areas due to the type of the institution

This will be achieved by taking advantage of the environmental standards in Turkey and in the world. In this context, the data analysis was conducted in Turkey, in the Çatalağzı district of Zonguldak province.

Results: The study sample includes industries such as nuclear power plants, thermal power plants, automotive industry, etc. and the selection of their sites. These investments require government incentives and investments; therefore, it is important to choose appropriate places in planning.

As a result, principles for employment-creating and energy-producing facilities will be set out in the study along with these problematic investment sectors.

Discussion: On the other hand, environmental problems in the course of operation must be prevented because such investments are environmentally friendly and technologically advanced. A good planning in terms of technological preferences is necessary to avoid environmental problems in natural and urban areas.

Keywords: environment, energy, planning, technology, economy, industry
Effects of Beauveria bassiana Isolates on Sitophilus oryzae L. Under In vitro Conditions

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Introduction: Rice weevils (Sitophilus oryzae L.) are the most destructive pests of stored-grains. They can cause significant losses to stored grains, especially cereals, at favorable conditions (25–35 °C and low RH). Integrated management of S. oryzae is considered the most effective approach for control. So that use of alternative products or reduced fumigants in stored grain is needed. One of the alternative products is entomopathogenic fungi. The objectives of present study was to assess the efficacy of entomopathogenic Beauveria bassiana isolates for the control of rice weevils and the damage they cause to stored wheat grains.

Material and Method: Sitophilus oryzae L. adults were taken from a culture that has been kept in the Entomology laboratory, Department of Plant Protection, Gaziosmanpaşa University. Three Turkish isolates of Beauveria bassiana were obtained from the collection maintained at the Phytopathology Laboratory. All fungal isolates were cultured on Potato Dextrose Agar (PDA) in 9 cm diameter plastic steril petri dishes and incubated at 25±1 °C and 75±5% relative humidity for 4 weeks for complete sporulation. After this period, conidia were harvested by flooding the petri dishes with sterile distilled water containing 0.05% (v/v) Tween 80. Five different spore concentrations of each isolates (1×10³, 1×10⁵, 1×10⁷, 1×10⁹ conidia/ml) were prepared. Ten wheat grains were dipped in spore solution of each isolates for 1 h then dried and transferred into the glass vail containing ten adult insects and incubated at 75% relative humidity, 25±1 °C for 40 days. Mortalities were recorded on the 1th, 3rd, 5th, 7th, 9th and 11th days post infection. Dead insects were counted and transferred into the moist chamber for mycosis. Experiment was repeated twice with 5 replication. Sterile distilled water containing 0.05% (v/v) Tween 80 was used for control treatment.

Results and Discussion: The data clearly indicated that at each time point the level of mortality increased with increasing spore concentration of B. bassiana isolates. The cumulative mortality in adults exposed to isolates of B. bassiana ranged among 22 and 94%, 31 and 100%, and 14 and 86% for different concentrations of F-52, F-53, and F-56 9 days after exposure, respectively. The highest mortality rate of 100% was obtained at the end of 9 days incubation period with isolate F-53 at 1x10⁸ spore concentration. The highest mycosis rate was obtained at the end of the 14th day with isolate F-52 in 10⁹ conidia/ml (95%) and followed by isolates F-53 (93%), and F-56 (82%). The results indicated that these isolates also exhibited higher mycosis rate. Further storage trial should be conducted especially with these isolates to see their in vivo performances.

Keywords: entomopathogen, fungi. Sitophilus oryzae, Beauveria bassiana.
New species of Erpobdellid leeches: Molecular Phylogeny and Description of Dina, Erpobdella and Trocheta

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Introduction: Leech genera and species belonging to the Family Erpobdellidae comprise an important part of freshwater benthic fauna. Erpobdellidae is one of the four families belonging to the suborder Erpobdelliformes of order Arhynchobdellida. Members of Erpobdellidae have abandoned the blood-sucking dependency of their ancestors and are instead predators of aquatic invertebrates. The Family Erpobdellidae previously included seven genera, but was recently reorganized into five (Croatobranchus, Dina, Erpobdella, Mooreobdella and Trocheta) according to morpho-genetic analysis. This study contains a component of the project "Phylogenetic and Morphological Resolution of the Erpobdellid species-complex (Annelida: Hirudinea: Arhynchobdellida: Erpobdellidae): Description of Dina, Erpobdella and Trocheta".

Material and Methods: Leech Specimens were collected Farm Pond (Mt Bethel, PA, USA) and Hadden Lake (Camden, NJ, USA), Dicle River (Bismil-Diyarbakir, Turkey), Behramaz River (Sivrice-Elazig, Turkey), Kesirvan stream (Küçükboştancı, Balıkesir) and Kırkgöz Resources (Antalya, Turkey) between May 2011-April 2016. Specimens were transported to Rutgers University (Camden, NJ) or the Firat University (Turkey). Collected specimens were preserved in 70% ethanol. External and internal structures of live specimens were observed by stereomicroscopy. Here we describe the phylogeny and behavior of the type species from Europe, and analyze erpobdellid specimens collected worldwide. Nuclear 18S rRNA and 28S rRNA, mitochondrial 12S rRNA and partial cytochrome c oxidase subunit 1 (COI) DNA fragments were amplified from genomic DNA using the polymerase chain reaction (PCR). New leech species will be named after they are introduced to Zoobank and museum cataloged.

Results: To define the distribution of Erpobdellids (Dina, Erpobdella and Trocheta) within Turkey and USA, we collected from seven populations throughout the countries. Morphological characters were scored after dorsal and ventral dissections, and Maximum Likelihood (ML) and Bayesian Inference (BI) analyses resolved phylogenetic relationships using mitochondrial cytochrome c oxidase subunit I (COI), 12S ribosomal RNA (rRNA), and nuclear 18S rRNA, 28S rRNA genes fragments. Our results identify five new species of erpobdellids, three Erpobdella n. sp. in Farm Pond, PA, Lake Gordon, PA and Hadden Lake, NJ in USA, Dina n. sp. in Dicle River of Bismil-Diyarbakir and Kançi Stream of Sivrice-Elazig, and a Trocheta n. sp. in the Kesirvan stream of Küçükboştancı-Balıkesir and Kırkgöz water of Antalya in Turkey.

Discussion: Recent phylogenetic studies based on morphology and DNA sequence data have shown that a thorough revision of Erpobdellids is necessary because the morphological characters used to differentiate genera and species are not informative according to phylogenetic affinities. In this study, four new species belonging to three different genera of Erpobdellidae were identified. The DNA sequences (mtCOI, 12S, 18S and 28S rRNA) obtained from the new erpobdellid species were recorded in Genbank. New leech species had phylogenetic divergences of 11–16 % at COI from other members of their respective genera.

Acknowledgement: We express our appreciation to Council of Higher Education (YOK) and TUBITAK of Turkey, and Busch Biomedical and GAIA grants of USA, to NS and DHS, respectively.

Keywords: new species, erpobdellid leeches, Phylogeny, Dina, Erpobdella and Trocheta
Identification of ectoparasitic *Trombidium holosericeum* larvae (Acari: Trombidiidae) on *Rhagio* sp. (Diptera: Rhagionidae) from Ordu Province

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Introduction: The family Trombidiidae Leach, 1815 includes 23 genera and 205 species in the world. *Trombidiidae* is one of the most commonly known genera in the family. The geographic distribution of *Trombidiidae* is restricted to the Holarctic and the majority of species known from Europe. This genus has 34 species in the world, but it has not been detailed research in Turkey and only six species have been reported from Turkey to date. The aim of this study is to add new host record for the genus *Trombidiidae* and to provide a key to the adults and larvae of the *Trombidiidae* species known from Turkey. In addition, the hosts carrying larvae of *T. holosericeum* is given.

Material and Methods: One *Rhagio* sp. on which four larvae obtained were collected Ordu province in 29 July 2017. Specimens were preserved in 75% ethanol, cleared in lactophenol solution and mounted in Hoyer’s medium.

Results: One of the four larvae collected from one specimen was put into life bottle consisting of coal and plaster mixture. After 12 days, deutonymph was observed. So the species was verified both from larvae and postlarval. Cosmopolitan wide spread *T. holosericeum* is found on a host in Turkey for the first time.

Discussion: The discovery of a stick insect as host for larval mites is presented. Members of Trombidiidae family are common ectoparasites on several groups of arthropods during larval stage for getting them the necessary nutrients to grow. Larvae of *T. holosericeum* are parasite on Hymenoptera, Hemiptera, Homoptera, Lepidoptera, Coleoptera and Diptera. Hitherto *T. holosericeum* has seen on the order Diptera, including Dolichopodidae, Drosophilidae, Empididae and Tipulidae families. It is the first time recorded the Rhagionidae family from Ordo province.

Acknowledgement: We would like to thank Dr. Mustafa Cemal Çiftci (Faculty of Agriculture, Department of Plant Protection, Siirt University) for the identification of the genus *Rhagio*.

Keywords: Trombidiidae, Rhagionidae host-parasite association, Turkey
The Investigation of Light Stress on Various Cellular Responses in *Chlamydomonas reinhardtii*

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**Introduction:** For photosynthetic organisms, absorption of sunlight is required for growth, but too much light can be harmful. Light stress can adversely affect growth and viability. The model unicellular green alga, *Chlamydomonas reinhardtii*, employs diverse strategies of regulation and photoprotection to avoid, minimize, and repair. The vesicle-inducing protein in plastids (VIPP1) plays a role in thylakoid membrane formation via membrane vesicles and it is known that thylakoid membrane structure was defected in high light stress. Heat-shock protein 70 (HSP70) family is a group of molecular chaperones that are highly conserved in evolutionary terms. Only a single HSP70 (HSP70B) protein is present in the chloroplast of *Chlamydomonas reinhardtii*. HSP70B is involved in the refolding of newly formed peptides and denature proteins accumulating at high concentrations in stress conditions, the repair of light conservation and the functions of Photosystem I (PSI). The aim of this study was to investigate of light stress on various cellular responses in *Chlamydomonas reinhardtii*.

**Material and Methods:** Wild-type (WT) and HSP70B-Artificial miRNA (HSP70B-amiRNA) strains of *C. reinhardtii* were shifted from continuous light to high light. The variance in cell numbers, cell sizes, total protein concentrations and also expression levels of HSP70B and VIPP1 proteins were investigated among 0-24 hours. The light intensity was used as continuous light and high light. Cell numbers and cell sizes were measured with Beckman cell-coulter. Total protein concentration was determined by Bradford. The expression levels of HSP70B and VIPP1 proteins were investigated by qPCR and immunoblotting.

**Results:** The results showed that WT was not showed much increase in cell numbers at both of lights intensity for 24 h. But, HSP70B-amiRNA cell numbers were increased. HSP70B-amiRNA-mutant strain were larger size than WT strain after shifting from continuous light to high light for 24 h. Total protein concentrations of WT and HSP70B-amiRNA were 118µg/ml and 98 µg/ml, respectively. The expression levels of HSP70B and VIPP1 proteins were similar according to qPCR and immunoblotting results, and a decrease in protein levels was detected.

**Discussion:** High light stress affected the cellular responses (cell numbers, cell sizes, total protein concentrations and also expression levels) in *Chlamydomonas reinhardtii*. The shift from continuous light to high light caused the down-regulation of the HSP70B protein, and down-regulation of the VIPP1 gene expression may enhance the HSP70B-HSP70C chaperone complex by binding to VIPP1 and help the cleavage of the VIPP1.

**Acknowledgement:** We would like to express our appreciation to Kaiserslautern TU, Germany which supported the study.

**Keywords:** Chlamydomonas reinhardtii, HSP70B, VIPP1
Preliminary Investigation of the Quality of Surface Waters of Bakırçay Using Growth Inhibition Test Using Green Algae *Scenedesmus dimorphus*

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**Introduction:** Bakırçay River is located in middle Aegean Region and flow through the cities of Bălıkesir, Manisa and İzmir and about 120 km in length (Kaymakçı, 2004). Along the river there are many active agricultural zone exists moreover domestic wastes leak and carried by numerous small streams and channels. Surface waters are one of the most important ecosystems to be protected from pollution. Bakırçay is also getting polluted by domestic, agricultural and industrial pollution from the settlements around. Protection of aquatic ecosystems such as surface water needs to have data from the monitoring of pollution. This kind of investigations can be done by analyzing environmental samples or using several biological assays. Analytical methods are time consuming and non-economical due to the severity and amounts of pollutants. Biological assay have advantage to get data in reasonable time and cost especially for composiz samples. Besides that, the reliability of data is quite high. Algal growth inhibition assay is most common and standardized method using for this kind of bioassay by many researchers all around the world. Algae as a primer producers of the ecosystems are very important organisms and have been used to widely in order to reveal health status of ecosystems worldwide. In this study, it’s aimed to assess the effects of surface waters of Bakırçay on growth inhibition of green algae *Scenedesmus dimorphus* as the representative of first trophic level.

**Material and Method:** The samples from 6 stations of Bakırçay river were tested in set of 5 dilutions according to guideline OECD 201 “Freshwater Alga and Cyanobacteria Growth Inhibition Test”. All samples were brought to laboratory in ice cold conditions as soon as it’s possible. Before the experiment all water samples were filtered by 0.22 µm diameter filter and added to media directly. Chlorophyll contents were detected by fluorimeter (Turner design) daily at the same time and the test duration was 72 hours. The data were calculated comparing the chlorophyll amounts and growth rates of control versus test populations.

**Results:** According to results all water samples from the stations on Bakırçay, inhibited growth rate of tested *S. dimorphus* except the water from station 1 caused to increase called hormesis. The samples from station 2 seems to be most inhibitory effect as 54.6 % inhibition and the least one is at station 4 (7.5%).

**Conclusion:** Preliminary result showed that due to agricultural and domestic activities Bakırçay river is under pollution pressure and biomonitoring studies needs to be continued.

**Keywords:** Bakırçay, *Scenedesmus dimorphus*, growth inhibition test, green algae

**Acknowledgement:** The present study was supported by Scientific Research Project of Fisheries Faculty of Ege University (Project No: 16/SUF/038 ).
Efficient Batch and Continuous Dye Removal Using Alginate-Kaolin-Graphene Nanoplate Adsorbent

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Introduction: Dye pollutants discharge to natural water sources from the effluents of industrial plants including polymer, textile, and cosmetics. Dyes are toxic for living water ecosystem and also may cause serious health effect on human body depending on the exposure dosage and time. Therefore, dye compounds should be removed from the effluent before discharging. There are several techniques to remove dye and other pollutants from the industrial wastewater. Adsorption is one of the cost effective, efficient and environmentally friendly techniques to remove impurities from the water. The performance of the adsorption is directly related to the adsorbent-dye interaction. Moreover; sustainable, inexpensive, natural and reusable adsorbent synthesis determines the efficiency of the adsorption. Recently, bio-based, waste derivative adsorbents such as zeolites, biopolymers, clays have been used for anionic-cationic dye removal. In this study, it is aimed to synthesize a bio-based adsorbent including alginate-synthesized from seaweed-, kaolin and graphene nanoplate to remove dye from the water. Kaolin is an efficient adsorption which is found in nature. Graphene nanoplate is very effective to prevent biological fouling and degradation of adsorbent in water. Effects of adsorption time, adsorbent dosage, dye concentration, pH on dye removal percentage have been investigated using a batch mode and continuous mode adsorption experiments.

Material and Methods: 4 g of sodium alginate, 2 g of kaolin and 0.1 g of graphen nanoplates were dissolved in 100 ml water. Gel-like solution was cross-linked and formed as a bead by immersing the polymer-clay-graphene in a CaCl₂-water solution. Then, the beads were removed, washed and dried. A continuous adsorption system was prepared by packing the adsorbent in an adsorption column. A batch adsorption system was also used to determine the adsorption efficiency. UV-Vis spectroscopy (at the optimum wavelength of 664 nm) was used to determine dye concentration before and after the adsorption.

Results: In the batch adsorption system, effect of pH was investigated and it was found that the appropriate pH for MB removal was between 5 pH and 7 pH. Operating time increased the % dye removal. Within two hours, greater than 90% dye removal was achieved. Increasing adsorbent dosage was shortened the adsorption time. However, after four hours, all adsorbent dosage gave the similar dye removal performance around 97 %.

Discussion: Kaolin-sodium alginate adsorbent was very effective to remove dye from water. When the kaolin used as adsorbent, the turbidity of the water was very high. Encapsulating of kaolin into alginate increased the quality of the water.

Keywords: sodium alginate, kaolin, graphene nanoplate, adsorbent, dye removal
Introduction: The presence of heavy metals in the wastewater has become an increasing concern. Industrial effluent from finishing, copper electroplating, and cooling water systems often contain heavy metal ions at different concentrations. The average level of copper in wastewater streams is in the 20–2200 mg/L range. Several methods such as precipitation, oxidation, ion exchange, filtration, and electro-chemical removal are used to remove copper from industrial wastewater. However, these methods remain incapable for tracer copper amounts in wastewater stream. Adsorption is an alternative method for removal of copper from wastewater. Biobased adsorbents are considered to be promising candidates for removal of heavy metal ions due to low cost, reusability properties. Chitosan is one of the bioadsorbents. It has hydroxyl and amine groups for bonding with copper ion. In this study, chitosan/perlite biocomposites were prepared for adsorption of copper ions. The study has investigated the effect of pH, contact time, initial copper concentration, and adsorbent amount on the adsorption of copper by using chitosan/perlite biocomposites.

Material and Methods: Perlite was stirred with 0.2 M oxalic acid and filtered. The resultant perlite was washed until the filtrate demonstrated a pH between 6 and 6.9. After that, the perlite was dried in an oven at 70°C for 12 h. 1.5 g of chitosan were mixed with 0.2-M oxalic acid solution at 50°C and a viscous gel was obtained. 3 g of perlite were mixed with deionized water and added to the viscous chitosan solution and stirred for 4 hours at 50°C. The beads were then prepared by dropwise addition of perlite-chitosan solution into a 0.7 M NaOH solution. The wet beads were dried in a freeze dryer. Copper solution with different concentrations was placed in contact with a certain amount of adsorbent under shaker. The effects of initial concentration, adsorbent amount, and contact time were investigated. Copper concentration was determined using UV-Vis spectrophotometer.

Results: The elimination of copper increased with increase in adsorbent amount. An increase in adsorbent amount can provide greater surface area and the availability of more adsorption surface sites. Adsorbed copper increased with the increase of copper concentration. This situation can be explained that the mass transfer resistance of copper between aqueous solution and adsorbent can be overcome by the increase in the concentration gradient.

Discussion: The results show that chitosan/perlite biocomposite is a good adsorbent for metal ions and has high adsorption capacity for the treatment of wastewater containing copper ions. Chitosan/perlite removes very low concentration metal ions. The adsorption capacity of biocomposite was dependent on the pH of the solution, adsorbent amount, initial concentrations, and contact time. The high adsorption capacity, good stability, and reusability make chitosan/perlite biocomposite bead a promising adsorbent for the removal of heavy metal copper from aqueous solution. Acknowledgement: We would like to express our appreciation to the Kocaeli University Scientific Research Projects Unit.

Keywords: adsorption, chitosan, copper, heavy metal, perlite
To the Monitoring the Marine and Coastal Protected Areas in Turkey: What Needs to be Done For Improvement

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Introduction: Marine and coastal protected areas (MCPAs) play an important role for the conservation and recovery of marine ecosystems. Secondly but not secondarily, these areas provide social and economic contributions. It is critically important to assess sustainable uses of the natural resources for designing and monitoring process of MCPAs. This study aims to evaluate the main problems in monitoring of the Turkish MCPAs. The relevant literature including the grey literature related to the MCPAs of Turkey were reviewed. In addition, based on examples of the well managed protected areas in Mediterranean and Europe, the key indicators for monitoring the MCPAs were discussed.

Discussion: A total of 17 MCPAs among which three of them do not have any marine component are located on the Turkish Mediterranean coasts. Out of 17, 13 MCPAs have monitoring activities. Regarding the monitoring, mainly water quality parameters and endangered species such as sea turtles’ nestings are followed. A total of 11 MCPAs have management plan; however only 5 of these plans take marine components into account the rest were only confined to terrestrial or wetland parts.

In summary, physico-chemical parameters, bio-ecological data (diversity, catch per unit effort values of commercially important species, by-catch values of endangered and threatened species, size-weight distribution, biomass, density, fecundity and size at maturity of indicator species), data related to the magnitudes of human activities and socio-economic impacts of stakeholders should be monitored inside and outside the protected areas to understand whether these MCPAs are successfully managed.

Keywords: marine and coastal protected areas (MCPAs); management; monitoring; Turkey
Monitoring of Great Bustard (*Otis tarda*) in Ankara Province period of 2016-2017

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Introduction: In addition to its typical steppe habitat, Ankara province also contains wetlands and forests. This diversity is the biggest reason why Ankara is hosting 324 birds. One of the species endangered in Ankara is the Great Bustard (*Otis tarda*). The Great Bustard’s habitat is natural steppic grasslands, agricultural fields and estates. It is a steppe bird that prefers open, flat or somewhat rolling landscapes. The species has two sub-populations in Turkey, one in Central Anatolia and the inner part of Southern Anatolia, the other in Eastern and South-eastern Anatolia. The Great Bustard is threatened on a global scale and the IUCN category is accepted as Vulnerable. The Great Bustard (*Otis tarda*) world population is estimated to be 44,000–57,000 individuals in 2017 while 764–1250 individuals in Turkey. The aim of the study was to expose the population of the Great Bustard in Ankara province and also exhibit the threats and conservation strategies.

Material and methods: The monitoring scheme was conducted in TİGEM area Ankara in 2016 and 2017. The area was visited once a month during two years monitoring activity to investigate the population and the distribution area of the species.

Results: The Great Bustard was recorded in Uzunbeyli and Yukarıöz village along TİGEM area in March - June in breeding season and in November and December in wintering season. The most recorded number was 150 in March 2017 and the lowest number was 3 in June 2017. Changing of natural steppes into irrigated fields, improper reforestation, overgrazing, unplanned settlement, changes in agricultural techniques, illegal hunting and the reduction of wetlands are detected as threats for Great Bustard in Ankara province.

Discussion: The Great Bustard is a globally threatened species and has suffered from large population declines throughout its range, including Turkey. The steppe habitat is severely damaged as a result of intensive agriculture and improper grazing in Turkey. Survival of the species for the conservation of steppe, grassland and open arable areas in Turkey is very important. In the framework of the European Union’s Bird and Habitat Directives, it is necessary to protect the Important Bird Areas in which Great Bustard exist.

Acknowledgement: We would like to express our appreciation to the Ministry of Forestry and Water Affairs 9. Regional Directorate.

Keywords: Ankara, threatened birds, protection, Great Bustard, *Otis tarda*
Research on the Fauna of Tephritinae (Diptera: Tephritidae) in Çorum Province

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Introduction: Fruit flies (Diptera: Tephritidae) is one of the largest Diptera family including 500 genera and 4500 species. In Turkey, 160 species of fruit flies have been distributed. The subfamily Tephritinae is the most specialized subfamily of Tephritidae. The larvae of Tephritinae predominantly infest flowerheads of the Asteraceae, the largest and the most advanced and widespread family of the angiosperms. In this study, fauna of Tephritinae were determined which were collected from Çorum province between 2015 and 2017 years.

Material and Methods: Adult specimens were collected from possible host plants using an insect net in different localities of Çorum province of Turkey between 2015 and 2017 years. Collected materials were killed in the killing jar and pinned in the laboratory for identification. Specimens were diagnosed using identification keys. Specimens are deposited at the Zoology Museum of Gaziantep University.

Results: In this study, 25 species (Acanthiophilus helianthi (Rossi), Campiglossa producta (Loew), C. tesellata (Loew), Dioxyna bidentis (Robineau – Desvoidy), Ensina sonchi (Linnaeus), Euaresta bullans (Wiedemann), Oxyna flavipennis (Loew), Sphenella marginata (Fallen), Tephritis bardanae (Schrank), T. cometa (Loew), T. dioscurea (Loew), T. divisera Rondani, T. erdemli Kütük, T. fallax (Loew), T. formosa (Loew), T. hyoscyami (Linnaeus), T. matricariae (Loew), T. postica (Loew), T. pulchra (Loew), T. recurrens Loew, T. seperata Rondani, Tephritomyia lauta (Loew), Trupanea amoena (Frauenfeld), T. stellate (Fuesslin), Xphosia miliaria (Schrank)) of 11 genera belonging to Tephritinae were obtained in the research region. Species are listed in alphabetical order. For the species in the region, wing and aculeus figures, host plants, material examined and zoogeographic distribution will be reported and a diagnostic key will be prepared.

Discussion: Çorum province is located in the transition zone of the Black Sea and Central Anatolian Regions and receives abundant rainfall. Due to these reasons, it has a wide biodiversity in the region. According to literatures, it is known the existence of 109 species belonging to this subfamily in Turkey Fauna. In this study, 25 species were recorded in Çorum province. When Çorum Tephritinae Fauna are compared with Turkey Tephritinae Fauna, result of research is in harmony with the region’s biodiversity.

Acknowledgement: We would like to thank the Scientific Research Projects Management Unit for provides funding with FEF.15.08 code project.

Keywords: fruit flies, Tephritinae, fauna, Çorum, Turkey.
Determination of Some Flavonoids and Antimicrobial Behaviour of *Peganum harmala*

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Introduction: It is known that *Peganum harmala* has some biologic activities such as analgesic, anti-inflammatory, anti-bacterial and anti-cancer activity. And also, *P. harmala* seeds have been used to treat skin cancer and traditionally subcutaneous cancers. It was seen that seeds of the plant are strong against different tumor cell lines in vitro and in vivo. This paper is concerned with antimicrobial activity of ethanol (65%) extract of *P. harmala* against 15 microorganisms by using the disk diffusion method, MIC (Minimum Inhibitory Concentration), MBC (Minimum Bactericidal Concentration) and MFC (Minimal Fungicidal Concentration) tests. In addition, composition of catechin, epicatechin, rutin, naringin, myricetin, luteolin, naringenin and apigenin were found with normal-phase HPLC in the obtained extracts.

Material and Methods: *P. harmala* (seed), was obtained from Özşen Lokman Hekim Company located in Ankara/Turkey, Gimat at 2016. Plant material was dried at room temperature and on draft for three weeks. About 10-30 g ground plant sample was extracted with 250 mL of ethanol (%65) in a Soxhlet apparatus by continuous heat extraction for 24 hours. Filtrate was evaporated with a rotary evaporator. The filtrate was freeze dried and stored in refrigerator at about 4°C after sealed with paraffin for further studies.

Results: HPLC analysis were shown that rutin (3.41 µg/g), luteolin (2.73 µg/g) and apigenin (1.69 µg/g) are existed in the *P. harmala* ethanol (65%) extract. In the antimicrobial activity studies, it was found that *P. harmala* showed activity in all tested fungi and bacteria depending on the amount of the extract loaded in the disks.

Discussion: MBC/MFC test showed that all the MIC values observed were bacteriostatic/fungistatic concentrations, which means they only inhibit the reproduction of microorganisms.

Keywords: *Peganum harmala*, antimicrobial activity, flavonoid
Ecotourism and the Protection of the Environment

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Introduction: The return to the essence of man is experiencing a period of intense debate, and one of those who are seeking the source connected to the conversion as noticed in the forefront of ecotourism. The exit point of ecotourism is a result of the unhappiness and dissatisfaction seen in people due to people's escapes from the urban environment or the inadequacy of the cities. Ecotourism is also important for what it brings and how it is sustainable, besides what it brings. So, as a consequence of returning to rural areas starting with ecotourism, the impacts of the environment and nature, as well as the level of impact of rural people, should be mutually examined as a consequence of how rural people will affect ecotourism. Ecotourism should increase the positive impacts on the environment, the local people and the ecotourists, and accordingly the negative effects should be eliminated or minimized.

Material and Methods: In the study, the method of document review was used. In this method, the printed publications in electronic and other mediums related to the mentioned subject are examined. The analysis of firms that have interacted with environmental integrity of ecotourism rural areas has been analyzed. The collected finds and ecotourism have been tried to be listed.

Result: In order to increase the positive impacts of the ecotourism, the local people and the ecotourists, it is necessary to include both the local people and the local public institutions. Depending on this situation, measures should be taken to eliminate or minimize the adverse effects. At the beginning of these measures, it is necessary to secure the ownership of the region by the public institutions, which will transform the material possibilities formed with the ecotourism into local people as well as the local people to adopt their own identity.

Discussion: Contribution of ecotourism to local circles and ecotourists, sustainable ecotourism, increasing ecotourism charm, the formation of the unique identity of the region to be ecotourism and the adoption of this identity by local people, ecotourism is the observation of the effects of the environment on the environment and the prevention or minimization of potential damage.

Keywords: ecotourism, sustainable ecotourism, environment, protection of the environment
Possibility of Using Natural Material Gyttja for Improving Quality of Soils Derived on Serpantinit and Peridotit Parent Material

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Introduction: The properties of soils developed on serpantinit and peridotit differ from other soils. Generally, these soils contain low Ca and high Mg for plants. High plants contain in appreciable amounts of Ca and are usually between 0.1 - 5% dry matter. Calcium has many functions for plants such as improving of cell wall and membrane stability, osmotic regulation, anion and cation balance. The deficiency of Ca in soils is causing diseases of bitter rottenness in the tomato, bitter speck in the apple. To improve the agricultural potential of these soils, it may be apply the materials containing high organic matter and CaCO\textsubscript{3} such as gyttja. Gyttja is low-cost and locally available natural materials which is a mixture organic and inorganic materials. The purpose of this study is to evaluate the effect of gyttja on the properties of the soils formed on the serpantinit and peridotit

Materials and Methods: In this study, the four soil samples (0-30 cm depth) developed on serpantinit and peridotit parent material in Kahramanmaras district and the gyttja taken from Afsin–Elbistan Coal-Fired Power Plants were used as materials. Properties of the soil and gyttja were determined using the standard methods in Turkey.

Results: According to the obtained data, the lime (CaCO\textsubscript{3}), available Ca and Mg contents of the soils varied from 1.74 to, 2.0 \%, 1755 to 2380, 1705 to 2610 mgkg\textsuperscript{-1}, respectively. Soil reactions is neutral (6.88-7.28) and organic matter contents is low (1.74-2.0). Organic matter and lime contents of the gyttja generally varied from 40 to 50\% and 30 to 40 \%, respectively. Approximately reserve of the gyttja is 1.8 billion tons in the Afsin–Elbistan coal-fired power plants (A-B units) in Turkey. It was estimated that gyttja reserves approximately 4.8 billion tons with new planning units.

Discussion and Conclusion: Soils have low in Ca and high in Mg content. Available Ca and Mg concentration in soils should be 1150-3500 and Mg 160-480 mgkg\textsuperscript{-1} for optimum plant growth, respectively. Available high Mg concentration in soils could reduce Ca uptake by plants. The available Ca / Mg ratio must be around 6 in the soil for optimum plant growth. Moreover, low organic matter content may be constraint agricultural productivity in the region. Therefore, gyttja can be suggested to improve quality and Ca and Mg balance of soils formed on serpantinit and peridotit parent material.

Keywords: Gyttja, serpantinit, peridotit, soil, Ca and Mg
Introduction: Climate change is one of the most important threats to our world and our country today. In order to reduce greenhouse gas emissions caused by climate change, the Kyoto Protocol has also been established with mitigation obligations and flexibility mechanisms. These are Clean Development Mechanism, common execution mechanism and emission trading. Emissions trading is carried out on two platforms as mandatory markets and voluntary markets. Turkey can only benefit from voluntary markets by its status. It offers opportunities for businesses, institutions, and organizations carrying out emission reduction activities such as emissions trading, renewable energy and forestry, based on its basis, to balance between low emission producers and multi-emission producers, to cover the gap between emission production and reduction and to encourage reduction. Considering the legal privileges and powers, it is considered that the special provincial administrations will be able to provide additional financial resources for their services and investments while contributing to the improvement of the environment, which is one of the areas of legal liability, on the one hand. In addition, with the approval of the Paris climate agreement, which came into force in 2016, Turkey will benefit from all mechanisms and Turkey's carbon emissions market will grow and bring new opportunities to both the public and the private sector.

Material and Methods: Similar examples are examined in the world and have been advised to local governments.

Discussion: In this study, it was tried to determine that by using renewable energy, forestation and afforestation projects with its own budget and autonomous structure in the legislation of special provincial administrations, they could obtain additional resources for their services and investments based on the marketing of the carbon certificates which are produced based on the necessity itself and the emission reduction resulting from In particular, the contribution of energy to the national economy and the environment to clean energy production are expected other benefits. The potential to generate additional income for the people living in rural areas is expected with the participation of special provincial administrations or municipalities and local people in projects. With the leverage effect of these projects in the medium and long term, the economic potential will have very positive effects on economic development in our small provinces. For the investment financing required for these projects, as it is in the context of combating climate change and emission reduction, there is the possibility of benefiting from the funds of many international institutions. Detailed information and Guidance on how to follow the procedures for creating projects for emission certificate production is available on the official website of the Ministry of Environment and Urbanism.

Keywords: provincial special administrations, alternative financial source, carbon certificate, emission trade.
Comparison of Forewings of Cerceris (Insecta: Hymenoptera: Crabronidae) species by Landmark Based Geometric Morphometric Method

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Introduction: Cerceris is a large genus of solitary wasps belonging to the Crabronidae (Insecta: Hymenoptera) family, which has 866 species in the World and 60 species in Turkey. Identification of species by using keys may result some confusions and geographical variations bring some systematic problems. Hymenopteran wings can be used to distinguish many taxa such as genera and species since it comprises important taxonomic characters. Recently, useful information has been obtained from geometric morphometric methods in discrimination of various populations of Hymenoptera. In this study, forewings of 16 species belonging to the genus Cerceris (Hymenoptera: Crabronidae) are compared by landmark based geometric morphometric method.

Material and Methods: Totally 194 dry wing samples were prepared and digitally photographed. In the computer environment all the photographs have been introduced to tps util32 module. For landmark points tps dig program was used. Here, 24 landmark points applied to the wing intersection areas are repeated for each example. These images were converted to tps format and stored as a separate file. Wing images were superimposed to obtain cartesian coordinates of 24 landmark points for 194 samples. The statistical analysis was applied by removing the size dependent variation. Differences within and among groups were revealed by statistical analyzes.

Results: Significant results which can be useful in discriminating the species were obtained in the ANOVA analyzes (p<0.005). According to canonical variant analysis (CVA) results, groups formed obvious clusters. Cerceris tuberculata, C.rubida and C.quadricincta species formed groups different from each other. Group formed by C. quadricincta is close to that of C. quadrifasciata. Remaining groups are homogeneously dispersed in each other.

Discussion: The wing shape may be affected by both genetically and environmental conditions, therefore it is open to variations. Landmark based geometric morphometric method alone can not be used for species discrimination which must be supported with other methods. Morphometric studies may be more useful in systematics if they are combined with genetic studies.

Keywords: Hymenoptera, Cerceris, geometric morphometrics, landmark, wing morphometrics
Investigation of Bacterial Flora in River Lumëbardhi Prizren (Kosovo) during Spring Season 2014 Year

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Introduction: Be provided safe drinking water is one of the basic human rights and is crucial to health. About two thirds of drinking water consumed worldwide is derived from various surface water sources like: lakes, rivers and open wells. The waters can easily be contaminated microbiologically by sewage discharges or fecal loading by domestic or wild animals.

Material and Methods: The samples for this analysis were collected with one-litre sterile polyvinyl chloride (PVC) plastic water bottles, from five (5) designated sampling points in river Lumëbardhi during spring season, 2014. Bacteria isolation, is done by selective medium’s: nutrient agar for heterotrophic bacteria, bile aesculin agar for Streptococcus faecalis, Violet red agar for total coliform bacteria, SS agar for salmonella and shigella, saborud agar for fungi, were used. All media were prepared and sterilized as instructed by manufacturer.

Results: Results of microbiological analysis are presented in Table 1. The higher number of heterotrophic bacteria is registered at fourth locality by 1,280,000 cfu /100 ml water. The lower number is registered at second locality with 240,000. The higher number of total coliform bacteria is registered at fourth locality, 530,000 cfu/ml water. The low number, of total coliform bacteria, is registered at second locality 90,000 cfu /100 ml water. The higher number of SS bacteria is registered at fifth locality, 680,000 cfu /100 ml water. The low number of SS bacteria is registered in second locality (30,000 cfu /100 ml water). The higher number of Streptococcus faecalis bacteria is registered also at fourth locality, 570,000 cfu /100 ml water. The low number of Streptococcus faecalis bacteria is registered in first locality (240,000 cfu /10 ml /water). The higher number of fungi is registered at fourth locality, 140,000 cfu /100 ml water. The low number of fungi is registered in first locality (10,000 cfu /100 ml/water).

Discussion: Results of total coliforms obtained in the present study showed that all examined samples from river exceeded the recommended values and not safe for drinking. Although, the WHO guideline for drinking water does not allow any detection of fecal coliforms and E. coli, in our study, it was found higher number of microorganism. The contamination of these water sources is probably due to poor protections and exposure to contamination by human and domestic wastes. From these results show that the waters of the river Lumëbardhi is higher polluted, than standards according to allows.

Keywords: water, river, microbiological, Lumëbardhi, Kosovo.
Landscape Architecture in Turkish Regional Development Plans

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Introduction: Turkish regional planning process started in the last periods of Ottoman Empire. However, in modern Republic period, planning efforts may be divided in two parts, unplanned development period and planned period. With the nomination of Turkey to EU, planning understanding also changed depending on the policies followed in Europe. Turkey started to adopt new statistical units (NUTS I, II and III). At NUTS II level, Turkey witnessed regional plans for the first time in 2010 in 26 NUTSII Regions. These plans have been in the second generation and now 2014 – 2018 plans are in force. These plans have some priorities changing depending on the regions they belong to.

Material and Method: Present study was conducted to determine the priorities of regional plans in Turkey in terms of landscape architecture, considering the key words of ecology, environment, aesthetical, recreation. Totally, 26 Regional Plans in Turkey are evaluated and their priorities are reviewed. Material of the study is composed of 26 Regional Plans and method includes the review of these plans.

Results: As the result of the study, 6 out of 26 Plans include all the keywords while 10 of them include only two and 10 of them include none.

Discussion: Landscape architecture is among the most related disciplines to regional development and planning since it comprises of a large extended field. This study shows that Turkish regional plans considered landscape architecture partly but they must involve larger rate of such considerations in the future revisions by including landscape architects in their preparation teams.

Keywords: regional planning, landscape architecture, ecology, environment, aesthetical, recreation

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**Introduction:** Black vulture *Aegypius monachus* has 98-107 cm body length, broad and wide wings. This is one of the endangered bird species in Turkey (IUCN-NT). The native population shows decreasing or fluctuations in Turkey. The species live in forested areas in hills and mountains which have scrub and arid and semi-arid alpine steppe and grasslands up to 4,500m. Nests are built mostly in trees or rarely on rocks. They prefer pine trees with flat tops for nesting. The next largest breeding colony is in Soğuku National Park / Kızılcahamam (Ankara) after the Türkmen Mountain (Eskişehir).

**Material and Methods:** This study was conducted on Black vulture population in Soğuku National Park / Kızılcahamam (Ankara). Observations were made within the field studies and the numbers of individuals and nests were determined. It was recorded that if there were nestlings in the nest during the breeding period or not and coordinates of these nests.

**Results:** According to the results of three-year observations in 2015-2017, the maximum number of individuals recorded in the field in one day is about 37 (only 150). Only one of the 12 different nests in the vicinity was actively used for over two years, while each of the other nests was actively recorded in different years.

**Discussion:** Black vulture individuals can go far away to feed. Although the number of individuals is not much, the carcasses left in the area from time to time can also attract individuals living at distant and can be fed together with the individuals who are constantly present in the Soğuku National Park. In this monitoring study carried out in the context of ongoing conservation studies for this species, which is particularly sensitive in breeding season, the presence and ultimate status of this species in the area were recorded.

**Acknowledgement:** We would like to express our appreciation to the Ministry of Forestry and Water Affairs 9. Regional Directorate

**Keywords:** black vulture, *Aegypius monachus*, endangered species, monitoring
Phrygana Vegetation of Azerbaijan

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Introduction: Typical phrygana vegetation in Azerbaijan territory; The birthplace of the Greater Caucasus, Bozdağ and the southern part of the Small Caucasus (Zuvand) and the Nakhichevan area are encountered. In the area of Nakhichevan, altitudes from 1000 (1200) to 1500 (1600 m) are seen as semi-chalcedes dominated by Artemisetum units, then followed by steppe and then mixed with high mountain steppe vegetation.

Materials and Methods: These studies were carried out between 2010-2016 in the regions of Talish and Nakhichevan where the phrygana vegetation of Minor Caucasus spread. The phytosociological and ecological characteristics of the study units were investigated comparatively. Collected specimens are stored in Baku State University, Faculty of Biology, Botanical Herbarium Laboratory.

Results and Discussion: These investigations were carried out in the regions where xerophyte plant associations (phrygana) spread on the territory of Nakhichevan and Thalısh (Diabar). These unions are dominated by barbed and grassy plants, while Acantholimon, Astragalus, and Onobrychis are common in the area and are dominant in the mountainous regions of Nakhichevan, while the dominant parts are Shahbuz, Julfa and Ordubad are dominant in vegetation. In the floristic composition of the phrygana vegetation, the shrubs are dominant and character species; Pyrus oxyprion, Astracantha microcephala, Astragalus aureus, Juniperus polycarpos, Rhamnus pallasii, Atraphaxis spinoza, Acantholimon bracteatum, Rhus coriaria, Acer iberica, Lonicera iberica, Prangos ferulacea, Thmus kotschyanus etc. and that the frigane vegetation dominate the region's vegetation. It was recorded that there were 235 belonging to the Fabaceae family and 89 belonging to the Astragalus genus in the Nakhichevan Autonoum Republic area. The mountainous - xerophyte vegetation encompasses the tranquil tropics of relief, rocky slopes, and talus of the mountains. They are of little use for pasture use. We can serve as a transitional pastureland for grazing after the use of winter pastures and before rising to summer pastures. Some researchers. Mountain xerophytes eventually emerged as neogons. Recent research, however, shows that this vegetation emerges in the foothills of Iran and the Little Asia, and is linked to the center of the xerophyte of the Mediterranean. Today, the phrygana vegetation of the Nakhchivane region proves this point by being a microcenter and having endemic species.

Keywords: Azerbaijan, Talish, Nakhichevan, Phrygana vegetation
Does Wood Ants Interfere with Soil Biological Quality (QBS-ar)?

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Introduction: Wood ants of *Formica rufa* group widely distribution in the northern hemisphere. They build an aboveground mound, which is consist of needles, leaves, twigs, and bark. There are three main elements to the diet of *F. rufa* ant - aphid honeydew which provides sugar for energy, invertebrate prey to provide protein for the development of the brood, and the seeds of certain plants to provide essential oils. Wood ants control the abundance and community structure of the invertebrates and, thus, indirectly influence the nutrient cycle. In the present paper, it is investigated the impact of *Formica rufa* on soil biological quality (QBS-ar).

Material and Methods: The study area is located in research forest Faculty of Forestry in north-central Turkey. Four ant nest mounds of similar size (ca. 0.5 m³) were selected for microarthropods measurements from October 2014 to September 2016. Three soil core samples were taken bimonthly from each plot to collect microarthropods (288 cores). Microarthropods were extracted using modified Berlese–Tullgren funnels, then sorted, identified, and counted under a stereoscopic binocular microscope.

Results: The mean abundances of microarthropods in the ant nest significantly lower than forest floor. The results obtained showed that QBS-ar values detected in the forest floor are significantly higher than the values obtained from wood ant nest in the repeated measured test. The Shannon diversity index (*H'*') of soil microarthropods was generally higher in forest floor then ant nest but this difference was non-significant.

Discussion: Ant nests in this study were chosen to be at similar dimensions at the beginning of the study since there is a positive relationship between the nest dimension and the foraging activity and population density. As a result of the preliminary study, *F. rufa* density was observed to be high at the nest edge (0-0.5m), and the density decreased by the distance as far as 10 m and observed as a single trail. Similarly, *F. lugubris* nest volume is correlated with foraging activity and *F. aquilonia* mound size effect reproductivity and population size. The results show that wood ants mounds affect soil biological quality (QBS-ar) significantly. It has also been determined that the ant mound does not affect biodiversity while decreasing the number of micro-arthropods.

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Keywords: wood ant, microarthropod, QBS-ar
A Literature-Based Survey on the Arthropod Biodiversity in Samsun Province, Turkey

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Introduction: Samsun Province is located in the costal line of central Black Sea region. The province has different habitats including sea, rivers, lakes, lagoons, reedbeds, marshes, meadows, pastures, forests, sand dunes, and farmland. Therefore, each region in the province has very rich fauna and flora. In the present study, we performed a literature-based survey on the arthropod biodiversity in Samsun province, Turkey.

Material and Methods: Investigations on biodiversity of some arthropod taxa in Samsun province have been previously conducted. In order to reveal arthropod biodiversity in Samsun province, we performed a survey based on scientific literature and our recent observations. Between 1993 and 2014, approximately 26 scientific publications on faunal composition of 52 arthropod families in Samsun province have been published. The names of each arthropod taxa reported from Samsun province are alphabetically arranged and information on numbers of collected samples, conservation status, geographical distribution and endemicity were given as list.

Results: In the present study, presence of approximately 338 species or subspecies belonging to 52 families, 17 orders and 4 classes in Samsun province have been determined based on literature and our observations. Hymenoptera (59 species), Lepidoptera (52 species), Diptera (48 species) and Coleoptera (38 species) species were the most common insects whereas Mesostigmata (23 species) was the most common arachnids in Samsun province. In addition, a small number species of Crustaceans orders, namely Cladocera (22 species), Amphipoda (7 species), Mysidacea (7 species), Cyclopoida (7 species), Calanoida (5 species), Diplostraca (2 species) and Isopoda (1 species), were also documented in Samsun province. In addition, there are several reports on the orders Ixodida (14 species), Prostigmata (5 species) Odonata (27 species) and Homoptera (14 species) and Heteroptera (12 species) in Samsun Province.

Discussion: As results of habitat destruction, over-hunting, spread of non-native and invasive species, environmental pollution etc., biodiversity is declining rapidly throughout the world. Therefore, systematic and faunal studies have a great importance in animal biodiversity. In the present study, we provide a preliminary list of arthropod biodiversity reported from Samsun province, Turkey. We believe that there are several hundreds of species to be still most of them not determined in Samsun province.

Keywords: Arthropods, biodiversity, Samsun province, Turkey
**Introduction:** Turkey ranks third place among the countries where pistachio production is made in the world, and provides important economic income. Therefore, it is necessary to conduct sustainable control measures against diseases and pests which negatively affect yield quality and quantity in pistachio. In particular, phytopathogenic fungi have an important place among the pests of pistachios. *Pseudocercospora pistacina* and *Septoria* spp are among the most common disease causing agents in pistachio growing areas of Turkey. Both of them are prolific, foliar fungi effecting fruits and leaves of pistachio, especially in the Southeastern Anatolia region of Turkey where dense pistachio orchards take place. Therefore, sequential fungicide sprays are being applied to restrict these fungal agents, especially in the Southeast Anatolia region. Such applications affect ecosystem and human health in and around pistachio orchards. It is important to develop Integrated Pest Management (IPM) applications for pistachio horticulture. Biological control measures are emphasized within the IPM programmes. This study investigated the *in vitro* antagonist activity of *Brevibacillus laterosporus* as a biological control agent against *P. pistacina* and *Septoria* spp.

**Material and Methods:** *P. pistacina* and *Septoria* sp. were subjected to binary test with *B. laterosporus* at 30°C on PDA medium. Colony developments of *P. pistacina* and *Septoria* sp. calculated and the experiment was terminated after 21 days of incubation. Each experiment was set up in triplicate. Antagonist activity of *B. laterosporus* was evaluated as moderate and high level based on the control group. Molecular identification of *B. laterosporus* was performed by 16S rDNA sequence analysis.

**Results:** *B. laterosporus* was found to be effective on colony development of *P. pistacina* and *Septoria* sp. with 83% and 64%, respectively.

**Discussion:** *B. laterosporus* was highly effective on *in vitro* colony growth of *P. pistacina* and *Septoria* sp. The data obtained through this study contains the first report on biological control of these important fungal phytopathogens of pistachio in Turkey.

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**Keywords:** *Pseudocercospora pistacina*, *Septoria* sp. *Brevibacillus laterosporus*, *in vitro*, antagonist activity.
Genetic Diversity of Endemic *Astragalus argaeus*, and Implications for its Conservation

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Introduction: *Astragalus* L. (Fabaceae), is likely one of the largest genera of vascular plants in the world, with an estimated number of 3000 species and more than 250 sections. Many species are local endemics, while comparatively few are widespread. It is also the largest genus in Turkey, where it is represented by nearly 476 taxa including 203 endemic in 64 sections. *A. argaeus* Boiss. is critically endangered endemic species growing only on Erciyes Mountain in Kayseri. In the present study, we aimed that to evaluate the distribution of the genetic diversity within and among natural populations of *A. argaeus* using the ISSR markers and provide elementary information for future conservation.

Material and Methods: Inter simple sequence repeat (ISSR) markers were chosen to detect the genetic diversity in four populations of *A. argaeus*. Ten primers were used to assess the diversity among 96 genotypes collected from the four localities in Erciyes Mountain.

Results and Discussion: A total of 78 bands were scored, of which 44 (55.8%) were polymorphic. The unweighted pair group method arithmetic average (UPGMA) and principle component analysis (PCoA) showed moderate genetic diversity at the species and population level. The percentages of polymorphic bands (PPB) ranged from 53.8 to 61.5 (58.01%±3.2) and average gene diversity (h) at the population and species level was estimated to be 0.17 and 0.23, respectively. The determined gene flow was (Nm) was 1.83. In analysis of molecular variance (AMOVA), the percentage of the variance was 38.72% among populations and 61.28% within populations. The data which small population size, habitat fragmentation and moderate levels of genetic diversity demonstrate that *A. argaeus* is a very vulnerable.

Acknowledgement: We would like to express our appreciation to the Erciyes University Scientific Research Project Commission, which supported this study (FDK-2015-5693).

Keywords: *Astragalus argaeus*, conservation, endemic, Erciyes.
Effect of Bacteria and Methyl Amine Treatments on Growth of Squash Seedlings Grown under Different Water Deficit Levels

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Introduction: Water is one of the most important resources for successful vegetable production. Drought stress negatively affects yield and quality of vegetables. Water is one of the most indispensable resources for successful vegetable growing. Vegetables need regularly water for vegetative and generative growth and development. The bacteria which promote plant growth and are used for biological protection and biological fertilizer are called Plant Growth Promoting Bacteria-PGPB. These bacteria can positively affect the capabilities of tolerance of plants under drought stress, increasing water use efficiency, regulating physiological process such as enzyme activity, phytohormone and developing various mechanisms.

Materials and Methods: Pot experiments were conducted in greenhouse conditions at Atatürk University. Some promising bacteria applications observed under abiotic stress conditions were applied to determine the efficiency for reducing yield and quality loses in squash seedlings grown under drought stress. For this purpose, a total of 5 bacteria isolated from rhizosphere of different plants grown under 4 different irrigation levels and 3 methyl amine concentrations (0, 2.5 and 5.0 mM) was used to determine on plant performance of squash seedlings.

Results and Discussion: Results showed that decreasing irrigation quantities significantly decreased the dry and fresh weights of squash seedlings. Moreover, lower irrigation levels caused a decrease in leaf relative water content (LRWC) and stomatal conductance (SC), but an increase electrolyte leakage (EL). However, PGPR and Methyl Amine treatments significantly increased the growth, LRWC and SC, but decreased EL of squash plants grown under lower irrigation levels compared to the control. The results of the study suggested that PGPR and Methyl Amine treatments could alleviate the deleterious effects of lower irrigation conditions on the growth of squash plants.

Keywords: methyl amine treatments, squash seedlings, LRWC

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Effects of Some Entomopathogen *Beauveria bassiana* (Balsamo) Vuillemin Isolates on *Holotrichapion pullum* (Gyllenhal) (Coleoptera: Apionidae) Adults

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Introduction: *Holotrichapion* spp. are important pests of agricultural crops especially forage plants such as alfalfa. *Holotrichapion pullum* (Gyllenhal) (Coleoptera: Apionidae) is an oligophagous species. This species is very common in alfalfa areas and can cause significant damage by creating large populations both in Turkey and in the World. *Holotrichapion pullum* adults feed on alfalfa leaves while the larvae feed on seeds, shoots and flowers. Despite the significant damage, no control strategy against the pest has been developed yet. One of the effective and environmentally friendly control method for this important pest is biological control. Among biocontrol agents entomopathogen fungi are ubiquitous microorganisms attacking various insect hosts by causing acute mycoses and can spread fast among host populations horizontally via aerially produced conidia and infect their host directly by penetration of the cuticle with germ hyphae. The objective of present study was to critically evaluate the potential of entomopathogenic fungi, *Beauveria bassiana* for biocontrol of *H. pullum*.

Materials and Methods: Different isolates of the entomopathogenic *B. bassiana* isolates (GOPT-498-4, GOPT-552, GOPT-562) were obtained from Plant Protection Department, Gaziosmanpasa University, Tokat/Turkey. *Beauveria bassiana* isolates were of local origin. These entomopathogenic fungi were cultured on potato dextrose agar medium (PDA). The conidia were harvested by scraping the surface of 30 days old culture gently with glass rod. The conidia were suspended in distilled water containing 0.2% Tween-80 and the final concentration of 1x10^8 spores/ml was determined by direct count using Haemocytometer. Prepared suspension of *B. bassiana* isolates were sprayed with the help of atomizer over the adults. Alfalfa leaves were provided as a food source for the adults and regularly replaced with fresh ones at an interval of 24 hours. Each treatment, having batch of 10 adults, was replicated four times. Mortality data was recorded up to 9 days.

Results and Discussion: The synthetic pesticides used against insect pests in agriculture have contributed undesirable side effects to other living organisms, and the environment. These negative effects encouraged scientists to search for biopesticides such as microbial pesticides. Entomopathogenic fungi are effective, and environmentally safe alternative to control many important pest species because they are safer for the environment. Based on the results of present study, the fungal isolates caused significantly different mortality in adults (p≤0.05). The highest mortality was obtained from isolate GOPT-562 with 100% mortality 9 days after inoculation; followed by isolate GOPT-498-4 with 83.3%. All isolates displayed different mycosis rates. In conclusion, three different *B. bassiana* isolates were tested against *H. pullum* adults under controlled laboratory conditions and demonstrated that the fungal isolates used in this study could be used as possible biocontrol agents against this insect. Further studies should include determination of the effectiveness of these isolates in the field.

Keywords: *Beauveria bassiana*, entomopathogen, *Holotrichapion pullum*, biological control
Estimation of Size at First Maturity of Pontic Shad (*Alosa immaculata*)

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**Introduction:** The fish populations are limited in size, and sustainability of fish stocks depend on reproduction. The age and size at sexual maturity may be important in assessing the optimum age of first capture of a species. It provides us useful information to determine parent stocks, minimum landing size and minimum mesh size of fishing nets. Pontic shad is an economically important fish species for the Black Sea countries. There are no any regulation and limitation on shad fishing in Turkey although they have annual landing about 3,000 tons as target species for artisanal and commercial fisheries. The study was aimed to estimate the size at first maturity and minimum landing size for Pontic shad (*Alosa immaculata*) for sustainable fisheries.

**Material and Methods:** Maturity data were collected from 286 Pontic shads between October 2016 and February 2017. Minimum landing size (MLS) suggestion is determined by the price formation at fish markets. Size at first maturity (Lₕ) is estimated by logical regression analyses.

According to model, length at 50% maturity (Lₕ0ₕ) is consider equal to size at first maturity (Lₕ). Pₐ is proportion of adult fish in any length class; Pₐ=1/(1+exp(a+bTL)), Lₕ=-a/b

**Results:** Average total length and average body weight was determined for all specimens as 18.94±0.142 cm and 65.75±1.987 g while 20.23±0.362 cm and 74.87±4.590 g for females, 18.80±0.361 cm and 59.67±4.226 g for males. Length weight relationship was estimated for females, males and all samples as W=0.0021 TL³.⁴⁰⁵, W=0.0024 TL³.³⁷¹ and W=0.0028 TL³.³²⁰ respectively. Relation between total length and proportion of mature fish was estimated as Pₐ=1/(1+exp(5.8575-0.3186TL)) and Lₕ as 18.39 cm. It is determined that maximum price formation occur at total length of over 25 cm according to culinary and market demands for Pontic shad.

**Discussion:** Though there are so many researches on population parameters of *Alosa immaculate* no any study on maturity size. Size at first maturity estimated as 18.39 cm and the proportion of small fish than 18.39 cm is 65.7% in the study. It is recommended that minimum catch size should be 25 cm in terms of maximum yield. This unsuitable situation has shown that a landing size regulation must be defined for the existence of stock.

**Keywords:** pontic shad, *Alosa immaculata*, size at first maturity, minimum landing size, sustainability.

**Acknowledgement:** We would like to express our appreciation to the Sinop University Scientific Research Project Commission, which supported this study (SÜF - 1901-15-02).
ORAL PRESENTATION

The Ecological Factors on the Effects of Number and Development of Youth of the *Fagus orientalis* Lipsky

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**Introduction:** The adverse environmental events caused by global climate change threaten the lives of all living societies day by day. Therefore, it is necessary to reduce the effectiveness of the factors that cause global climate change to the lowest level and to restore the degraded ecological balance in all living environments. In this scope; it is important to ensure the continuity of the health and quality levels of the forests that play a role of protecting and rehabilitating all live life with the products and other functional services provided at the top level of carbon storage capacity. Successful rejuvenation and reforestation efforts must be carried out rapidly in order to achieve this. Numerous factors are influential on these important silvicultural activities, but the influence of ecological factors is quite extensive. In this study; *Fagus orientalis* Lipsky has a wide natural distribution area in our country forests; the effects of ecological factors on the rejuvenation success in the field of natural rejuvenation in the Department of Yumurtatepe Forest Management affiliated to the Directorate of Vize Forest Management have been examined.

**Material and Method:** This study was carried out on the grounds of natural rejuvenation in 2016 at the 61nd branch of the Department of Yumurtatepe Forest Management. In the study; In the experiment areas taken as 10 units in the size of 25x40m from the rejuvenation area, the dynamics of the stands and the ecological factors predominant in the area were determined. For this purpose, a mobile meteorological station was established, soil profiles were opened and specific location conditions were determined by means of an advanced GPS. In addition, the growth characteristics of beech youth were measured with a digital millimeter-sensitive mini-length gauge and a digital millimeter-diameter gauge. The number of youths per square meter determined as a success criterion was determined at the same points between the years of 2016-2018. Factor Analysis was applied to see the effects of ecological factors and other factors on rejuvenation success. For this purpose, SPSS Package Program was used.

**Results and Discussion:** According to the results of Factor Analysis applied to the results obtained from measurements and determinations made on the experimental sites, at the 61nd branch of the Department of Yumurtatepe Forest Management has a total of 7 factors effective on the rejuvenation success in the natural rejuvenation area of eastern beech 61 and these 6 factors explained 92.78% of the total variance. According to the study results, ecological conditions are effective at natural rejuvenation success and at a high level of 73.64% in the development of natural youth.

**Keywords:** *Fagus orientalis* Lipsky, rejuvenation success, ecological factors
Introduction: Today, it is already known that heavy metals (HMs) are accumulated in soil, air and waters increasingly all over the world, due to progress in industry and related sectors (such as power stations, heating systems, automotive, chemical and textile industry), rapid population growth and globalization. Moreover, HMs can transfer from these sources to other organisms via food chain, beginning with plants. The final stage of this transportation process can cause some dramatic health problems in humans, therefore we investigated the effects of HMs on some of the most commonly consumed plant varieties.

Material and Methods: In this study, different concentrations of some HMs (PbCl\(_2\), CdCl\(_2\)) and their combinations (PbCl\(_2\)+ CdCl\(_2\)) were examined in respect to different physiological parameters, such as germination percentage, root - shoot length, water, pigment and malondialdehyde (MDA) contents for their hazardous effects in barley and wheat varieties (Hordeum vulgare cv. Çildır, Triticum aestivum cv. Gerek, respectively) selected from Central Anatolia. Hydroponic studies were carried out by using growth chamber under controlled photoperiod conditions for both germination and growth sessions. Beakers were arranged in a randomized block design with Pb and Cd treatments applied in triplets.

Results: According to our results, while germination percentage, root - shoot length, water and chlorophyll contents were dramatically decreased after HM treatments, carotenoid and MDA contents were increased compared to control groups. By detailed observations of the results, Çildır (barley) were found to be more tolerant to HM stress by comparing to Gerek (wheat).

Conclusion: Clearly seen that, applied HMs are the causes of oxidative stress in these crop species. Therefore, further studies with other HMs and their different concentrations on different species could produce reliable comparisons for determination of the hazardous impacts of HMs. Some of those further studies are already undertaken in our laboratory by using different concentrations and varieties.

Keywords: crops (barley, wheat), germination, heavy metals (Cd, Pb), MDA, pigment
Introduction: Mussels serve as useful indicators of temporal trends in environmental quality because they accumulate some contaminants in their tissues at levels many time higher than in the surrounding water. The purpose of the study is to demonstrate the Cu/Zn SOD immunoreactivity in the gastric tissues of rats which are fed with mussels that are collected from the Çamburnu region of the Dardanelles.

Material and Methods: Four groups of rats are included in the study, group 1 (n=6), control group fed with Standard rat food, group 2 (n=6), 75% mussels and 25% Standard rat food daily, group 3 (n=6), 75% mussels and 25% Standard rat food every two days, group 4 (n=6), 75% mussels and 25% Standard rat food every three days. To detect Cu/Zn SOD localization in the tissues, the LAB-SA Detection System was used. Cu/Zn SOD immunoreactivity was detected of epithelial cells in the stomach tissue of rats fed with mussels. After the immunohistochemical staining processing all gastric tissue samples are evaluated in terms of Cu/Zn SOD immunoreactivity with light microscopy.

Results: It was determined that Cu/Zn SOD immunoreactivity in the gastric epithelial cells of the rats in the mussel-treated group was higher than in the mussels fed every other day and every three days. In this group Cu/Zn SOD enzyme was found to be 70% positive. Cu/Zn SOD enzyme was not secreted in the control group. There was statistically significant difference between the Cu/Zn SOD immunoreactivity of epithelial cells in the gastric mucosa of the rats in the experimental and control groups (p> 0.05).

Discussion: In this study Cu/Zn SOD was detected in stomach tissue of rats fed with mussels collected from Çamburnu region. The first defense against free radicals in the organism is by SOD enzyme. The physiological function of the enzyme is to protect the oxygen metabolizing cells against the harmful effects of the superoxide free radical. The antioxidant Cu/Zn superoxide dismutase (Cu/Zn SOD) enzyme catalyzes the hydrogen peroxide dismutation of superoxide radicals and removes the effects of free radicals which cause oxidative stress. The detection of Cu/Zn SOD production in the stomach mucosa suggests that the mite may trigger oxidative stress.

Acknowledgement: We would like to Express our appreciation to the ÇOMÜBAP, which supported this study (ÇOMÜBAP -2010/244).

Keywords: mussel, Dardanelles, Cu/Zn superoxide dismutase, stomach
Evaluation of Visitor Management Tools in Küre Mountains and Ilgaz Mountain National Parks

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Introduction: Protected areas with rich biodiversity and cultural resources are important natural sites for people to renew themselves by moving away from the city's concentration. The national parks located within the protected areas contain the plenty landscaping characteristics of the natural ecosystem, as well as high potential for recreational and tourism. The sustainable use of those parks with national and international scales has become a matter of importance. In Europe and America, efforts are being made to support the sustainable use of areas that have conservation status, such as national parks, by developing visitor management tools. To control of them are limitations, activities or solutions developed to take action against adverse events that may occur in the field. In our country, such applications have begun to be used gradually.

Material and Methods: In this study, Küre Dağı and Ilgaz Dağı national parks located in Kastamonu province borders were selected as study areas. Küre Mountain National Park has the first Pan Parks system of our country and is focused on the protection of wildlife. Ilgaz Mountain National Park has rich habitat diversity and wildlife potential. The questionnaires formulated by focusing on management plans, recreational activities, problems related to management and use of designated visitor management tools, were sent to the 10th Regional Directorate of Forestry in May 2015 and the results were given.

Results: From the point of view of the use of visitor management tools in the questionnaire, it is seen that the Küre Mountains National Park ( % 40,4) is applied more than the Ilgaz Mountain National Park (% 26,9). By comparing the data of the two areas, some suggestions will be made in terms of sustainable use based on visitor management tools.

Discussion: Increasing tourism and recreational trends in national parks have begun to contradict the concept of sustainability. Regulation of visitor tools developed in the context of visitor management strategies to reduce visitor influx in these area play an important role in ensuring sustainability.

Acknowledgement: This work was produced in the scope of a master thesis completed in 2016 at Adnan Menderes University, Institute of Science, Landscape Architecture Department.

Keywords: protected area, national park, Küre Mountain National Park, Ilgaz Mountain National Park, visitor management tools
The Need of Environmental Cooperation in Turkic World and The Role of Turkey

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Introduction: The Turkic Republics (Azerbaijan, Kazakhstan, Kyrgyzstan, Uzbekistan and Turkmenistan), which have gained independence after the collapse of the USSR, have faced many different problems brought about by becoming an independent state. In addition to the issues that affect international relations such as power and security, which can be considered as "high politics" from the perspective of realist theory, environmental issues and problems regarded as "low politics" are ignored. Efforts to resolve these problems have remained in the shadow of other political issues, and the initiatives in this regard have not been successful. In particular, the shrinking of Aral Lake, located on the borders of Uzbekistan and Kazakhstan, suggests that the environmental aspects of regional cooperation should be questioned urgently. Amu Derya and Siri Derya Rivers flowing through Aral and pass through Kyrgyzstan, Kazakhstan, Uzbekistan, Tajikistan and Turkmenistan, affect these countries water management regimes and their dual-multiple relations. In addition, problems such as water and dam management problems, HEPP projects, common electricity systems, irrigation canals, agriculture have also disturbed inter-state relations and become a major regional problem, instead of developing regional cooperation. The Green Theory which has a growing emphasis on the discipline of international relations, says that the international system should adopt an ecocentric approach, rather than a human-focused approach, just like the outcome of the crisis in Central Asia. Global warming, transboundary waters, environmental problems such as desertification, and the immigration of disasters from man-made boundaries, necessitated the green theory that arises from these problems and disasters to have a similar approach. In this perspective, green theory is one of the most effective theories that links high politics and low politics. Turkey who is being closely interested with the region and regional issues, is giving priority to political and cultural issues and has an important role in Central Asia through national, bilateral and regional institutions. Turkey should assume a more active role in environmental issues affecting the regional cooperation to be a powerful actor in the region.

Material and Methods: Materials to be used in the research will be selected from books, articles, internet pages, etc. Literature search method will be used in the study.

Results: Turkey’s increasing role in the Central Asia region, also requires the close involvement of social and environmental issues and problems as well as diplomatic and political relations. In this context, Turkey's endeavor to deal with the environmental problems in Central Asia and to mobilize regional organizations which have an active role in the region will be an important foreign political development.

Discussion: Turkey's Euphrates River case with Iraq and Syria which has been solved by diplomacy and international law constitute an important and valuable experience for the ongoing environmental problems in Central Asia.

Keywords: Central Asia, environmental problems, cooperation, green theory
Evaluation of Antimicrobial Effect of *Zosima absinthifolia* (Vent.) Link

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**Introduction:** *Zosima* Hoffm. (Apiaceae) is represented by 4 species in the world. Among them *Z. absinthifolia* (Vent.) Link is only distributed in Turkey. This common plant has tripinnat leaves, 10-25-rayed umbels, greenish to pale yellow flowers, and obovate-shaped and grayish fruits. The plant grows on steppe and limestone slopes of 400 to 2000 m. Nowadays *Z. absinthifolia* is edible after cooked in the same region plant fruits used as a food spice in Turkey and Iran as well as used as a digestive, carminative and anti-inflammatory agent in Turkish folk medicine. Aerial parts of the plant have also some medicinal usage in Pakistan folk medicine to relieve indigestion, stomachgas and to treat cough and bowel disorders. The main objective of this study is to evaluate the antimicrobial effect of ethanol–water extracts of *Zosima absinthifolia* on fourteen gram-positive and negative bacteria (*Bacillus subtilis, Enterococcus faecium, Enterococcus faecalis, Enterobacter aerogenes, Escherichia coli, Klebsiella pneumoniae, Staphylococcus aureus, Staphylococcus epidermidis, Salmonella infantis, Salmonella typhimurium, Salmonella Kentucky, Salmonella enterica, Pseudomonas aeruginosa, Pseudomonas fluorescens*) and one fungi (*Candida albicans*).

**Material and Method:** The active compounds found in different parts (flowers, leaves, stems, and roots) of *Z. absinthifolia*, were extracted with ethanol–water solvent. These extracts were tested in vitro for their antimicrobial activity against 15 microorganisms by disk diffusion (DD) and minimum inhibitory concentrations (MIC) method. Activity was evaluated by measuring the zones of inhibition against the tested organisms and MIC was determined from the lowest concentrations of extracts to inhibit the growth of microorganism.

**Results:** Results showed that *Z. absinthifolia* showed anti-infective properties against against *E. faecalis, S. epidermidis, S. aureus, S. aeruginosa* and *S. kentucky*, no activity was observed against *B. subtilis, C. albicans E. aerogenes, E. coli, E. faecium, K. pneumoniae, S. enteritidis, P. fluorescens, S. infantis* and *S. typhimurium*.

**Discussion:** According to the results of *Z. absinthifolia* extract was observed to have an antimicrobial activity at different rates against some microorganisms. Further research is needed to explain the composition of the extract and mode of action of the compounds found in the extract.

**Keywords:** Zosima, Apiaceae, antimicrobial activity, disk diffusion, MIC.
Carotenoid Composition of two *Scenedesmus* Species from the Saline Water of Kapulukaya Reservoir by HPLC-DAD

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Introduction: Microalgae metabolites are used for health, food, cosmetic industries, biodiesel production, and as feed additives. The local algae species, *Scenedesmus obliquus* and *Scenedesmus regularis* from a highly saline water body of Kapulukaya Reservoir were isolated to analyze their carotenoid composition and content using HPLC method.

Material and Methods: For separation of carotenoids, YMC C30 column (250 x 4.6 mm I.D., 5 μm) was used. The mobile phase (A) consisted of methanol–acetonitrile–water (84:14:2, v/v/v) and mobile phase (B) consisted of methylene chloride (100%), flow rate was arranged as 0.6 mL/min. A gradient solvent system 100% A and 0% B in the beginning, decreased to 95% A in 8 min, 75% A in 25 min, 72% A in 30 min, 45% A in 50 min, returned to 100% A in 52 min and maintained for 8 min. Extract injection volume was 20 μL and the response of the peaks was detected at 450 nm.

Results: The saponified cells to resolve a range of carotenoids, proved an acceptable separation as inferred from the retention factor (k) ranging between 0,75-7,76 and the separation factor (α) values greater than 1. Resolution peaks assigned to carotenoids, 22 for *S. regularis* and *S. obliquus* extracts were reached within the duration time of 45 min. In both species, main carotenoids identified either tentatively or positively were all-trans-lutein, 9-or 9’-cis-lutein, 13-or 13’-cis-lutein, cis-lutein, All-trans-a-carotene, 9-or 9’-cis-a-carotene, All-trans-β-carotene, 9-or 9’-cis-β-carotene. All- trans-β-cryptoxanthin (RT 34.46) and cis-β-carotene (RT 32.02) found only in *S. regularis* while Neochrome (RT 16.52) and cis lutein (RT 31.07) only found in *S. obliquus*. Auroxanthin, neochrome, neoxanthin and cis-neoxanthin were identified as epoxy-containing compounds.

Discussion: Quantitatively, *S. obliquus* was predominated by β-carotene and cis isomers as major component, being 61.17 % (3.05 mg/g) in total carotenoids (TC) while *S. regularis* was predominated by β-carotene and cis isomers as major component, being 80.71 % (5.76 mg/g) in total carotenoids (TC). In terms of total carotenoids, the species were considered to be efficient sources for further practical applications.

Keywords: microalgae, *Scenedesmus obliquus*, *Scenedesmus regularis*, carotenoids, HPLC-DAD
A Preliminary Evaluation on the Bird Fauna of the Mount Zülküf (Ergani / Diyarbakır)

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Introduction: The bird fauna of Mount Zülküf (Ergani) and its near surrounding was determined by this study. Due to this mountain area is considered a sanctuary place; it is visited by many local and foreign people every year. The area has an important value in terms of religious tourism. There is no comprehensive any study on bird diversity of the area which has great importance on account of religious and cultural value. The present study aims at presenting ornithological importance of the mountain area by provide full list of bird species together with habitat preferences.

Material and Methods: The bird species that showing distribution in the Mount Zülküf and its near surrounding constituted the material of this study. Preliminary results of the research project that started April 2017 were evaluated. Between the April 2017 and December 2017 16 field excursions was conducted in the area by standard ornithological equipment which is consisted of GPS, field glasses (8×40), telescopes (20-60×80), and a camera (with a 400 mm lens).

Results: During the April – December 2017 period 56 bird species that belong to 9 orders and 17 families were detected and represented. Among the recorded species 39 are belong to Passeriformes while 17 are Non-passeriformes group. Of the recorded species 26 residents, 22 summer migrants, 5 winter visitors and 2 passage migrants. The seasonal status of one species was not defined fully and revealed as a vagrant species. Among the recorded species there is no any globally threatened species while four species revealed as threatened species for Turkey (Buteo rufinus, Falco naumanni, Columba palambus and Delichon urbica) recorded in the area without least concern species. Despite considerable habitat diversity, the most preferred habitats are wooded, gardens and rocky areas in the study area.

Discussions: This is the first study on bird diversity of the area which has great importance on account of religious and cultural value. The preliminary results of this study are compatible with the ornithological literature for the Diyarbakır and South-eastern Anatolia Region where are well known. Presenting bird diversity of Zülküf Mount, together with existing cultural importance of the area, will help to bring to light the ecotourism potential of the area. At the end of the conducted project, the important areas will be determined and suggestions will present concerning protection of areas in terms of meet the basic requirements of birds such as feeding, resting and protection. Also, the determination of bird species will help to evaluate and compare the changes in the bird fauna and conservation efforts in the future.

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Keywords: avifauna, bird diversity, conservation, Zülküf Mountain, Ergani, South-eastern Anatolia
An Approach to Conserve Natural Fish Populations: Egg White Powder as Dietary Protein Source for Rainbow Trout (*Oncorhynchus mykiss*)

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**Introduction:** Fish meal is the most important protein source for aquaculture feeds, produced from natural fish populations. The global demand for animal protein and feed ingredients, and the pressure on natural resources in the ecosystem are expected to increase gradually in the next few years. In the period from 1960 to 2014, the global supply of fish dramatically increased compared to that of other animal products, due to vigorous growth of the aquaculture industry, which now provides about 50% of the total fish and shellfish production for human consumption. Therefore, sustainable major source of protein search which can be used in aquaculture feeds has become an important issue. The study aimed to assess the possible use of egg white powder (EWP) as an alternative animal protein source in aqua-diets, providing a solution for the significant pressure on natural fish stocks.

**Material and Methods:** Egg white powder used in the experimental was obtained from a commercial feed production plant. Four different replacement levels (%0, 25, 50, 100) were applied in the experimental feed ration. Rainbow trout (*O. mykiss*) fingerlings (6.02±0.06 g) were fed with experiment diets for 30 days, twice a day ad-libitum. At the end of the feeding experiment growth performance and feed utilization parameters were calculated.

**Results:** All experimental diets were accepted by fishes. According to relative growth rate (RGR) and specific growth rate (SGR) data, growth performance increased significantly with the increase of the EWP replacement levels (p<0.05). Feed utilization was significantly affected by dietary incorporation of EWP (p<0.05) with the lowest FCR recorded in the 50% EWP replacement group.

**Discussion:** Many studies have been carried out to substitute the main protein source used in aquaculture feeds. These studies were generally focused on the use of plant protein sources, however none of earlier studies succeeded high level of replacement of dietary fish meal by a single plant source so far and moreover most of the earlier plant protein replacement studies suggested a mixture of various plant sources due to their imbalanced amino acid profiles. According to our findings however, EWP with high protein and an effective amino acid profile similar to that of fish meal might be used directly as a main protein source in the fish feed.

**Acknowledgement:** Experimental procedures in the present study were approved by the Ethical Commission of Kastamonu University Animal Husbandry Committee (Ethical Commission Approval Number: 2018.05).

**Keywords:** *Oncorhynchus mykiss*, rainbow trout, egg white powder, sustainability
Introduction: The spider fauna of Turkey is poorly known compared to other countries of the world. Up to now, 46469 species of 4031 genera of spiders have been described in the world. There are only 1117 species, belonging to 52 families known from Turkey. The aim of this study is to present the spider diversity of Kütahya province.

Material and Methods: All specimens were collected from field by using aspirator, sweep net and pitfall traps in Kütahya province during two years, beginning from April 2015 to October 2016. The identification was made by means of a SZX61 Olympus stereomicroscope. The keys of Heimer, Nentwig (1991), Roberts (1995), and Locket, Millidge (1951, 1953) were used for the species identification. The specimens which were labelled and preserved as museum materials in Arachnology Museum of Ömer Halisdemir University (OHUAM).

Results and Discussion: Totally 147 spider species in 21 families determined from study area. Most species rich families were Gnaphosidae, Salticidae and Lycosidae. According to the result of this study, the spider diversity in Kütahya Province contains 40,4% at the family level, and 13,2% at the species level of all Turkish spiders.

Acknowledgement: The authors acknowledge the Scientific and Technological Research Council of Turkey (TÜBİTAK) (Project no: 214Z016).

Keywords: Kütahya, Araneae, fauna, Turkey
Detection of Some Heavy Metal Levels in the Yeniçağa Lake

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Introduction: Lake Yeniçağa is located in the western Black Sea region of Turkey. One hundred and eighty-three different bird species migrate annually over İstanbul and Çanakkale Straits to Yeniçağa Lake. Studies conducted in the past years have shown that the lake is under an anthropogenic effects and the lake is under heavy metal pressure. The aim of this study to determine the accumulation of heavy metals in the ten stations of the water and sediment of Yeniçağa Lake.

Material and Methods: The accumulation of heavy metals (Cd, Cr, Mn, Pb, As, Cu, Ni, Zn, Fe and Al) in the water and sediment of Yeniçağa Lake were investigated by ICP-MS. One Way ANOVA and Mann Whitney U test (SPSS 21.0v) were performed to test the significance of the difference of heavy metal contents among water and sediment samples. The relation of heavy metal accumulation in sediment and water samples was evaluated by correlation test. Sediment quality was also assessed by some factors of the Sediment Quality Research Methods (SQG).

Results: It was detected that concentrations of Al, Mn, As and Pb were found higher than water quality criteria (TS-266 2005, EPA 2009, EC 1998, WHO 2009). The highest accumulation in the water was Mn and in the sediment was Fe (p<0.05). Very strong (r= 1.000**) positive correlations were found between the accumulations of heavy metals in the water and sediment samples. Contamination factor (Cf) is one of the most frequently used studies in the assessment of heavy metals found in sediment is a method that provides serious data about the current situation. It was detected that Cd and as present very high contamination in the sediment. The degree of contamination (Cd) value revealed that the Yeniçağa Lake registered at the fourth level of very high degrees of contaminations. According to the Mean-Effect Range Median-Quotient (m-ERM-Q) method, the sediment of the lake was found to be toxic by 49%.

Discussion: Yeniçağa Lake has already been studied by researchers. They found that accumulations of heavy metals in water and sediment were harmful for ecosystem and people’s health. The purpose of this study is to monitor the change and situation of the lake composition for five years. Some metals were found to be at the same level, while others were found to be higher. The arsenic value has increased considerably compared to the past years. The result of the study is that the dimension of the danger is still at serious levels.

Acknowledgement: I would like to Express my appreciation to the Prof. Dr. Ahmet Altındağ.

Keywords: sediment quality research, sediment, correlation
Analysis Coastal Ecosystem Services: The Case of Eastern Black Sea (Trabzon, Turkey)

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Introduction: Coastal areas have been regarded as attraction centers by human beings for centuries as used for sheltering, feeding, and transportation activities. It is clear that the development level reached by the mankind today is largely depended on willingness of feeling, staying by and using the water resources. The role of water cannot be neglected when looking for development history of the world. Therefore, investigation of the reasons that make the coastal areas attractive and type of benefits or services received from the coastal landscapes is an important research task to be accomplished. It is well known that the main factors of triggering coastal attraction are the provisioning, supporting, regulating and cultural benefits obtained from the coast. In this study, in accordance with the coastal scientific definition concept, the aim is to analyze and define the main coastal ecosystem services used by the coastal communities.

Material and Methods: For this purpose, remote sensing and in-situ survey techniques were used to determine ecosystem services on a pilot study area of the Eastern Black Sea coast by considering the sea side and land side of the coastal area.

Results: In view of the findings, fisheries, tourism, recreation, sheltering and agricultural activities and their related sub-processes are found to be main ecosystem services used in the study area. Temporal analysis of the study area revealed that coastal morphology and green coverage that are the basis of ecosystem services have greatly changed in negative direction in the region.

Discussion: In this manner, it can be concluded that coastal erosion, coastal urbanization, transportation and pollution are the main problems that need to be handled by the authorities and decision makers in urgency.

Keywords: ecology, coast, ecosystem services, Black Sea
No Genetic Evidence of Habitat Fragmentation on *Juniperus excelsa* M. Bieb Populations in Turkey: Its Implication for Conservation

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**Introduction:** *Juniperus* L. populations cover 4.29% of Turkey’s forests area. There are about 75 juniper species around the World, nine of them are in Turkey. About 82% of the total juniper forests in Turkey consist of *J. excelsa* M. Bieb (Crimean/Greek juniper) species. It distributes mainly in Turkey and neighbor countries. The main aim of this study is to determine genetic variation of *J. excelsa* populations which is distributed main and marginal areas, to compare for their genetic diversity, to explore genetic evidences of habitat fragmentation and to contribute to determination conservation strategies for *J. excelsa*.

**Material and Methods:** Leaf samples belonging to 472 plant including the out-group (*J. polycarpos* K. Koch and *J. foetidissima* Willd.) were collected from 21 populations. DNA of samples were isolated from leaf specimens. Eight SSR markers were employed for evaluation of genetic diversity and differentiation in populations. Obtained data from SSR loci were statistically evaluated to be able to reach a conclusion about genetic diversity and differentiation patterns of the studied populations, and also to explore genetic evidence of habitat fragmentation on the populations.

**Results:** Seven of eight SSR markers were polymorphic. Average expected/observed heterozygosity and Shannon information index values were calculated to be 0.539, 0.448 and 1.34, respectively. Also, Fis, Fst, Nm values were 0.124, 0.043 and 5.513, respectively. Nei’s Genetic distance values for SSR loci ranged between 0.023 (Eskişehir-Mihallicik and Denizli-Açpayam) and 0.292 (Mersin-Tarsus and *J. polycarpos*). The results of AMOVA indicated that most of the genetic variation was originated from intra-population level (97% for SSRs). Furthermore, Mantel-test results showed that there was no statistically significant correlation between geographical distance and genetic distance. PCoA analysis hinted the presence of geographical divergence of east and west populations. It was seen that out-group showed apparently different structure from *J. excelsa* populations, while *J. excelsa* populations had less tendency to establish specific structures.

**Discussion:** The results of this study coincide with conclusions of other studies in which *J. excelsa* populations were analyzed using similar genetic markers. In this study, it was seen that *J. excelsa* populations had high genetic diversity and low genetic differentiation. No sign was found about negative effects of inbreeding depression and habitat fragmentation. In conclusion, it might be said, *J. excelsa* populations have genetic potential to maintain their presence in the future, and populations with high genetic variation have an advantageous for genetic conservation of the species.

**Acknowledgement:** We would like to express our appreciation to the Akdeniz University Scientific Research Project Commission, which supported this study (FDK-15/781).

**Keywords:** genetic differentiation, genetic diversity, habitat fragmentation *J. excelsa*, SSR
Wastewater Characterization and Chemical Treatability for a Waste Paper Industry

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Introduction: The main objective of this study is to reveal the physical and chemical treatability of paper industry wastewater. The paper industry is one of the important sectors that consume high amounts of water and provide wastewater at different stages of production. The paper industry accounts for 42% of the existing industrial wastewater. Within the scope of this study, the chemical treatability of the influent wastewater in a paper factory (waste paper) has been studied. As a result of chemical treatment, influent COD values (7300-8025 mg /L) can be decreased to 900-1600 mg /L after chemical treatment and sedimentation. Since the total COD and dissolved COD are close to each other in these units, the chemical treatment should be improved, and the wastewater discharge characteristics should be improved by going to the alternative chemical usage. In case of discharge to the receiving environment, these waters should be given to the biological treatment unit after the chemical treatment and sedimentation processes.

Material and Methods: Coagulation-flocculation experiments were carried out for this purpose. Alum(Al₂(SO₄)₃·18 H₂O) and iron (FeCl₃·6H₂O) salts were used as coagulant for chemical coagulation.

Results: The following parameters have been measured: Flow, total COD, dissolved COD and settling tank influent and effluent suspended solids. The highest pollutant load is found in the old paper-14 m³ mudstone unit (2453 kg COD / day). The wastewater flow in the process varies between 3-1300 m³ / day. Total COD varies between 154-28923 mg/l. The dissolved COD range is 123-14461 mg/l. Suspended solids after sedimentation varies between 36-25300 mg/l. Suspended solids before sedimentation range is 94-24720 mg/l.

Discussion: As a result of the chemical treatment with FeCl₃, the COD values range from 970 to 1566 mg/L. In the experiment with Al₂(SO₄)₃, these values were found to be in the range of 1526-1533 mg/L. It is not possible to discharge these effluents without biological treatment or advanced treatment.

Similarly, in different time periods, preliminary settling tank exit samples were taken and laboratory studies were carried out. As a result of chemical treatment with FeCl₃, the effluent COD value was found to be 1270 mg /L. In the experiments made with aluminum sulfate, the effluent COD value was 936 mg /L. It is not possible to discharge these waters to receiving environments. These waters should be given to the organized industrial zone treatment plant. If the paper industry wastewater is discharged into the receiving environment, it must be subjected to aerobic and anaerobic treatment. If these waters are supplied to the common treatment system, pre-treatment is generally suitable.

Keywords: paper industry, chemical treatment, total COD, dissolved COD
Systematics and Ecology of Keban and Ağın (Elazığ) Districts Spiders (Ordo: Araneae)

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**Introduction:** Spiders are capable of living in all types of habitats in the world have 47309 known species. In the course of time, new species are discovered and added to the list. In Turkey, spiders are represented by 1117 species. In this study, systematic and ecology of Keban and Ağın (Elazığ) districts spiders were investigated.

**Material and Methods:** Spiders were collected by different methods (catching by hand, aspiratory and sweeping) between the months of July-October 2016-2017. Specimens were collected from 15 sites in Keban districts and 13 sites in Ağın district of Elazığ. Spiders stored in 96% ethanol at -20 °C. They were caught from different altitude biotopes as pines forest, fire-influenced biotopes, rocky areas, grassland and near water. The collected material were deposited in the University of Gaziantep, Zoology Museum (GAUZM). Morphological identifications were based on reference publications on the taxonomy of Palearctic region spiders with species nomenclature following the World Spider Catalog.

**Results:** In this study, 380 specimen belonging to 14 families were collected. Spiders were diagnosed on species basis. The largest number of samples were found in the Lycosidae family. This family was followed by the families Gnaphosidae, Salticidae and Pholcidae.

**Discussion:** The study was carried out in different habitats. Most of the spider samples were found at the edges of Keban Dam. Specimens were identified based on species. The ratio of female/male ratio and adult / juvenil were 2.6:1 and 7.3:1, respectively. The species reported through previous studies was supported with new localities in this study.

**Acknowledgement:** The authors are grateful to Gaziantep University, Department of Scientific Research Projects (FEF.YLT.16.09) for financial support.

**Keywords:** spider, fauna, ecology, Ağın, Keban, Elazığ
The Effects of Different Cutting Treatments on the Sprouting Ability in Anatolian Chestnut (Castanea sativa Mill.)

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Introduction: Chestnut genus, belonging to the Fagaceae family, are important forest trees. There are 10-12 species of the genus in the world. Anatolian chestnut (Castanea sativa Mill.) is the only species found naturally in Turkey. The species is mainly distributed over the North Anatolia (Black Sea Coast), Marmara and Western Anatolia in Turkey. Also, it is locally spread over the Mediterranean area (Isparta, Manavgat, Alanya). Chestnut forests are faced with extinction with biotic and abiotic pests in Turkey and all over the world for many years. Stand structure of chestnut forests are degraded due to inappropriate silvicultural treatments. The aim of the study is determination of effects on sprouting ability and shoot growth of different cutting height, cutting shape and interventions with cutting surface in the Anatolian chestnut forest.

Material and Methods: The study area was selected from pure chestnut stands in Trabzon-Araklı region. In the scope of the study, treatments were determined as three different cutting heights (1-cutting from soil level, 2-cutting from 10 cm higher than soil level, 3-cutting from 30 cm higher than soil level), two different cutting shapes (oblique cutting, cutting V-shaped) and interventions with cutting surface after cutting (the tar was applied and the tar was not applied). By performing a combination of these treatments, 12 different treatments were used. Accordingly, the study was carried out on 360 stumps to be 12 treatments × 10 trees × 3 replications. At the end of the first growing season, shoot length (cm), shoot diameter (mm), shoot number per stump were determined in one year shoots. Variance analysis and Duncan test were performed to data by using SPSS 23.0 statistical program.

Results and Discussion: As a result of the study, there were statistically significant differences at 99% confidence level in terms of shoot length, shoot diameter and shoot number per stump among 12 different cutting treatments. Duncan test was used to determine the groups among the treatments. Accordingly, 9 different groups occurred in terms of shoot number, 6 different groups took place with regard to shoot length, and 5 different groups emerged for shoot diameter. It was determined that the average shoot number was 82 shoots, the average shoot length was 125.32 cm and the average shoot diameter was 12.46 mm. All measured characters have generally been found to have higher values in higher areas. In previous studies, it was reported that shoot number was increased in parallel with the increase of stump height.

Acknowledgement: We would like to express our appreciation to the TÜBİTAK-TOVAG, which supported this study (TÜBİTAK 214O216).

Keywords: Anatolian chestnut, regeneration, cutting method, sprout
On the Relationship Between Ecological Tolerance-Optimum Levels and Co-occurrence Patterns of Shallow Water Ostracoda from Central Texas (USA)

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Introduction: Ostracods are one of the most abundant (ca. 70K spp.) taxonomic groups which can be found in a wide array of aquatic habitats from freshwater to marine waters. Except some of those rare or habitat-specific species, co-occurrence of two or more species from one locality is not surprising. Implication of this refers that these species may have similar ecological tolerance and/or optimum levels. However, most currently, it has been argued that the species with common occurrences in wide geographical areas would have higher tolerance ranges corresponding to a reduction in optimum levels.

Material and Methods: The materials were collected from 9 different water bodies in 63 sampling sites between 02 May to 14 June, 2017 from Central Texas, USA. In the laboratory, samples were washed thru three standard sieves. Species separated from the sediment by using fine needles were identified under the microscope. Identification was basically done with the current literature. During this study we tested two hypotheses: H1: Species with negative co-occurrences tend to have larger mean optimum differences than the species with positive co-occurrences. H2: species with wider tolerance ranges show wide distributional patterns. The Probabilistic Model (Probabilistic Species Co-occurrence Analysis in R) was used to find co-occurrence patterns. C2 program was used to determine ecological tolerance and optimum estimates.

Results: Total of 42 ostracod taxa (30 living, 12 subfossils) were found from the area. Species with wide tolerance ranges generally showed frequent occurrences and wide distribution. Increasing tolerance ranges corresponds a reduction in optimum estimates. Out of 739 species pairs, 41 was tested. Of those, there was 1 positive (Physocypris pustulosa and Pseudocandona spA), 1 negative (Cypridopsis vidua and Cypridopsis elongata) and 39 random associations.

Discussion: Our results suggest that cosmoecious species with wide range of ecological tolerances to different environmental variables and with broad geographical distribution tend to be found in many different types of habitats than the species with relatively narrow tolerance ranges. Such high levels of tolerance ability seem to increase species survival chances in different aquatic conditions. Nevertheless, our study being the first in the area suggests further needs of studies on the subject area.

Acknowledgement: We thank Drs. Benjamin F. Schwartz and Weston Nowlin for providing a working space in their laboratory at Freeman Aquatic Center, Texas. Fulbright Research Scholarship program is thanked for their support.

Keywords: ecological tolerance and optimum, surface waters, habitat preferences, species diversity, distribution
Developing A System for Walnut Husking to Reduce Wastewater Formation and Its Comparison with Industrial Husking System for Environmental Perspective

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Introduction: Green shell of walnuts (husk) is usually removed manually or some machines working with water (MW) in Turkey. This machine works with water by grinding husk. In this husking process, high amount of green colored water emerges as waste which has rich in antioxidants (especially juglon) and can cause environmental pollution. In addition, the walnut which contacted with water in this process and took inside the water by through capillary channels of its shell. This creates quality losses and can lead to the development of toxin-producing molds. For this reason, it is necessary for husking to be carried out without using water with an environmentally and product-friendly approach. This study is aimed to present some results of “Determination of quality characteristics of walnuts belonging to some cultivar and cultivar candidates and developing new methods for walnut production”. That contains developing a system for walnut husking without water and compare with industrial husking system.

Material and Methods: Modified vegetable peeling machine (Avamore) without water inlet (MWO) was used for husking. Small size industrial MW (Hilal) was used to compare. Yalova 3 and Chandler walnuts were selected as material and harvested at last season before cracking of husk. Walnuts was selected according to the fruit diameter in the range of 24-27 mm. 1/2/3 kg of walnut loaded each time and machine worked 1/2/3 minute for husking without water. Husking rate and ratio of damaged walnuts were calculated by counting of un-husked and damaged walnuts.

Results: Husking rate was determined between 91-95 % and 97-98 % for MWO and MW. Highest husking rate achieved by 2 kg loading and 1 min working conditions for both cultivars. Damaged or walnuts less than 0.5 % for both machines. Nearly all of these damages were determined on unhealthy walnuts such as hollow, shrunk or defective. In MW consume water and approximately 3.7-4.5 L walnut husk wastewater (WHW) formed for production 1 kg of husked walnut whereas there was only 0.1-0.2 L wastewater formed per kg of husked walnut in MWO. MWO did not consume water but this wastewater formed as a juice of husk.

Discussion: WHW is rich in flavonoids and phenols that are significant for resource and environment. WHW is often poured directly to sewage in Turkey and to the landscape for evaporate and/or store in ponds in USA. That causes pollution and wasting of resource. Enrichment and separation of phenols or flavonoids from WDW improve the utilization, cause economic benefits and reduce its pollutant effect. It will be easier to produce of these component from WHW of MWO than that’s of MW. Because in this study WHW of MW was 2250-3700 times diluted than that’s of MWO. Also solid waste of MWO richer than that’s of MW. These solid waste could be used for production of these components.

Acknowledgement: We would like to express our appreciation to the General Directorate of Agricultural Research and Politics (TAGEM) which supported this project.

Keywords: walnut husking, hull, husk, wastewater, peeling, juglon
Production of Granular Formulation from Local Fungal Strains
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Introduction: Entomopathogenic fungi are becoming very popular for the control of arthropod pests in agri-forest systems. The stability and conidial yield can vary according to fungal species and strain. In our laboratory, nine *Metarhizium anisopliae* strains, isolated from local sources such as soil samples and pests, and selected from laboratory collection in order to produce an effective fungal biopesticide with granular form against subterranean pests causing significant economic losses in agriculture, were subjected to stability tests before biopesticide production studies.

Material and Methods: By realizing pathogenicity tests on *Melolontha melolontha* larvae which are important subterranean pests, 4 strains of fungi (KTU-2, Gg-12, KTU-51 and KTU-60) with high lethal effect were determined. By consecutively realizing 12 passaging operations on determined strains, morphological (colony morphologies, change of color, formation of infertile area, spore production and resistivity of spores to UV), virulence (bioassays on *Galleria mellonella* larvae), genotypic (digestion with RAPD-PCR and Restriction Endonucleases), biochemical (determination of proteolytic activity and esterase profiles) effects of passaging were determined.

Results and Discussion: After analyzing the results, KTU-2 and KTU-60 were selected for formulation. By growing up conidia on rice with solid phase fermentation, selected strains were converted to a fungal biopesticide prototype first time in Turkey.

Acknowledgement: This research was supported by Karadeniz Technical University, Trabzon, Turkey (KTU-BAP 9549 and 5178)

Keywords: *Melolontha melolontha, Metarhizium anisopliae*, biopesticides.
Impacts of Riparian Zone on Some Soil Properties in Different Land Use Types (Aladağ Catchment, Turkey)

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Introduction: Streams that pass through different land use types interact with their surrounding environment. As a result of this interaction, some changes occur in the soils of riparian zones. In this study, we investigated some characteristics of soils in forest land, range land, and forest openings adjacent to the perennial stream in the riparian ecosystems.

Material and Methods: This study was conducted in the Aladağ watershed of Bolu - Turkey. In the study, three plots from riparian ecosystems of rangeland (RL), natural forest (NF), forest opening (gaps) (FO) were selected and a total of 24 soil profiles were collected along the transect lines established perpendicular to the mainstream in each site of the streambank for each land use types. The transect lines started from green line and extended 150 m to inland in both stream sides. Soil samples were taken from 0, 50th, 100th, and 150th meters starting at green line. Then, soil samples were analyzed and compared for different land use.

Results: When morphological examinations of soil profiles from different land uses in Bolu Aladağ watershed were evaluated, the lands of the RL and FO were composed of loose deposits and layers formed on alluvial and colluvial deposits. It was determined that the groundwater in the soil profiles dig at 0 m and at 50 m far from the main stream was near the surface (40 - 55 cm) In general, staining, iron oxidation, gley and bad odor formations were observed at the depth of 35-40 cm in these soil pits. The drainage problems were not observed in the upper soils whereas poor permeability was determined as "poor drainage" in the subsoils of rangeland and forest opening at 50 m and 100 m distances from the green line. When the soil profiles of forest land were evaluated, it was observed that alluvial and colluvial deposits were replaced by natural soils derived from the andesite parent material. Forest land had a mull type forest floor. In the soil pits opened at the distance of 0 m in both the right and left sides of the main stream, groundwater level appeared at the depths of 50 - 55 cm. Soil depth to parent material was also measured as 20-30 cm at the soil pits dug at the distance of 100 m and 150 m from the main stream.

Discussion: Soil depth and water table level were limiting factor in different land use types in riparian ecosystems in Bolu Aladağ Catchment for plant root development. The physiological depth of all land use types changes depending on the stream channel and decreases as the distance from the stream.

It was observed that drainage and root development problems increase when getting closer to the stream channel. In water-side ecosystems, priority should be given plants tolerating shallow ground water level and root development.

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This research was based on the doctoral thesis “Exchange of Soil Carbon Storage in Riparian Zone Ecosystems (Case Study of Bolu Aladağ Catchments”.

Keywords: Riparian zone, land use type, soil
Effect of NADP·H₂ and NaF on the Oxygen Absorption of Barley Roots Under NaCl Stress

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Introduction: Glucose molecule is considered to be one of the wide-spread respiratory substrates. Glycolytic pathway is one of the conversion ways of hexose molecules. Nevertheless, pentose phosphate pathway of glucose oxidation is much more important. Environmental conditions, such as salinity affects glucose oxidation pathways in plants. Studying the efficiency of alternative respiratory pathways under extreme salinity is one of the objectives of the contemporary physiology.

Materials and Methods: Six-day seedlings of barley “Karabakh-7” (Hordeum vulgare), cultivated at 80 mM NaCl were chosen for the study. Oxygen absorption by seedling roots was determined by polarography.

Results and Discussion: In order to study the change rate of glycolytic and pentose phosphate respiratory pathways in plants under salt stress, one of the pathways was inhibited completely with a specific inhibitor. The portion of glycolytic pathway is determined by its inhibition with sodium fluoride. And this process is related to the creation of magnesium-fluoride-phosphate complex. The addition of sodium fluoride to this system weakens the respiration of plants for about 25 per cent. The decrease of oxygen absorption with sodium fluoride is probably due to the fact that as an inhibitor sodium fluoride inhibits not only glycolysis, but also the enzyme of glucose-6-phosphate dehydrogenase. The addition of NADP·H₂ after the glycolytic pathway is inhibited, removes the inhibition effect of sodium fluoride, and increases the oxygen absorption for about 11 per cent compared to control. Supposedly, after adding NADP·H₂ the rapid increase of oxygen absorption by seedlings, which were kept in salt solution for a long term, proves that the oxidation process is changed into pentose phosphate pathway. This experiment was realized in contrary. First the effect of NADP·H₂, then NaF was studied. The addition of NADP·H₂ increases respiration. Later, the addition of sodium fluoride decreases the oxygen absorption for about 11 per cent.

Keywords: polarography, glycolytic pathway, inhibitor, pentose phosphate
Effects of Different Organic Fertilizer Sources on Wheat Yield

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Introduction: Bread wheat (Triticum aestivum L.) is the basic cereal crop used for human nutrition and bread making. Large areas of wheat cultivation lead due to monoculture and conventional cultivation to decrease the organic matter in soil. The organic matter on arable land Turkey is only in a few to medium level and continues to decline, resulting in lower soil fertility. In the last years sustainable agriculture production became popular because of soil health, organic farming and food safety. In this study, different organic sources are used to determine wheat yield effects. Especially in Aydın province olive oil production is very important and oil extraction process from olive fruits produces a large quantity of liquid waste. With this study besides the different organic resources it is aimed to assessment the olive mill waste water in wheat production.

Material and Methods: The experiment was conducted in Aydın province with randomized split plot design. Golia wheat variety was grown under three different organic sources with different doses (farm yard manure; 0, 2, 4 ton/da, hay; 0, 0.5, 1 ton/da and olive mill waste water; 0, 2.5 ton/da) and their combinations are used and plant height, 1000 kernel weight, grain yield, leaf area and harvest index parameters are determined.

Results: Different the organic fertilizer sources effected statistically significantly wheat yield and its components. The obtained values show big differences and changed between for plant height 53.46-74.80 cm, 1000 grain weight 32.95-42.99 g, biomass 312.00-795.33 kg/da, hay yield 158.50-412.50 kg/da, number of ears per square meter 246.33-392.16, number of kernels per spike 23.90-38.73, spike yield 0.89-1.55 g, yield 321.13-590.06 kg/da, flag leaf area 14.26-31.78 cm², harvest index 0.25-0.70. The highest grain yield obtained from 2.5:2:0 (olive mill waste water: organic manure: hay) composition.

Discussion: When the obtained results are compared 2.5:2:0 combination showed the highest values for biomass, grain yield and harvest index parameters. In this experiment it could be shown that olive mill waste water reduced the yield of wheat and the combination of organic fertilizers with olive mill waste water had a negative impact for the wheat yield. Farm yard manure had more possitive impact on grain yield of wheat.

Keywords: Triticum aestivum, olive mill waste water, organic matter, yield
Introduction: Biomass studies are needed to make true estimates of carbon stocks. Allometric equations developed using independent variables such as tree diameter, height, specific weight, which can be easily measured in the field, are linear or nonlinear regression equations. In this study, belowground and aboveground biomass equations of Kızılcahamam region natural pine stands were determined.

Material and Methods: A total of 34 sample trees were measured in various diameter and height groups in Kızılcahamam Forest Enterprise. Using the data obtained from those individuals, the biomass values of tree components were calculated. The study tested different models in determining biomass as a function of DBH or DBH and H. The models were selected as best-fit models according to different criteria.

Results: The models make it possible to estimate the biomass values of aboveground and belowground tree components from diameter at breast height and independent variables of diameter at breast height (d₁,₃) – tree height (h). Models using DBH and H as independent variables show stronger relationships than models using DBH as independent variable.

Some models that use DBH as independent variable:

<table>
<thead>
<tr>
<th>Single-Tree Biomass Equations:</th>
<th>R²</th>
<th>F</th>
<th>S₀</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAB =25.2346+(-5.8687d₁,₃)+(0.5188d₁,₃²)</td>
<td>0.86</td>
<td>93</td>
<td>137</td>
</tr>
<tr>
<td>lnWBB =-4.0720+(2.2100 ln d₁,₃)</td>
<td>0.90</td>
<td>300</td>
<td>0.39</td>
</tr>
</tbody>
</table>

Some models use DBH and H as independent variables:

<table>
<thead>
<tr>
<th>Single-Tree Biomass Equations:</th>
<th>R²</th>
<th>F</th>
<th>S₀</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAB=106.6611-11.5098d₁,₃+11.481h+0.5972d₁,₃²+0.7758h²</td>
<td>0.86</td>
<td>45</td>
<td>139</td>
</tr>
<tr>
<td>lnWBB =10.8345-2.5377ln d₁,₃+0.7068ln d₁,₃²+11.4013ln h+2.1988ln h²</td>
<td>0.92</td>
<td>85</td>
<td>0.37</td>
</tr>
</tbody>
</table>

Discussion: According to the comparison made with afforestation of black pine by Güner ve Çömez (2017); afforestation areas have more needle leaf and below ground biomass, while natural stands of the same diameter are seen to have higher body weight. Up to 30 cm DBH, total aboveground biomass is very close to each other. Although harvesting and weighing a tree’s biomass directly in the field is the most accurate method, it is a time-consuming and destructive application. The use of allometric relationships rather than direct harvesting in determining biomass is a frequently preferred non-destructive and indirect method. It is also less time-consuming and cheaper.

Keywords: Pinus nigra, biomass, allometry
**Introduction:** In recent years, one of the serious problems was the traffic pollution in terrestrial ecosystems. Pollutants resulted from vehicle traffic affect adversely organisms and lead to damages by different ways. Because of the inability to move, plants are more exposed to pollutants. Traffic pollution causes anatomic, morphologic and metabolic changes in plants.

In this study, it was aimed to determine the variations in N and P concentrations based on traffic pollution in *Olea europaea* L. leaves in İzmir. *Olea europaea* is an economically important species and used in food, pharmaceutical and cosmetic industry. Due to lack of enough knowledge on this subject, results of the study may give important information for ecological and agricultural studies.

**Material and Methods:** Leaf samples of *Olea europaea* were collected from three different positions in trees and localities in İzmir according to traffic density. Half of the leaf samples were washed with distilled water. N concentrations were determined by elemental analysis instrument and P concentrations were determined by UV spectrophotometer after wet digestion.

**Results:** Significant variations were determined in N concentrations based on traffic density in both washed and unwashed leaves and all leaf positions while the differences in P concentrations were not statistically significant. N concentrations were gradually increased by increased traffic density. The variations in N and P concentrations due to leaf position were not statistically significant. Washing the leaves by distilled water didn’t lead to an important variation.

**Discussion:** Results were indicated that traffic pollution caused variations in N concentrations in *Olea europaea* leaves. This may be resulted from pollution stress or accumulation of pollutants that contain N in plant tissues. Leaf position was not seriously effective in terms of N and P concentrations. It was thought that the reasons of why washing leaves with distilled water didn’t make difference in N and P concentrations may be the inability to sufficiently remove the accumulated materials from the leaf surface with distilled water or lack of accumulated materials substantially contain N and P in leaf surface.

**Acknowledgement:** We would like to express our appreciation to the Amasya University Scientific Research Project Commission, which supported this study (FMB-BAP-015-0119).

**Keywords:** *Olea europaea*, nitrogen, phosphorus, traffic pollution
Use of Environmentally Friendly Bacterial Cellulose Films as Food Packaging Materials

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Introduction: Petrochemical based plastics such as polyethylenes, polyesters, polyamides which we use to store the remaining foods in the refrigerator after opening their vacuumed packs have been used in the past years. Because such materials have a high tension and high tear strength, they also have important features in terms of air tightness, liquid leakage and heat retention. However, components such as styrene, 1,3-butadiene, melamine, formaldehyde, acrylamide, di-2-ethylhexyl phthalate, di-2-ethylhexyl adipate, vinyl chloride and bisphenol which may be present in petrochemical-based food packages can cause serious problems on human health. Besides, there is very low evaporation transition from such materials, which causes moisture to form in the food package and cause microorganism reproduction. In addition, since petrochemical-based materials used as food packaging materials don’t have a biodegradable property, the waste remains in the environment for many years and causes serious ecological problems. Therefore, the use of biodegradable polymer films such as polyhydroxybutyrate (PHB), chitosan and cellulose as packaging materials in food storage has become an important issue in the storage of food. Bacterial cellulose also has a biodegradable, flexible, porous structure that can be used as environmentally friendly packaging material.

Material and Methods: Gluconacetobacter hansenii HE1 strain was grown in Hestrin-Schramm liquid medium at 30 °C for 24-48 hours. The activated culture was inoculated, with 1% ratio, to fresh medium and allowed to incubate for 10 days at 30 °C under steady conditions. Bacterial cellulose films formed at the end of the period were purified. The cellulose layer was then dried, sterilized and used as packaging material. Stretch film was used as a positive control. Stretch films were sterilized by standing under UV for 3 hours. Sausage specimens purchased from the market were kept in the fridge at 0, 2, 4 and 6 days at +4ºC without wrapping, wrapped with a stretch film, wrapped with bacterial cellulose film. Colony counts for microbial load were determined by the arithmetic mean, with 3 replicates among each sample group.

Results: In the study Plate Count Agar for the general viability count, Violet Red Bile Agar for the coliform count, Baird Parker Agar for the staphylococcal count, and Rose-Bengal Chloramphenicol Agar for the microfungus were used. Only PCA medium showed bacterial growth. At the end of the sixth day, the microbial load of the sausage wrapped with bacterial cellulose was found to be 1.9x10^5 cfu / ml while it was found 2.7x10^5 cfu / ml for stretch film and 5.1x10^5 cfu / ml for non-wrapped sausages.

Discussion: It has been observed that microbial contamination with airborne filtration through porous, thin, web-like structure, which bacterial cellulose has, can filtrate air-borne contamination better than petrochemical-derived stretch film. For this reason, bacterial cellulose can be used as a packaging material to store foodstuffs and to extend shelf life.

Acknowledgment: This research was supported by TUBITAK BIDEP-2209. Project Number: 1919B011601901

Keywords: bacterial cellulose, biodegradable, environment
Electrodeionization Processes in Heavy Metal Removal from Wastewater – Effect of Applied Voltage

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Introduction: Electrodeionization (EDI) is a hybrid process that involving both electrodialysis (ED) and ion exchange (IX) processes. The EDI process consists of anion and cation exchange membranes arranged between anode and cathode. Also ion exchange resins filled in the cell compartments to improve ionic conductivity. The ions pass through the ion exchange membranes and the ion exchange resins towards the anode and cathode under the influence of the electrical field. Dilute and concentrate compartments occur as a result of this transportation. The EDI is a green process that requires only electrical current and ion exchange materials. The polarization, which is an important problem in electromembrane processes, is solved by the EDI process by ion exchange resins.

The aim of this paper is to investigate the mechanisms of EDI and effects of applied voltage on the processes. The findings of this study will help determination of applied voltage for subsequent studies.

Material and Methods: Commercially available 5 compartment EDI cell was used in the experiments. At the end of the cell, there is an anode and a cathode from platinum coated titanium material. Ion exchange membranes (AEM and CEM) are placed in the cell in succession. The dilute compartments contain the cation exchange resins (2.5g). Three different voltages (30V, 25.5V and 22.5V) were applied and effects on the process were determined.

Results: The EDI process was examined. Voltage is one of the most important parameters that affecting the processes. The experimental results show that EDI process has high removal efficiency at low voltage. Different voltage values applied to the processes such as 30V, 25.5V and 22.5V and the % removal efficiencies were 88.59%, 94.23% and 94.75%, respectively.

Discussion: EDI process is not only produce ultrapure water but also concentrate reusable valuable substances in wastewater. The finding of the present study suggests that without any chemical need, the system have high removal efficiency at low voltages. This environmental separation strategy is a very promising separation process with low process cost and high ionic separation power.

Acknowledgement: We would like to express our appreciation to the Bülent Ecevit University Scientific Research Project Commission, which supported this study (BAP-2014-77047330-04).

Keywords: electrodeionization, heavy metal removal, wastewater treatment, voltage effect.
Introduction: Water quality in terms of its physical, chemical and bacteriological parameters is an indispensable requirement for the human body. In terms of drinking water quality, user perception is one of the most important factors. No drinking water is truly pure, but contains minerals (magnesium and calcium salts, iron, manganese) and other substances dissolved from the surrounding rocks and environment leading to very large concentrations of minerals that cannot be tolerated by humans. Consequently, seasonal monitoring of water quality parameters such as dissolved oxygen, pH, temperature, and metallic compounds such as iron (Fe), lead (Pb), copper (Cu), cadmium (Cd), mercury (Hg), nickel (Ni), zinc (Zn) is required to help safeguard against any health related issues that would arise from drinking contaminated water. For this study, the water quality from the source of Kirazlı stream in Kastamonu province will be investigated.

Material and Methods: Water samples were collected monthly from twelve (12) different locations in Kirazlı stream, Kastamonu province between May 2016 and June 2017, during the third week of each of the months. A total of twenty-eight (28) different physico-chemical water quality parameters were analysed while ten (10) are presented herein (APHA AWWA WPCF, 1995; Anonymous, 1998). Data collected were analysed statistically using analysis of variance (ANOVA). The Pearson correlation coefficient approach was performed to ascertain the statistical relationship between some selected variables on dissolved oxygen which is one of the most important water quality parameter.

Results and Discussion: One of the most important water quality parameters, dissolved oxygen (mg/L) was correlated with the selected parameter averages of temperature (°C), pH, mineral content of Fe, Pb, Cu, Cd, Hg, Ni, Zn obtained from samples in the 12 different locations.

Average values of the parameters without seasonal consideration have been calculated as follows: dissolved oxygen (13.32±0.35 mg/L), temperature (10.96 ±1.1 °C), pH (8.51±0.12), and mineral content of Fe ( 0.0095±0.0023 mg/L), Pb ( 1.32± 0.46 ug/L), Cu( 17.52±6.17 ug/L), Cd(0.77±0.30 ug/L), Hg( 0.0076±0.0029 ug/L), Ni( 7.24±2.77 ug/L) and Zn( 10.76± 3.78 ug/L). In addition, Pearson correlation, “r” values are lower than critical values of (r_{crit}) at 0.5 and even 0.1 levels of significance (α). As a result, all selected parameters have negative correlation with almost 99% on dissolved oxygen (mg/L). Analysis using ANOVA also indicate that the calculated results are statistically significant (p < 0.05)

Keywords: water quality, stream, Kastamonu, heavy metal, correlation
The Endemics of Amasya and IUCN Conservation Status

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Introduction: The definition of endemics is the limited distribution of the plant groups. These groups are known as species, subspecies or over species. Endemism means the presence of a plant species in a limited region. The endemism ratio and the endemic taxa of Amasya related to the IUCN conservation status were determined in this study.

Material and Methods: This study is designed related to the project of General Directorate of Nature Protection and National Parks entitled "Amasya Terrestrial and Domestic Water Ecosystems Biological Diversity Inventory and Observation" (The Ministry of Forestry and Water Affairs, 2018). The taxa were checked from Güner (2012). The determination of the threat categories of the endemic taxa were evaluated related to the study of Ekim et.al (2000).

Results and Discussion: The number of endemic taxa in Amasya is 225 and the endemism ratio is %13.18. This ratio is lower than the average seen in Turkey. Although Amasya is located in the transition area between Central Anatolia and Blacksea Regions and this causes the increase in the variety, the endemism ratio stays low as the bedrock does not depict much diversity in Amasya. When the distribution of endemic taxa investigated in Amasya related to the IUCN conservation status, it is seen that the following plant taxa were found related to the threat categories: 1 "Extinct (EX), 4 "Critically Endangered (CR)", 9 "Endangered (EN) and 8 Vulnerable (VU)". 189 taxa are accepted as in "Lower Risk (LR) category. There is 1 taxon in Amasya accepted as "Data Deficient (DD) and "Not Evaluated (NE)" related to IUCN classification.

Acknowledgement: This study was produced depending on the studies of Ministry of Forestry and Water Affairs, General Directorate of Nature Protection and National Parks, Amasya Local Directorate, The project of National Biological Diversity Inventory and Observation entitled "Amasya terrestrial and domestic Water Biological Diversity Inventory and Observation" (The Ministry of Forestry and Water Affairs, 2018). We also thank about the support and contribution of General Directorate of Nature Protection and National Parks, Directorate of 11th Region and Amasya Local Directorate.

Keywords: Amasya, endemic, IUCN
Introduction: Lagos from Eastern Mediterranean fish; on the counter and in the restaurants as the most valuable fish. There are two species in our country called Sand Lagos, *Epinephelus aeneus* (Geoffroy Saint-Hilaire, 1817) (white grouper) and Rock Lagos, *Epinephelus costae* (Staindahner, 1878) (gold blotch grouper). In this study, Lagos fish in the Eastern Mediterranean Region of Turkey, have discovered the growth characteristics of hunting and feeding, aimed to determine the current status of the fish.

Material and Methods: Turkey have discovered the Lagos fish in the Eastern Mediterranean Region. To determine the fish's current situation, research was made with focus in growth, hunting and feeding characteristics, eighty fishes from *E. aeneus* species and nineteen from *E. costae* species from 6 stations between February 2016 and August 2016; Height, weight, age-height, age-weight and height-weight analyzes (from Silifke Taşucu to İskenderun).

Results: *E. aeneus* reached a minimum of 35 cm, maximum 44 cm at 1 year, the highest age group at 8 years is defined as minimum 85 cm and maximum 110 cm. It appears that *E. aeneus* and *E. costae* species grew rapidly in the first years of their long life span and then slowed down. $b = 3.114$ for *E. aeneus* species, $b = 3.310$ for *E. costae* species. Therefore, positive allometry was found in both species. The condition factor of Fulton is $K = 1.6$ for *E. aeneus* species, $K = 1.2$ for *E. costae* species. Sixty four fishes from *E. aeneus* species and fifteen fishes from *E. costae* species was examined for the individual's stomach contents. These contents were identified as vertebrates and invertebrates, gonadosomatic index, condition factor and the number of eggs analyzes were performed. In the content of the *E. aeneus* species, there were 22.1% invertebrates and 11.4% vertebrates. In the content of *E. costae* species, there were 19.3% invertebrates and 8.6% vertebrates. *E. aeneus* and *E. costae* species have GSI, gonad weight and number of eggs which indicates that the breeding season starts in May and reaches the highest in July and August.

Discussion: Age-height, age-weight, height-weight analysis considering the results, decreases rapidly in both species. In our work, it seems that Lagos is on intensive fishing grounds. They are not allowed to hunt without changing their gender. For this reason, hunting should be prohibited especially in breeding seasons in areas covering the entire habitat. Hunting ban applied in our country is not enough. All Mediterranean countries need to act together.

Keywords: *Epinephelus aeneus, Epinephelus costae*, lagos, growth, nutrition, reproduction grida, white grouper, gold blotch grouper
Hydrogen as a Fuel and Its Impacts on Environment

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Introduction: Energy is one of the most important needs in a modern society. Energy consumption per capita is an indication of the development of a country. Energy sources are mainly fossil fuels (coal, oil and natural gas) which can cause severe environmental problems such as acid rains, global warming and climate changes. Besides the severe environmental problems with fossil fuels, the sources of them are also finite. Because of increasing need of energy, researchers are forced to search for renewable energy sources such as hydro, biomass, wind, solar, geothermal, wave, tide and so on.

Materials and Methods: Using hydrogen (H₂) as a clean energy carrier is one of the promising way to save environment. H₂ is universally accepted as a clean energy carrier because of its high energy density. It does also reduce the emission of greenhouse gases by using it as fuel in fuel cells or in combustion engines directly. In order to use H₂ as fuel, it is necessary either to compress it or to liquefy it. Both processes are difficult and costly. Metallic and nonmetallic hydrides have received considerable research interest in recent years. NaBH₄ is one of the most prospective H₂ storage materials as it stores 10.8 w % hydrogen. H₂ is generated by the following hydrolysis reaction of NaBH₄ in the presence of a suitable catalyst:

\[ \text{NaBH}_4 + 2\text{H}_2\text{O} \rightarrow \text{NaBO}_2 + 4\text{H}_2 \]

Half of the hydrogen produced by this reaction comes from the water which is a great advantage and make it effective on hydrogen generation for portable proton-exchange-membrane (PEM) fuel cells applications.

With fuel cells, one can bypass the 2nd law of thermodynamics where the efficiency is limited by Carnot Cycle. Therefore, the efficiency is much higher as compared to conventional mode which is

Chemical Energy → Heat energy → Mechanical Energy → Electrical Energy

There are a few intermediate steps, hence lower efficiencies. By using fuel cell, however, it is possible to convert the chemical energy directly into electrical energy

Chemical Energy → Electrical Energy

In this case, Carnot Cycle Limitations are by-passed.

Discussions: Use of fossil fuels, due to their detrimental effects on environment and being precursor for green-house gases, must be minimized. Therefore, focus must be directed towards alternative and renewable energies. By usage of hydrogen-fuel cells which are extremely environmentally friendly, one will have high efficiency without obeying the Carnot Cycle limitations. Hence, the future of fuel cells is very bright and H₂-economy will probably dominate in the near future.

Acknowledgement: The author would like to express his appreciation to Kyrgyz-Turkish Manas University for its support.

Keywords: hydrogen energy, environmental pollution, fuel cells, acid rains, green-house gases
The Use of Naturalness Concept to Identify Natural Forest Landscapes (Çakırlar Watershed Case, Antalya)

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Introduction: The naturalness concept has great relevance for forest landscapes regarding their biodiversity, maintenance and restoration. The naturalness is related to the degree to which a natural state has been degraded. The purpose of this study is to identify natural forest landscapes by using naturalness concept.

Material and Methods: The raster-based weighted overlaying techniques was applied to determine the areas of naturalness. The criterion maps were used in overlaying of layers by GIS.

Results: The values of naturalness are determined at two levels. Following criteria used in the first stage in determination of naturalness; accessibility, land use susceptibility, vegetation, grazing, non-wood-product areas. Slope and terrain forms were used to determine the land-use limitations of study area. The accessible areas are classified as a function of the roads and slope grade classes. Vegetation types have already been assessed to vary from natural to man-made vegetation areas. The areas grazed by the villagers and the areas where the non-woods produced were assumed to be weighted negatively on naturalness. Only the forest areas were assessed at the second stage. In this stage, the woody species diversity and the periods of the forest stand development were used. Here, it is assumed that these criteria are significant in order to forest succession. As a result of study, the widest distribution of highest naturalness reveals in landscapes with calcareous forests in hilly, mountainous and high mountainous areas.

Discussion and Conclusion: In this study, the status of the current vegetation and the characteristics of the forest distributions play an important role in determining the naturalness. Potential vegetation analysis based on historical data is not possible to considering. A human intervention concept that reduces or increases the effects of land use has been highlighted as a concept. Indeed, the highest natural areas have emerged in the areas where human access is not possible. Following them, it was understood that the forests in the high natural areas are mixed coniferous forests. The important role of bedrock in high-natural areas can be assessed by its susceptibility to land use.

Acknowledgement: I would like to express that this study is a part of Project “Determination of Landscape Types and Their Functions with Application Possibilities (Case of Antalya Çakırlar)”, which supported by the General Direction of Forestry (19.3303/2010-2012-2014).

Keywords: naturalness, forest landscapes, Antalya
Introduction: Ayvalık and surrounding areas with the shore areas and the richness and the beauty of the nature makes it very unique. Moreover, all the islands in the surrounding areas gives Ayvalık’s resources more value. This study has been conducted for the first time ever in order to determine the problems and bring solutions for the surrounding shore line of Ayvalık.

Material and Methods: The study has been completed between 2016-2017. There has been research and observations done within the four seasons in order of fauna and flora of the area.

Results: We can observe the roles of the human factors within the land of the coastal line. Also, we can detect the declining changes in the ecosystem in the surrounding areas due to many factors. Such as; usage of sand from the sea, organization of the beaches, construction near the coastal line, drying the wet lands for tourism, usage of natural water wheels, releasing contaminated water to the shores, contamination due to high sea traffic, fires, hunting, sewage, contamination of water, releasing trash, and usage of insecticides. Especially the usage of the shore line and the organization of the beaches has been severely damaging the coastal land of the area. The living conditions of *Pancratium maritimum* (Sand Daffodil) and *Narcissus tazetta* (Narcissus) have been damaged. Moreover, their population have been declining.

Discussion: In order to keep the natural ecosystem of the area safe, we should innovate new ways and techniques to protect the ecosystem. First and most important part of this protection plan should start with the coastal line, coastal beaches, wet lands and green areas.

Keywords: Balıkesir, biodiversity, ecology, flora, Dune, Halophyte
Seasonal Variation of Cladocera in Hamsilos Bay, Sinop
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Introduction: Cladocera are the second dominant group after Copepoda in coastal marine ecosystems. Especially from the beginning of spring to the end of autumn, they reach high abundance and they also contribute to the abundance of mesozooplankton. Due to their high abundance and wide distribution in the coastal areas, they constitute the important food part of the planktonic carnivores and fish. They play an important role in pelagic food web and in the production of organic material. In the present study, we aimed to investigate the seasonal change of abundance of Cladocera and their relation with environmental parameters.

Material and Methods: The present study was conducted monthly at four stations between July 2015 and June in 2016 in Hamsilos Bay, Sinop. Samples were collected with plankton net (mesh size= 112 µm, mouth diameter =0.5 m) from the bottom to the surface by vertical tows. Temperature, salinity and dissolved oxygen of the surface sea water were measured in situ using an YSI 6600 MDS model multiparameter. Analysis of Spearman Correlation was applied to determine the correlation between abundance of Cladocera and environmental parameters.

Results: In the present study, four Cladocera species were identified, namely Penilia avirostris Dana, 1849, Pseudevadne tergestina (Claus, 1877), Pleopis polyphemoides (Leuckart, 1859) and Evadne spinifera P.E. Müller, 1867. The water temperature varied between 8.34 °C-25.87 °C; salinity ranged from 17.7 to 19 ‰; the dissolved oxygen values changed from 7.01 mg/L to 10.08 mg/L. The annual mean abundance of Cladocera was calculated 236.1 ind.m⁻³. The highest mean abundance of Cladocera was recorded in September 2015 (1855 ind.m⁻³), particularly due to high P. avirostris (699 ind.m⁻³). The minimum mean abundance was seen in March 2016 (0.2 ind.m⁻³). Cladocera didn't encounter in subsamples of zooplankton in January, February, April and May 2016.

Discussion: It is known that the presence of the Cladocera in the plankton is controlled by temperature and that its high reproductive capabilities are dependent on parthenogenesis. The temporal distribution of Cladocera is discontinuous. Findings related to the seasonal distribution of Cladocera species are similar to those of studies conducted previously in the area and it has been determined that there is a strong correlation between temperature and seasonal distribution.

Acknowledgement: The present work was supported by Sinop University for Scientific Research Project (SÜF-1901-14-04). I thank the crew of "Zıpkın" for their assistance in the field study.

Keywords: Cladocera, abundance, Hamsilos Bay, Sinop
ORAL PRESENTATION

Records of Sea Turtles Strandings Between 2002 and 2017 in the Samandağ Beach on the Eastern Mediterranean Coast of Turkey

Bektaş Sönmez

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Introduction: Data on stranded sea turtles allow us to obtain information on their age classes, temporal and spatial distribution and mortality rates. Strandings can also provide preliminary information for conservation planning and management, and also marine habitats of sea turtles where taken into consideration in any management plan to be developed in future. This study aimed to investigate the causes and life stages of stranded both sea turtles on Samandağ beach.

Material and Methods: The stranded data were collected on Samandag Beach during 2002 - 2017 nesting season. Straight Carapace Length and Width, Curved Carapace Length (CCL) and Width of each sea turtle were measured. Life stage was assessed in 3 stages, that is oceanic, subadult and adult, based on CCL measurements. Causes of death sea turtles were determined through a necropsy.

Results: A total of 302 stranded dead turtles was found. Of these, 167 (55.4%) were Chelonia mydas, 127 (42%) were Caretta caretta and 2 (0.6%) were Trionyx triunguis and 6 individuals (2%) that were unidentified. The mean annual strandings were 10.5 and 7.9 individuals for C. mydas and C. caretta, respectively. It was identified in C. mydas that 11 (6.6%) individuals as adult, 102 (61.5%) individuals as subadults and 53 (31.9%) individuals as oceanic stage. There are significant differences among the life stages of stranded C. mydas. For the C. caretta, it was identified that 29 (25.2%) individuals as adult, 81 (70.5%) individuals as subadult and 5 (4.3%) individuals as oceanic stage. The C. caretta showed significant differences according to life stages. The causes of deaths of 130 sea turtles were determined on Samandağ beach. The leading cause of death is due to fishing activities (46.9%), followed by marine pollution (27.7%), intentional killing (16.7), marine vehicle collision (5.4%) and predation (3.8%). According to the species, the most intense cause of dead was determined that 28 (56%) C. mydas were found to have died due to marine pollution, and was determined 54 (67.5%) C. caretta were found to have died due to fishing activities.

Discussion: While subadult and oceanic stage were intensively stranding for C. mydas, subadult and adult stages of C. caretta were intensively stranded. The Samandağ coast may be probably development and/or feeding area for subadults individuals in the both species. The marine pollution and fishing activities are most important causes of stranded for both species. Compared to similar studies in the Mediterranean, these results are similar.

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Keywords: stranded, Chelonia mydas, Caretta caretta, Samandağ
Antibacterial Concrete Mortar Production for Sustainable Building Design Using Graphene Oxide Powders

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Introduction: One of the most critical parameters for long-lasting concrete applications and the sustainable use of building materials are the antibacterial properties of the concrete. Anti-bacterial concrete applications have become widespread in recent years for hospital floors and common usage areas containing wet floors. Nevertheless, antibacterial properties come to the forefront when long-term concrete applications and re-use of waste concrete aggregates are considered. In this study, the antimicrobial properties of graphene oxide reinforced concrete were analyzed considering the total number of living things.

Material and Methods: Graphene oxide was synthesized by the Hummers method using graphite (50 μm, extra pure, 99.50 wt%, Merck) in the form of synthetic powder. Graphite has been oxidized using sodium nitrate, sulfuric acid and the potassium permanganate. The mixture was stirred, heated, washed and separated from the suspension by vacuum filtration. The Portland cement amount and water to cement ratio was fixed at 350 kg and 0.45, respectively for 1 m\textsuperscript{3} concrete design. 17.5 kg graphene oxide was added the mixture and microbiological analysis has been performed against to total viable counts.

Results: The results show that graphene oxide reinforced concrete mortar shows antibacterial properties. The reproduction of microorganisms, including total viable ones in concrete surface was completely inhibited, with 5% (w/w) graphene oxide usage.

Discussion: Because of the graphene oxide high synthesis cost, the optimum mixture parameters should be determined by optimization methods. Antibacterial performance of the optimum graphene oxide should be compared with the other nano materials or low cost organic or inorganic compounds.

Keywords: antibacterial concrete mortar, graphene oxide, sustainable building design
The Effects of Boron particles on Pigment Content in Submerged Macrophyte
(Myriophyllum spicatum)

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Introduction: Nanoparticle (NP) (<100 nm) toxicity is a relatively new science for ecotoxicological investigations and has passed the literature as 'nanotoxicology'. Nanotoxicology is expressed as a new subdivision of toxicology, which describes the harmful effects of nanoparticles. The uptake and accumulation of NPs by plants is an increasingly important issue for researchers and recently some scientific studies on this topic have been published. The aim of this study was to investigate acute toxic effects by comparing pigment contents of Myriophyllum spicatum L. exposed to nano and micro boron particles for 72 hours under growth conditions.

Material and methods: Myriophyllum spicatum was collected from Muğla-Köyceğiz Kargıcak Stream. Three days before the experiment, the plants were kept in the laboratory to acclimation to the laboratory conditions. The acute toxicity test medium for plants is the modified Hoagland nutrient solution.

Results: Myriophyllum spicatum was exposed to nano and micro boron particles for 72 hours at concentrations of 50, 100 and 200 ml/L, after which the pigment content was measured by spectrophotometer. According to these results, chlorophyll a content except for the lowest concentration decreased with increasing concentration in nano boron, and in micro boron it is the opposite. At the lowest concentration (50 mg/L), it is 15% higher than the control group for nano-boron and 62% lower for the micro-boron. At high concentrations of micro boron (100 and 200 mg/L), pigment contents were significantly increased compared to control and nano boron treatment groups. Chlorophyll b content is similar to chlorophyll a content.

Discussion: Boron plays an active role in the growth points of leaf, root and green parts of photosynthesis products.. In studies up to now, no study of boron nanoparticle on Myriophyllum spicatum and other macrophytes has been found. Previously, in the boron study, boron affect membrane permeability, and it was observed that thickening on cell walls was observed in deficiency.

Keywords: boron, nanoparticles, macrophyte, toxicity, pigments
Use of Pruning Wastes in Improving Soil Productivity Parameters Under Mediterranean Climate Conditions

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Introduction: It is known that some of the waste of pruning is evaluated in non-agricultural areas, but a large part of it is burned out. Burning of pruning wastes may involve an environmental risk because of atmosphere pollution. Especially in semi-arid agricultural ecosystems, evaluation of pruning wastes by applying to the soil helps to prevent erosion by protecting the soil aggregates against the effects of rain drips and causes soil nitrogen and carbon budgets to increase. In this research the effects of amendments of pomegranate (Punica granatum L.) pruning residue (PRP) into soil (Typic Xerofluvent) by two different soil tillage equipment (disk harrow and rotary tiller) on physical and chemical properties of soil was aimed. For this purpose, an experiment was conducted during 2011 to 2012 in the Batı Akdeniz Agricultural Research Institute station in Turkey.

Material and Methods: Pruning residues of pomegranate (PRP) were incubated for two years after having been chopped by the PTO (Power Take Off) driven pruning residue chopper. The mean geometric diameters of the PRP particles at the proper feeding densities were determined to be 10.0–11.0 mm. The PRP laid on the soil surface were mixed to soil by tillage tools such as disk harrow and rotary tiller. PRP were applied to soil at application rate of 5280 kg ha⁻¹, on the basis of dry matter, after pruning every two years.

Results: The effects of PRP on soil properties were determined using soil samples taken at the different depths of 0–10 cm and 10–20 cm. In study, it was determined that the effects of PRP on organic matter (OM), bulk density (BD), available water content (AWC), electrical conductivity (EC), soil reaction (pH), cation-exchange capacity (CEC), total nitrogen (N), available phosphorus (P), calcium (Ca), magnesium (Mg), sodium (Na), potassium (P), and exchangeable copper (Cu), iron (Fe), manganese (Mn) and zinc (Zn) concentrations of the soil have taken place in different directions and levels. Statistically significant differences were obtained in all productivity parameters except BD by PRP practices. According to the results obtained in this study, the use of pomegranate pruning residues in this way would be beneficial in increasing soil productivity.

Discussion: The efficiency level of applied pruning wastes on soil fertility parameters was found to be a) the structural composition of the pruning waste b) the duration of the incubation c) the difference in the soil properties d) the pruning waste developed depending on the soil application method. Significant improvements in various macro plant nutrients, particularly in the range of organic matter, nitrogen and phosphorus, may be important in the preference of the use of such pruning wastes.

Acknowledgment: We thank the Scientific Research Projects Management Unit of Akdeniz University for their support (the project numbered 2011.01.0104.001).

Keywords: organic matter, pomegranate pruning residue, soil productivity, soil tillage
Isolation and Characterization of Rhizobia from Root Nodules of Some Wild Legume Taxa

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Introduction: Wild legumes are widely distributed in arid regions and actively contribute to soil fertility in these environments. The N2-fixing activity and tolerance to hard conditions may be higher in wild legumes than in crop legumes. Turkey has an important place for production of grain legume crop species beside that it is a gene center of wild legume species. Turkey is known as the micro gene center of many legume species. The research conducted revealed that Rhizobia are evolved with its own host in the gene center. With the view of this information this region should be the origin center and evolved region of microsymbiont rhizobia of broad bean, pea, lentil and chickpea. This study aimed to investigate nodule forming rhizobial diversity of wild annual Lens spp, Pisum spp., Cicer spp, Vicia spp and Lathyrus spp. form Gaziantep province of Turkey.

Material and Methods: Nodulated Lens spp, Pisum spp., Cicer spp, Vicia spp and Lathyrus spp. plants were collected during 2016-2017 spring (April-May) in 8 different districts of Gaziantep province that takes place in the Southeastern region of Turkey and the nodules were used to isolate rhizobia. Wild annual Lens spp, Pisum spp., Cicer spp, Vicia spp and Lathyrus spp populations exhibiting natural distribution in Gaziantep province were collected and species identification was determined. The isolates were characterized on the basis morphological, cultural and phenotypical properties.

Results: A total of 470 nodulated plant samples belonging to annual wild Lens spp, Pisum spp., Cicer spp, Vicia spp and Lathyrus spp. were used in rhizobia isolation studies from nodules. The Rhizobia isolates obtained were heat, pH, antibiotic, salt and heavy metals resistant. Most of the isolates exhibited in vitro nodule formation on their own cultivated host species except that of isolates obtained from wild Cicer spp.

Discussion: Gaziantep province hosts a wide variety of annual wild grain legume species. The data obtained through this study contains first reports on nodule forming rhizobial diversity of wild Lens spp, Pisum spp., Cicer spp, Vicia spp and Lathyrus spp. Identification of rhizobia isolates, definition of best Legume-rhizobia symbiotic relationship, determination of new species, understanding of host specification and adding to the rhizobia taxonomy are of great importance for future studies conducted on biodiversity.

Keywords: wild legumes, N2-fixing, Rhizobia, root nodules, biodiversity
Research on the Geometridae (Lepidoptera) Fauna of Adıyaman Province

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Introduction: Geometridae is a family belonging to the Macrolepidoptera group of the order Lepidoptera, which includes all moths and butterflies. While the majority of geometrid moths display a nocturnal lifestyle, many fly by day. Compared to other macrolepidopteran families, Geometridae species tend to be picky about living in certain habitats. Considering this characteristic of the family, the Geometridae species are regarded as useful environmental indicators by some researchers. The aim of this study is to determine the species belonging to the Geometridae moths (Lepidoptera) fauna of Adıyaman province.

Material and Methods: In the study, materials were collected in different altitudes, climatic conditions and types of vegetation owners by insect net, white curtain and light trap. Collected samples were deposited in Gaziantep University Entomology Laboratory. All specimens were prepared and labeled according to the standard museum methods.

Results: As a result of this study, three subfamilies (Ennominae, Larentiinae and Sterrhinae), 20 genera and 21 species ([Abraxas sylvat (Scopoli), Aplocera annexata (Freyer), Aspitates ochrearia (Rossi), Camptogramma bilineata (Linnaeus), Charissa onustaria (Herrich & Schaeffer), C. variegata Duponchel, Chiasmia clathrata (Linnaeus), Costaconvexa polygrammata (Borkhausen), Cyclophora albipunctata (Hufnagel), Dyscia innocentaria Christoph, Eilicrinia cordiaria (Huebner), Ematurga atomaria (Linnaeus), Epionerepandaria (Hufnagel), Eupithecia breviculata (Donzel), Lythria purpuraria (Linnaeus), Neognopharmia stevenaria (Boisdval), Odezia atrata Linnaeus, Rhodometra sacraria (Linnaeus), Rhodostrophia discopunctata Amsel, Timandra comae Schmidt Therapis flavicaria (Denis & Schiffermüller)) of Geometridae moths have been identified from study region. Species were listed alphabetically. Material examined, adult figures and zoogeographic distribution will be presented.

Discussion: Geometridae fauna of Adıyaman known poorly. In the study, we determined 21 species of Geometridae in Adıyaman. All species we recorded for the first time from Adıyaman province. This study will be an important source for next studies.

Acknowledgement: We thank the Gaziantep University Scientific Research Projects Department (BAP) for all support (Project Number: FEF DT 17.06.). This study is part of the first author’s PhD thesis.

Keywords: Geometridae, Lepidoptera, fauna, Adıyaman.
Introduction: Eastern Black Sea Region is a remarkable region with its rich and diverse natural plant species. On the other hand, it is necessary to use land efficiently of all its parts because of having limited and uneven terrain structure and lack of flat arable land. For this reason, some agroforestry techniques that can take aim at many products over the same field are needed. In order to apply these techniques, the potential in the region needs to be determined. Home gardens can give practitioners significant clues in determining this potential. In this study, the general characteristics such as agricultural products, growing techniques of forest and fruit trees, and versatile exploitation in home gardens located in the Eastern Black Sea Region were evaluated.

Material and Methods: In the scope of the study, homes were randomly selected from villages and neighborhoods where the home gardens were located in Trabzon and Rize provinces. Surveys were applied to 22 home gardens in Rize, and five home gardens were sketched. In Trabzon, surveys were applied to 26 home gardens, and five home gardens were sketched. In addition, agroforestry systems applied in the home gardens were determined by the observations made on the land and the drawn sketches. And so, the similarities and differences in Rize and Trabzon provinces were revealed.

Results and Discussion: It was determined that the main agricultural product is tea in Rize province. However, as a result of the increase of tea + kiwi plantations in recent years, kiwi has become the second agricultural product. It was also determined that the main agricultural product is hazelnut in Trabzon province. But, it has been seen that the tea + kiwi plantations in the eastern districts of Trabzon have increased in recent years. The cultivation of multiple agricultural products and fruit trees in the home gardens is achieved through nested cultivation. The best examples of this are found in many home gardens in Rize and Trabzon provinces. In agroforestry applications, farming of corn was usually made in clusters. And around it, linden + alder + cherry laurel + mandarin + orange species were chosen as wind belt. In Rize province and the eastern districts of Trabzon, it was made the nested cultivation by together cultivating linden + tea + other fruit trees. And also, it was seen that the nested cultivations as mixtures of tea + kiwi, pear + tea + mandarin + orange, tea + corn + bean + linden. In the central and western districts of Trabzon, agroforestry applications are made by growing hazelnut + fruit and forest trees, clustered corn + bean + other vegetables and forest and fruit trees in the same area.

Keywords: home gardens, agrosilvicultural, agroforestry, nested cultivation
Ecological Characterization of Non-Marine Ostracods (Crustacea) from Kırşehir Province, Turkey

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Introduction: Ostracods are widely distributed small (0.3-5 mm in length) bivalved aquatic invertebrates. Their most distinctive feature is low-magnesium calcium-carbonated carapaces that are easily fossilized in sediment. Therefore, they are widely used in palaeo-reconstruction studies. In this sense, the ecological characterization and preferences of individual species have critical roles. The main scope of the present study is to determine the distribution and ecological preferences of non-marine ostracods in Kırşehir province.

Material and Methods: In total, 111 sampling sites with 11 different aquatic habitats were visited between 17-21 May, 2015. Physicochemical measurements, water samples for cation and anions, and sediments for total in/organic phosphates were taken from each sampling site. Water and sediment samples were protected in a cold container. Subsequently, ostracod samples were collected with a hand net (200 µm mesh size) and fixed in 70% ethanol. In laboratory, standard methods were followed for taxonomic identification and water and sediment analysis. Data were evaluated by using different statistical analyses.

Results: Total of 6428 individuals belonging to 34 recent and 14 sub-recent taxa were encountered from 89 of 111 sampling sites. The first two axes of Canonical Correspondence Analysis explained the 76.7% of correlations between species and used environmental variables. Among variables, pH, station type, total phosphate, elevation and water temperatures had significant effect on species composition (P<0.05). Significant correlations of species correspond to their estimated optimum levels for different variables. Nearly half of species (7 spp.) with three or more occurrences (16 spp.) showed titanoeuryplastic characteristics for Ca when much of the other species showed limnetic-oligohaline and cold stenothermal-polythermophilic characteristics for salinity and temperature, respectively. While ranges of 12 of 22 ecological variables of sampling sites with and without ostracods overlap, 10 did not overlap.

Discussion: 42 of the 48 taxa were firstly reported from Kırşehir. The ecological results herein show that ecological characteristics of species are changed when we compared with previous. This indicates the deficiencies of ecological information about the individual species. The absence of ostracods in sites had similar ecological values of sites with ostracods may be explained as i) species may not be there, ii) seasonality, iii) we may have not change to collect, iv) the narrow tolerance levels of species, and v) there may be some other biotic factors.

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Keywords: Ostracods, distribution, ecologic characterization, Kırşehir
Introduction: Reducing environmental pollution and damages caused by the pollution is one of the most important issues. The pollution of the existing water resources of our country has greatly increased the already existing problem of thirst, and in recent years it has become one of the biggest problems for our country. Heavy metals are one of the most important pollutants in aquatic systems. High metal levels in surface water can pose a health risk for humans and the environment. When heavy metal concentrations are high, they can have negative effects on aquatic life. Some plants can absorb, and accumulate the heavy metals. This is a new technology that named phytoremediation. The phytoremediation has a lot of advantage, so this technology is very popular in last years.

Material and Methods: In this study, heavy metal concentrations (Cu, Ni, Cd, Mn, Zn, Pb, Cr) were determined in the plant (Phragmites australis, Juncus acutus), water and sediment samples taken from 6 different stations in February, April, June, August, October, December from Bafa Lake. In addition, in-situ physicochemical measurements (pH, temperature, conductivity, salinity, dissolved oxygen) were made in the water samples. The plant samples were washed a few times with tap water and deionized water. The plant samples were divided as rhizome, leaves and root. The plant and sediment samples were dried in the oven. After that, they were digested with acid solution. The heavy metal concentrations in the samples were determined by Inductively Coupled Plasma Mass Spectrometer (ICP-MS) technique followed by acid digestion (except water samples). Bioaccumulation factor determined for each plant sample.

Result: As a result of the statistical evaluation, the station 4 was determined as the dirtiest station of heavy metals. When we investigated in terms of bioaccumulation ability, it was determined that Phragmites australis and Juncus acutus are good bioaccumulator for Cu, Cd, Mn and Zn. Bioaccumulation has occurred mostly in the root in P. australis and in the stem in J. acutus.

Discussion: A bioaccumulation factor (BAF) over 1,000 is considered positive in phytoremediation. Phragmites australis and Juncus acutus proved to be effective for the bioaccumulation of Cu, Cd, Mn, and Zn. Therefore, this plants can be accepted as a good bioaccumulator for Cu, Cd, Mn, and Zn.

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Keywords: Bafa Lake, heavy metal, plant, sediment, water.
The Evaluation of the Opportunities for Improving Forest Villages (The Case of Kastamonu Regional Directorate of Forestry)

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Introduction: 27.6% of Turkey’s surface area is covered by forests. 7.1 million forest villagers live in nearly 22.6 thousand villages nestled in forest areas. Currently, the number of agricultural enterprises in rural areas is 3.1 million. Almost half of these enterprises comprise of families/enterprises in forest villages. One out of two families living in the rural areas is forest villager. The improvement of this population which is socially and economically affected by the work regarding forest areas gains importance as well. While efficiently making use of forest reserves in Turkey as a developing country, it is essential to take measures for the improvement of the forest villagers who are facing certain socio-economic constraints due to the use of these reserves.

The primary sources of living for forest villagers living within forest areas are agriculture and forestry. Forest villagers who need to put their products on the market in the same market conditions have to produce them in more infertile, small and multi-piece areas. It is certainly necessary to take the forest villagers into consideration in order to achieve an improvement in rural areas. The aim of this study is to identify the socio-economic factors that cause Kastamonu forest villages to improve. The study involves forest villages within the boundaries of Kastamonu Regional Directorate of Forestry.

Material and Method: In the study, the forest villages in the city of Kastamonu were sampled through stratification. The measurement for stratification was the size of agricultural lands belonging to the villages. The first group comprises of villages with 0-25 da land. 9 out of 72 villages were sampled in this group. The second group involves villages with 25-50 da land. 15 out of 124 villages were sampled in this group. The third group includes villages with land larger than 51 decares. There are 223 villages in this group and 23 of them were sampled. 47 out of 399 villages were sampled in total and face-to-face questionnaires were administered on totally 158 enterprises/houses in these villages. The socio-economic factors involved in the improvement of Kastamonu forest villages were revealed by the analysis of the obtained data through the methods of correlation analysis and factor analysis.

Results: Ten key factors were identified in the study as a result of factor analysis carried out to identify opportunities for improving Kastamonu forest villages. These are named as “Agricultural Land Factor”, “Forest Crimes Factor”, “Deforestation Factor”, “Livestock Factor”, “Factor of Vegetable Production Efficiency”, “Factor of Corn Production Efficiency”, “Factor of Development Level of Enterprise’s Commercial Structure”, “Factor of Economic Deprivation and Labour Force Migration”, “Economic or Illegal Utilization Factor” and “Factor of Village Leadership or Social Life Leadership”.

Discussion: These factor groups which were found effective in improving Kastamonu village forests have various separate measures within them. It is important to develop forestry policies taking these groups and their measures into consideration and put these policies into practice in the short-medium and long term.

Keywords: rural development, forest villages, factor analysis
Chorology of Subgenus *Cyanus* (Mill.) Hayek (Asteraceae) Growing in Turkey

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**Introduction:** The *Cyanus* group (Asteraceae, Cardueae-Centaureinae) was first mentioned by Miller as a genus. The first to consider it a section within the genus *Centaurea* by de Candolle and this was widely accepted by most taxonomists. Today it is usually recognized as a subgenus or as a group within the genus *Centaurea*. Some authors, however, reassign it to a generic status. *Cyanus* comprises 44 species in the world and is known with 18 species from Turkey. Eight of them are endemic for Turkey (Endemism ratio 44%).

**Material and Methods:** Between the years 2014-2017, many specimens were collected from different localities and populations belonging to subgenus *Cyanus* during the field studies. At least one sample for each taxon was prepared according to common herbarium techniques. These specimens were identified and by using Flora of Turkey and neighbor floras.

**Results:** Distribution of each taxa also were showed on the map. In consequence of this study, Chorologies of *Cyanus* (21 taxa) in Turkey were determined based on the field and herbarium studies, and their distribution maps were given.

**Discussion:** *C. reuterana* Boiss. var. *reuteriana*, *C. woronowii* Bornm., and *C. bourgaei* Boiss. are not endemic anymore. Because these taxa were established in the other regions.

**Acknowledgement:** This study was financially supported by Selçuk University (BAP Project Number: 15101001).

**Keywords:** *Centaurea*, Chorology, compositae, endemism
The Protection of Animals as Property in Turkish Criminal Law

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**Introduction:** The article 151/2 of Turkish Criminal Code (TCC) entitled “The crime of damage to property” disposes that someone who kills, puts in useless condition or reduces the value of a possessed animal without any justification is sentenced to prison from four months to three years or to the punitive fine upon the complaint of the victim, who is the owner of the animal. The possessed animals are considered as subjects of the crime of damage to property. Therefore, if the act of damage is practiced towards a possessed animal, it is a criminal conduct. However, if a waif animal is damaged, this act does not constitute the crime of damage to property according to the article 151/2 of TCC.

**Material and Methods:** In this study, we will examine the crime of damage to property – specific to animals – regarding to decisions of Turkish Supreme Court by the method of document review.

**Results:** The legal interest protected by the crime of damage to property is not the right to life or to physical integrity of animals but the right to property of the animal owner. Animals are accepted as movable property element in Turkish criminal law.

**Discussion:**

The provision in the article 151/2 of TCC values economic purposes above the right to life of animals. The animals are protected as an environmental interest in articles 181 and 182 of TCC which mean wilful and reckless pollution of environment. These provisions are considered more constructive than the article 151/2 of TCC for the protection of animals.

**Acknowledgement:** This study is supported by TUBITAK Postgraduate Scholarship Program.

**Keywords:** environmental criminal law, crimes related to animals, crime of damage to property.
The Sensory, Nutritional, Chemical and Microbiological Properties of Frozen Stored (-22°C) Anchovy (*Engraulis encrasicolus*, Linnaeus 1758) and Bonito (*Sarda sarda*, Bloch 1793) Meats

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**Introduction:** Freezing is the method most people choose for preserving fresh fish and other seafood products. However, this preservation technique is effective only if the product is handled in such a way that its quality is kept near its peak freshness. Plastic wrap is probably the most frequently used wrapping material and the second-best choice for freezing after vacuum packaging. Another popular packaging method is to use heavy-duty plastic freezer bags. Thanks to the developing technology, the aquatic products can be obtained cheaper at the times when the hunting is abundant and practically prepared at home and can be stored frozen in refrigerators easily. Especially, people living in coastal areas are store fish that seasonally caught such as anchovy and bonito using packaging material such as refrigerator bag and stretch film. The objective of this study was to determine the sensory, nutritional, chemical and microbiological properties of two fish species, anchovy (*Engraulis encrasicolus* L. 1758) and bonito (*Sarda sarda* Bloch 1793) at frozen storage period.

**Material and Methods:** There is no additives were used in this study. Both types of fish were packaged without washing. Bonito samples were then packed into freezer bags and anchovy samples were place into styrofoam plates and then wrapped with cling wrap. Both groups were stored at -22°C during 12 month.

**Results:** While the values of protein%, fat%, moisture% and ash% of bonito samples were nonsignificant statistically (p>0.05), the fat values of anchovy samples were significantly different (p<0.05). At the end of the storage period, the TBA and peroxide values of anchovy samples and peroxide values of bonito samples exceeded acceptability limit values for consumption. At the end of 12 months total amino acid amounts of bonito and anchovy samples were determined as 21.64 g/100g and 16.92 g/100g, respectively. Total saturated fatty acid (ΣSAFA) amounts were %29.99-36.96; total monounsaturated fatty acid (ΣMUFA) amounts were %26.62-%21.42 and polyunsaturated fatty acid (ΣPUFA) amounts were %32.04-%29.79. According to microbiological analysis results; Total mesophilic aerobic bacteria count of fresh bonito and anchovy samples were 3.14-5.37 log cfu /g; Total psychrophilic aerobic bacteria count were 3.09-4.42 log cfu /g; Total yeast-mold and Total coliform bacteria count were 2.92-2.81 log cfu /g, respectively. These values were determined as 2.90-3.28 log cfu /g; 2.75-3.23 log cfu /g; 2.69-2.54 log cfu /g and <10 at the end of 12 months, respectively. The appearance, odor, taste and texture values of 0, 6 and 12 month were significantly different from each other (p<0.05).

**Discussion:** The nutritional compositions of bonito and anchovy samples that frozen storage at -22°C during 12 month were not affected. It can be said that bonito samples were more than stable anchovy samples in terms of chemical changes. No microbiological deterioration was observed in both fish. According to sensory analyses results; the shelf life of bonito and anchovy samples were 12 and 6 months, respectively.

**Keywords:** bonito, anchovy, freezing, sensory, nutritional, chemical, microbiological
**Masting of Seven Oak Species in Turkey**

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**Introduction:** Masting in oak species is a complex, group phenomenon with many evolutionary and ecological aspects. Understanding the patterns associated with masting in oaks is crucial for acorn production, natural regeneration and wildlife management in Turkey. The goal of this study is to determine the mast years, the start and the end of acorn fall dates, and the 1000-acorn weight in seven oak species.

**Material and Methods:** A total of seven oak species (*Quercus infectoria* subsp. *infectoria*, *Q. vulcanica*, *Q. cerris*, *Q. ithaburensis*, *Q. trojana*, *Q. aucheri* and *Q. coccifera*) were observed at three to four locations between 2003 and 2008 in the Lakes Region of Turkey. Acorn fall period and 1000-acorn weights were recorded during mast years.

**Results:** Except for *Q. aucheri* and *Q. coccifera* in 2004, masting was observed for all species in 2004 and 2007. Depending on the species and elevation, acorns mature and fall from October to early December. Mean 1000-acorn weight ranged from 3.8 kg (*Q. infectoria* subsp. *infectoria*) to 12.9 kg (*Q. ithaburensis*). Except for *Q. ithaburensis* in 2007 and *Q. vulcanica* in both years, 1000-acorn weight significantly differed between locations. At least 60% of acorns are healthy and viable but proportion of healthy acorns can be as high as 97%. Most of the acorns are consumed by rodents and mammals but 5 to 97 acorns per m\(^2\) were observed on the ground.

**Discussion:** Promotion of cross pollination and predator satiation may be responsible for masting in these oak species. Understanding these dynamics is essential for successful regeneration of oak stands in the region.

**Keywords:** *Quercus*, oak, acorn, masting
Effect of Broiler Chicken Manure on Corn (Zea mays) Yield and Some Macro Element Contents

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Introduction: It is a fact that the use of poultry fertilizers, which are produced every year due to increased production of broiler chickens, can prevent environmental problems with their proper use in agriculture and increase quality of the soils. In this study, the effects of fresh and composted chicken manure, composting fresh broiler manure with rice husk, on the growth of corn plant (Zea mays L.) were investigated.

Material and Methods: 4 different doses (0%, 1%, 2%, 4%) of fresh and composted chicken manure were applied to the pots and corn plants were grown in a greenhouse. Before the taffeling period, plants were harvested and wet weight, dry weight, P, K, Ca, Mg values were determined in the plants.

Results: According to the results, as the wet and dry weights of the above ground parts of the plants were considered, it was seen that manure*dose interactions were statistically significant. While the highest wet plant weights were measured at the rate of 4% dose of fresh manure, the highest dry weights were found at the rate of 1%, 2%, 4% doses of fresh manure. It was observed that the manure*dose interactions on Ca and Mg contents of the roots were statistically significant and it was determined that 4% dose of the composted chicken manure was the most effective application for increasing Ca and Mg contents of the plants.

Discussion: Generally, it can be said that the fresh and composted poultry manure contains organic matter and nutrients and therefore increased doses increase the yield and macronutrient content of the underground and overland parts of the corn plant.

Keywords: chicken manure, composting, corn, plant nutrients
ORAL PRESENTATION

Morphological Studies on Trichomes of Alyssum (Brassicaceae) in Turkey

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Introduction: Introduction: The Brassicaceae or mustard family comprising about 419 genera with 4130 species distributed worldwide. The Brassicaceae are cosmopolitan but especially temperate areas, with the highest diversity in the western North America, Mediterranean area and Irano-Turanian region. The genus Alyssum L. comprises approximately species in the 113 and 56 of these are endemic to Turkey. The aim of this research is to study the variation of silicle trichomes of Alyssum species for widening the knowledge of the trichome diversity in Brassicaceae and likely use of it in the taxonomy of the genus.

Material and methods: Material and methods: Trichome morphology of 17 species of Alyssum was studied using scanning electron microscopy, dried specimens were used. Samples were mounted using double adhesive tape on aluminum stubs, sputter-coated with gold and examined with a Jeol Tescan scanning electron microscope at the Bartın University Central Research Laboratory.

Result: Result: Fruit trichomes of 17 Alyssum species can be separated into four types; stellate, lepidote, tuberculate and bifurcate. In most species, only stellate trichome is observed. Only two species are found to have two or three trichome types. A. bulbotrichum has stellate and tuberculate-trichomes, A. strigosum has stellate, bifurcate and tuberculate trichomes. The trichome types in A. lepidotum and A. baumgartnerianum were lepidote. Trichomes density is different in the species studied. End of branches of trichomes was similar in different varieties. The number of rays was 2-22 in studied Alyssum taxa. A. ochroleucum has 18-22 branches while A. strigosum has only 2-6 branches on trichomes. Trichome surface ornamentation was similar in the species studied. Some of these stellate hairs are characterised by the presence of primary and secondary branches in the stellate hairs and others by multibranches. Alyssum strigosum has asymmetric rays on pedicel that make it different from the others.

Discussion: Discussion: Alyssum trichome morphology has been commonly used as a diagnostic character. Studied Alyssum species can be easily distinguished from each other by trichome type. In conclusion, the present study supports the use of fruit trichomes morphological characters as a parameter for species identification.

Keywords: Trichome, Silicule; Alyssum, Brassicaceae. Micromorphology, SEM
Preparation and Characterization of Activated Carbon Produced from *Eriobotrya japonica* Seed by Chemical Activation with ZnCl₂

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**Introduction:** Activated carbon (AC) has important adsorptive, environmental, thermal, electrical and mechanical characteristics for new practices of AC. It is a highly ambidextrous material with wide surface area, wide internal surface area, pore volume, well chemical stability, and diverse oxygen-containing functional groups on the surface. Because of its perfect adsorption capability, it is widely used in purification and separation in many industrial processes including medicinal use, gas storage, pollutant and smell rustication, gas separation and catalysis. Activated carbons are produced from different raw materials of organic origin that are rich in elemental C, including biomass waste. In this study, AC is produced from *Eriobotrya japonica* seed by chemical activation with ZnCl₂. The characterization of the produced activated carbons are determined by SEM, TGA and BET analyzes.

**Material and Methods:** *Eriobotrya japonica* (EJ) seed was used activated carbon preparation in this study and was collected from markets in spring and summer in Karaman province of Turkey. The preparation of the activated carbon (AC) primarily contains carbonization and activation. Active carbon was produced from EJ seed using chemical activation method with ZnCl₂ agent.

**Results:** Activated carbon was produced at three different carbonization temperatures (500, 600, 700 °C). The highest BET surface area (1079 m²/g), micropore surface area (417 m²/g) and total micropore volume (0.52 cm³/g) were obtained under the following conditions: impregnation ratio of 1/1, activation temperature of 700 °C and activation time of 2 hour.

**Discussion:** This suggests that ZnCl₂ is a promising activating agent for producing activated carbon with an improved microporous structure. The results show that the chemical activation with ZnCl₂ from EJ seed is good in terms of specific surface area, pore development, and the structural order of activated carbon. EJAC-ZnCl₂ can be contemplated as an excellent low-cost and eco-friendly adsorbent.

**Acknowledgement:** The authors are grateful for the financial support of the Scientific Research Project of Karamanoğlu Mehmetbey University (Project Number 01-D-17).

**Keywords:** *Eriobotrya japonica*, activated carbon, chemical activation, SEM, BET
Role of Plants in Heavy Metal Contaminated Land Remediation

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Introduction: Restoration of the natural structure to its original form in post-operational mining sites is generally considered within the context of ecosystem restoration and studies on reformation of the natural flora are considered as the most important step in the ecosystem restoration. The still operational Murgul copper ore deposit and its immediate vicinity are highly contaminated by heavy metals and visually. It is necessary to reorganize such areas as an area where natural ecosystem structure is restored by removing the sources of pollution. Therefore, a need exists to develop in situ low cost technologies to effect surface stabilization. The use of vegetation can be an attractive option, since there are some native plant species that can colonize parts of these polluted sites unaided. The objective of the present study was to determine the dimension of the pollution in the soils at Murgul copper ore deposit and its immediate vicinity and identify the plant species for use in the remediation efforts to reclaim the nonoperational mining fields to the nature.

Material and Methods: The main study material was the Murgul copper mine site and the soil and plants samples obtained from its immediate vicinity. Soil samples were collected in 4 locations in a creek bed near the study area and the vicinity. These samples were collected at about 0-10 cm and 10-20 cm deep based on the depth of the plant roots. pH and heavy metal analyses were conducted on the soil samples. Plant samples collected from the study area were identified in the AÇU herbarium. Reclemation studies in turkey and in the world use of plants were implemented in purpose of recycling the open mine fields after they were closed was examined through literature scanning.

Results: The mean accumulation levels of heavy metals in the study area were determined as Ni> Cu> Mn> Zn> Cd> Pb> Co> Cr. Furthermore, it was identified that 31 plant species in 16 families naturally grow at these locations.

Discussion: Heavy metal analyzes on soil samples obtained during field studies demonstrated that heavy metal deposits were Ni> Cu> Mn> Zn> Cd> Pb> Co> Cr, respectively in the study area. Literature review demonstrated that it would be possible to reclaim the natural structure after the termination of mining operations in the area within the context of ecosystem restoration with the use of the following indigenous species that are hardy against heavy metal pollution: Silene armeria L., Pilosella officinarum C.H. & F.W. Schultz subsp. micradenia (NP.) Sell & West, Lotus alpinus (DC.) Ramond., Bellis perennis L., Salix caprea, Rhododendron spp., Quercus petraea, Populous spp. from Asteraceae, Caryophyllaceae, and Fabaceae families.

Keywords: heavy metal, mineral fields, landscape restoration, natural plants, heavy metal toxicity tolerance of plants.
Examination of Changes in Land Cover around Settlements: The Case of Drahna Forest Sub-District Directorate

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Introduction: In order to manage forests sustainably, it is necessary to protect, develop and monitor the production capabilities and quality of forest ecosystem, biodiversity, its contribution to the world's carbon cycle, land and water resources and other socio-economic functions. For this reason, it is important to monitor and report the changes occurring in forest ecosystems and to take the necessary precautions in place and on time. In this study, changes occurred in the forest and non-forest areas around settlements within the boundaries of the Drahna Forest Sub-District Directorate during the time period of 40 years between 1967 and 2006 were tried to be introduced with the help of ArcGIS which is one of the Geographic Information Systems (GIS) tools.

Material and Methods: Three forest management plans and relevant stand data maps of Drahna Forest Sub-District Directorate, which is affiliated to Ulus Forestry Operation Directorate of Zonguldak Regional Directorate of Forestry, for the periods 1967-1986 (1st Plan Period), 1986-2005 (2nd Plan Period) and 2006-2025 (3rd Plan Period) were examined using ArcGIS version 10.4. The non-digitized 1st and 2nd period stand data maps were digitized and the map belonging to the 3rd plan period was obtained from the related unit in digitized form. Land changes occurred in three affected zones of 0-250, 251-500 and 501-1,000 m, which were created on the basis of settlements of 11 forest villages within the plan unit, were examined in terms of area and time.

Results: Within 0-250 m, the normal closed forest area increased by 142.46 ha, and the open forest area decreased by 166.74 ha. The settlement area increased by 87.06 ha, the cutover forest land (OT) increased by 8.89 ha and the agricultural area decreased by 71.69 ha. Within 251-500 m, the normal closed forest area decreased by 421.78 ha and the open forest area decreased by 448.29 ha. While the settlement area increased by 12.12 ha and the OT area increased by 13.32 ha, the agricultural area decreased by 0.13 ha. Within 501-1,000 m, while the normal closed forest area increased by 891.14 ha, the open forest area decreased by 782.45 ha. The settlement area, which had not been shown in the maps in 1967, was measured as 1.49 ha in 2006 after 40 years and while the OT area increased by 13.60 ha, the agriculture area decreased by 119.76 ha. Throughout the affected zones (0-1,000 m), an increase was determined in the normal closed forest areas during the period of 40 years from 1967 to 2006 and a continuous decrease was determined in the open forest area and in agricultural areas.

Discussion: Our national forest assets, which are 20.2 million hectares according to the inventory data for the period 1963-1973, reached up to 22.3 million hectares in 2017 by continuing to increase every year. Within the study area, the general forest area (normal + open) decreased by 24.28 ha and 26.51 ha respectively in the affected zones of 0-250 and 251-500 m within the period of 40 years and increased by 108.69 ha within the affected zone of 501-1,000 m. A decrease was determined in the forest area which is around 500 m of the settlement areas. According to the results obtained from the study, it is observed that there was a decrease in agricultural areas and open forests and an increase in normal closed forests.

Keywords: land cover, GIS, Drahna forest sub-district directorate, temporal change, forestry management.
Introduction: Chemicals used in agricultural areas have negative effects on ecological systems. Therefore, especially biological control methods have had more importance. Chemical management methods are also used in agricultural areas where biological control is insufficient. Insecticides used in pest control; they are quite harmful to other living things that are not targeted, and the environment. For this reason, it is important to investigate agricultural biotechnology studies and less toxic chemicals. In these studies, the toxic effects of certain antibacterial and antiviral drugs over the model organism Galleria mellonella were investigated.

Material and Methods: Artificial diet containing an old dark honey pellet (broodstock) ground to grow the larvae of G. mellonella under laboratory conditions were used. This diet, utilized for the continuation of the G. mellonella culture, was also used as a control diet in experiments conducted to investigate the effect of different concentrations of antibacterial and antiviral drugs on toxicological effects of the seventh stage (last stage) larvae. Hemolymph was removed from larvae reaching stage 7 and stored at -80 °C until analyzed. The changes in oxidative damage indicators from the obtained samples were analyzed using spectrophotometric methods.

Results: These studies have shown that the biological parameters of G. mellonella vary with concentrations of antibacterial and antiviral drugs in different tissues with oxidative damage and detoxification capacity.

Discussion: Understanding the toxic mechanism of action of antibacterial and antiviral drugs on G. mellonella may allow for the developing of new chemical methods that are not targeted at living organisms and have less negative impacts on the environment.

Keywords: Galleria mellonella, oxidative damage, detoxification, antibacterial
Mineral Contents of Two \textit{Rhizopogon} Species Growing in Gaziantep

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\textbf{Introduction:} Mushrooms are an important group of organisms in nature and can be found almost everywhere in terrestrial ecosystems. Beside their important roles in nature, they have long been used as a source food for human in various cultures. Because of their high content of various essential nutrients, including trace minerals, there is an increasing interest for the consumption of them. In this study, dry fruit bodies of two wild edible hypogeous mushrooms, \textit{Rhizopogonluteolus} Fr. and \textit{Rhizopogonroseolus} (Corda) Th. Fr., which are also collected in some regions Anatolia, were studied for their mineral contents such as Ni, Cu, Co, Zn, Cr, Mn, Mg, Cd, Fe, Ca and Pb.

\textbf{Material and Methods:} The solutions were prepared by following the wet digestion procedure and the analysis of the mineral contents were determined by an atomic absorption spectrophotometer (AAS).

\textbf{Results:} The mean contents of minerals in \textit{R. Luteolus} and \textit{R. Roseolus} were determined as 3.84 and 3.41, 10.13 and 1.22, 2.07 and 1.94, 46.02 and 17.2, 0.79 and ND, 8.87 and 2.83, 58.69 and 57.41, 0.96 and 1.18, 206.4 and 45.91, 626.6 and 965.4, ND and ND mg/kg dw for Ni, Cu, Co, Zn, Cr, Mn, Mg, Cd, Fe, Ca and Pb respectively.

\textbf{Discussion:} Ten of the 11 minerals were found to be exist in \textit{R. luteolus} while nine were detected in \textit{R. roseolus}. Pb was not detected in any of them. Though both \textit{Rhizopogon} contained considerable amounts of minerals, all the contents are in the range reported from Turkey and other countries and in acceptable limits for human consumption.

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\textbf{Keywords:} mushroom, \textit{Rhizopogon}, mineral content, Gaziantep, Turkey
The Effects of Seasonal Variations on The Succession of Some Species of Calliphoridae (Diptera) in Eskisehir Province

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Introduction: Forensic entomology is the study of the application of insects in criminal investigation. These insect colonizers can be used to estimate the time of death i.e., time interval between death and corpse discovery, also called postmortem index (PMI), movement of the corpse, manner and cause of death and association of suspects at the death scene. There are reported differences in the species of insects involved with the decomposing corpse in different habitats and different season. Calliphoride members, which are very important in forensic entomology. The determination of the seasonal species density and seasonal species diversity of the members of the Calliphoridae family is of great importance for the evaluation of entomological data in forensic medicine. This study in Eskişehir province, between June 2014 and February 2016, at Meşelik Campus of Osmangazi University, in insectarium (located at the edge of the forest area): It is aimed to determine the members of the Calliphoridae family, which form colony due to the seasonal succession, radiating from the decomposition of chicken liver parts left on insectary.

Material and Methods: During the different studies carried out in the insectarium, there is intense smell in the environment when the larvae are fed with the liver. Calliphoridae members perceive this intense smell in the insectarium from the outside. The Calliphoridae members were caught with the fly trap. All the adults caught were identified at the species level. During the 21-month period, seasonal species changes, density differences in different years, male-female ratios were determined. The results were evaluated with the ANOVA test (Scheffe test (P <0,05) from Post-Hoc tests) using the IBM SPSS STATISTICS (version 20.0) package program. Seasonal variations of species and seasonal temperature differences were evaluated for their impact on Calliphoridae members.

Results: At the end of the study, three species were identified: Calliphora vicina, Lucilia sericata, Chrysomya albiceps. The number of mature individuals from the outside of the insectarium was determined as 1685, including 962 female (332 Lucilia sericata, 329 Chrysomyia albiceps, 301 Calliphora vicina), 723 males (239 L. sericata, 251 C. albiceps and 233 C. vicina). In total, 754 adults were obtained in 2014 while 931 adults were obtained in 2015. It was found that the female individuals who come to the putrefaction of the insectarium are about 1/3 more than the male individuals, that the density of species in the same seasons is different between years, and that increased putrefaction in the indoor area attracted more individuals.

Discussion: It has been reported that the seasonal densities of Calliphoridae members differ in many studies to date. There is a difference in fauna between the last months of autumn and winter, summer and spring seasons when insect activity is reduced or stopped on the carrion. In this study, it was determined that the Calliphoridae species that came from the outside for the insectarium meat odor differ in seasonal species intensities in one year, and that the same months in 2014 and 2015, the same species showed different intensities due to temperature differences.

Keywords: Calliphoridae, seasonal variations, forensic entomology
Introduction: The Black Sea Sustainable Rural Tourism (BSST) Program is a community based, social enterprise venture dedicated to supporting economic development in rural areas around the Black Sea, combining for-profit businesses elements and sustainable development practices. By using for-profit elements, hybrid non-profits are able to generate funds that can be used to help build additional social ventures. The program is unique as it places an emphasis on active community participation in designing and implementing new ventures that economically benefit communities as a whole while protecting the environment, preserving cultures and promoting sustainable energy, agricultural and business practices. Both selected communities and accommodations around the Black Sea can join the BSST network as per nationally adopted sustainability criteria. Member communities, accommodations take part in trainings for youth, gender and accessibility and cross-border exchanges to promote best practices. The program currently covers Ukraine, Turkey and Georgia, while the others are expected to follow in due course.

Material and Methods: The BSST Program is community based. The participation of the private sector, local government, NGOs and individual members of the community is a key requirement for membership and needed so that a Community Organization can, with the help of BSST Program and a National Office, design and manage an integrated plan to develop responsible tourism for their community and commit to Global Sustainable Tourism Council (GSTC) destination criteria. The Community Organization helps select and prepare accommodations to work with GSTC criteria. Accommodations, like local businesses, are part of the Community Organization and through the adoption of GSTC criteria are able to list their accommodations on a dedicated international BSST web portal where responsible travellers can select and pay for rooms and other activities.

Results and Discussion: The BSST program promotes engagement and it considers travellers as important emissaries in building understanding, learning from others and providing jobs and promoting entrepreneurship in rural areas without damaging the environment. Despite the challenges, the small difference made, could certainly be important to the people in a small Turkish, Ukrainian or Georgian village. The Program will give the traveller the opportunity to experience places that are fascinating, welcoming and rich in cultures and lifestyles that will vanish unless they are appreciated and nurtured. The traveller will know that their participation directly benefits local communities and takes nothing out. The BSST Program, targeting community sustainability, does not put an emphasis on accommodations like other sustainable tourism efforts and takes the holistic view that an entire community needs to benefit from sustainable approaches to development. Communities are not pre selected but those who have chosen this route are invited. Therefore, each community knows it must develop a strategic plan, a community organization and work with local government, NGOs and small businesses - like the local baker, small farmer and others.

Acknowledgement: We are thankful to the Global Sustainable Tourism Council for the use of their sustainable criteria, the International Ecotourism Society, TrainingAid Germany, Bridge Innovation and Development Georgia, public authorities, local communities and individuals in Ukraine, Turkey and Georgia for their commitment.

Keywords: ecotourism, sustainable tourism, rural tourism, Black Sea, Turkey, Ukraine, Georgia.
Fruit Morphological Examination of Eight Grape (Vitis vinifera subsp. vinifera) Cultivar

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Introduction: The earliest cultivation of grape dates back to BC 4000-7000 years in the area between Black Sea and Caspian Sea. Today it is estimated that there are over 10 000 cultivar (cv.) of grape (Vitis vinifera subsp. vinifera) are being cultivated all over the World, among them 1 200 cultivar are currently cultivated in Turkey. Fruit morphology plays key role in identification of the grape species and cultivar. In this study, morphological examination of eight local vine-grapes was analyzed and compared.

Material and method: Samples of white (i.e. Sauvignon Blanc, Viognie and Narince) and red (i.e. Cot Malbec, Syrah, Kalecik Karası, Öküzgözü and Boğazkere) grape cultivar were collected from Kırşehir-Toklumen vineyard of Kavaklıdere Company. Grape bunches for each sample were collected from labelled grape tree on 10 September 2017. For each grapefruit, grape bunches were collected from three different tree. 30 fruits from each grape-bunch was collected, followed by key parameters including weight, size, stem length, stem thickness, color, seed number per each individual of grape grain were measured and recorded. Maturation ratio of individual fruits were evaluated in accordance with assigned color scale.

Results: Average values of fruit size, weight, grain stem length, grain stem thickness and seed number per each grape grain for the samples collected from three different grape tree were obtained as respectively listed below. Fruit size, weight, grain stem length, grain stem thickness and seed number per each grain were 12.23 x11.62 mm, 1.16 gr, 5.08 mm, 0.73 mm and 1.15 for Sauvignon Blanc; 11.94 x11.25 mm, 1.08 gr, 5.37 mm, 0.72 mm and 93 for Viognier; 14.43 x13.63 mm, 1.74 gr, 5.45 mm, 0.60 mm and 1.81 for Narince; 12.50 x12.42 mm, 1.29 gr, 5.97 mm, 0.65 mm and 1.62 for Cot Malbec; 12.56 x11.80 mm, 1.23 gr, 6.20 mm, 0.75 mm and 1.51 for Syrah; 13.51 x13.15 mm, 1.62 gr, 4.93 mm, 0.80 mm and 1.51 for Kalecik Karası; 19.39 x17.67 mm, 3.95 gr, 6.60 mm, 1.23 mm and 2.0 for Öküzgözü; 15.42 x13.98 mm, 1.97 gr, 6.60 mm, 1.17 mm and 2.05 for Boğazkere.

Discussion and Conclusion: The largest size and weight were obtained as 19,39x17,67 mm and 3,95 gr for Öküzgözü cultivar while the lowest size and weight were obtained as 11,94x11,25 mm and 1,08 gr for Viognier cultivar. The longest and thickest grain stem were obtained for Öküzgözü and Bağazkere cultivar while the shortest grain stem and thinnest grain stem were obtained for Kalecik karası and Narince cultivar, respectively. Seed number was obtained approximately 1 seed for individual fruit grain of Sauvignon Blanc, those were obtained 2 for individual fruit grain of Öküzgözü and Bağazkere. The findings revealed that the fruit grain color, size, weight, seed seed number per grain, grain stem length and thickness varied significantly among the examined cultivar.

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Keywords: viticulture, grape cultivar, fruit morphology, Vitis vinifera subsp. Vinifera
A Recent Contribution to Snow Hydrology: Subpixel Snow Cover Mapping Through Support Vector Regression Analysis of MODIS Reflectance Data

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Introduction: Since snow can cover up to 40% of the Earth’s land surface during the Northern Hemisphere winter, the extent and variability of seasonal snow cover are important parameters in the climate system, due to their effects on energy and moisture budgets, and because surface temperature is highly dependent on the presence or absence of snow cover. In turn, snow-cover trends serve as key indicators of climate change. The climatological, hydrological, and ecological importance of snow cover is linked to its energy storage, high reflectance, good insulating properties, significant heat capacity, substantial water storage, and eventual release of this storage during the melting season. As a frozen-water reservoir, snow holds precipitation until snowmelt runoff is released. Snowmelt runoff can pose a flooding hazard because it is often released rapidly during spring. However, snow is essential for the water supply of more than one sixth of world’s population that relies on fresh water from seasonal and glacial snowmelt.

Remote sensing (RS) has been offering a powerful alternative for consistent monitoring of snow cover extent with timely and multispectral data acquired by various kinds of coarse and medium spatial resolution instruments. In this study, we aim to investigate the design and assessment of Support Vector Machines (SVM) for fractional snow cover (FSC) mapping from Moderate Resolution Imaging Spectroradiometer (MODIS) data in Ilgaz Forest District region lying within the borders of Çankırı and Kastamonu provinces.

Material and Methods: For this purpose, thirteen MODIS - Landsat 7/8 image pairs are used. SVM models are trained by using MODIS top-of-atmospheric reflectance values of bands 1-7, normalized difference snow index, normalized difference vegetation index and land cover class as predictor variables. During the training and the testing, the effects of the training data size and the sampling type on the predictive performance of SVM models are investigated.

Results: The results on the independent test scenes indicate that the developed SVM models with radial basis function (RBF), linear, 2nd order polynomial, 3rd order polynomial and 4th order polynomial kernels are in good agreement with reference FSC data with average values of $R \geq 0.91$. In contrast, the standard MODIS snow fraction product, namely, MOD10 FSC, exhibits slightly poorer performance with average $R = 0.77$.

Discussion: It was proved in our study that SVM models also produce quite satisfactory results as compared to traditional snow cover mapping methods. As an overall conclusion, SVM is a strong and competitive alternative for FSC mapping.

Acknowledgement: We would like to express our gratitude to the Çankırı Karatekin University Scientific Research Project Commission, which supported this study (BAPK OF090316L04).

Keywords: remote sensing of snow, support vector regression, MODIS, landsat.
Development of New Seedless Grape Varieties (*Vitis vinifera* L.) via *in vivo* Chromosome Doubling

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**Introduction:** Despite being one of the leader countries, the number of grape varieties at local and international market is limited in Turkey. The principal grape cultivar is Sultanina mainly growing in Aegean region. Turkey is in the leading position in terms of production and exportation of “Sultanina” grapes that are being sprayed with gibberellin to increase berry size. Seedless table grapes are the most preferred by the consumers. Grape breeding has two main sources of. They are stenospermocarpy and parthenocarpy. Another way to obtain seedlessness and large berries in grape breeding by ploidy. Infertile pollens of triploids plants stimulate developing seedless. Size of organs such as fruit and leaves increase with poliploidy. Production of seedless table grape by poliploidy studies were mostly performed in Japan, South Korea and China. “Honey Seedless”, “King Dela” and “Mirai” were obtained from hybridization studies of these tetraploid varieties and diploid genotypes. In this study, we will try to develop new method for the production of seedless grapes by ploidy.

**Material and Methods:** This research was carried out in M. Palieri and Tekirdağ Misketi grape varieties at Tekirdağ Viticultural Research Institute vineyards in 2014. In the colchicine experiment, control (distilled water), 0.25%, 0.50% and 0.75% of colchicine doses were applied using soaked cotton by colchicine solutions to the shoot tips during 1 and 3 days. The ploidy of the plants was determined by flow cytometry.

**Results:** In the method, survival rate of the shoot tips was determined to be 100% after colchicine treatment. Effect of colchicine on shoot length was found to be significant as statistical in M. Palieri and Tekirdağ Misketi varieties. The shoot length decreased as the dose and duration of colchicine applied to the shoot tip. Flow cytometric analysis revealed that plants have on average 1.00 pg nuclear DNA (2C).

**Discussion:** In the development of new varieties in grape breeding programs, these studies that stimulate somatic mutation should be given importance. Nowadays, it is very important to continue research on this method which can be used effectively in the treatment of seedlessness and large berry grape. Our results also confirmed that flow cytometry is fast, easy, accurate and relatively cheap method to determine ploidy of *in vivo* grape varieties (*Vitis vinifera* L.).

**Keywords:** grape, polyploidy, colchicine, flow cytometry, shoot tip
Introduction: Some species of zooplankton are usually considered to be useful indicators of water quality and trophic state. The aim of this research was to describe the recent composition as well as seasonal changes in zooplankton community during 2017, and to estimate possible trophic level of Eğirdir Lake.

Material and Methods: The zooplankton community structure in Eğirdir Lake (Isparta-Turkey) was studied between January 2017 and December 2017 in five stations seasonally. At each station physico-chemical variables in water were measured such as pH, conductivity and temperature (using a WTW multi 340i), dissolved oxygen concentration, saturation of dissolved oxygen (using a WTW oxi 3210). Zooplankton samples were collected with plankton net Hydro-Bios model 55 μm mesh size and fixed in a 4 % formaldehyde solution. The Brachionus: Trichocerca quotient (QB/T) and frequency index (F %) were also calculated to determine the trophic level of Eğirdir Lake in the present study.

Results: Totally 52 species were identified. The zooplankton found in Eğirdir Lake were belong to Rotifera (59 %), Cladocera (33 % ) and Copepoda (8 %.) groups predominantly.. The water temperature ranged from 1.6-26.9 °C throughout the study period with a mean of 14.3 °C. Values of pH ranged from 8.5 to 9.7. The dissolved oxygen values changed from 8.3 mg/L to 13.8 mg/L. The highest conductivity value (398 μS/cm) was recorded in winter and spring while the lowest value (282 μS/cm) was in summer with a mean of 363 μS/cm. The depth and secchi disk were recorded between 5.0-9.4 m and 0.5-7.3 m, respectively. The maximum number of taxa (34) was determined in the autumn season, and the minimum number of taxa (15) was determined in the spring. According to frequency values, Bosmina longirostris and Polyarthra dolichoptera were determined to have the highest frequency value (95 %) and these species were noted most frequently in all seasons.

Discussion: Synchaeta pectinata, P. dolichoptera, Asplanchna priodonta and Bosmina longirostris were the dominant species of the lake. According to the QB/T index (Q=0.66) used for the determination of trophic level, Eğirdir Lake is oligotrophic.

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Keywords: trophic state, cladocera, rotifera, copepoda, Eğirdir Lake
The Ecotoxic Effects of ZnO Nanoparticles on Raphidocelis subcapitata

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Introduction: Nanoparticles (NPs) are the materials with at least two dimensions between 1 and 100 nm. Recently, NPs have been used in many products and raw materials, such as paints, drug delivery, cosmetics, textile, toys, and military. Particularly ZnO NPs have been used in a wide range applications due to their unique physical and chemical properties. ZnO NPs have photocatalytic activity under UV and visible light conditions, which increase the ecotoxic effects under different environmental conditions (pH, light, ionic strength (IS), hardness, and alkalinity). However, there is still limited information on the ecotoxic effects of ZnO NPs.

The aim of this study is to reveal the roles of IS, dispersion method and NP concentrations on the viability of green-algae R. subcapitata (SAG61.81). In accordance with this purpose, the effects of different concentrations (1, 10, 50, 100, 500 mg/L) of ZnO NPs were prepared in synthetic surface water samples with different IS (0, 0.2, 2 and 8 mM) and different sonication methods (mixing and probe sonication) on green-algae R. subcapitata were evaluated.

Material and Methods: Following the OECD 201 growth inhibition test guidelines, the test duration was set to 72 hours. Cell viability, lipid peroxidation and specific die-off rates (k' value) were calculated. The particle size distribution and zeta potential were also measured for the characterization of the NPs. The numbers of viable algae in suspensions were determined by cell counting using Neubauer hematocytometer. k' value was calculated using cell viability results.

Results: We have shown that cellular membranes were significantly compromised under ambient light radiation and nano-ZnO concentrations. Our results suggest that adverse effects are not necessarily only attributable to individual particles smaller than 100 nm but also to low concentrations of larger, naturally agglomerating ZnO NPs. Cell membrane damage was more pronounced due to photocatalytic activity of the ENPs. Our findings also indicate a high sensitivity of algal communities to levels of NPs concentration that are to be expected in the surface water environment. However,

Discussion: Information on ecotoxic effects of nanoparticles is still limited. In order to understand the long-term effect of NPs on the ecosystem, substantial information is required regarding their persistence and bioaccumulation.

Acknowledgement: We would like to express our appreciation to Akdeniz University Scientific Research Unit for the financial support (AU-BAP-2013.01.0102.010).

Keywords: algae, ecotoxicity, ZnO nanoparticles, ionic strength, dispersion method
Introduction: The Green Revolution in the world led to a quantum jump in agricultural production via the intensive use of inputs like chemical fertilizers and pesticides etc. Despite the immense benefits of chemicals, its indiscriminately uses led to pesticide resistance, pest resurgence, outbreak of secondary pests, pesticide residues in the products, soil, air and water. Consequently, increasing attention has been directed towards biopesticides. Among the biopesticides, *Bacillus thuringiensis* (Bt) based products is successfully used for the pest management. *Bt* strains produce a wide variety of insecticidal proteins active against larvae of very diverse insect orders as well as, in some cases, against species from other phyla. In this study, *Bt*-Xd3 and *Bt*-Se13 obtained from previous studies were formulated as biopesticide and were used for management of pest insects.

Material and Methods: Spore and crystal mixture of *Bt*-Xd3 and *Bt*-Se13 were obtained by fermentation and mixed with natural preservatives to protect them from environmental conditions. Then, the suspensions were encapsulated by spray drying and characteristics of encapsulated products were determined. Finally, *Bt* products were tested against *Spodoptera exigua* (Lepidoptera: Noctuidae) and *Agelastica alni* (Coleoptera: Chrysomelidae) in the laboratory conditions.

Results: The spore yields of the encapsulated *Bt*-Xd3 and *Bt*-Se13 were determined as $1.6 \times 10^{10}$ and $8.1 \times 10^{11}$ cfu/g, respectively. Moisture content, suspensibility and wettability of the formulated *Bt*-Xd3 were determined as 8.3, 86% and 21 s, respectively. Moisture content, suspensibility and wettability for *Bt*-Se13 were also determined as 7.29, 77.66% and 25.2s, respectively. While formulated *Bt*-Xd3 showed 100% larval mortality on *S. exigua* at $10^9$ cfu/ml concentration, formulated *Bt*-Se13 showed 94% larval mortality on *A. alni* at the same concentration. Median lethal concentrations ($LC_{50}$) of *Bt*-Xd3 and *Bt*-Se13 were estimated as $1.5 \times 10^6$ and $1.4 \times 10^4$ cfu/ml, respectively.

Discussion: Biopesticides, particularly *B. thuringiensis* based biopesticides are the best alternative to conventional pesticides in the pest management. They dominate the biopesticides market worldwide due to their cost effective mass production, specificity, persistence in the environment, and safety. With this work, bacterial biopesticides which are effective on both lepidopterans and coleopterans were produced. These biopesticides may be registered for the control of *S. exigua* and *A.alni*, and used successfully for the integrated pest management.

Acknowledgement: We would like to express our appreciation to the Karadeniz Technical University Scientific Research Project Commission (KTUBAP-5778) and The Scientific and Technological Research Council of Turkey (2211-C).

Keywords: bacterial biopesticides, *Bacillus thuringiensis*, pest management
Glassy Art Around Kastamonu and Sinop

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Introduction

Glassy painting technique is a kind of painting technique, which is used with water-based paints on glass surface, powder paint, watercolor paint, gouache paint, glass paint or acrylic paint. Paper, canvas, wood, wall, such as the method of painting on surfaces, glass surface is followed by a reverse process. Since the painting on the glass is reversed when it is finished, a method we can call the bottom of the glass is applied. This process, which requires the first thing to be done, is proceeding from end to the beginning. For instance, while the details, the signature and the date of the paintings made on opaque surfaces are realized at the last stage and the design, the details and the signature are started in the technique of the glass under the picture. Then, the surfaces between the lines forming the pattern of the shape, finally the background is painted. Picture under glass can be made on glass used in different thickness depending on the surface size of the picture. In the early 19th and 20th century, under glass paintings, which have increased in popularity, have been forgotten due to the rapid social development and cultural shock that developed towards the end of the 20th century. The effect of various parts of plants and wild animals on glass art was be examined in glass art made in various religious places (tekke ve zaviyeler) and Kastamonu-Sinop prisons until 1960. The art of glass is difficult to do, but it is easy to lose and disappear. When it is broken, it cannot be used and therefore disappears. For that reason, even 50-60 year old works in glassy art are considered to be old. Nearly 40 (forty) concrete examples will be presented about the art that has turned to extinction. In this symposium, we will exhibit the works of 40 close glass paintings from the beginning of 1850 to the end of the symposium and also we will present about 25 glass sub-works in terms of environmental art.

Material and Methods:

From 1990 to 2018, samples of glassy paintings were obtained from antiquities, wreckage and old acquaintances from various people around Kastamonu and Sinop provinces.

Results:

From the beginning of 1850 until 1960, 40 close glassy paintings consisting of various plants and wild animal paintings from our region will be exhibited from the beginning of the symposium and approximately 25 glass paintings will be presented in terms of the environment.

Discussion:

The glassy art is difficult to do, but it is easy to lose and disappear. When it is broken, it cannot be used and therefore disappears for this reason, even 50-60 year old works in glassy art are considered as old paintings. Because, there is a high risk of breaking with little carelessness in earthquakes and transport.

Keywords: Kastamonu, Sinop, glassy art, glassy paintings
**Effects of NeemAzal -T/S Chitin Synthesis Inhibitor Activity Against Galleria mellonella (L.) (Lepidoptera: Pyralidae)**

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**Introduction:** IGRs are named as third generation insecticides and are classified according to their action mechanisms. IGRs and Chitin Synthesis Inhibitors (CSIs), an important class in this, interfere with chitin biosynthesis in insects, thus, preventing moulting. These compounds have a repressive effect on the life cycle required for the growth of insects. Azadirachtin, which is currently considered as an IGR, has been reported to inhibit feeding growth and development of insects. There are no negative effects on the environment and other living organisms. The first objective of this study was to determine the LC95 dose of NeemAzal-T/S, which is an azadirachtin derivative for the sixth stage *Galleria mellonella* L. larvae, (being a Lepidoptera sample and a pest of a honey bee hive). The second objective of this study was to investigate the morphological, histological, and histometric CSI roles of lethal and sub-lethal concentrations of this compound on the integument.

**Material and Methods:** *G. mellonella* used in the experiments were obtained from the stock culture. The larvae were fed with semi-synthetic nutrients in glass jars in an incubator at 28 ± 2°C in 78% relative humidity and completely dark. NeemAzal-T/S (10g/1000 ml) was supplied from Trifolio M Gmbh (Germany) using an Azadirachtin source. The application of NeemAzal-T/S for the fifth stage *G. mellonella* L. larvae by the method of probity analysis revealed the LC95 value as 4200 ppm. In the experiments, of NeemAzal-T/S’s LC95 and its sub-lethal doses such as 2100, 1050, and 525 ppm were used. One-way analysis of variance (ANOVA) was used to compare the mean values of cuticle thicknesses of the sixth-stage larvae in the control group and the experimental group. Duncan’s (1.1-8) test was used to determine the significance of differences between the mean values of the groups.

**Results:** Morphologically, in all exposed the larvae slowing of the movements, growth inhibition, loss of tissue fluid, blackout and bleeding were observed in a dose/response manner. Nevertheless, the changes were not at the same level in all group. The moulting was unsuccessful at four different concentrations. NeemAzal-T/S was found to be effective on cuticle thickness. Histologically, cuticle secretion of epidermal cells was blocked at a dose/response manner and the blockage was more definite at higher concentrations and endocuticular lamellae formation was blocked.

**Discussion:** The morphological, toxicological and histological results of the Azadirachtin derivative insecticide, NeemAzal-T/S, on the larval integument of the sixth stage *G. mellonella* L. larvae indicated that this compound has a classical CSI-like effect exerted by the inhibition of chitin biosynthesis. The results of this study suggest that the use of natural products like NeemAzal-T/S, as an insecticide/pesticide can aid pest control in an environmentally friendly manner.

**Acknowledgement:** Autor thanks to Selçuk University BAP Office for supporting (project number: 07201005)

**Keywords:** NeemAzal-T/S, greather wax moth, *Galleria mellonella*, chitin synthesis inhibitor (CSI)
Effect of Different Phosphorus Levels on the Forage Yield and Some Yield Characteristics of Pea (*Pisum sativum* L.)

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**Introduction:** Pea (*Pisum sativum* L.) is one of the best-known grain legumes in temperate climate because of its universal popularity as a fresh vegetable and forage. Pea is a leguminous crop, which contains higher amount of protein and is an excellent human food. Nitrogen (N) and phosphorus (P) are major nutrient elements for grain legumes like pea. P has a key role in the energy metabolism of all plant cells and particularly for N fixation in legume crops. Peas have a relatively high requirement for P, and, phosphorus fertilizer can enhance forage yield. Encouraging vigorous root growth is an important step in promoting good nodule development. This study was designed to determine the effect of different P levels on the forage yield and some yield characteristics of pea.

**Material and Methods:** A pot study was conducted outdoor conditions on the experimental area of Field Crops Department, Faculty of Agriculture, Ege University, Izmir, Turkey from October 2016 to April 2017. Seven different phosphorus levels (0-20-40-60-80-100 and 120 kg P ha⁻¹) (as triple superphosphate) were tested. Pea variety ‘Utrillo’ was used for test crop. The experiments were arranged by a completely randomized block design with four replications. P or N and K fertilizers were applied as one dose just before sowing as recommended doses i.e. 15 kg N ha⁻¹ (as starter in the form of urea), and 50 kg K ha⁻¹ (as potassium sulphate). The plants were harvested at the end of flowering stage. Characteristics such as plant height (cm), leaf-stem-pod ratios (%), dry matter (DM) content and yield (g plant⁻¹) were measured in the study.

**Results:** Significant increase with progressive increase in applied P fertilizer, and a maximum number of leaf per plant was recorded in 60 kg P ha⁻¹, beyond this dose, a significant reduction was observed. Fresh forage yield of pea crop was significantly affected applied P levels. All P levels produced significantly greater yield as compared with control (0 kg P ha⁻¹). The highest fresh yield was obtained from 120 kg P ha⁻¹, but there were no any significant differences among 80, 100 or 120 kg P ha⁻¹. Stem ratio in fresh forage were significantly decreased with increase of the doses of P from 0 to 120 kg ha⁻¹. Maximum stem ratio (16.7%) was recorded in the control, beyond this significant reduction was measured. Phosphorus application had no significant effect on pod ratio and DM content. DM yield was significantly increased as P application rate increased from 0 to 60 kg ha⁻¹, and thereafter statistically remained constant.

**Discussion:** Based on the results of this study, application of phosphorus at the rate of 60 kg ha⁻¹ is recommended for obtaining the greatest DM yield in pea. However, field experiments in the coastal part of the Aegean region under Mediterranean climate still need to confirm practical recommendations to farmers.

**Keywords:** *Pisum sativum*, phosphorus levels, forage, DM yield
The Concept of Permaculture in Turkey and The World

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Introduction: The concept of permaculture was proposed by Australian environmental scientist Bill Mollison and his student David Holmgren for the first time in 1978. This term was adopted as the abbreviation for “permanent agriculture” and “permanent culture”. Permaculture helps plan and design sustainable habitats by means of certain principles and applications. In addition, it creates functional and compatible mutual familiarity between people and the nature. In this study, the concept of permaculture and its principles are explained, its applications in Turkey and The World are also investigated.

Materials and Methods: The principles of permaculture were organized and classified by Hemenway (2007) through evaluating the studies by Mollison (1991), Holmgren (2002) and other scientists. Whereas, the ethics of permaculture which include environmental, economic and public aspects were proposed by Mollison (1991).

Results: Permaculture aims to create sustainable settlements and living even closer to the nature rather than struggling with it via studying the nature itself. Therefore, a variety of activities and courses have been planned and organized to introduce and teach permaculture in Turkey and The World. However, mostly adults attend these activities. If these courses and activities are planned for young people and the children, more benefits can be achieved for the future.

Discussion: After investigating a variety of different commonly held points of view, we can predicate permaculture as living in respect to our environment and sustaining life by causing minimum harm to the nature.

Keywords: permaculture, sustainability, principles and ethics, Turkey
Enhanced Antibacterial Activity of Magnesium Oxide Nanoparticles with Chlorhexidine on Staphylococcus aureus

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Introduction: In the last 30 years, nanotechnology and nanoscience have developed and has new features that are incomparable to other technologies all over the world. In this context, certain nanoparticles exhibit antibacterial properties depending on their size, synthesis, structure and surface properties, which in turn may enhance the activity of inorganic antibacterial agents in nanotechnology. In this study, MgO metal oxide nanoparticles were investigated as inorganic antibacterial agent. Staphylococcus species, a member of the family Micrococcaceae, are gram positive, coke-like, non-spore, immobilized, catalase positive, facultative anaerobic bacteria. S. aureus form resistance very quickly against antibiotics.

Material and methods: Disk diffusion method was applied to determine antibacterial activity. According to this method; 100 µl of bacterial, nutrient agar liquid medium and overnight culture were added to the petri dish with nutrient agar solid medium. 25 µl of magnesium oxide nanoparticles (MgO NPs) solution at 25, 50, 100 mg/mL previously prepared with chlorhexidine was absorbed into sterile empty discs (6 mm) and placed in petri dishes. As a positive control only 25 µl chlorhexidine were used in the petri dish. The petri dishes were allowed to incubate at 37 °C for 24 hours. After incubation, the diameters of the zones formed around the disks in the petri dishes were measured.

Results: A statistically significant difference (p <0.05) was found between disk diffusion methods at three different concentrations in determining the susceptibility of Staphylococcus aureus strain to MgO NPs with chlorhexidine. Disc diffusion methods of S. aureus strains yielded different sensitivity results for all three treatment groups (25, 50, 100 mg/L) of MgO NPs. The highest sensitivity was observed at the highest treatment group and the lowest sensitivity was observed at the lowest treatment group. When we compared the sensitivity of MgO NPs with that of chlorhexidine mouthwash, it was higher than chlorhexidine in all treatment groups and found statistically significant (p <0.05).

Discussion: As a result of the obtained results, the antibacterial property of chlorhexidine mouthwash which has antibacterial properties has been increased by MgO nanoparticle. The antibacterial property of the 100 mg/L treatment group is 52% higher than chlorhexidine.

Keywords: antibacterial effect, magnesium oxide, nanoparticles, Staphylococcus aureus
The Effect of Corn Flour and Wheat Flour on *Ephestia kuehniella*'s Lipid Percentages

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Introduction: *Ephestia kuehniella* is also known as a pest of stored wheat and it is called mill moth among the public. It damages the quality of product significantly in stored flour. *E. kuehniella* is also a pest of grains, bran, bread, almond, peanut, dry fruit, biscuit and valonia oak. Studies were found in literature on the fatty acid content of *E. kuehniella*, while no studies were found in which wheat flour and corn flour were given as nutrient. The objective of this study is to research effects of different developmental stages of *E. kuehniella* feeding on different nutrients on total lipid and fatty acid content and to find out the ideal nutrient that can be used in studies investigating the relations between host-parasitoid.

Material Method: Mill moth *E. kuehniella* was used in trials. The trials were conducted under continuous dark with a temperature of 28°C and 65±5 temperature and humidity conditions. Folch et al.’s (1956) method was used to find out the total lipid and total acid percentages of the samples. For total lipid, 40 insects were homogenized in a tube containing 5 ml of chloroform-methanol solution (2:1 v/v, 5 minutes, 35,000 rpm). The homogenate was filtered on filter paper (Whatman no 40) and the solvent was evaporated under N2 gas. Potassium hydroxide was used for saponification. The tubes were kept in the desiccator (Silica gel) until completely dry. The values obtained are divided by the number of individuals.

Results: In larval stage, the highest total lipid percentage was found in moths reared in wheat flour, while in pupal period it was in those reared in corn flour in females and males. No statistical differences were found between data. The highest total fatty acid percentage was obtained from larvae, pupae and females reared in corn flour.

Discussion: In our study, the result that the highest total lipid and total fatty acid in pupae, females and males were found in corn flour. It can be resulting from the fact that in pre-adult developmental stages, there is a need for high amounts of carbohydrate during metamorphosis and that this need is met from corn flour. Especially, the highest total lipid amount in all stages was found in moths reared in corn flour and there are statistically significant differences.

This study found differences between the total lipid and total fatty acid amounts of *E. kuehniella* which is fed by wheat flour and corn flour. These differences can vary based on the developmental stages of the beetle, on whether it is male or female and on metabolic needs in these stages. As a result of our study, it is recommended to rear the corn flour in the physiological studies that deal with host parasitoid relations of this moth.

Keywords: *Ephestia kuehniella*, wheat flour, wheat germ, total fatty acid, total lipid
Introduction: One of the major carbon sources of rivers is the leaves that are fallen down from trees and reach the water. It has been proven that the activities of certain benthic invertebrates are enhanced by the amount of decaying leaves. Because the composition of the leaf litter is the most important factor in the colonization of the macroinvertebrates. Besides that, both decolonization and colony formation can be effective under environmental conditions. In this study, we aimed to determine leaf package preferences of Odonata and Isopoda larvae and the advantages of leaf packages in faunistic study.

Material and Methods: This study was carried out in Tunca River (Edirne). Three stations were selected in the river and 5 different leaf pack (Platanus orientalis, Ulmus leavis, Morus alba, Juglans regia and artificial Buxus sp.) were used to take samples. A total of 25 packets were placed in the stations. Odonata and Isopoda samples were collected from June 2012 to October 2012. The collected samples were placed in 70% alcohol. Then ANOVA test was used in the analysis of Odonata and Isopoda in time, station and leaf packs and 0.05 α statistical significance was used in all tests.

Results: Variance analysis test showed no difference (p> 0.05) when looking at the difference in the nesting of the aquatic Odonata with respect to leaf types, stations and time. Whether or not there is a difference in colonization according to leaf species of Isopoda was examined by variance analysis test and p <0.05 was found to be different according to the results. It has been shown that this difference comes from the Tukey multiple comparative test result of artificial Buxus sp., which has more organisms in it than others. A total of 8 taxa belonging to Odonata and Isopoda were found during the study. Odonata of these taxa 7; 1 in Isopoda.

Discussion: Although the number of organisms in Odonat and Isopod in the leaf packs was found to be the most intense in artificial Buxus sp., there are few in all leaf variety. This shows us the importance of leaf variety in colonization. The data show that organisms use leaf packaging for protection rather than feed.

Acknowledgement: I would like to express my appreciation to the Trakya University Scientific Research Project Commission, which supported this study (TÜBAP-2011-130).

Keywords: Odonata, Isopoda, community structures, leaf pack, Tunca River
Introduction: Quaternary climatic and environmental oscillations have greatly shaped biodiversity particularly in northern hemisphere. Species distributed in more northern latitudes either have gone extinct or shifted their range into southern parts. While Turkey was never covered by glaciers, temperature drop affected species toward having more structured populations. Cynips divisa is an oak dependent gall wasp species with a wide distribution. Studying geographic distribution of genetic variation across the range of C. divisa in Turkey would make it possible to expose probable effects of the Quaternary changes on a plant depending insect species.

Material and Methods: Two hundred seventy-eight adult gall wasps representing 22 localities were used to isolate DNA, amplify, and sequence mitochondrial cytochrome b gene (cyt b) and nuclear ITS2 region. Sequences were collapsed into haplotypes/alleles and analyzed using several computer programs to reveal genetic diversity, population differentiation, and times of divergence. Major clade separations were evaluated regarding Quaternary period and associated climatic changes.

Results: Sequences produced 115 haplotypes and 15 alleles. Genetic diversity estimates were h= 0.81818, π= 0.01197, and h= 0.31623, π= 0.00167 for cyt b gene and ITS2 region, respectively. Most of C. divisa populations exhibit high diversity. Phylogenetic and diversification analyses point to divergence of major C. divisa lineages around Pleistocene. Dating back as far as the last 2.5 million years seem to create main genetic lineages of the species. Besides, shallow separations during more recent glacial times covering the last 780.000 years appear to play a key role in the formation of contemporary population genetic structure of the species.

Discussion: Current findings on C. divisa indicate that diversity estimates are higher than other oak gall wasp species both from Turkey and Europe. Severe population contractions and expansions have occurred across the range of the species in Turkey. Clade separations together with estimates of times of divergences designate particularly Quaternary climatic oscillations. In most possibly, associated with its host responses C. divisa reacted to those changes. Findings of this study show congruencies with the results of other species studied in Turkey and in the western Palearctic.

Acknowledgement: We thank Abant İzzet Baysal University for supporting this work (Project BAP-2016.03.01.1069).

Keywords: clade age, climatic changes, gall wasp, genetic diversity, quaternary.
Synthesis of Fluorescent Macrocyclic Complexes for Environmental Studies

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Introduction: Macro cyclic and supramolecular chemistry have developed into one of the most active and promising research areas of chemical science, located at the interface between chemistry, physics and biology. An enormous potential exists for future applications in such fields as bio- and nanotechnology, environmental protection, catalysis, molecular electronics and photonics as well as medicine.

Material and Methods: The reagents used were purchased from Sigma Aldrich and Merck. Synthesis of macrocyclic sensor was performed. The sensing actions of the molecular sensor were confirmed by UV–Vis absorbance and fluorescence spectroscopic studies.

Results: The sensing actions of the molecular sensor were confirmed by UV–Vis absorbance and fluorescence spectroscopic studies. Among the various anions, molecular sensor was found to be sensitive to Zn$^{2+}$ ion in aqueous medium.

Discussion: The design of fluorogenic ionophore based upon cyclen (cyclen=1,4,7,10-tetraazacyclododecane), widely used molecular platforms of nitrogen analogue of crown ethers (aza-crown), aiming for the selective and efficient sensing of transition metal ions in water medium for environmental systems. Among the fluorophores, anthracene and some substituted anthracene compounds’ functions are most widely employed due to their remarkable fluorescent properties. Such compounds could aslo be used for in vitro diagnostic assays and competition binding studies in drug development.

Acknowledgement: We thank the Scientific Research Projects Foundation (BAP) of Selcuk University (Konya/TURKEY) for financial support of this work.

Keywords: fluorescence, macrocycle, sensor, environment, complexation.
Prediction of Evaporation From Class A Evaporation Pan with the Use of Penman and Priestley-Taylor (PT) Models

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Introduction: The class A evaporation pan (E_{pan}) reflects the combined effect of meteorological parameters on evaporation. Thus; E_{pan} is used effectively in determining the amount of evaporation from open water surfaces such as lakes, dams, etc. It has been reported by many researchers that evaporation pan data can be successfully used to estimate evaporation from lakes, water storage structures, and other water bodies. However, the problems such as; cost of the class A evaporation pan and the micrometer depth meter inside it, the qualified staff requirements for measuring, the specific environment requirement in the area in which it is located, the situation in which the measurement cannot be carried out (water frozen or overflow of water in the pan or for any other reason) limits the use of this pan everywhere and at all times. In such cases, it may be very useful to know the mathematical model predicted by the meteorological parameters of the evaporation value (for the place of interest). The aim of this study was to testing and evaluating the compatibility of predicted E_{pan} value with Penman and Priestley-Taylor models and of measured E_{pan} value in the station for Samsun city center conditions.

Material and Methods: These models estimated the amount of evaporation from the E_{pan} were tried under the humid climate conditions of Samsun in years 2012 and 2013. Daily meteorological parameters were applied two mathematical models chosen as Penman (1948) and Priestley-Taylor (PT) (1972) and the results were compared with the evaporation amounts from the (E_{pan}) measured in the station. Statistical methods given as regression test (R^2), root mean square error (RMSE), average deviation (AD), average relative percentage error (ARPE), the coefficient of efficiency (CE) were used to find out the success of E_{pan} values measured in the station and predicted by the models.

Results: 2012 and 2013 PT model gave the daily values of 0.50 and 0.65 R^2, the monthly values of 0.93 and 0.91 R^2 respectively. However, 2012 and 2013 Penman model gave the daily values of 0.52 and 0.70 R^2, the monthly values of 0.98 and 0.96 R^2 respectively.

Discussion: In this study, the results of both Penman and PT models gave the good E_{pan} prediction. In addition, Penman model gave the best statistical results. Finally, use of Penman model for evaporation estimate from dam, lake or any water mass is recommended in places with a humid climate such as Samsun.

Keywords: class A evaporation pan, Penman, Priestley-Taylor, model, equation.
Notes on the Aleocharinae (Coleoptera: Staphylinidae) Fauna and Their Ecological Importances in Turkey

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Introduction: Insect is the largest class in the animal kingdom in terms of both the number of species and individuals. Discovered species number is over 1 million. The beetles (Coleoptera) is represented by 386,500 species in 29,500 genera belonging to 176 families. The Staphylinidae family is the largest family of the Coleoptera and animal kingdom. It is represented by more than 56,000 species in 33 subfamilies. Aleocharinae is the largest of these 33 subfamilies. The subfamily has more than 1,000 genera and over 12,000 species in the world. The species can be found in almost any habitat depending on humidity and water. However, they are more common in the banks of rivers, creeks, lake sand dams, wetland sand and wet agricultural areas. Most species are predators of the other arthropods. Also they occur in burrows of some mammals, in the nests of ants and termites. They are belonging to the Myrmecophilous and termitophilous groups, and their body patterns are very similar to the body of ants and termites. The purpose of the present study is to facilitate further faunistic, ecological and other studies on the Aleocharinae of Turkey.

Material and Methods: In the preparation of this list of Aleocharinae in Turkey, it was consulted many taxonomic revisions or reviews that include descriptions of new species or new records from Turkey. In addition, it has been given ecological observations of the authors.

Results: After a review of the literature on the Aleocharinae fauna of Turkey, it was found that 603 species in 92 genera belonging to Aleocharinae subfamily from Turkey have been reported. 219 of them are endemics to this country and represent more than 36 % of the Turkish Aleocharinae fauna. Amongst them, the Attheta represent is the most speciose genus of the subfamily Aleocharinae, with 94 species. 14 of these species are endemics to Turkey. The other most speciose genera are Oxypoda (61 species) and Aleochara (57 species). The Aleocharinae genera with the highest diversity of endemic species in Turkey are Geostiba (75 of 82 species), Leptusa (22 of 27 species), Myrmecopora (5 of 12 species), Drusilla (6 of 9 species) and Meotica (5 of 6 species). While studying on the rate of endemism of Aleocharinae in geographic regions of Turkey; it was found that the most endemic species occured in the Mediterranean region (91 species). The other most endemic species have been reported Black Sea Region (59 species), South East Anatolia Region (32 species) and Aegean Region (27 species). Most species of Aleocharinae have ecological important. For instance, Aleochara, Attheta and Oligota act as parasitoids and predators. They have been considered potential agent candidates for biological control of commercial crops.

Discussion: In detailed studies to be carried out in the future, the Aleocharinae fauna of Turkey will be determined better and the number of present species will increase. Which is still in completely inventoried, because many species remain to be discovered and described. Studies with Aleocharinae species, which is very important for agriculture and forest ecosystems, will help of staphylinids as a biological war agent.

Keywords: Coleoptera, Staphylinidae, Aleocharinae, fauna, endemism, ecology, Turkey.
Introduction: It is essential for the individuals to learn about the nature in which they inhabit and to have nature education in order to protect it. Childhood, consequently, is considerably important. The social studies courses aim to develop sustainable environmental understanding of the students. The best instrument to fulfill this aim is to provide nature education through extracurricular activities. Applied studies on nature education rather than theoretical ones will contribute more to the field of education.

Material and Methods: The aim of the study is to provide this objective through nature education, and the study was conducted in a primary school in the center of Kastamonu in the second semester of the academic year 2015-2016. 43 students participated in the application and the implementation process was carried out by the class teacher. At the beginning of the course, the students were examined about the natural and human elements, and the second step of the course was to create a memorial forest. On the way, students were given two work papers to note the natural and human elements they encountered during the trip. The teacher informed the students and the students prepared the improvisation dialogue. Upon returning to the school, the students wrote a story about nature education.

Results: It was observed that the students were very interested in the activity before and during the nature education activity. In addition, students increased sensitivity to environmental issues such as environmental cleaning and protection of trees. They realized that the growth and development of trees and tree planting took place in a very long time. The students became happy that they would have a tree of their own in the countryside. In the end it was seen that the students reached the skill aimed with nature education by having fun, doing and experiencing.

Discussion-Suggestions: Authorities are expected to help teachers and school administrators do more nature education activities and to do required arrangements on long and exhausting procedures.

Keywords: nature education, social studies, primary school student
Review of the Oxytelinae (Coleoptera: Staphylinidae) fauna of Turkey

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Introduction: Geographically, Turkey—covering an area of over 780,562 thousand km² spanning Anatolia and Thrace—forms a natural bridge between the old world continents of Asia, Africa and Europe. Thus, it is characterised by extremely variable climatic and ecological conditions, associated with a wide range of natural vegetation. Oxytelinae is a widespread and rather big subfamily of Staphylinidae (Coleoptera), comprising about 2,200 species worldwide out of 50 genera. Compared to most other areas of the Western Palaearctic region, the current knowledge of the fauna of the Oxytelinae of Turkey must be considered rather incomplete, although this fauna recently has received substantial attention. They occur in many places, most often in dung, in decaying animal or plant matter, under stones, on plants, under seaweed, in fungi and leaf litter. The majority of the species are free-living, predators of other invertebrates. This study, which aims a general evaluation has been prepared by benefiting from the available studies about the Oxytelinae fauna of Turkey.

Material and Methods: In the review of Turkish Oxytelinae fauna, it was consulted all publications that concern the fauna of Oxytelinae from Turkey, including recent Palearctic catalogue, many taxonomic revisions or reviews that include descriptions of new species or new records from Turkey. In addition, it has been given ecological observations of the authors.

Results: The subfamily Oxytelinae is represented by 130 species belonging to 13 genera in Turkey. 15 species of them are currently known to be restricted to Turkey and represent more than 11 % of the Turkish Oxytelinae fauna. The highest diversity is known from Mediterranean Region of Turkey, with 89 species. The other most species have been reported Black Sea Region (47 species), and Aegean Region (44 species). The Carpelimus represent is the most speciose genus of the subfamily Oxytelinae, with 31 species. 11 of these species are endemic to Turkey. Most species of Oxytelinae have ecological important. According to our observation in the field trips, most of Oxytelinae species can be found in the creek banks, in dung and on mushrooms and many oxyteline species are zoophag, saprophag and mycetophag. In addition, a few of them are feed on leaves and sprout of plants.

Discussion: The Oxytelinae fauna of Turkey and its distribution are still poorly studied and many species are known only from a small number of localities. For this reason, any attempt for more detailed analysis of ecological studies are is very difficult. As detailed systematic and faunal studies are carried out in the future, it is expected that the Oxytelinae fauna of Turkey will be increased. In addition, more studies on the ecology and phenology of Oxytelinae species will be displayed better their ecological roles.

Keywords: Coleoptera, Staphylinidae, oxytelinae, fauna, ecology, Turkey
Evaluation of Mercury and Arsenic Parameters in Underground and Surface Waters of Sinop Boyabat Gökırmak Underwatershed in Terms of Water Quality

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Introduction: Water needs are increasing day by day due to the rapid increase of the population, but due to the decrease of available resources. Gökırmak is one of the largest branches of Kızılırmak. Geologic, hydrogeological, tectonic and petroleum exploration studies were carried out in Gökırmak Underwatershed in the past, but no studies were found in terms of water quality. The most important source discharge in Gökırmak Underwatershed consists of limestone and alluvial filling material. Apart from the sources pouring out of limestone and alluvial fill, it is observed that the geological formations providing mostra in the region were emptied from the fracture and crack systems, and the surrounding settlements were filled with drinking and partially irrigating water needs, and there were a large number of resource discharges under flow 1 l/s. Volcanic rock varieties with granite derivative, andesite–basalt derivative are encountered in the region. Hydrogeochemical properties of water should be determined in monitoring the pollution of water resources and in determining the properties of drinking using water. For this reason, mercury and arsenic parameters which were very harmful in underground and surface water sources in Gökırmak Underwatershed were analyzed and evaluated according to TS 266 and WHO 1998.

Material and method: In October 2017, samples were taken from 14 points, 5 of which were ground water and 9 of which were ground water at Gökırmak Underwatershed and pH<2 was preserved. Mercury and Arsenic analyses were carried out in ICP–MS device according to EPA 200.8 of the samples.

Results: The lowest value was 0.63 µg/L and Arim Creek at 14 points with surface and ground water determined in Gökırmak. The highest value was 13.1 µg/L at Çarşak Creek. The value of Arsenic limit in WHO and TS 266 is 10 µg/l and the Mercury limit is 1 µg/l. The value of Arsenic limit in WHO and TS 266 is 10 µg/l and the Mercury limit is 1 µg/l. All other points in the field of study except çarşak stream arsenic was lower than the limit value. As a result of Mercury analysis, all points were measured as <0.05 µg/l.

Discussion: Since Gökırmak Underwatershed is at lower levels in terms of urban development, human-induced pollution is less. Therefore, water resources are less polluted. Therefore, the Mercury and Arsenic values with pollution parameters do not exceed the expectations. Only 13.1 µg/L arsenic value observed in Çarşak Creek stream exceeds the WHO and TS 266 limit value. The reason for this is thought to be the granite-derivative magmatic rocks in the Dodurga Barrage region in the nutrition area. Çarşak Creek is not used by the local people for drinking and use purposes, but because it is used in irrigation, there is no need for an additional study on arsenic removal.

Keyword: water, mercury, arsenic, Gökırmak underwatershed
DNA Barcoding and Phylogenetic Characterization of Anopheles (Diptera: Culicidae) Species in Sultan Marshes Ecosystem

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Introduction: Identification of Anopheles species based solely on traditional morphological characters may be hindered by morphological variation and the occurrence of cryptic species. Given the limitations of traditional taxonomy for Anopheles species identification, various molecular markers have been used to confirm previously defined morphospecies and to uncover hidden biological diversity. In this study, the adult female Anopheles specimens collected from Sultan Marshes Ecosystem were analyzed for identification and phylogenetic characterization of the species based on the barcode fragment (658bp) of mt-COI gene.

Material and Methods: Mosquito samplings were utilized between June and August of 2016 by using light traps with CO₂ supply in the study. The female specimens belonging to Anopheles spp. were separated from collected insect species and morphological identifications were utilized according to the published keys. Genomic DNAs were isolated from individual specimens and subjected to PCR analyses with the common primers amplifying barcode mt-COI gene region. PCR products were purified from agarose gel and sequenced in both directions with PCR primers. Finalized sequences were searched in the GenBank database by using BLASTn algorithm to compare fragments and constitute the data set for phylogenetic analyses of mt-COI.

Results: A total of 1225 Anopheles specimens were collected during the research period and the most prevalent species was determined as An. sacharovi (94.0%) followed by An. maculipennis (5.0%) and An. claviger (1.0%). PCR products of 15, six and four isolates belonging to An. sacharovi, An. maculipennis and An. claviger, respectively were included in sequence analyses. 558 (84.8%) identical sites were determined among the mt-COI sequences belonged to related Anopheles species while 100 polymorphic sites were designated leading to detection of nine different haplotypes. Six, two and one haplotypes were characterized within the An. sacharovi, An. maculipennis and An. claviger, respectively. Intraspesific nucleotide differences of 0.5% and 2.1% were determined for An. sacharovi and An. maculipennis.

Discussion: Anopheles species prevalent in the Sultan Marshes Ecosystem have been determined with the current study. The phylogenetic characterization of the species belonging to generations corresponding to the related species have been revealed using mt-COI DNA barcodes. Considering the malaria and other mosquito-borne diseases, our results emphasized that Anopheles species particularly An. sacharovi, have constituted significant risk potential to public and animal health in the region. In this respect, there is a need for surveillance and assessment of risk analysis for the corresponding Anopheles species on the base of vector-pathogen-host relationship.

Acknowledgement: This study was supported by The Scientific and Technological Research Council of Turkey (TUBITAK) with the project code 114O646

Keywords: Anopheles sp., Sultan Marshes, mt-COI, phylogenetic characterization
**ORAL PRESENTATION**

**Molecular Characterization of Poultry Red Mite, *Dermanyssus gallinae* Lineages in Central Anatolia Region of Turkey**

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**Introduction:** *Dermanyssus gallinae* also known as the poultry red mite (PRM), is an obligatory bloodsucking ectoparasite of both wild and domestic birds and is widespread around the world. It causes huge economic losses in the poultry industry. The purpose of this study was pointing out the genetic diversity of *D. gallinae* lineages infesting laying hens from some chicken farms located in Central Anatolian Region of Turkey by analyzing mt-COI gene region and comparing them with the haplotypes obtained in the other countries.

**Material and Methods:** The mite specimens were collected between May and August 2017 from five laying farms in Nevşehir and Kayseri provinces in Turkey after acaricide applications and transferred into the vials containing 70% ethanol. Genomic DNAs were isolated from individual mite specimens and subjected to PCR analyses with the primers amplifying partial mt-COI gene region. PCR products were purified from agarose gel, cloned and sequenced in both directions by vector specific primers. Finalized sequences were searched in the GenBank database by using BLASTn algorithm to compare fragments and constitute the data set for phylogenetic analyses of mt-COI.

**Results:** A total of 4000 mites comprising 2330 adults, 1275 nymphs and 395 larvae were counted in collected material. All the mites exhibited specific features of *D. gallinae* according to the described keys. Sequences of totally 100 isolates from each development stage were included in COI data set. There were 68 polymorphic sites distributed among the COI sequences leading to the detection of 6 (TD1 to TD6) haplotypes. *D. gallinae* mt-COI sequences from Turkey and the other countries clustered into 6 haplogroups in which A, B, C, D, and E were previously reported. The haplogroup F was firstly identified with this study and included the all common haplotypes (TD1 to TD4) of Turkish mite isolates.

**Discussion:** Our findings suggest that *D. gallinae* lineages within the haplogroup F are probably indigenous and might have independently evolved in Turkey. We have also detected further two haplotypes TD5 and TD6 within haplogroup E and A which have been already reported from several countries with less distribution in the region. Consequently, our study provides first data on the genetic characterization of *D. gallinae* lineages in Turkey and their risk factors in laying farms. However further studies based on larger scale samplings from different regions of Turkey are needed to clarify the genetic composition of indigenous PRM populations.

**Acknowledgement:** This study was supported by Erciyes University Research fund with the Project code TSA-2016-7028.

**Keywords:** *Dermanyssus gallinae*, hen, molecular characterization, Turkey
An Analytical Approach to Salinity Problems of Coastal Turfgrass Areas

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Introduction: By virtue of the global climate change effect, surface waters decrease and therefore the use pressure on underground water resources increases and underground water level decreases. In coastal areas, with a decrease in ground water level, sea water by which leaching into the ground water mixes with the ground water and leading to the salinization. Salinity stress, one of the most important abiotic stress factors, affecting on plant development has become a more significant problem for turfgrass management in many areas.

Results: The coastline of Antalya, especially the golf course, has large amounts of turfgrass areas. Due to the decline in fresh water availability, in efforts to conserve fresh water resources, non-potable water, such as recycled, effluent or reclaimed water may become a major source of irrigation for turfgrass particularly in semi-arid and arid areas. In salt-affected sites, for maintenance of desirable turf quality is required turfgrass varieties which are more tolerant of the salinity stress caused by poor soil or poor irrigation water quality. Hence, development of salinity tolerant cultivars is crucial for long-term sustainable turfgrass management. For example, a research (Sarıca, 2014) has shown that, *Paspalum vaginatum* is the most resistant to salinity, *Cynodon dactylon* and *Zoysia japonica* are resistant to medium tolerance and *Eremochloa ophiuroides* is the least resistant to salinity.

Discussion: Genetic diversity is crucial for developing salinity tolerant cultivars from turfgrass breeding population, and also serves as the foundation to dissect the genetic network controlling salinity tolerance for geneticists and molecular biologists. Natural variations, tolerant to salinity have been studied in several turfgrass species. In this study, to give information about the studies on turfgrass species / varieties, which are tolerant to increasing salinity in the golf and football areas, especially located on the coast is aimed.

Acknowledgement: We would like to express our appreciation to the Scientific Project Coordination Unit of Akdeniz University.

Keywords: turfgrass, salinity stress, coastal areas
Bank Erosion in Response to Different Stream Orders (1st, 2nd) and Precipitations

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Introduction: Soil erosion by water is an important issue for not only water quality standpoint but also for the quality and productivity of soil to produce goods to feed nations. Streambank erosion along the different stream system/orders (gully, 1st, 2nd etc.) can be accounted for the major portion of the total erosion yielding from a watershed. Factors affecting streambank erosion are land-use, soil type, stream hydrology and morphologic characteristic including sinuosity and slope. The purpose of this study is to quantify streambank erosion along the different stream orders of Olur sub-watershed within the Coruh River Basin.

Material and Methods: The erosion pin method was used to measure the stream bank erosion rates for a one-year period. The total streambank areas and the lengths of stream networks, soil bulk densities from the bank areas and erosion rates were measured to calculate total soil loss via stream bank erosion.

Results: The average erosion rate for the first one year period was 10.1 cm. According to stream classification system by Strahler, the total stream bank soil loss rates from the second-order stream (main channel), first-order streams, and the gullies in Olur sub-watershed were calculated as 8, 311, and 310 tons/km/year, respectively. Result showed that soil loss from the banks of entire stream network of Olur sub-watershed was considerable high (2.25 ton/ha/year).

Discussion: Since gully and streambank erosion under the effects of many spatial and temporal scale effects and their interactions, their contribution to total sediment yield from a watershed covers wide ranges from 7 to 92% (Fox et al., 2016). In this study, higher rate of sediment contribution from the bank erosion is mainly related to single storm event accured during the study period.

Acknowledgement: This study was supported by the Coruh River Watershed Rehabilitation project (2012–2019) in a consortium with the Turkish General Directorate of Forestry and the Japanese International Cooperation Agency (JICA).

Keywords: Coruh River Basin, stream bank erosion, water pollution, reservoir siltation
ORAL PRESENTATION

Design and Analysis of Species-Specific Artificial Reef Models to Determine Shelter-Preference Behaviour of *Homarus gammarus* in Erdek-Ocaklar, Turkey

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Introduction: European lobster (*Homarus gammarus*, Linnaeus 1758) is a most common and important species in the Mediterranean Sea, and has a great economically value for human consumption although there are two species belong to Nephropidae family that are *H. gammarus* and *Nephrops norvegicus* in the coasts of Turkey. The main purpose of this study is to determine the shelter-preference behaviours of European lobster by design and analysis of the possible species-specific artificial reef models.

Material and Methods: Six different species-specific artificial reef models were designed by wooden, iron, and concrete materials. These models were grid model (wooden and iron bar materials), plate model (sheet metal and concrete materials), U-type model (concrete material), and chimney cap model (concrete material). A total of 18 artificial reefs (3 for each model) were deployed on the bottom according to the deployment plan at 10, 15, and 20 m water depth. Transect and quadrate monitoring methods as visual census technique were carried out by SCUBA divers that have ability to estimate the species in a monthly period at the same time of the day (10.00-12.00 am). Also, underwater video records were captured by GoPro underwater camera and Nikon CoolPix digital camera.

Results: A total of 569 individuals belong to 20 species were counted. The target species *H. gammarus* (totally 14 individuals) were only observed in two different artificial reef models. They only preferred concrete materials as nesting environment such as U-type model (width × length × height × thickness; 400 × 500 × 200 × 60 mm) and plate model (width × length × height × thickness; 400 × 800 × 50 × 50 mm). Juveniles preferred plate model while adults preferred U-type model. Furthermore, *H. gammarus* only preferred the models at 20 m water depth.

Discussion: The results of this study revealed that *H. gammarus* only preferred concrete materials as nesting environment. The concrete artificial reef models were found relatively successful between designed and analyzed artificial reef models. The relationships between the sizes of artificial reef models and species should be investigated by comparing concrete models at different sizes in further studies. This paper also suggests that more researches on concrete artificial reef models should be carried out to ensure the sustainability and to protect of the stock of this species for future researches. However, there is lack of knowledge about the shelter-prefer behaviours of individuals after releasing or introducing to the natural environments. Therefore, reared lobsters should be released into concrete artificial reefs to ensure the sustainability of species in further researches.

Acknowledgement: This study was supported by Çanakkale Onsekiz Mart University Scientific Research Project Coordination Unit (Project Number: FBA-2015-437).

Keywords: species-specific artificial reef, European lobster, *Homarus gammarus*
Introduction: Information about the distribution of aquatic insects is limited because of lack of ecologic information it is really necessary to know the ecologic information (the demands of oxygen, life conditions etc.) to learn the major factors which affect the distribution of aquatic insects. It is not easy to collect the aquatic insect from their natwal environmental and grow them up in the lab, besides it is not too difficult to make it. By creating a controlled growing environment, it is possible to obtain more reliable information by observing the life story of aquatic insects better. In this study, it is aimed to grow up the individuals belong to trichoptera which is one of the most important groups of sweet water benthic macroinvertebrates, in the lab.

Material and Methods: This study is practiced with 446 larvas belong to trichoptera team were collected with kick-net methods from Daday stream, Karasu brook the local of Set alabalik facility and the local of ersizlerdere Kara Cehennem brook, between March-October in 2017 standard fish aquarium as growing environments is prepared according to habitat conditions where samples are collected.

Result: With this study totally 44 adult individuals including 2 individuals from the species of Rhyacophila nubila, 2 ones from Philopotamus montanus, 1 individual from the species of Hydropsyche angutipennis, 18 ones from the species oh Hydropsyche bulbifera, 1 individual from the species of Hydropsyche dinarica, 20 individuals from Hydropsyche instabilis are obtained. In the scanning of literature, it has not been practice of like this study, so this study is the first sample of this field.

Conclusion and Discussion: At the end of the study, growing success is observed mastly in the species of H. bulbifera with % 15,6 success rate of the species which is grow up in the lab. This is followed the species of H. instabilis % 14,2, H. dinarica % 5,4, H. angustipennis % 2,8, P. montanus % 2,8, R. nubila % 2,5 respectively. This study show that trichoptera larvas can be grown in the area of lab and they can be used in the different experiment areas for the information’s that belong to their ecology.

Keywords: Trichoptera, rearing, growing up, ecology, lab culture, diagnosis
Temporal and Spatial Trends of Growing Degree Days in the Western Black Sea Region, Turkey

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Introduction: There is an important relationship between temperature and plant development because temperature is one of the most fundamental environmental factor controlling the various phenological phases. As a measure of growth season intensity, which is based on actual temperatures, growing degree days (GDD) is a simple and accurate method commonly used to predict the growth of living things and plants. However, temperature has fluctuated from year to year depending on the climate region of the world. As a result of climate variations, environmental and ecological disruptions are experienced in some regions of Turkey. Western Black Sea Region, which is an important ecosystem of Turkey, is one of the sensitive areas to climatic risks. Monitoring thermal and vegetation sources in such areas is an important task to determine regional and local ecosystem potential. The aim of this study is to determine trends of the GDD in Western Black Sea region and to examine the spatial pattern of the GDD in different periods.

Material and Methods: In this study, daily temperature records were used to calculate the GDD of the stations in the Western Black Sea. The Mann-Kendall trend analysis method was applied to determine positive and negative trends in GDD. Finally, the spatial pattern of GDD was determined by using interpolation methods via Geographical Information Systems.

Results: The climate of the Western Black Sea Region is controlled by many factors on a global and local scale. In this respect, the temperature of the area has a variable structure. According to the results, GDD shows significant changes in the positive direction, similar to the daily temperature records. Particularly, annual GDD trends showed a positive trend at all thresholds that used in this study. The only negative trend at the GDD₀ level found for the Çankırı station. Significant positive trends in annual GDD have been determined several stations such as Akçakoca, Zonguldak, Bartın, Amasra, Bozkurt, Sinop, Kastamonu, Tosya, Ilgaz, Bolu and Düzce.

Discussion: According to many prediction models for climate change and global warming, temperatures of Turkey and the surroundings will continue to rise. The Western Black Sea region will also become a more sensitive region in terms of ecological and environmental aspects due to these climate changes. Temporal and spatial shifts occur in phenological activities in the region depending on temperature variables. As a result, inter-annual variability of GDDs shows statistically significant positive changes over the period of 1970-2013, which confirms global warming tendency.

Keywords: Western Black Sea Region, ecological effect, growing degree days, trends, climate variables
Invertebrates that Get on Noah’s Ark: Kayseri Example in National Biological Diversity Inventory Studies

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Introduction: In terms of invertebrate animals; Turkey is the country with the richest biodiversity in Europe and the Middle East. It is ninth in terms of biodiversity across Europe. However, data are based on the estimated number of invertebrate species in Turkey. For the purpose of revealing and protecting the biological diversity, the “National Biological Diversity Inventory and Monitoring Project” was prepared by the Ministry of Forestry and Water Affairs, the Directorate General for Nature Conservation and National Parks, and it was approved by the Ministry of Development in 2013. It is planned to introduce the Biological Diversity Map of our country by completing these studies in 81 provinces by 2019. The obtained data is processed as "Noah's Ark Database”. In this context, Biological diversity of invertebrate of the Kayseri province has been investigated.

Material and Methods: The literature searches for invertebrate groups were based on current nomenclature. On the internet; each class, order, and family name is written as a separate keyword in search engines and crawled. Some theses, books and articles which can not be reached to the electronic form have been obtained from the national thesis center or other libraries through the Atatürk University Library.

Results: As a result of the literature study, 2285 taxa of 2203 species and 81 subspecies belonging to 273 families have been recorded. The highest species/subspecies were recorded from the Coleoptera (481/27) and its families. This is followed by Lepidoptera with 454 species, and Hymenoptera with 333 species/subspecies. 35 of the species identified are endemic. Of the species identified according to IUCN, 127 LC; one NT; one in the DD category. According to IUCN, 125 species of LC, one species of NT and one species of DD from Lepidoptera; There are two species of LC from Coleoptera. IUCN data for all other invertebrate groups are not available.

Discussions: It has been estimated that the high biodiversity rate of the Kayseri province is mostly attributed to the Sultansazlığı, which is registered as the Ramsar site, and the Erciyes Mountain, which is characterized by the relict. When some topics such as endemism status, IUCN status, Turkish name are evaluated together, it is seen that the most detailed information belongs to Lepidoptera (butterfly). There were only 9 endemic species from this order and 2 species in the LC category according to the IUCN, with the highest number of Coleoptera with a taxa number of 508. This is due to the very limited work on the "endemic situation" and "IUCN status" of Coleoptera families. There are many invertebrate groups in Turkey that have not yet been researched. Similarly in the field of research; it is estimated that the number of true species / subspecies is much higher than that mentioned here, considering lack of faunistic studies on many invertebrate groups. Therefore, planning of faunistic studies on unstudied groups of invertebrates in the research area will provide an important contribution to the biological diversity of Kayseri and Turkey.

Acknowledgement: I thanks to Ministry of Forestry and Water Affairs for financial support.

Keywords: national biological diversity inventory studies, invertebrate, Kayseri, Turkey
Determination of the Green Turtle Mortality Rate at Yumurtalık Bay (Northeast Mediterranean) in Pelagic Bluefish Longline Fishing

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Introduction: 99% of green sea turtle nests in the Mediterranean are located in Turkey and Cyprus coast. In addition, 78% of these nests are located in the three regions of Turkey (Kazanlı, Akyatan, Samandağ) and two region of Cyprus (North Karpaz, Alagadi). Yumurtalık Bight is a region between these three major nesting sites in Turkey and juvenile individuals in this bay are intensely observed. Bluefish catching made with pelagic longline throughout a year in this area. Some mullet species are used as bait in this longline. In field studies conducted in the region, juvenile green sea turtle individuals were observed to be caught while feeding on these baits. However, there is no numerical information about the number of individuals caught and how much of them have been killed or damaged. In this study, it was attempted to estimate how many individuals were captured and mortality rates of these individuals, depending on the longline fishing carried out in the region.

Material and Methods: Project personnel participated in 17 operations carried out by professional fishermen between January 2017 and January 2018 in order to obtain the data. In these operations, the number of individuals fed with bait, the number of individuals caught in the hook, and the manner of catching were recorded and the total mortality rate of the entire fishing fleet was calculated.

Results: The results showed that about 175 individuals were caught on this fishing gear a fishing season. In addition, it has been estimated that 60-65 of these individuals have died. Therefore, the mortality rate due to bluefish fishing was determined as 60-65 individuals/year. It has been determined that green sea turtles are caught between 08:00 and 12:00. It has been observed that the green sea turtles have been captured from two different regions to the hook, the outer surface of the body and the mouth. None of this manner of catching lead directly to mortality. Because, the fisherman removes hook from caught individuals and released. However, some of the captured individuals changed the some parts of fishing gears position; so these part of fishing gear was lost. It is not possible for these individuals to perform their daily activities (search food, feeding etc.) while carrying the fishing gear (weight: 300-500gr, main line: 18-20m; and plastic floater). This most likely causes their deaths.

Discussion: Green turtle is classified as "endangered" on the IUCN red list. For this reason, these mortality in a small region are so important. Therefore, more detailed studies should be done on this fishing method and necessary precautions must be taken to protect the green sea turtles.

Acknowledgement: We would like to express our appreciation to the Çukurova University Scientific Research Project Commission, which supported this study (FED-2017-9133).

Keywords: Chelonia mydas, mortality, longline, Iskenderun Bay
Introduction: Insecticides are preferred because of their easy applicability in combating pest insects and their short-term results. Insecticides used over dose and unconsciously in agricultural areas cause ecological damage. Also; the use of over dose insecticides in agricultural areas has led to the development of insect resistance. Since the resistance mechanism developed is genetic, it is transmitted to later fertilizers. For this reason, it is important to apply the insecticides in the restricted areas and in the optimal amount. Insects increase their detoxification capacities to protect themselves from insecticides. Detoxification mechanisms are based on the breakdown of insecticides before reaching the target area. The most important detoxification enzyme in insects are Glutathione-S-Transferases (GST). GST enzyme in insects has a role in protection of cellular membranes against oxidative degradation as well as detoxification mechanism. Galleria mellonella may be used as a model organism for understanding the insecticide resistance mechanism.

Material and Methods: Artificial diet containing an old dark honey pellet (broodstock) ground to grow the larvae of G. mellonella under laboratory conditions were used. This diet, utilized for the continuation of the G. mellonella culture, was also used as a control diet in experiments conducted to investigate the effect of different concentrations of antibiotics on toxicological effects of the seventh stage (last stage) larvae. Hemolymph was removed from larvae reaching stage 7 and stored at -80 °C until analyzed. The changes in GST enzyme activity from the obtained samples were analyzed using spectrophotometric methods.

Results: These studies have shown that the GST enzyme activity of G. mellonella vary with concentrations of antibacterial and antiviral drugs in different tissues. Xenobiotics and some antibiotics have been observed to increase the GST enzyme activity of G. mellonella.

Discussion: Developing the resistance mechanism of insects; may lead to an increase in the dose of insecticide used in chemical management. Therefore; the use of intensive medicines in pesticides that have developed resistance may increase the cost and may also adversely affect the environment and the economy of the country. Studying the insecticide resistance and determining which chemical resistance the insects develop will allow alternative methods to be developed. The most important biochemical indicators for insecticide resistance are Glutathione-S-Transferase enzymes. The determination of the effects of chemicals on insect detoxification enzymes and the investigation of less toxic alternative chemicals are very important issues in terms of the ecological environment.

Keywords: insecticide resistance, detoxification capacity, pest insect, Galleria mellonella
Development of Ecoregion-Based Taper Systems for Taurus Cedar

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Introduction: Taurus cedar (Cedrus libani A. Rich) forests are economically and ecologically one of the most important forests in Turkey. It is presently found primarily in the Taurus Mountains of Turkey. Taurus cedar forests cover an area of about 482391 ha with a current standing volume of approximately 27.4 million m³. In this context, knowing the state and limitations of growth and yield of Taurus cedar forests in the Taurus Mountains is necessary for improving future management and planning strategies of timber resources. However, information regarding growth and yield is currently lacking in Turkey. Moreover, in recent years, Turkey has adopted the principles of multipurpose and ecologically based forest management. The ability to predict the growth and yield of forest stands located in various climates and site conditions is critical in the development of ecologically based management plans and strategies, which are essential for long-term strategic planning. The objective of this study was to develop ecologically based merchantable volume systems for cedar.

Material and Methods: Mediterranean Region divided four major subregions: Maritime, Interiors of Mediterranean, Lakes, and Backside of Mediterranean ecoregions. The first three are found within the geographic region encompassed by this study. A total of 145 trees were felled from different ecoregions and natural stands located throughout the area of distribution of Taurus cedar in the Taurus Mountains of Turkey to develop the models. Taper data from 362 trees were collected in. Kozak taper equations was selected and evaluated in this study. To compare the differences in the analyzed taper functions among different ecoregions and species, we used the nonlinear extra sum of squares method.

Results: All the parameters were significant at $P < 0.05$ in the model of Kozak. Depending on the ecoregions, the multicollinearity of the model was from low to moderate, as inferred from the condition number. This result indicates that on some occasions slight problems with multicollinearity may appear; however, these problems are of little practical importance.

Discussion: In this study, the results of the $F$-test revealed that different parameter estimates are necessary for each ecoregion and species. These results are not surprising given that different ecoregions have different bio-geoclimatic conditions. These differences may be caused by the fact that the site conditions of the Mediterranean sub region are most suitable for the growth of cedar. Ecologically based taper equations provide more accurate volume prediction than common models and assist in achieving sustainable management.

Acknowledgement: The present study was financially supported by the Scientific and Technological Research Council of Turkey (Project no: 109 O 714).

Keywords: taper model, segmented model, ecoregion, cedar
Comparison of Fatty Acids and Amino Acids Profiles of Whiting (Merlangius merlangus euxinus Nordman 1840) Meat and Roe During Fishing Season

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Introduction: Within the scope of the study, the whiting meat and eggs were examined in view of its fatty acid and amino acid composition during fishing season in Black Sea. The nutritional quality of fish meat and eggs were compared in the study.

Material and Methods: The study was conducted within the legal fishing period and the sampling was carried out once a month as 2 replications 2 parallel in Sinop, Turkey. Amino acid analysis was performed after digestion-HPLC column pre-derivatization method, fatty acids composition according to IUPAC method IID-19 method.

Results: The amount of SFA, MUFA and PUFA were between 35.42-43.42%, 25.60-38.21%, 18.00-35.93% in fish meat; 27.74-33.90%, 53.47-58.45%, 10.63-13.13% in fish roe, respectively. The content of oleic acid in meat was found at maximum level at March, while the amount of omega 3 was maximal in April. Fish eggs were higher in saturated fatty acids like butyric acid, stearic acid, heptadecanoic acid and myristic acid. EPA, DHA contents of fish meat and eggs were 7.42-10.72, 3.39-22.67g/ 100g, 4.47-14.01; 0.03-0.37, 3.79-4.76 g / 100g, respectively. All of the essential amino acids were detected in whiting meat and roe. Lysine was the highest essential amino acids in both meat and roe in all of the months. The amounts of lysine and glutamic acid in fish meat were higher than in eggs. The content of glutamic acid in fish meat was found higher than in fish roe during the study. The histidine amino acid content of the meat and roe ranged from 224.5-438.3 mg/kg. The ratio of essential amino acids to non-essential amino acids (EA/non-EA) in meat and egg were found to be maximal 0.9 in March and 0.9 in January and February, respectively.

Discussion: It has been found that whiting meat and egg contain high amounts of essential fatty acids and amino acids. The nutritional quality of fish meat and egg varies seasonally. Otherwise the umami source aromatic amino acids content of fish meat higher than roe. It can be said that whiting meat consumed lovingly by the consumer for this reason.

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Keywords: whiting, fish roe, amino acids, fatty acids, EPA, DHA.
ORAL PRESENTATION

The Effects of Different Altitudes on Some Biochemical Parameters of *Ricania japonica* (Melichar, 1898) (Hemiptera: Ricaniidae) Eggs

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**Introduction:** *Ricania japonica* (Melichar, 1898) is a pest insect that widespread in the Black Sea Region of Turkey and causes significant economic loss in agricultural areas. In the present study we investigated the effects of different altitudes on total protein (TP) levels, important oxidative stress marker malondialdehyde (MDA) content and detoxification enzyme Glutathione-S-transferase (GST) activity of *R. japonica* eggs collected from *Camellia sinensis* (tea plant).

**Material and Methods:** *R. japonica* eggs were collected from four different altitude (0, 100, 200, 300 m) in Ardeşen /Rize. Collected eggs from *Camellia sinensis* were used to determine the lipid peroxidation product, MDA content, and detoxification enzyme GST activities. Samples were stored in -80 until biochemical analyzes were performed. Protein concentrations were determined according to the method of Lowry et al. (1951) by using bovine serum albumin as a standard. MDA content were determined as a indicator of lipid peroxidation. GST activity was assayed by measuring the formation of the GSH and 1-chloro-2,4-dinitrobenzene conjugate. Assays were replicated four times. To determine significant differences between means, Mann-Whitney U test (SPSS 1997) was used.

**Results:** It has been determined that MDA content increased depending on the altitude. It was recorded that there was a statistically significant increase especially at 200 m and 300 m when compared with control group. GST activity was significantly increased in 100 m. TP content of eggs were significantly decreased according to control.

**Discussion:** Our results show that altitude caused oxidative stress on the *R. japonica*. From increased activity of the enzyme which is responsible for detoxification against oxidative stress, we infer that this insect has developed high tolerance against the stress factors which may be caused by the altitude. According to previous researches, *R. japonica* has been reported to be highly resistant, highly adaptable to environmental conditions and also exhibiting a very wide spreading range.

**Keywords:** *Ricania japonica*, altitude, MDA, GST
Morphological Characteristics of Males of *Culicoides alazanicus* Dzhafarov, 1961 and *C. griseidorsum* Kieffer, 1918 (Diptera: Ceratopogonidae) from Sinop Province

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**Introduction:** The genus of *Culicoides* Latreille, 1809 (Diptera: Ceratopogonidae) has more than 1400 species and a wide distribution in the world. These biting-midges are about 1-3 mm in length. Their larvae and pupae live in aquatic and semi-aquatic habitats. Adults are found around these breeding sites. Females of *Culicoides* suck blood but their males feed on flower nectar and plant sap. A total of 61 *Culicoides* species are known in Turkey. 6 of them were identified in Sinop. While *C. alazanicus* was reported from Bartın, Zonguldak, *C. griseidorsum* is known only from Samsun in Turkey. In this study it was aimed to contributions for the Sinop *Culicoides* fauna.

**Material and Methods:** This study was carried out in Akliman District (42°02'28.3"N 35°02'26.7"E) of Sinop Province from May to November 2014 and from June to November 2015. The midges were caught using 6 V CDC miniature light traps and 18 W, 12 V black fluorescent lamp traps. The collected samples were stored in 70% ethyl alcohol. *Culicoides* specimens were mounted on microscope slides in phenol-Canada balsam. Preparations were investigated under the light microscope, and taxonomic measurements such as palpal ratio, antennal ratio, costal ratio, tarsal ratio were calculated.

**Results:** A total of 21 females and 6 males of *C. alazanicus* and 6 females and 1 male *C. griseidorsum* was examined in Sinop.

**Discussion:** In this study, males of *C. alazanicus* and *C. griseidorsum* species are described and their taxonomic characteristics were determined for the first time from Sinop in Turkey.

**Keywords:** Sinop, Diptera, Ceratopogonidae, *Culicoides*, biting-midges
Making of Landscape Planning of Amasra’s Bioclimatic Comfort Area for Using Thermal Band

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Introduction: In Amasra the regions are coastal, interior and mountainous. Bioclimatic comfort are used to evaluate whether coastal, urban and rural landscape planning can provide bioclimatic comfort for landscape planning and management strategies without urban island effect. The results of bioclimatic comforts in these areas have been evaluated in relation to climatic data for using Landsat imagines. The results have been compared and researched to find out if they are sufficient in the area.

Material and Methods: Solving land use problems is not appropriate for the rural and urban areas that are most suitable for land use. Undesirable and unplanned developments in the use of coastal and urban land in our country have increased the losses caused by soil erosion. In this study, Amasra Thermal Band analysis was performed to determine the bioclimatic comfort values of different coastal areas. In addition to describing the thermal islands in the shallow areas, satellite images can be applied to evaluate the thermal urban environment. In this context, it was tried to produce a temperature map by analyzing the surface temperature (LST) of the Landsat TM5 satellite image. Landsat 5 images were obtained from the USGS for the study area.

Results: The use of Landsat bands in the study area has been mapped with the classification that is controlled by the maximum probability classification algorithm of ERDAS imagine 2016 software. The Normalized Difference Plantar Index (NDVI) image was generated using Landsat images. The digital number of the Landsat thermal infrared band (10.40 - 12.50 μm) is converted to spectral radiation. Surface emission calculated using NDVI. The spatial pattern of surface temperature in the study area was taken to describe the local effects on the coastal area. Areas with bioclimatic comfort and ecologically urbanized areas are interpreted with different graphic presentation techniques. The results obtained are important because they create databases for sustainable landscape planning and provide a direction for planners and managers.

Discussion: As a result of rapid changes in land use, rural ecosystems and quality of life are deteriorating and declining. In the presence of increasing building density, natural and cultural resources need to be analyzed in detail for people to live comfortably. For this reason, optimal land use planning should be done in the rural area. As a result of the work, a preliminary guide to landscaping planning and design strategies for coastal areas was reached. There may be bioclimatic map analysis results for coastal, interior and mountainous regions in Amasra. Used for places with similar climatic conditions.

Keywords: thermal Band, NDVI, ERDAS, Amasra, bioclimatic comfort
Preliminary Results of Litterfall and C&N Contents of Litterfall in Black pine (Pinus nigra Arn.) Forests at Different Development Stages in Çankırı

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Introduction: Litterfall constitutes the majority of the source of the organic layer (forest floor) and the humic materials above soil in forest ecosystems. Amount of litterfall is affected by species, climate and soil productivity while tree growth and net primary production are affected by litterfall. As described litterfall is an important ecosystem process that rarely have been quantified for conifer forests in Turkey. Thus this research was carried out on the black pine (Pinus nigra Arn.) forest ecosystems in Çankırı province where the aim was to determine the amount of litterfall, carbon and nitrogen content of litterfall among different stand types in different time periods.

Material and Methods: There were three different age classes and 4 sampling area on each age classes. Nine litter traps were placed on each sampling area and totally 108 litter traps were placed in this study area. Litterfall was collected from all litter traps seasonally for one year and the amount of litter fall was estimated for 1 m² where the knowledge of 0.113 m² area of litter traps were used. C and N contents of litter were analyzed by dry combustion method where CN analyzer was used.

Results: According the preliminary results of this study the most litterfall, C and N amount of litterfall were occurred in young age class (ab stand type) black pine forest and they were 515, 272 and 8.7 g m², respectively. These amounts were approximately 70-75% more than those in middle and old age classes were. In all age classes more than 90% of litterfall was accumulated by needles and the rest was a mixture of bark, male cone, twig, cone and the rest. Although black pine is an ever-green species it has been calculated that needle fall was varying among the seasons and especially most needle fall was occurred in autumn where it was 3 to 10 times more than those in other seasons.

Discussion: Calculations about the amount of litterfall presents very important information about the forest ecosystem functions such as primary production, carbon and nutrient cycles. In forest ecosystems C and energy transfer are related to the amount of biomass produced as a result of photosynthesis. The change in net primary production of plants also affects the annual amount of litterfall. At the present study the knowledge of litterfall and its’ C-N content will help researchers to be able to model future ecosystems functions of these measured areas.

Acknowledgement: We would like to express our appreciation to the TÜBİTAK, which supported this study (TÜBİTAK-COST - 215O572).

Keywords: Pinus nigra, litterfall, carbon, nitrogen.
Introduction: Phytoplankton, as a very reactive element of the lake ecosystem, is first to react to changes in the environment. These changes concern both quantitative and qualitative phytoplankton structure. Obruk Reservoir is a reservoir built on Kızılırmak River in Çorum between the years of 1996-2007 to produce irrigation, drinking water and energy. This study constitutes only a part of the biodiversity works carried out at the Obruk Reservoir. In this context, it is aimed to determine the water birds belonging to the dam and to determine the microbiological and physicochemical quality of the reservoir water taken from different localities.

Material and Methods: Eleven stations were chosen in different areas of Obruk Reservoir. The samples were taken from these stations in February 2018 and April 2018 horizontally at a depth of 0.5 meter using ruttner water sampler with one liter capacity. In the field, phytoplankton samples were placed in 250 ml dark bottles and fixed with Lugol’s solution. In the laboratory, 5 ml of water was poured into objective slides for microscopic analysis. Phytoplankton species were identified according to widely used taxonomic keys.

Results: In the winter period, the highest number of organism was recorded at St.9 and St.10, but in the spring period at St.8 and St.10. The total number of species was 38 in the winter period, whereas it was 20 in spring. The species diversity decreased in the spring period but the total organism amount increased by two and a half. Bacillariophyta was the dominant phytoplankton group showing the greatest species richness (13 taxa) in February 2018. Species numbers of Bacillariophyceae and Fragilariophyceae diatoms were more important than Coscinodiscophyceae diatoms in Bacillariophyta. The second dominant group was Chlorophyta with 9 taxa. Asterionella formosa, Monoraphidium irregulare and Dolichospermum smithii were the most common species at phytoplankton both in winter and in spring.

Discussion: The most notable organism in phytoplankton samples of the Obruk Reservoir has been the Asterionella formosa species, the most abundant diatom in all stations. Asterionella formosa species is known to develop well in high PO_4 environment. Another characteristic of the species belonging to the genus Asterionella is that this genus can absorb the phosphate charge from water. However, some researchers remarked that Asterionella formosa is the characteristic species of mezotrophic lakes. It is seen that the number and types of organisms in St.8, St.9 and St.10 were higher than in other stations of Obruk Reservoir. The increase in the total number of organisms in all there stations was caused by especially Asterionella formosa, Monoraphidium irregulare from green algae and blue-green algae Dolichospermum smithii.

Keywords: water quality, pollution, phytoplankton, Obruk Reservoir
Introduction: Oppioid mites are most abundantly represented by species and individuals. They occur in almost all terrestrial habitats, especially in soil and litter. They are worldwide in distribution, abundant in most of the geographical regions. The superfamily Oppioidea comprises 1100 species. So far, 69 species of this superfamily have been recorded from Turkey. Aim of the study, the oribatid mites inhabiting in the Erciyes Mountain are evaluated from the taxonomic point of view with the aim of contributing to the oribatid fauna of Turkey.

Material and Methods: A total of 276 soil, litter, moss, and lichen samples were randomly taken from the study area between April and November in 2011. Mites were extracted with the help of a Berlese-Tullgren funnel extractor Extracted mites were killed, fixed and stored in 70% ethanol. The light and scanning electron microscopes (SEM) were used to examine mites. The compound microscopic examinations of specimens were made in lactic acid, mounted in temporary cavity slides.

Results: As a result of investigations, totally eight species belonging to the families of Autognetidae, Epimerellidae, Quadroppidae and Oppiidae from the superfamily Oppioidea were determined. These were *Oppiella nova nova* (Oudemans, 1902), *Berniniella serratirostris hauseri* (Mahunka, 1974), *Berniniella bicarinata* (Paoli, 1908), *Cosmogneta ozkani* Toluk, Ayyıldız and Subias, 2007, *Quadroppia (Coronoquadroppia) nasalis* Gordeeva,1983, *Anomaloppia ozkani* Ayyıldız, 1989, *Epimerella subiasi* Toluk & Ayyıldız, 2008 and *Ramusella* (*Insculptoppia*) *insculpta* (Paoli,1908) türleri tespit edilmiştir. These taxa were previously determined from Yozgat, Samsun, Artvin and Erzurum provinces.

Discussion: The photographs of determined taxa were taken using a LEO 440 model scanning electron microscope. Their morphological features, distributions and ecology were reviewed on the basis of our samples, and their taxonomic problems were discussed.

Keywords: Acari, Oribatida, Oppioidea, Erciyes Mountain, Kayseri.
Assessment of Stone Pine (*Pinus pinea* L.) Forest Fragmentation in the Western Anatolia Using Landscape Metrics and Typology

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**Introduction:** Landscapes incorporate diverse units that interact with each other and these units have various functions both in ecology and physiognomy. Thus, assessing landscape character plays an important role for conserving bio-diversity as well as spatial planning and management of habitats and landscapes. Environmental factors have strong impacts on the distribution of landscape types. To determine and analyze these factors are significant in terms of their conservation value of landscape diversity. For its ecological value, *Pinus pinea* L. which has a scattered distribution around the Mediterranean basin was chosen to be evaluated according to the environmental parameters in this study. Although *Pinus pinea* L. does not have a widespread distribution, it is naturally found in Bergama-Kozak, Aydın-Kocarli, Antalya-Side, around the Marmara Sea, the coast of Gemlik Gulf, Onsen and Haciagali villages in Kahramanmaras, Artvin and Trabzon in the Black Sea Region (Zohary, 1973). This study was conducted in three provinces (Mugla, Denizli and Aydın) located western Anatolia.

**Material and Methods:** Datasets obtained from ASTER Global Digital Elevation Model (ASTER GDEM), forest map showing spatial distribution of stands of three provinces (Mugla, Denizli and Aydın), the maps representing different classes of soil, geology, aspect and slope were used to complete analysis. Four thematic maps were overlaid in ArcMap and characterized by landscape character analysis (LCA). To assess fragmentation among 34 different stands, landscape metrics were calculated using Fragstats.

**Results:** 903 patches incorporating all forest stands, 111 character types, represented by 4 variants of *Pinus pinea* L. community (Cf, CfCz, CfM, CfS) according to tree species composition were determined. As a result of landscape distribution statistics, Cfa3 have the highest value of Mean (MN), while Cfb2 has the lowest. With regard to Largest Patch Index (LPI) and Patch Density (PD), Cfd1 obtained the highest value.

**Discussion:** LCA is quite new to Turkey as an analysis tool, and there are a few studies using different thematic maps to define landscape types in regional or local scale. Integrated the outputs of this analysis with landscape metrics using fragstats, a holistic approach was adopted to make a comprehensive evaluation at landscape level.

**Keywords:** landscape character assessment, landscape typology, environmental factors, landscape diversity
Examining of Perceptions of Middle School Students for Environmental Awareness and Social Values

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Introduction: With the industrialization process, humanity's looting of nature has become an increasing tendency and problem to use nature mercilessly in the direction of its own interests. As a natural consequence, both the present and future generations and the lives of the living are threatened. For this reason, subjecting individuals to good environmental education constitutes an important task of today's society and educational institutions. The basic aim of environmental education given in this direction is; to become a "citizen of the world" who is conscious, conscious, aggressive, eco-citizen and planet possessing an environmentally conscious, aggressive, eco-citizen, in order to gain a critical perspective on the interaction of the environment with the individual's perception as a whole. In addition, it is expected that environmental educated individuals will develop cultural tolerance as well as ecological tolerance. Therefore, in this study, it was determined that secondary school students' perceptions of environmental awareness levels and their perceptions of social values, and the relationship between environmental perceptions and social perceptions of students in terms of some variables and general perceptions.

Material and Methods: The research was conducted based on the screening model. The study's universe constitutes 5th, 6th, 7th, and 8th grade students, one of whom is a member of the Istanbul Provincial Directorate for National Education and one is general secondary school. In the sample, a total of 406 students selected by coincidence cluster sampling method are included in the study universe. "Environmental Assessment" and "Social Value Scale" were used as data collection tools.

Results and Discussion: According to the results obtained, the level of achievement that the students have regarding environmental awareness is moderate and the school does not differ according to the type. Nevertheless, the level of students' perception of environmental awareness varies significantly according to academic achievement and grade. The perception level of the students towards the social values is high. However, it can be said that it is very close to the middle level. The perceptions of the students about the social values do not show any significant difference according to the school type and class variable but they differ according to the academic achievement levels. There is also a meaningful relationship between students' perceptions of social values and environmental awareness.

Keywords: environmental consciousness, social value, middle school students
Demographic Analysis of *Cynips quercusfolii* Reveals Population Size Changes During the Last Ice Ages

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**Introduction:** Populations mirror the past, as historical events leave their imprints on populations. Historical events such as drastic temperature changes have left their signatures as implied by population contractions and expansions. In this study, we attempted to disclose population size changes of *C. quercusfolii* given as a response to the Pleistocene ice ages. Thus, we tried to specify possible effects of the last glacial cycles on the populations of *C. quercusfolii* through employing population demographic analysis on this species.

**Material and Methods:** We screened 27 populations of *C. quercusfolii* sampled across Turkey for informative substitutions and analyzed dataset through conducting mismatch distribution analysis and calculating some population parameters. To obtain information for population size changes Tajima’s $D$, Fu’s $F_S$, Harpending’s raggedness index, sum of squared deviations, $\Theta_1$ and $\Theta_K$ were calculated using Arlequin program, and the results were interpreted considering the timing of Pleistocene glacial and interglacial cycles.

**Results:** Mismatch distribution analysis for all samples produced a multimodal graph. However, mismatch analysis employed for each population separately showed some differences. While some populations (i.e. Balıkesir, Çankırı, Kütahya, and Yalova) displayed unimodal profile suggesting population expansion, others (i.e. Afyon, Bingöl, Bitlis, Bolu, Bursa, Çankırı, Elazığ, Erzincan, Erzurum, Giresun, Gümüşhane, İstanbul, İzmir, Karaman, Kastamonu, Kayseri, Kırklareli, and Konya) showed multimodal profile implying declining then subsequently growing populations. Estimations of population declines and expansions strongly suggest that particularly glacial and interglacial cycles of the Pleistocene period were highly effective on *C. quercusfolii* populations. It seems that those glacial cycles left their signatures on the population demographic structures of the species.

**Discussion:** All tests employed in this study indicated that *C. quercusfolii* populations reacted significantly against severe conditions of the last ice ages through fluctuations in populations. Effects of the past oscillations were also observed in the genomic components of *C. quercusfolii* as some its populations drastically contracted, and when the environmental conditions became more suitable expanded. This pattern is congruent with the common pattern observed for the taxa that are distributed in the northern latitudes.

**Acknowledgement:** We are grateful to Abant İzzet Baysal University for supporting this study with the Project 2011.03.01.380.

**Keywords:** population demography, *Cynips quercusfolii*, population size changes, Hymenoptera.
Contribution of *Cynips quercus* to the Turkish Biodiversity

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**Introduction:** Biodiversity is considered at various levels of biological hierarchy from genes to species and ecosystems, making genetic, organismal and ecological diversity all parts of this definition. Turkey is one of the richest countries in the world in terms of biodiversity, and we are still far from being completely reveal and understand our own diversity. Part of the Turkish biologic diversity involves oak gall wasps at the level of both species and genetic diversity. In this study, oak gall wasp species, *Cynips quercus* was assessed to disclose genetic diversity of the species in Turkey to contribute to the overall Turkish biodiversity.

**Material and Methods:** Genomic DNA was isolated from 175 gall wasps collected from 30 localities across the entire range of the species in Turkey. A mitochondrial gene and a nuclear non-coding region were amplified, sequenced and analyzed through employing several analysis programs. Obtained diversity estimates were evaluated and compared with previously published results of other gall wasp taxa both from Turkey and the Palearctic region.

**Results:** Genetic diversity estimates were strikingly high for most populations with the average $Hd=0.6265$, and $\pi=0.074$. Hierarchical partitioning of the genetic diversity disclosed that 69% of genetic diversity is shared among populations, yet each population has still significant level of variation (31%). Populations sampled from the eastern part of the sampling range harbor higher genetic diversity as compared to the west.

**Discussion:** Genetic diversity estimates of *C. quercus* reveal that the species show higher diversity compared to other oak gall wasp species studied so far from Turkey and Europe. The existence of such substantial amount of genetic diversity is accompanied by structured populations. Obtained results of *C. quercus* support previous findings relating the richness of the Turkish gall wasp species, and we believe that it contributes greatly to the overall Turkish biodiversity. Since biodiversity worldwide continues to deteriorate and keeping diversity requires protection of the habitats as well as species so that we continue to hold this high diversity.

**Acknowledgement:** We are grateful to Abant İzzet Baysal University for supporting this study with the Project BAP-2016.03.01.992.

**Keywords:** Turkish biodiversity, *Cynips quercus*, genetic diversity, Hymenoptera.
Assessing the Relationship of Honey Bees Fed with Syrups Containing Platinum Group Nanoparticles to Toxicity

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Introduction: The rapid development of nanotechnology in the last 30 years has been a major concern for the environmental and health effects of nanoparticles (NPs). The platinum group (platinum and palladium) elements are rarely found in nature and disseminated with the anthropogenic activities. In particular, although these group elements are widely used in many areas such as technology, medicine, and catalytic converters, the platinum group accumulates due to the environmental insufficiency towards disposal of wastes. Contamination through the elements of platinum group is primarily caused by the particles or substances in the air, and the dust by the roadside, soil, mud and water. This contamination eventually results in the biological accumulation in living organisms. With this study, it was aimed that the acute toxic effects of Polyvinylferrocene (PVF⁺)-supported platinum (Pt) (Pt/PVF⁺) and palladium (Pd) (Pd/PVF⁺) nanoparticles be evaluated comparatively by using the honey bees (Apis mellifera).

Materials and Methods: Young worker bees are used from the same race (Apis mellifera Caucasica) the same age, living in the same hive etc. Randomly selected 50 bees were put into each container. To feed the bees, on the other hand, 1 ml volume of droppers (pasteur pipettes) were used. The sucrose solution was put into the droppers with the help of a syringe. Test conditions were performed at 25 ± 2 ° C and in the dark.

Results: In this study where the lethal concentration values of Pd/PVF⁺ and Pt/PVF⁺ NPs over Apis mellifera have been determined, the LC50 value for 48 and 96 hours were calculated through the probit analysis by taking the experiment results as the basis. Throughout the experiment, no mortality was seen in the control group, nor were any behavioral abnormalities observed. We that as the exposure time for each of Pd/PVF⁺ and Pt/PVF⁺ NPs according to LC50 value extended, the required amount to indicate the same toxic effect decreased, and its toxic effect showed rather a great deal of increase in time.

Discussion: Today the studies that evaluate the effect of nanoparticles on honey bees are rather few in number. One of them is the study conducted by on the acute toxicity of nanoparticles referred to as TiO₂, ZnO-TiO₂ and Ag-TiO₂.

Keyword: Apis mellifera, nanoparticles, nanotoxicology, platinum, palladium
A Hypothetical Study on Smart Neighborhood Design: “A+ Neighborhood”

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Introduction: The concept of “Smart City” has been receiving higher mention in the urban planning literature in recent years. In general, the smart-city concept is considered as the integration of energy and information technologies into the buildings, the infrastructure and urban spaces. However, the scale of cities and the social lifestyle are two critical filters that should be evaluated for the formation of smart cities. In this regard, emphasis is put on the importance of approaching the issue from the neighborhood scale.

The aim of this study is to develop a hypothetical spatial model for the design of cities that promote the conservation of energy in the physical space, while encouraging energy consumption in public spaces and social life. The study is focused at the scale of a neighborhood unit.

Material and Methods: In the first phase of the study, the concepts of smart city, energy efficient urban design and neighborhood are explained theoretically. In the second phase, a hypothetical design study based on certain assumptions is presented under the heading “A+ Neighborhood”.

Currently, the strategies for smart neighborhood design are being formulated. The design in this study was developed with an objective approach that considers the standards available in the planning legislation in Turkey and in the urban design literature.

Results: A smart neighborhood is a settlement unit that:

- promotes the use of public spaces against the increasing consumption factors in private spaces,
- minimizes automobile-dependent movement behavior, and provides equal, comfortable mobility to each individual,
- is structured in compatible with the micro-climate conditions and has the energy management infrastructure, and
- promotes domestic values and features an effective communication system.

According to the hypothetical design, which is developed based on certain assumptions (climate, density, scale, etc.), the three primary universal design strategies of the A+ Neighborhood are:

- A “social” neighborhood that enables high levels of communication and interaction,
- A barrier-free neighborhood at human-scale that is designed for everyone,
- An energy efficient neighborhood that provides improved communication and a high-level of control over consumption systems.

Discussion: The “neighborhood unit” has both an ecological and social meaning; and thus, it should occupy an important place in the formation of smart cities. Thus, the spatial model in this study is presented as an ideological basis that can be addressed in the urban planning processes.

Keywords: smart cities, neighborhood unit, urban design, energy efficiency
ORAL PRESENTATION

Current Situation of Medicinal and Aromatic Plants and Swot Analysis in Konya

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Introduction: Generally SWOT analysis is referred that understood the subject will be addressed in terms of strengths, weaknesses, opportunities and threats for future development. Medicinal and aromatic plants, which grow in Konya, are obtained by collecting both natural flora and cultured which have economic importance.

Material and Methods: The aim of the study was to determining the main medicinal and aromatic plants that are important for Konya and revealing the possibilities of developing the sector by doing SWOT analysis. In this study are utilized both data of General Directorate of Forestry for collected natural flora and data of Turkish Statistical Institute for cultivated plants.

Result and discussion: It is determined that the main medicinal and aromatic plants collected from natural flora are Satureja cuneifolia Ten, Rhus coriaria L., Cyclamen ciliatum, Hypericum perforatum L. and Galanthus elwesii Hook. f. Cyclamen ciliatum is used frequently ornamental plants, Satureja cuneifolia Ten is used especially as species, essential oil and aromatic water in processing industry. Rhus coriaria L. is used for commonly species and medical purpose, Hypericum perforatum L. is used drug industry and then Galanthus elwesii Hook.f is used for medical purpose too. Additionally medicinal and aromatic plants cultivated in Konya are lavender, poppy, cumin, nigella, safflower, fenugreek and sesame. According to data of General Directorate of Forestry in 2016, medicinal and aromatic plants collected from natural were produced nearly 1 tones in Konya. On the other hand Turkish Statistical Institute specified that cultivated medicinal and aromatic plants were produced approximately 26.876 tones in 2016 in Konya. However, these datas not reflect the reality due to unregistered production. It was estimated that there are more production in medical and aromatic plant. Some of produced medicinal and aromatic plants in Konya is evaluated in domestic bazaar such as cumin and also parsley is exported. It is detected as a result of SWOT analyses, although climate conditions are suitable for cultivating medicinal and aromatic plants in Konya, number of processing industry of medicinal and aromatic plants are not enough and agricultural mechanization is limited. In addition to this, the strengths of medicinal and aromatic plants sector are it has biological diversity and economically profitable. the weakness of medicinal and aromatic plants sector are processing industry has not developed and labour intensive the opportunities of sector is that it have supply deficit and the threats of sector is adulteration problems. Moreover, production of medicinal and aromatic plants not only should be extended in Konya which have different agro-ecological zone but also the opportunities for development of the sector for specific products that will create added value.

Keywords: Konya, medicinal and aromatic, produce, swot
Reproductive Markers under Heat and Cadmium Stress in Wistar Rats

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Introduction: Stress is one of the important factors that could provoke a variety of human pathologies. Stress includes all kinds of environmental conditions as that of pollution and heat. Heat stress causes serious physiological dysfunction that may result in heat-related diseases. Nowdays, animals and humans can be affected by the combined effect of heat and metal stress. In the present study, the effects of hyperthermia and cadmium pollution on the reproductive markers of Wistar rat are investigated. Therefore, biometric markers, spermogramme, testosterone, triiodothyronine (T3), in addition to the histological profile of liver, kidney and testis were investigated.

Materials and methods: The impact of heat stress-humidity (HSH), cadmium (Cd) and heat stress-humidity-cadmium (HSH-Cd) was carried out on male Wistar rats for a period of 30 days. The control and the Cd groups (10 mg CdCl\textsubscript{2} daily by gavage) were accommodated at the same room (mean temperature and relative humidity of 23.6±2.25 °C and 56±5.34%, respectively), whereas the HSH and HSH-Cd groups were housed in a hyperthermia chamber where they exposed each day from 09:00h to 13:00h (mean temperature and relative humidity of 36.6±1.87 °C and 77.7±5.76%, respectively). ANOVA test was applied to compare between all groups, in addition to Student’s \textit{t}-test which was used to compare the mean of each treated group against the control. However, the significant test was used at \textit{p}<0.05 level.

Results: Results showed a significant decrease of sperm markers in all groups exposed to heat and cadmium. Testosterone level was lower also in all treated groups. However, T3 has been affected negatively only in groups exposed to hyperthermia. The histological profiles showed degeneration of liver and kidney structure, especially in the combined treatment. Histological alteration of testes and the vanishing spermatogenesis stage was observed. Testicular weight, food intake and water consumption were remarkably affected in heat stressed rats.

Discussion: The present study demonstrated that the decrease in the testicular function could also be attributed to the effect of Cd alone, or combined with heat stress on the hypothalamic-pituitary-gonadal axis. This result agrees with others who found that rabbit’s sperm count is decreased during summer compared to winter. Hyperthermia can affect testosterone production because it is essential for the maintenance of spermatogenesis. It has been suggested that Cd accumulation in the mitochondria of thyroid follicular epithelial cells might disturb the oxidative phosphorylation of this organelle, lower energy supply, and therefore inhibit the synthesis and release of thyroid hormones. Notably, it has been proposed that temperature plays a double role, where it has a direct effect on TRH and subsequently plasma T4, and indirect effect by decreasing the appetite; the later can decrease thyroid hormone blood level of sheep. In cattle, thyroid hormones were reported to be lower in hot season compared to winter. On the other hand, the concentration of triiodothyronine in the combined group (HSH-Cd) was decreased as that of HSH group. Histological deteriorations of hepatic and renal tissues as well as of the testicular seminiferous tubules, accompanied with the disappearance of spermatogenesis stages were clearly seen.

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Keyword: Cd, heat, hormones, rat, reproduction.
Determination of Heavy Metal Accumulations in Some Macrofungi Growing in Seydişehir (Konya) District

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Introduction: Unlike other organisms, fungi have a very strong accumulator property. In this way, they accumulate the minerals which are intensive either in the substrate or in the air. Due to approximately 3000 of the macrofungi species are edible ability, macrofungi increase the likelihood of heavy metals, which can be found in the growing environment through food chains, to pass into the human body.

It was necessary to examine the heavy metal contents of macrofungi due to the fact that the research area is located on the northern slopes of the Taurus Mountains and that the soil structure is rich in some minerals and that there is a metal factory which can be.

Material and Methods: The materials used in this study constitute the macrofungi collected from the land that nearby the city center in the vicinity of Seydişehir district of Konya in 2016–2017. 8 localities were determined in the field. Soil samples were taken from the localities for analysis by appropriate methods. The macrofungi obtained from the fieldwork were brought to the laboratory. After identified, they were stored in a dry environment in the laboratory until they were dried and analyzed. Heavy metal analyzes of the macrofungi found in the region were carried out by ICP-MS at Selçuk University İLTEK center.

Results: Soil and fungal samples obtained from field studies were analyzed by ICP-MS. As a result of the analysis, the soil of the region was found to be rich in some minerals. All the soil samples taken from the localities have a distinct elevation in Al (Al) and Iron (Fe) angles. In terms of these minerals, the same situation was also found in fungi grown in localities. It was seen that the increase of heavy metal concentration in soil samples increased linearly in certain proportions in fungal samples.

Discussion: Macrofungi are known to have a strong accumulator property. Studies have been carried out on the chemical structures and heavy metal contents of macrofungi in these literature. It is stated that among the fungi grown in close regions in the studies done, there is a difference in the chemical compositions according to the species, and the structure of the soil that they grow plays a role in this. According to the studies, it is emphasized that the fungi are a good mineral source, but that the heavy metal content of the soil must be taken into account when collecting. In our study, the heavy metal contents of the fungus samples obtained from the soil with high heavy metal contents were high, so that it is possible to collect fungi that grow in the soil, which is likely to be heavy metal pollution, chemically contaminated, or which has high heavy metal content on the main bedrock, may be harmful to use as food.

Acknowledgement: We would like to express our appreciation to the Selçuk University Scientific Research Project Commission, which supported this study (BAP 15401109).

Keywords: macrofungi, heavy metal, pollution, Seydişehir, Konya, Turkey.
Catch Composition and Efficiency of the Trammel Nets in Artificial Reefs in the Aegean Sea

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**Introduction:** Artificial reefs are submerged structures that are deliberately placed on the sea bottom to influence physical, biological and socio-economic processes. Artificial reefs are employed worldwide for several purposes, notably to enhance fish production in an area by providing hard substrata for benthic and fish communities. In the Turkey, the main objective of the use of artificial reefs is to improve small-scale fisheries by increasing the catches of commercial species in terms of number and biomass. The most considerable issue is to sustain fisheries without damaging the marine ecosystem in reef areas. The aim of this study is to determine the seasonal variation in catch composition and CPUE of the trammel nets used in artificial reefs area.

**Material and Methods:** The study was carried out in the Edremit Bay artificial reef area, the Northern Aegean Sea between 2013 and 2015. Artificial reefs were sampled 15 times by experimental fishing with a bottom trammel net that was 200 m long and 1.9 m in height, with a 40 mm inner mesh and a 110 mm external mesh, a size used by the majority of local fishermen. Experimental trammel nets were made with multi-flament material (PA) which consists of two panels. Water depths in fishing grounds varied from 8 to 35 m. The soaking time of nets varied from 3.2 to 5.2 h. Catch per Unit Effort (CPUE) was used in comparing fishing trials and the relation between seasons was examined with paired sample-T test.

**Results and Discussion:** A totally 71 species belonging to 34 families were recorded. Sparidae was dominant in the catch composition with 13 species. The percentage distribution of the total catch was 95.2% commercial species and 4.8 % discarded. Bottom trammel nets caught mostly Diplodus annularis, Mullus barbatus, and Scorpaena porcus in this study. These species are composed 48.9% and 37.6% of total catch composition in terms of number of individuals and biomass respectively. Average CPUE was calculated as 2.2 ± 0.5 individuals /set/h and 147.5 ± 35.8 g/set/h for in this study. Seasonal CPUEs were found that 2.48 for summer, 1.66 for autumn, 1.80 for winter and 2.68 for spring in terms of number of individuals. In addition CPUE values according to biomass were also found 186.6 g for summer, 113.1 g for autumn, 121.4 g for winter and 168.9 g for spring. The study found that trammel nets are more efficient in the summer. There was no statistically significant difference between the seasons (p≥0.05). The fishing methods used in artificial reefs are very important to its sustainability. If the trammel nets are not used accurately, they entangled onto the reef blocks and may cause ghost fishing. Nevertheless, trolling and hand lines have a lower risk of causing ghost fishing, and they can be recommended as a way to maintain the sustainability of reef fisheries.

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**Keywords:** artificial reefs, small-scale fisheries, trammel nets, Edremit Bay, Aegean Sea
ORAL PRESENTATION

The Biogeochemical Factors Which Control the RSi Fluxes from Resuspended Sediments in the Aegean Sea (İzmir Bay)

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Introduction: Nowadays, one of the significant impact of global warming is the increasing frequency of typhoon events. Typhoons in the sea leads to strong interference. Typhoons causes the dispersion of sediment in the water column (resuspension), as the shallow inner part of Izmir Bay especially. Sediments providing silica into the water column can cause diatom dominated changes in the local phytoplankton composition and can inhibit toxic dinoflagellate species. The aims of this study are to determine silica fluxes from the sediment in the resuspension events and to determine factors controlling silica fluxes.

Material and Methods: Water and sediment samples from 16 stations selected in the inner part of Izmir Bay, were taken four times on a seasonal basis in 2015. Core incubation experiments were carried out on the R.V. Dokuz Eylül 3. Core incubation experiments were conducted for 4-8 hours on the boat. The surface layer of the sediment core has been resuspended for the duration of the trial with aeration of overlying water at insitu temperature. On the other hands, control cores containing only the bottom water, were used to determine the net flux of silica from sediment. Measurements of dissolved silica in the Biogeochemical laboratory was carried out spectrophotometrically. Metal analyses in sediments were also carried out in ACME laboratories accredited. Organic carbon in sediments was determined by Walkley-black method and carbonate in sediments was determined by measuring the pressure of carbon dioxide with the acidic environment.

Results: The average silica flux values obtained from core incubation experiment in the spring, summer, autumn, and winter, respectively, 19327, 17979, 14242 and 7327 µmol Si/m²day. The highest silica flux has been observed as 94352 µmol Si/m²day at Station No. 6 in the summer.

Discussion: According to the results obtained from core incubation experiment, it was concluded that 1) the carbonate, orgC and Mn control the flux of silica during the winter months, 2) the carbonate precipitates on the silica skeletons of diatoms autigenically and 3) the carbonate was limited the dissolution of silica skeletons. Different silica flux control lines with negative slope were attributed to different size groups of diatoms. It was concluded that fluxes of silica at the resuspended sediments of some stations were not controlled by carbonate because of the fact that the calcareous cyst-forming dinoflagellate, Scripsiella trochoidea,blooms produce cysts during the spring and summer in Izmir Bay. It has been demonstrated in the establishment of the controlling silica flux by calcium carbonate and organic carbon in the autumn season. It was observed that the highest silica flux with resuspension of the sediment was four times greater than that of undistributed sediment maximum silica flux. It was concluded that mussel harvest in Izmir Bay may carry less risk in terms of algal toxins and public health.

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Keywords: resuspension, silica flux, carbonate precipitation, İzmir Bay, Aegean Sea.
Length-Weight Relationship and Exploitation of Whiting, *Merlangius merlangus* in Ordu Coasts, Black Sea

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**Introduction:** Whiting, *Merlangius merlangus* (Linnaeus, 1758) is a commercial fish species along the coasts of Black Sea and its fishery mostly carried out by bottom trawl and gill nets. Since the bottom trawling fisheries has been prohibited in the south-eastern Black Sea; whiting fisheries have mostly been done using by gill nets in the area. A recent fishery statistic shown that a total of 11541 tons of whiting was fished from Turkish seas, mostly from the Black Sea (10979 tons) in 2016. This study provides some actual information such as length, weight, age and mortality rates of whiting population in the southern Black Sea in order to detect whether fishing pressure or not.

**Material and Methods:** A total of 752 whiting specimens from the Central Black Sea were seasonal collected from commercial coastal gillnet, which have landed at Fatsa and Perşembe fishing ports in Ordu between July 2017 and March 2018. A total of 282 otoliths were used for ageing. Non-seasonal Von Bertalanffy growth parameters, $L_\infty$ and $K$, and natural and total mortalities were computed with the FISAT package programme.

**Results:** Total length and weight of whiting specimens were ranged from 6.9 cm to 20 cm (average: 14.6 ±0.06 cm), and 2 g to 68.9 g (average: 24.6 ±0.30 g). The samples grouped densely between 12 and 16 cm. Minimum landing size (MLS) is 13 cm for *Merlangius merlangus* according to Turkish Fisheries Regulation Circular (TFRC). Thus, 14% of all samples in this study are under legal size. The length-weight relationship equation calculated was $W = 0.012 \times TL^{2.829}$ ($R^2 = 0.91$). As seen, there is a negative allometry in terms of $b$ value. Age groups of whiting were ranged from I to IV. Mean lengths according to age groups were 12.7 ±0.07, 15.1 ±0.07, 17.6 ±0.11 and 19.4 ±0.32, respectively. Von Bertalanffy Growth Parameters were $L_\infty = 21.08 \pm 5.4$ cm, $K = 0.38 \pm 0.3$ year$^{-1}$, $t_0 = -1.35 \pm 1.0$ year$^{-1}$. Mortalities (M, F and Z) and exploitation rate (E) of whiting from the Ordu coast were 0.816 year$^{-1}$, 0.610 year$^{-1}$, 1.426 year$^{-1}$ and 0.43 year$^{-1}$, respectively.

**Discussion:** According to exploitation rate (E = 0.43), whiting fishery seems stable. Namely, there is no overfishing on whiting population in the area for the time being. In fact, the last TFRC (no. 2016/35) banned the trawl fishery along the Ordu and the most area of eastern Black Sea. When the trawl pressure on whiting stocks is declined due to the banning, E value may have also decreased.

**Keywords:** whiting, *Merlangius merlangus*, length, weight, exploitation, Ordu, Black Sea.
**Introduction:** Species of the genus *Kudoa* Meglitsch, 1947 (Cnidaria: Myxozoa) are important myxozoan parasites with about 100 nominal species infecting a large range of fish hosts with a wide geographical distribution. As a result of recent interest on myxozoan parasites of fish in Turkey, two novel species *Kudoa niluferi* and *Kudoa anatolica* have been described in two Black Sea fish species and this study provides details on the infections of both species in their hosts.

**Materials and Methods:** Samples of *Neogobius melanostomus* and *Atherina hepsetus* collected from Sinop coasts of the Black Sea were investigated for their myxosporean parasites using conventional methods and two novel species of the genus *Kudoa* were determined infecting their host fishes. Their overall infection prevalence and intensity values as well as host length related occurrences were determined in accordance with related literature. All applicable international, national and institutional guidelines for the care and use of animals were followed and all animal work was conducted with the approval by the Sinop University Animal Research Local Ethics Committee (Licence Date and Number: 06.08.2015 – 2015-20).

**Results and Discussion:** Two novel species *Kudoa niluferi* from musculature of *Neogobius melanostomus* and *Kudoa anatolica* from musculature, kidney tubules and urinary bladder of *Atherina hepsetus* were described. Overall infection prevalence and intensity values were 12.8% and 2+, respectively, for *K. niluferi* and 41.6% and 2+, respectively, for *K. anatolica*. The infection values of both parasite species showed gradual increases as the length of infected host fish increased in muscle infections. On the other hand, the situation was reversed as the infections of *K. anatolica* in the kidney and urinary bladder of infected hosts decreased as the length of host fish increased. These results are the first on host – Kudoid parasite interactions and showed that while parasites in coelozoic tissues could decrease gradually, histozoic manner of infection stay persistent even with increasing infections with parasites.

**Keywords:** myxozoa, kudoa, fish, Black Sea
The Impact of Environmental Degradation on Happiness: Sample of Selected Islamic Countries

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Introduction: Individual’s happiness is influenced by economic, socio-cultural and environmental factors. It has been investigated that the impact of environmental degradation on happiness for a long time. The correlation between happiness and environmental degradation has made significant contribution to economic literature. However, literature mainly modeled per capita income as key factor of happiness. Due to the importance of economic growth to increase per capita income and happiness, nations have been pressuring on natural resources, particularly nonrenewable resources, for their economic activities. After the severe degradation of environment, nations realized that income had little impact on happy life. This irreversible environmental degradation reminded that solely income cannot bring enhanced happiness. This study aims to investigate the relationship between the happiness and the environmental degradation.

Material and Methods: Environmental degradation is measured as the sum of energy, mineral, net forest depletions and carbon dioxide damage as in US dollars. The data is taken from the Adjusted Net Savings data of World Bank and world happiness report. The panel consists of six Islamic countries, which are Egypt, Iran, Kazakhstan, Nigeria, Malaysia and Turkey, and spans the period of 2006 and 2014. The empirical analysis is based on Pooled OLS, Fixed Effect, Random Effect and Hausman tests. The study also applies robustness check regressions by adding some socio-economic control variables such as unemployment rate, life expectancy at birth and inflation rate.

Results: The results suggest that the environmental degradation has negative impact on happiness whereas per capita income has positive and statistically significant impact on happiness. For the control variables, unemployment and life expectancy at birth have negative and statistically significant impact on happiness.

Discussion: This study emphasizes that policy makers need to stimulate more environmentally friendly growth paths for their economies. Furthermore, policy makers also need to raise awareness of possessing a happy future depending not only income but also clean environment. This study was conducted in the scope of the limited country samples. It is recommended that the findings can be tested in different country groups and with different explanatory variables.

Keywords: happiness, environmental degradation, per capita income, panel analysis
Effect of Biochar and Amendments on *Ailanthus altissima* Capacities to RemEDIATE a Pb and As Contaminated Mining Soil

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**Introduction:** Soil contamination is mainly due to a wide range of organic and inorganic compounds produced by various human activities. These contaminated areas present a risk not only for the soil fauna but also for human health, if pollutants reach the food chain, either by contamination of surface waters, groundwater or plants capable to accumulate pollutant in their organs. Hence such area need to be rehabilitated. *Ex situ* methods for soil remediation have been used for a long time but are expensive and disruptive to soil. Phytoremediation techniques for the stabilization or extraction of metal(loid)s could be an efficient alternative as they provide a low-cost and environmentally friendly option. However, due to the often poor nutrient content of these contaminated soils, amendments must be added to enhance plant growth and to improve phytoremediation efficiency. Biochar, a pyrogenic product, is a promising amendment for assisted phytoremediation. It has been demonstrated as a potential candidate for the remediation of metal(loid) contaminated soils. However, the mechanisms of contaminant-biochar retention and release depend on the amount of soil contaminants and physicochemical characteristics, as well as the durability of the biochar contaminant complex, which may be related to the pyrolysis process parameters and the biomass feedstocks. The aim of the present study was to evaluate the capabilities of *Ailanthus altissima* associated to amendments (compost, biochar and osmocote) to stabilize heavy metals in a contaminated site located at Pontgibaud (France) presenting no vegetation cover and contaminated by high concentration of lead (11453 mg.kg\(^{-1}\)) and arsenic (539 mg.kg\(^{-1}\)).

**Material and Methods:** The main physicochemical parameters and Pb and As contents were determined in soil pore water as well as the analysis of soil microorganisms. Additionally, the growth, dry weight and metal(loid)s concentrations were analyzed at the end of the experiment in the different *Ailanthus altissima* organs.

**Results:** Results showed that the addition of biochar (5%) and compost (5%) to technosol improved soil conditions by increasing soil pH, electrical conductivity, water holding capacity and reduced mainly Pb mobility and availability in the soil pore water. Furthermore, addition of osmocote increased soil bacterial flora with a significant increase for microorganisms belonging to Actinomycetes, Mycobacteria, Enterobacter and Azotobacter groups and allowing probably a better *Ailanthus altissima* growth; but a slightly increase and decrease was observed in soil pore water for Pb and As concentration respectively.

**Discussion:** In conclusion, the data clearly demonstrated that biochar and compost application can be effectively used for Pb immobilization, thereby reducing its bioavailability. Finally the application of osmocote solution is most effective for *Ailanthus altissima* biomass production which is one of the essential criteria for a good candidate species in phytoremediation.

**Acknowledgement:** We would like to express our appreciation to the Istanbul University, the LBLGC laboratory of Orléans University which supported this study and the Erasmus program, who financed my stay in France.

**Keywords:** *Ailanthus altissima*, biochar, mesocosm, mine technosol, osmocote.
Introduction: Behavioral toxicity tests, if properly designed, can be used in conjunction with standard acute lethality tests, chronic full or partial life cycle tests, and early life stage toxicity tests to add ecological realism to toxicant assessments and the regulations made as an outgrowth of these assessments. Changes in certain fish behaviors, especially cough rate and avoidance reactions, are very sensitive indicators of sublethal exposure to metals. Other tests involving predator avoidance, feeding behavior, learning, social interactions, and a variety of locomotor behaviors show promise but have been insufficiently studied to judge their sensitivity or utility. Today, fish in the environment are inevitably exposed to chemical pollution. Although most hazardous substances are present at concentrations far below the lethal level, they may still cause serious damage to the life processes of these animals. Fish depend on an intact nervous system, including their sense organs, for mediating relevant behavior. Unfortunately, the nervous system is most vulnerable and injuries to its elements may dramatically change the behavior and consequently the survival of fish. Heavy metals are well known pollutants in the aquatic environment. Their interaction with relevant chemical stimuli may interfere with the communication between fish and environment. The affinity for a number of ligands and macromolecules makes heavy metals most potent neurotoxins.

Material and Methods: *Gambusia holbrooki* specimens were collected from Gülaptopulu Lake Edirne. The fish used were adult both females and males between 20 and 35 mm total length (about <1 g) The fish acclimated for 2 weeks in a glass aquarium (50 × 50 × 100 cm, 100 L) under routine approved animal welfare protocols at the aquarium room. The photoperiod (12:12 light/dark), water temperature (22 °C), and pH (7–8) were maintained until at the end of experiment. After acclimatization, fish were transferred to smaller propylene caps, each containing 1 L heavy metal (10, 20, and 50 ppm Co, Cr, As) and control water. The video output from the camera was fed to a computer running an animal movement tracking software (EthoVison XT). After 5 min of acclimation, the movement of each fish in aqua was recorded with the video USB camera (SN9C105 model 640 x 480 pixels) for 5 minutes (Miranda 3).

Results: In this study, three different doses chosen for heavy metals 10, 20, and 50 ppm were applied to the fish for 3 different periods (6, 13, and 21 day). Exposure depends on the behavior of analyzes conducted and control groups were used to determine the changes. Behavioral changes were detected by using video-based movement analysis system (EthoVision XT). The following behaviors were measured: total distance, velocity. The comparison of control and exposure groups and time showed that depend on time of exposure and type of heavy metals affected to behavioral of *Gambusia holbrooki*.

Discussion: Behavioral toxicity tests can be used in conjunction with standard acute lethality tests, chronic full or partial life cycle tests, and early life stage toxicity tests to add ecological realism to toxicant assessments and the regulations made as an outgrowth of these assessments.

Changes in certain fish behaviors, especially which determined by video-based movement analysis system (EthoVision XT), were very sensitive indicators of sublethal exposure to metals.

Keywords: *Gambusia holbrooki*, Co, Cr, As, behavioral effect
Effects of Hydrochars Obtained from Different Organic Wastes on Soil Enzyme Activities

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Introduction: Hydrochar is a by-product of the thermal decomposition of organic feedstocks that are occurred in high amounts. The aim of this study was to determine the effects of different hydrochars on a series of soil enzyme activities in vitro conditions.

Material and Methods: Hydrochars derived from sewage sludge (SS), poultry manure (PM) and pomace (P) through hydrothermal carbonization (HTC) were mixed with soil at the rates of (2.5, 5.0 and 10.0 tda⁻¹) and incubated at 25°C for 120 days. Urease (U), alkaline phosphatase (AP) and β-glucosidase (BG) enzyme activities were determined in the soil at the beginning (T0) and 120 days (T120) of incubation.

Results: Our findings showed that under SS and PM hydrochars applications, U enzyme activity was depending on dose and time showed some variations, the highest activity emerged from the 5.0 tda⁻¹ dose, the lowest activity arise on the 2.5 tda⁻¹ and the 10.0 tda⁻¹ dose of T120. P hydrochar according to U enzyme activity was observed in the reverse direction of the treatment of SS and PM hydrochars. Also, at the T0 of the experiment, U enzyme activity didn’t show significant difference between application dose and time. Under SS, PM and P hydrochars applications, AP and BG enzyme activities depending on dose and time showed some variations; AP enzyme activity of SS, PM and P hydrochars showed the highest activity at the T120. BG enzyme activity of SS and PM hydrochars showed the highest activity at the T0, P hydrochar showed the highest activity at the T120. The enzyme activity of AP and BG increased as the application dose increased.

Discussion: These findings indicated that the regression equations for the relationship between these enzyme activities in SS, PM, and P hydrochars were observed for AP (r=0.94, 0.90 and 0.88) and BG (r=0.99, 0.96 and 0.97) respectively. However, there was no clear relationship between SS, PM and P hydrochars in terms of U enzyme activity at T0 ve T120 and three applications dose. So the SS, PM and P hydrochars applications were more effective on the AP and BG enzyme activities of soil and there was clear relationship between SS, PM and P hydrochars in terms of AP and BG enzyme activities at T0 ve T120 and three applications dose. It is likely that hydrochar–soil interactions will interact better in time, as hydrochar will continue to be oxidized and will likely contribute further biological activities.

Acknowledgement: This research work was financially supported by the Ankara University Scientific Research Projects (BAP) Office (BAP-16L0447004- 06/2016).

Keywords: alkaline phosphatase, hydrothermal carbonization (HTC), hydrochar, urease, β-glycosidase.
Current Distribution of *Myocastor coypus* in Gala Lake, Environmental Problems Caused and Suggested Solution

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**Introduction:** The coypu, *Myocastor coypus*, is a large hystricognathous rodent with a semiaquatic mode of life. It is native to South America from where it was introduced to various parts of the world at the beginning of this century. Animals escaping from these farms frequently led to the creation of invasive populations in the wild. Coypu has become an environmental problem in extreme amounts in wetlands in America and Europe, and its populations have been destroyed by humans. *M. coypus* was brought from Caucasus to Eastern Anatolia of Turkey in Karasu and Arpaçay since 1973. In Turkish Thrace, feral populations have been known since 1982 in Tunca and Meriç rivers. Fallowing 2014, the populations of the species showed an excessive growth, and the species started to cause great damages in Gala Lake and all related wetlands by consuming high amounts of rice reeds and water plants.

**Material and Methods:** This study was carried out in Gala Lake between 2014-2018 in order to determine the population density and the damage given by *M. coypus* in methods such as day and night direct observation in the lake with boats, phototraps, clues, stools, nest detection in wetlands related with Gala Lake.

**Results:** The excessive increase in *M. coypus* population after 2014 caused a great damage in Gala Lake and all related wetlands such as lakes, ponds, streams, canals and an economical loss especially in rice fields. The species was found to cause extreme damage to wetlands by over-consuming water plants such as reeds, and to lead indirect negative effects by causing irreversible harms to bird nesting and breeding activities and fish beds in wetlands.

**Discussion:** Local residents declared that they suffered from *M. coypus* as a result of the damage the species leads in wetlands and rice fields, that they could do nothing about coypu because it is categorized as Protected Animals according to MFWA (Ministry of Forestry and Water Affairs) they have informed the official authorities about their complaints for the solution of the problem. At the end of the studies carried out in this context, a report about a provisional or permanent change of the status of coypu from Protected Animal in the MFWA category to Unprotected Animal was prepared by Republic of Turkey MFWA, General Directorate of Nature Conservation and National Parks, 1st Regional Directorate Edirne Provincial Branch Directorate and sent to MFWA. According to the decision of MFWA methods of stopping, reducing or completely destroying the *M. coypus* population will be recommended.

**Keywords:** *Myocastor coypus*, coypu, Gala Lake, Edirne
In-Situ Conservation: An Evaluation of Protected Area Planning and Management, Sultan Marsh, Kayseri

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Introduction: Because of the acceleration of the processes increasing the pressure on biodiversity such as industrialization and urbanization in the world, preservation of biodiversity and sustainable use of biological resources have been accepted as an important problem that can be avoided by coordinated international efforts. In-situ and ex-situ conservation approaches are widely adopted on the international scale in preserving biological diversity, including ecosystems, species diversity and genetic diversity. Conservation projects for "in-situ" conservation areas (national parks, natural reserves, natural protected areas etc.) and “ex-situ" conservation areas (gene conservation and management areas, seed and collection gardens etc.) have been established and carried out in Turkey with very rich in biological diversity since the 1950s when in-situ conservation works have begun. Planning and management of the protected areas within the framework of the in-situ conservation approach is one of the most important issues to highlight. In this study, the planning and management process of the protected areas in the case of Sultan Marsh, Kayseri (under the status of natural protected area, national park, wetland and natural reserve area) was evaluated in line with the objective of effectively preserving biodiversity as one of the most important Turkey’s wealth, and ensuring its sustainable use.

Material and Methods: In the context of in-situ conservation, world examples and literature on the planning and management of protected areas have been reviewed, and the planning and management process of the Kayseri Sultan Marsh natural reserve has been examined. In this direction, the issues related to goals and objectives, institutional structure, planning authorities, legal framework, sustainable development strategies, participatory planning approach and implementation process regarding the planning and management of protected areas have been identified and evaluated.

Results: The main problems identified in the planning and management process of the area can be stated as natural water cycle degradation in the wetland ecosystem, ecological pollution caused by unplanned developments and tourism activities, non-uniformity of management and planning approaches implemented by different institutions within the basin, lack of common understanding in the integration of sectors, insufficient economic incentive measures, lack of experience and technology transfer.

Discussion: Adopting a participatory planning process, which is integrated with national policies, strategies, goals and objectives, addressed as a whole from the upper-scale spatial strategy plans to the urban design scale, based on conservation-use balance is extremely important in the planning and management of protected areas.

Keywords: conservation of biological diversity, in-situ conservation, protected areas, Sultanazlığı, Kayseri
Characterization and Growth of Autochthonous Hydrocarbonoclastics Bacteria Isolated From the East-Algerian Littoral

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Introduction: The East Coast-Algerian suffers from several types of pollution, the most important of which is that due to hydrocarbons. Marine pollution by hydrocarbons, whether chronic or accidental, raises significant problems to the environment. Our study consists in isolating, identifying the hydrocarbon-based bacteria of the East-Algerian littoral and to evaluate their growth and potential of biodegradation.

Material and Methods: After isolation, biochemical, and molecular identification with RNA 16S, about 53 strains of microorganisms have been isolated. We have selected four strains; Vibrio alginolyticus PB-WC 11099, Exiguobacterium aurantiacum strain NB11_3A, Halomonas venusta strain NY-8 and Dietzia sp CNJ898 PLO4 for the growth test in the presence of different classes of hydrocarbons: alkanes-mono-aromatics and refined hydrocarbons (gasoline) as unique source of carbon and energy. A total hydrocarbon assay was carried out before and after each growth by a visible UV spectrophotometer at a wavelength of 436 nm after extraction with pentane, removal of the polar substances, and evaporation of the extraction solvent and an oxidative decomposition of sample.

Results: The results obtained from the total hydrocarbon rates achieved after growth of the four selected autochthonous bacteria with the hydrocarbons tested show that all the strains appear to degrade the hydrocarbons with different rates. Thus, the maximum degradation is obtained with Exiguobacterium aurantiacum strain NB11_3A in the presence of benzene 02.21 mg / l, followed by the degradation of heptane of Halomonas venusta strain NY-8 with a rate of 3.12 mg / l and Vibrio alginolyticus PB-WC 11099 with a value of 3.76 mg / l. With Exiguobacterium aurantiacum strain NB11_3A we have the lowest degradation rate in the presence of cyclohexane, namely 21.23 mg / l.

Discussion: Vibrio alginolyticus PB-WC 11099 gave the best results with all the hydrocarbons tested (alkanes and mono-aromatics). The degradation of refined petroleum gasoline was also observed with all bacterial species selected with different rates. Dietzia sp CNJ898 PLO4 and Vibrio alginolyticus PB-WC 11099 use a wide range of hydrocarbons as the sole source of carbon and energy.

Keywords: hydrocarbons, hydrocarbonoclastics bacteria, bioremediation, Algeria.
A Research on the Vegetation Structures of the Mountain Pastures in District Adana

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Introduction: Pastures are the foremost source of feedstuffs for which animals need roughage. In addition to the pastures and meadows, they keep the soil in place, preventing wind and water erosion. Pastures is the most important nutritional source of animals. In our country, it is not grazed in accordance with the principles of grazing. Because of this, grass yield and grass quality are low. For the improvement of yield and quality, the properties of the vegetation cover in the pastures must be known. A vegetation study is conducted for the characteristics of vegetation-covered species.

Material and Methods: This research was conducted to determine botanical compositions of the native pastures in the six villages of district Tufanbeyli and Saimbeyli, Adana, in the year of 2010. Vegetation of the pastures was studied by the Loop Method. In each pasture 1200 loop measurements in 12 lines were made, plant-covered area rate, botanical composition in the plant covered area and similarity coefficients among the pastures were calculated from the loop measurements.

Results: 44 plant species of 37 genera from 12 plant families were determined on the vegetation of the pastures. Plant cover percentages varied between 78.6% to 98.6% and percentages of grasses, legumes and other family plants in the total plant cover varied between 23.4%, and 9.1%, 30.0%, and 48.8%, 28.3%, and 52.2%, respectively, as depending on the pastures.

Discussion: According to the quality scores, the pastures studied were in poor and very poor conditions. It was concluded that because of poor conditions of the pastures, the research on the determination of proper improvement methods for the pastures must be conducted.

Acknowledgement: We would like to express our appreciation to the TUBİTAK-TOVAG supported this study (106G017).

Keywords: pasture, vegetation survey, loop method, botanical composition
Color-Pattern Variation in *Cercopis vulnerata* (Hemiptera: Cercopidae) Distributed in Sinop and Kastamonu (Turkey) Provinces

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**Introduction:** *Cercopis vulnerata* (Rossi, 1807) (Hemiptera, Cercopidae) is a plant-sap sucking species known for its reddish black coloration and having a wide range of nutrition including open fields in forests, grasses and fruit trees. *Cercopis* species are also very important because of the variation they show. The specimens were evaluated in terms of total body size and sexual size among different variants of this species from Sinop and Kastamonu provinces.

**Material-Method:** Samples were collected from Kastamonu and Sinop provinces by sweeping net in May and June of 2017. The specimens transferred to the insect killing vessel, labeled and brought to the laboratory. Each sample was prepared with the standard insect preparation method using stereomicroscope. Samples were separated by color/pattern differences, and body sizes were measured. One-Way ANOVA and independent T-test were used to assess whether the differences is significant statistically between variants and between sexes of a variant.

**Results:** Three different variants of *C. vulnerata* were identified in the study. Two of them are *C. vulnerata* var. typica and *C. vulnerata* var. helvetica. However, no information about the third form was available. This form is thought to be a new variant. The largest dimension among variants belonged to *C. vulnerata* var. helvetica, and the differences in size between all forms were significant (P <0.01). The populations of *C. vulnerata* var. helvetica are overwhelmed in the region. In this variant, it was also found that there was a sexual dimorphism in size, and male individuals were larger than females. This feature was significant (♀♀ n = 50, ♂♂ n = 50, P <0.01). In the other variants, no significant difference was found between the sexes.

**Conclusion and Discussion:** There is no studies carried out on the variation of *C. vulnerata*, which has a limited number of local recordings in our country. Investigating the factors related to the polymorphisms in *C. vulnerata* and evaluation the populations from different regions are very important, because the polymorphism could be a precursor to speciation.

**Acknowledgements:** This study was supported by Ondokuz Mayıs University Research Fund [Project number PYO.FEN.1904.16.013].

**Keywords:** *Cercopis vulnerata*, variation, polymorphism, sexual dimorphism, Sinop, Kastamonu
Introduction: The amount of venom that spiders produce is small. Because they rarely cause envenomation cases, they are not as important as snakes and scorpions. Although the toxicity of some species of spiders does not a threat to human beings, their venoms are highly effective against insects and other invertebrates, even some small vertebrates. More than 50 000 spider species have been identified in the world. Among these are about 300 species that can affect human beings. Spiders' venoms have intense biological effects and contain special toxins. Work on these toxins is increasingly intense. However, research on venom glands and venom apparatus in spiders is very limited.

Material and Methods: Fifteen individuals belonging to the Maimuna vestita (C. L. Koch, 1841) used in this study were collected in a field study in Bursa on September, 2016. The venom apparatus of the spiders was removed under stereo microscope (Nikon SMZ800, Japanese). The constructions constituting the venom apparatus were prepared by routine methods and examined in stereo light microscope and Jeol JSM 5600 (Japanese) SEM and micrographs were recorded.

Results: Maimuna vestita (C. L. Koch, 1841) is a spider that spreads in Central Europe, Mediterranean countries and Central Asia. In this study, the microanatomy of M. vestita's venom apparatus was performed using Scanning Electron Microscope (SEM). M. vestita's venom apparatus is located on the front of prosoma and consists of a pair of chelicerae and venom glands. Each chelicerae consists of basal and movable segments called as fang. The basal segment of the chelicerae is covered with hairs. The fang is movable, there is a groove in the place where on the chelicerae. There are groove tooth called as “marginal tooth” on both sides. When the fang is not used, it stays closed in this groove. The fang narrows towards the tip and the tip of the tooth is very sharp. At the tip of the subterminal part of the fang there is a venom pore. The venom glands, which are the other parts of the venom apparatus, are about the same size, long cylindrical shape, and extend from the inside of the chelicerae to the prosoma. The venom glands are fairly smooth and wrapped with muscle bundles. The venom produced in the venom gland is transported by a venom duct passing throughout the chelicerae. The venom is ejected from the venom pore by means of strong contraction of these muscles.

Discussion: In the present study indicated that structure of the venom apparatus of the species is similar to other spiders. However, the number and shape of the marginal tooth, the length of the venom gland and the settlement differ from other species.

Keywords: spider, venom apparatus, morphology, microanatomy, SEM.
ORAL PRESENTATION

The Trichoptera Fauna of Eastern Part of Küre Mountains National Park (Kastamonu, Turkey)

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Introduction: Trichoptera is one of the largest insect orders with regard to aquatic larvae in aquatic ecosystems. Adults are terrestrial, and usually fly on the edges of streams and coastal plants. Up to now, the Trichoptera fauna of Turkey was represented by 482 taxa of 80 genera from 21 families (450 species and 32 subspecies). According to literature, a total of 69 taxa that belongs to Trichoptera order were recorded up to now from Kastamonu. Previously, 31 of these 69 taxa were reported from Küre Mountains National Park. The aim of this study was to determine the Trichoptera fauna of Eastern Part of Küre Mountains National Park, which will contribute to knowledge of the Trichoptera fauna of Turkey.

Material and Methods: The adult caddisflies specimens were collected from Eastern Part of Küre Mountains National Park in August and September of 2015. The specimens were collected by light trap with a blacklight tube (6 W), and preserved in 80 % ethyl alcohol. Such characteristics as forewing length, number of spines on the legs, number of maxillary palpi and presence of ocel eyes were used for identification of the taxa at family level while genital preparation was used for identification at species level. In order to characterize the genital structure, the posterior half of the abdomen was cut off using dissecting needles, followed by placing the genital section in 10% KOH solution for twenty minutes. After maceration, the genitalia were cleaned in one drop of soapy water, followed by transferred into a few drops glycerin. The specimens were examined by using the stereomicroscope (Leica APO S8).

Results: A total of 2578 samples including 426 male and 2152 female were collected at eight sampling stations from Eastern Part of Küre Mountains National Park. The examination of the collected samples revealed that 28 taxa which belongs to 8 families (Rhyacophilidae, Hydroptilidae, Philopotamidae, Hydropsychidae, Polycentropodidae, Psychomyiidae, Leptoceridae, Calamoceratidae) and 13 genera.

Discussion and Conclusion: The findings introduced 8 new taxa to the Trichoptera fauna of Kastamonu, total taxa has increased to 77 from 69 with this study. In addition, 13 taxa were recorded for the first time from Küre Mountains National Park, so the Trichoptera fauna increased to 44. As a result, this and similar studies will contribute to the Turkish Trichoptera fauna, and will also shed light on other systematic and ecological studies.

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Keywords: Trichoptera, genital identification, Küre Mountains National Park
Genome-Wide Verification of Isogenic Nature of Clonal Fish Lines in the Atlantic salmon (Salmo salar) through Next Generation Sequencing Technologies

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Introduction: Farmed Atlantic salmon (Salmo salar) is the dominant cultured species in Europe by production and value. Thus genomic resources are well established compared to other teleosts. However, isogenic clonal fish lines which are of great interest for aquaculture related research have not been successfully produced, yet. The main constrains include the low survival of doubled haploid clone founders (propagated through androgenesis or mitotic gynogenesis) and the ability to discriminate between such DH fish with biparental inheritance (arising through failure of gamete irradiation) and meiotic gynogenetics (arising through untargeted spontaneous retention of the second polar body in gynogenesis). Until recently only small numbers of genetic markers were available for genotyping and thus verification of such lines. Reliable and efficient markers technologies are needed for genome-wide screening and next generation sequencing offers this potential.

Material and Methods: A total of 46 DNA samples, starting from outbred parents to putative homozygous clone founders (G1) and to the putative isogenic clonal progeny (G2) in the second generation alongside with haploids were used as template to generate a double-digest restriction associated DNA sequencing (ddRAD-seq) library so as to verify genome-wide isogenity of putative clonal Atlantic salmon lines.

Results: A single round of sequencing by synthesis resulted in 35 million raw reads producing an average of over 1,230 polymorphic single nucleotide polymorphism (SNP) loci. All polymorphic loci were Blast searched against three available versions of salmon genome assemblies to remove multi-copy loci due to a recent whole genome duplication origin in Salmonidae family. Single copy loci (22% of total polymorphic ddRAD loci in each family) showed exclusive transmission of maternal alleles among G1 families while varying levels of sire contribution (10-25%) was detected among G2 families. Although these fish were initially genotyped using 27 microsatellite loci which suggested isogenicity of all samples, residual sire contribution was only detected in the high resolution power of next generation sequencing technologies.

Discussion: The existence of non-maternal (sire alleles) among all members of the five G2 families suggested sub-optimal UV irradiation dose during the propagation of these putative clonal families. This study represents a successful example of verification carried out in species of duplicated genomes and provides evidence for the utility of NGS technologies to discriminate between the different offspring types generated by different ploidy manipulations. Reliable establishment of isogenic clonal lines in the Atlantic salmon, prime commercial interest in Europe, is critical for their utility as a research tool.

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Keywords: Atlantic salmon, isogenic lines, fish
Introduction: Fresh vegetables may be contaminated by bacterial species belonging to the family Enterobacteriaceae originating from soil, water, insects, intestinal tracts of humans and animals. Although some members of this family may be harmless, the other species may be pathogenic for human. Lettuce is among commonly consumed raw vegetables by human. Presence of members of the family Enterobacteriaceae in lettuce may cause health problems in humans. Therefore, the members of the family Enterobacteriaceae were examined.

Material and Methods: The members of the family Enterobacteriaceae were tested on EMB agar on five lettuce samples obtained from markets and identified using API® 20E Test Kits.

Results: Total number of Enterobacteriaceae on the lettuce samples ranged from $1.6 \times 10^4$ CFU/g to $1.1 \times 10^5$ CFU/g. According to biochemical tests, eight isolates were identified as Escherichia coli (2 isolates), Enterobacter cloacae (1 isolate), Yersinia ruckeri (2 isolates), Citrobacter youngae (2 isolates), and Klebsiella pneumoniae (1 isolate) species. Escherichia coli (2 samples), Citrobacter youngae (2 samples), Yersinia ruckeri (2 samples) were the most prevalent bacterial species on the samples. All isolates showed negative oxidase and positive catalase reactions. While all isolates were positive for β-galactosidase activity and produced acid from glucose and mannose, most isolates produced acid from arabinose (88%), sorbitol (75%) and rhamnose (75%). Sixty-three percent of the isolates showed positive lysine and ornithine decarboxylase activities. Half of the isolates showed positive arginine decarboxylase activity and produced acid from amygdalin. Less than half of the test isolates used citrate (38%) as a sole carbon source and produced acid from inositol (13%), sucrose (38%) and melibiose (38%).

Discussion: According to biochemical test results, isolates exhibited different catabolic activities. Due to importance of the members of Enterobacteriaceae on human health, we recommend washing lettuce very well before using.

Keywords: Enterobacteriaceae, lettuce, API® 20E Test Kits
Degradation Caused by Run-of-the-River Hydroelectric Power Plants on Forests and Local Communities in Turkey

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Introduction: It is known that World Bank and IMF centred neo-liberal policies from early 1980’s were also effective in the energy sector. With the influence of these policies, according to the provisions of the Electricity Market Law No. 4628 that passed in 2001 in Turkey, construction of power plants has been predominantly turned over to the private sector. Private sector applications for hydroelectric power plants started to be accepted and construction of run-of-the-river hydroelectric power plants (HPP) in thousands were brought to the agenda during the process. This study aims to analyse the negative effects of run-of-the-river HPP projects, whose numbers rapidly increased in Turkey during 2000s, on the forests and local communities in construction sites.

Material and Methods: In the study, first of all, national and international literature was swept and general information on HPP projects was acquired. Next, national legislation on HPP, reports of professional organizations and non-governmental organisations on social and environmental problems that HPP projects cause, and a number of Environmental Impact Assessment (EIA) reports prepared for HPP and court cases for invalidating those reports have been examined. Observations have been made in and around some HPP that were picked as examples. Also, local communities and society leaders have been interviewed. Information collected have been analysed and recommendations on protection of forests and local communities have been developed.

Results: Run-of-the-river HPP projects cause environmental problems generally during their construction stages and operation stages. These problems can be listed as; social, cultural, historical and economic effects, problem of pollution and excavations, effects on species and natural habitats, erosion of deltas, decreasing underground waters and drying lakes, decreasing water quality, damages to the ecosystem, negative contribution to the climate change, negative effects on biodiversity, excessive extermination of trees and other forest entities.

Discussion: River basins are not taken as a whole in the construction of HPP and similar facilities. Water resources can only be maintained if they are managed on the basis of basins. Otherwise, the presence of the rivers in the country will be endangered, also, the forests and the local communities will suffer. In order for HPPs to be considered as a true renewable energy source, the negative impacts on the forests and the local communities must be minimized.

Keywords: environment, forests degradation, river basin management, social conflict
A Review on the Protected Area Qualification of Nature Parks

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Introduction: The importance of protected areas, which protects the natural and the cultural values and also provides recreational services, is increasing gradually. Nevertheless, in recent years, practices displaying the use and the exploitation, instead of insight of the nature conversation, come up in Turkey. In some cases, even if the status of the protected areas does not change, it can be seen that the characteristics of the protected area change. Nature parks, which are one of the protected areas within the forest regime in Turkey, are one of the most prominent examples of this subject. While the number of nature parks are increased rapidly, significant losses are experienced in their protected area characteristics. This study aims to evaluate the changes in nature parks, which have been put into service as recreation areas rather than protected areas and whose characteristics have been changed in the recent years.

Material and Methods: The number of nature parks that were first announced in 1983 in Turkey has now risen to 209 and the area covered by nature parks has risen to 99378 hectares. Natural parks, which are one of the four protected area status according to the National Parks Law No 2873, are managed by the General Directorate of Nature Conservation and the National Parks of the Ministry of Forestry and Water Affairs. In this study, the situation in all nature parks in the country were examined. The changes in the numbers and areas of these natural parks from past to present have been analysed by comparing their registry dates, natural and recreational values.

Results: The year 2011 is a breaking point for nature parks. In 2010, there were 40 nature parks covering 74529 hectares, while in the same year the number of nature parks increased to 179 and the area reached 81332 hectares. While the average size of a nature park in 2010 was 1863 hectares, this value dropped to 454 hectares in a year.

Discussion: Although the management purposes and separation criteria of the recreation areas and nature parks are quite different from each other, in 2011, the status of 139 recreation areas was changed and declared as a nature park. It is very difficult to say that sufficient research and scientific evaluation has been made during this change. This change, which was carried out without having a scientific basis, has resulted in the loss of quality in nature parks. When nature parks are declared, area protection qualifications should not be ignored and national policies and strategies for the management of nature parks should pay attention to this situation.

Keywords: forestry, management, planning, recreation, urbanization
Introduction: A dam on a river system induces numerous changes in the aquatic environment both in the river downstream and that of upstream. These changes modify the food resources available to fishes. As a consequence, fish communities undergo rapid transformations particularly in terms of trophic organization. A study investigating the influence of the Almus Dam on the diet of two sympatric cyprinid fish species (Squalius cephalus (Linnaeus, 1758) and Capoeta banarsecui Turan, Kottelat, Ekmekçi & Imamoglu, 2006) was undertaken on the Yeşilırmak River in Turkey.

Material and Methods: Diet composition and resource overlap for these species were documented by analyzing gut contents of 124 specimens collected at five stations located at upstream sites (4 sites) above the Almus reservoir and downstream site (1) below the reservoir during May and June 2015.

Results: A combination of fish community sampling and gut contents determined that Almus Dam impacted upon the abundance and feeding habits of two cyprinid fishes. The abundance and diversity of fishes were greater upstream of the reservoir than downstream site. Both species were omnivorous and fed mostly on insects, algae and terrestrial plant materials. Generally, C. banarescui consumed more algae, chironomid larvae, detritus and terrestrial vegetation while diet of S. cephalus comprised mostly insects, algae and terrestrial vegetation. The proportion of individuals from two species with empty stomachs was greater from downstream site. Fish species, especially C. banarescui displayed altered feeding strategies and exploited different prey taxa upstream and downstream of reservoir. Conspecific of two fishes feeding niches were distinct in Hubyar, Çevreli and Gümenek but intermediate food-niche overlaps was estimated in Karadere and İsmailiye.

Discussion: As a result, despite the similarity among the diets, our analyses suggest that generalist feeding strategies and altering foraging preferences in their diet in such unstable conditions are important adaptive features that may reduce the inter-specific competition in the fish community and permit the partitioning of food that allows minimize competitive interactions. Food partitioning may also simply reflect a large degree of consume locally greater abundances of resources.

Keywords: feeding ecology, trophic interaction, cyprinid fishes, niche partitioning, dam effect
Introduction: Ostracods are micro bivalved crustaceans. They can be found in almost all kinds of aquatic habitats. Their adaptive ability is high and is mostly known from 5000 m bls and up to 5000m asl. They are very sensitive to environmental changes. This study aims to understand ostracods ecological tolerances and habitat preferences in Malatya.

Material and Methods: All materials were collected with a hand net in situ from 125 stations at Malatya from August 03 to 10 in 2015. Samples fixed in 70% ethanol were filtered in the laboratory and subsequently sorted from sediment. Species description was done under Olympus BX-51 microscope by following the taxonomic key provided in literature. Water samples were collected in sterilized containers from each station to quality measurements. C2 program was applied to find tolerance and optimum point of every species for environmental variables.

Results: We collected 25 species in 125 sampling sites (12 different habitat types) and 24 of them are the first record for Malatya. *Ilyocypris bradyi* was the only species found in all habitats and *Potamocypris unicaudata* was the only species found in ponds. According to C2 results, *Heterocypris salina* had the maximum optimum range for salinity and *Limnocythere inopinata* the maximum optimum range for water temperature and Calcium.

Discussion: Previously, there was three species (*Psychrodromus olivaceus, Potamocypris fallax, Zonacypris constata*) reported from the area. Including these species, it is now 27 species known from Malatya. Two of three species were not found during our study. It is crucial to state that there was a strong relationship between numbers of sampling site and numbers of species found between artificial and natural habitats. For example, 32 sites of troughs displayed 15 species but the same numbers of ostracods were also found from 22 streams. This suggests the fact that increasing numbers of sampling did not change the numbers of species. Regardless of their habitat preferences, cosmoeccious species seems to be most common amid habitats. This implies that they have relatively high levels of ecological tolerances (but lower expected optimum values). Accordingly, these species increase their survival chances with relatively high tolerance ranges, pointing that they can be found in wide geographical ranges in variety of natural and/or artificial habitats.

Acknowledgement: This study was supported by TUBITAK project no 2130172.

Keywords: Ostracod, ecology, habitat types, Malatya
Estimation of Sediment Pollution Status in a Spring Originated Shallow Pond

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Introduction: Sediment pollution is a major problem in pond management than the overlying water. West Pond (Çifteler, Eskişehir) is one of the five Sakaryabaşı Karst Springs which was converted to a pond. Eutrophic West Pond is the main water source of the rainbow trout culture station of about 25 tons and sustainable monitoring was aimed to determine the sediment contamination status by using pollution index, enrichment factor and organic index.

Material and Methods: The study was carried out in two stations representing the with macrophyte and without macrophyte in the littoral area in the pond in January, April, July and October of 2017 representing seasons. Samples of surface sediments, taken by using Eckman-Grab, were transported to the laboratory preventing light penetration and in cold conditions. Sediment organic matter, total organic carbon, total nitrogen and total phosphorus levels were determined according to standard methods. Sediment contamination index, organic index and organic nitrogen index values were calculated according to Sakan et al. (2009) and Zhang et al. (2015).

Results: The maximum levels of the pollution index were determined that pond’s sediment is polluted with total nitrogen, organic matter, total phosphorus, respectively. The calculated enrichment factors indicated that low nutrient contamination (total nitrogen, total organic carbon, total phosphorus and organic matter) was recorded in the sediments of the pond. Both of the stations were also determined as highly contaminated based on organic index of the sediments. The total nitrogen pollution and organic indexes were found to be higher in without macrophyte station by comparison with the macrophyte existence station except April. Enrichment factor was also determined as the highest level for nitrogen.

Discussion: The current nutrient levels -particularly nitrogen- of the pond’s sediment revealed that pond has been getting polluted quantitatively in the last ten years period. It can be concluded that sediments of the pond serve as a repository for nutrients (nitrogen etc) accumulation from adjacent agricultural areas with contaminated groundwater through the years. In this context, the reduction of agricultural pollution is of great importance in terms of controlling the external nitrogen load around the pond. Phragmites spp. colonisation in the littoral area of the pond incorporates nitrogen and phosphorus in their roots and body densely. Concordantly, periodic macrophyte harvesting method would be more suggestive than the total macrophyte removal in terms of pond’s sediment management and culture station’s sustainability.

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Keywords: sediment, pollution index, organic index, pond management
Analyzing Relationship Between Vegetation and Rainfall Using SPOT VGT Data

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Introduction: The natural phenomena which are the most influential on vegetation distribution and development is the climate variations. Change in the amount of rainfall is one of the important climatic factors that have significant effect on vegetation condition. This is especially true in arid and semi-arid regions where the change in precipitation may be excessive. Quantitative assessment of vegetation areas is necessary to understand the effects of climate change. Continuous monitoring of vegetation status at local scales can provide early clues to the response of the vegetation to climate changes. In this study, three different land cover settings were analyzed based on climate conditions in Kahramanmaras province.

Material and Methods: Spot Vegetation (VGT) data with a spatial resolution of 1 km consisting of 10-day periods covering the years 1998-2014 were used to determine the relationship between different climate conditions and vegetation. In order to show the temporal variation of the 10 day NDVI values, temporal change graphs were created by using several images. In order to determine the relationship between the temporal changes of NDVI and the daily precipitation data obtained from the General Directorate of Meteorology, correlation analyzes were made between the 10-day precipitation values of each meteorological station and the temporal characteristics of vegetation obtained from the 10-day images of SPOT VGT.

Results: Analyzes made for different vegetation formations in the study area depicted that the relative greening rate of the plants during the wet periods showed higher vegetative activities than the dry period. Statistically significant correlations show that plant species are more reactive during wet conditions. It was also found that vegetation development is much more related to long-term rainfall accumulation than short-term precipitation. In general, it was observed that the vegetation cover reacted to rainfall variations and produced statistically significant results.

Discussion: As a result, it has been found that the rainfall pattern has a strong influence on the vegetation development. The frequency of precipitation events over a certain period of time is influential in plant development along with other local factors and land cover characteristics of the area. Therefore, precipitation characteristics may not be the only factors that have an effect on the NDVI values. In addition, other local factors such as topography, soil characteristics and human activities must be taken into account to explain climate effects on the vegetation cover. It has been seen that the distinction of vegetation development in arid and humid periods can be obtained more easily and quickly by means of remote sensing data.

Keywords: Kahramanmaras, SPOT VGT, NDVI, rainfall, vegetation.
Gender And Age Dependent Distribution of Klebsiella pneumoniae Strains In Various Culture Samples Collected From Hospitals In Konya

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Introduction: The use of common antibiotics is increasing rapidly all over the world and especially in our country. In addition to transferring antibiotic resistance genes, the use of unnecessary antibiotics also increases the rate of resistance to these antibiotics. This leads to great losses both in terms of economy and health. Klebsiella pneumonia is the cause of many infections, mainly urinary tract infections. In this study, information about the age, sex, distribution of K. pneumoniae strains isolated from different hospitals in Konya province is presented.

Material and Methods: K. pneumoniae strains were isolated from various clinical specimens (urine, blood, wound, etc.) between January and August 2017 from microbiology laboratories of public hospitals and some private hospitals in Konya province. 192 K. pneumonia strains identified by Vitek2 identification cards were confirmed in the laboratory. Clinical information of all strains was prepared in a table of age and gender information.

Results: Of 192 samples collected, 118 were obtained from Meram Education Research Hospital, 39 from Beyhekim Public Hospital and 35 samples from Medicana Hospital. 100 of the samples are from female patients; and 92 of them were isolated from male patients. It has been determined that of 118 samples taken from the Meram Education Research Hospital, 70 were female and 48 were male patients; of the 39 samples taken from the Public Hospital of Beyhekim, 14 were female and 25 were male patients; of 35 samples taken from Medicana Hospital 21 male patients and 14 female patients. When the age distributions of the patients are taken into consideration; 1. Group (0-6) years: 41 individuals, 2. Group (7-14) years: 6 individuals, Group 3 (15-29) years: 17 individuals, Group 4 (30-59) years: 34 individual, 5th group (≥60) age: 94 individuals.

The highest K. pneumoniae strains were obtained from urine samples and the gender distribution of these samples was calculated as female: 59, male: 47.

Discussion: According to these, K. pneumoniae strain was prevailed among in the 5th group people who are 60 years and above mostly, then in the 1st group and 4th group respectively. It is thought that the incidence of K. pneumoniae in infancy and old age may be related to periodically low body resistance.

Acknowledgement: We would like to express our appreciation to the Selçuk University Scientific Research Project Commission, which supported this study.

Keywords: Klebsiella pneumoniae, age, gender, prevalence, Konya.
**Introduction:** Yeniçağa Lake is located in the Western Black Sea region in Turkey. Today it is shallow, endorheic and eutrophic lake with a maximum depth of 5.2 m and it is one of important wetland areas in Turkey.

*Astacus leptodactylus* has been stocked naturally in the lake. Detailed study related with *Astacus leptodactylus* in Yeniçağa Lake has not performed as yet. Thus, the aim of this study was to determine the population structure and reproduction features, i.e. the sex and length composition, the length-weight relationship, fecundity, and mating, spawning and hatching time.

**Material and Method:** This study was conducted in Lake Yeniçağa in May 2017 and April 2018 to investigate some biological characteristics. Samples were collected monthly with fyke-nets in the lake. Each sample was measured. Fecundity was determined by counting the pleopodal eggs.

**Results:** In samplings 629 crayfish were caught using fykenets. The ratio of males to females was 1.69:1. The total body lengths of both sexes ranged from 70 to 260 mm and the majority were in the 160-169 mm length class. It was determined that 14.89% of males were in 160-169 mm length class and 15.45% of females were in 140-149 mm length class. For weight distribution 17.92% of males were in 50-59 g weight class and 24.03% of females were in 40-49 g weight class. It was seen that mating began the middle of December and the first crayfish with pleopodal eggs was seen in the middle of February. The number of pleopodal eggs varied between 100 and 650 eggs/crayfish. The average diameter of the pleopodal eggs was calculated 2.45 mm.

**Discussion:** The proportion of male individuals in the crayfish population of Lake Yeniçağa was higher than that of females. Although the average weight of both sexes were nearly the same, the average length of males was higher than that of females. According to the b value, it was determined that, there were a negative allometric growth in both sexes.

**Acknowledgement:** We would like to express our appreciation to the Hacettepe University Scientific Research Project Commission, which supported this study (Project no: FHD-2017 13750).

**Keywords:** *Astacus leptodactylus*, Yeniçağa lake, population parameters
Investigation of Antimicrobial Effect of Vitis vinifera subsp. vinifera cv. Boğazkere

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Introduction: The earliest cultivation of grape dates back to BC 4000-7000 years in the area between Black Sea and Caspian Sea. Grape is one of the most cultured and consumed fruit in the world. Today it is estimated that there are over 10 000 cultivars (cv.) of grape (Vitis vinifera subsp. vinifera) are being cultivated all over the World, among them 1 200 cultivar are currently cultivated in Turkey. Many studies mention that grape show biological activity such as antioxidative, anti-inflammatory and antimicrobial because to containing various biologically active substances such as flavonoids, polyphenols and anthocyanins. The main objective of this study is to evaluate the antimicrobial effect of Vitis vinifera subsp. vinifera cv. Boğazkere on eighteen gram positive and negative bacteria and one fungi.

Material and Method: Fruit of grape (fruit juice, seed and fruit bark) were extracted with 60% ethanol solution. These extracts were tested in vitro for their antimicrobial activity against 19 microorganism (Enterobacter aerogenes, Salmonella infantis, Listeria monocytogenes, Klebsiella pneumoniae, Pseudomonas fluorescens, Pseudomonas aeruginosa, Salmonella Kentucky, Enterococcus faecalis, Listeria innocua, Salmonella enteritidis, Enterococcus durans, Salmonella typhimurium, Enterococcus faecium, Staphylococcus aereus, Staphylococcus epidermidis, Bacillus subtilis, Escherichia coli, Saratta murosscens and Candida albicans) by disk diffusion (DD), minimum inhibitory concentration (MIC) and minimum bactericidal/bacteriostatic concentration (MBC) tests.

Results: Ethanol extracts of Boğazkere cultivar showed antimicrobial activity against 15 bacteria, while it doesn’t show any activity against 4 (S. kentucky, E. durans, S. typhimurium and C. albicans) microorganism at tested concentration. According to the disk diffusion test results 10 µL extract exhibit antimicrobial activity against any bacteria, 50 µL extract show antimicrobial activity (7,33-12,33 mm) against twelve bacteria and 100 µL extract show antimicrobial activity (7,33-19,66 mm) against fifteen bacteria. Extract exhibit inhibition between 20-0,039 mg/100 µL value in MIC test.

Discussion: The strongest antibacterial effect observed in 100 µL extract against E. faecium with 19.66 mm zone diameter while the lowest antibacterial effect observed in 100 µL concentration of extract against S. aerogenes with 7.33 mm zone diameter. MIC value determined between 20-0.039 mg/100 ml for fifteen bacteria. MIC value observed as bacteriostatic for all microorganism.

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Keywords: grape, Boğazkere, vitaceae, antimicrobial effect, MIC, disk diffusion
Introduction: Turkey is located at the between Asia and Europe, has rich habitat diversity because of its geomorphologic, topographic and climatic characteristics. As a matter of fact, this habitat diversity enabled our country to have 12,816 plant taxa and 4,040 endemic taxa. The Western Black Sea region has a different meaning in terms of species diversity. This characteristic shows itself in a variety of woody species. The main objective of this study is to identify the flora (especially woody species) of Kızılcasu Forest Planning Unit (FPU), which located south of Cide district and covers ca. 9052 hectares. Planning unit is located between 300 to 1450 m. elevation, as a whole remains in the Important Plant Area of the Western Küre Mountains.

Material and Methods: Plant species were collected from Kızılcasu Forest Planning Unit which was found in Şenpazar (Kastamonu) town between 2008 and 2009 years. The plant specimens were identified by using Flora of Turkey and East Aegean Islands. After that, plant names were checked according to new Turkey’s Flora.

Results: In all, 233 vascular plant taxa belonging to 65 families and 167 genera have been determined. 3 taxa (1.3%) belong to Pteridophyta and 230 taxa (98.7%) belong to Spermatophyta. Five taxa (2.2%) belong to Gymnospermae, while the other 225 (97.8%) are Angiospermae. The richest family was Asteraceae (26–11%), followed by Rosaceae (23–10%), Lamiaceae (18–8%) and Fabaceae (16–7%). In addition to this, the richest genus was Campanula L. (6–4%), followed by Ranunculus (4–2%), Galium (4–2%), Salix (4–2%), Salvia (4–2%) and Acer (4–2%). The distribution of taxa within the phytogeographical regions are as follows: Euro-Siberian elements 82 (35.2%), Euxine 26 (11.2%), Mediterranean elements 6 (2.6%), Irano-Turanian elements 6 (2.6%) Hyrcano-Euxine 3 (1.3%), East-Medit. 2 (0.9%), Euxine (mt.) 1 (0.4%), cosmopolitan and multiregional 107 (45.9%), collected. When we evaluate the plant taxa in terms of life form, can be seen in the following ratios: Hemicryptophytes 115 (49.4%), Phanerophytes 59 (25.3%), Cryptophytes 24 (10.3%), Therophytes 17 (7.3%), Chameophytes 16 (6.9%) and Vascular Parasites 2 (0.9%). The number of endemic plants found was 9 (3.9%), while 1 (0.4%) rare plants.

Discussion: Comparing the present study to others, Asteraceae is ranked first in all studies because it is the largest family of the Turkish Flora and through worldwide. Kızılcasu FPU are located within the Euro-Siberian floristic region, for this reason most taxa in this study belongs to this region. Hemicryptophytes were the most observed life form in the study area. Another important result is that the purpose of the study is realized and Phanerophytes ratio is quite high. Similarly, with life form, endemism rate of study area is lower than other region due to again Black Sea region’ endemism ratio lower than other floristic regions. With this study, was found new distribution area for Leonurus cardiaca L.

Keywords: plant biodiversity, Western Black Sea, forest, Kastamonu
The Effect of Sowing Time on Some Yield and Quality Traits of Buckwheat (*Fagopyrum esculentum* Moench) in Yozgat Ecological Conditions

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**Introduction:** Turkey is one of the most important plant gene center in the world due to the has different ecological conditions and topography. Also, Turkey is a rare country in the world where has different agro-ecological conditions that easily cultivate many culture plants. Buckwheat is a new plant that has entered our country's agriculture fields in recent years. Buckwheat has been primarily cultivated for grain production. But, recently, it has been considered for forage crop and included into the diet of dairy cows.

**Material and Methods:** This study was conducted to determine the yield and some quality characteristics of buckwheat at 5 different sowing times during 2015 and 2016 years in Yozgat ecological conditions. The experiment was arranged in randomized blocks design with three replications. In this study; plant height, fresh yield, hay yield, crude protein ratio, seed yield, seed protein ratio, 1000 seed weight, ADF, NDF N, P, Ca and Mg content were investigated.

**Results:** In the first year, the average hay yield for each sowing times were 1.50, 3.04, 4.42, 1.74 and 0.57 t.ha⁻¹ respectively. In the second year, no results were obtained at 1st and 3rd sowing times and, hay yields were 0.45, 2.41 and 0.14 t.ha⁻¹ at 2 th, 4 th and 5 th sowing times respectively. Seed yield was 0.67, 0.75, 0.09 and 0.12 t.ha⁻¹ respectively in 2015. Plants could not produce seed at 1st, 3rd and 5th sowing times in 2016 and, seed yields were respectively 0.26 and 0.56 t.ha⁻¹ at the second and fourth sowing times. K, P, Ca and Mg contents both years were found within the livestock requirement limits.

**Discussion:** Sowing time and ecological conditions were effective on the parameters determined in the buckwheat plant. Especially the high temperatures or frosts that occurred and the difference in temperature between day and night were caused adverse effects on the plant during the germination and flowering period. Also, in the late sowing, the temperature requirement of the plant was not met and the seed could not be mature. Therefore, the sowing time of buckwheat can be appropriate between late spring and mid-summer in the Yozgat ecological conditions.

**Acknowledgement:** Also, the study is a part of Şive Köksal’s master thesis

**Keywords:** buckwheat, sowing times, yield, quality, Yozgat
Seed Orchards of Required to be Used According to the Regions and Altitude Levels in Turkey

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Introduction: One of the main objectives of modern forestry practices is to produce wood raw materials with high quality and quantity at minimum cost. In order to achieve this, it is necessary to use genetically improvement seed material in forestation using tree breeding techniques. One of the most important breeding facilities established within the scope of tree breeding studies is seed orchards. Seed orchards; It is established with the aim of meeting the needs of seeds from the genetically improvement sources in forestation works and to increase the production and quality of the wood raw materials to be made in the per unit area when the seed is used from the seed orchards. According to the researches carried out, it was understood that when the existing seed orchards are used in Turkish red pine the quality and quantity can be increased by 20-40% by using the seeds of the genotypic seed orchards in the afforestation that can increase the volume by 8% more than the afforestation. In this study, the seed orchards and priority orders to be used in the forestation works to be done according to the regions and the altitude levels were investigated so that the seed orchards could be used more efficiently.

Material and Method: In Turkey, registration, establish and maintenance works of seeds orchards are carried out by the Forest Tree Seeds and Tree Breeding Research Institute Directorate. In this study, the official records were investigated and the seed orchards established up to this day were investigated in terms of number, species and area, and evaluations were made.

Results and Discussion: As a result of the study, the seed orchards which were established with the species of Turkish red pine (Pinus brutia Ten.) and Black pine (Pinus nigra) most commonly used in the afforestation and regeneration studies have been investigated. In the evaluations, origins and priority orders required to be used in the forestation and regeneration works to be done in Turkey according to the regions and the altitude levels have been identified.

Keywords: seed orchard, afforestation, Turkey
The Evaluation of Seasonal Water and Sediment Heavy Metal Pollution Levels of Turnasuyu Stream (Ordu, Turkey)

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Introduction: Heavy metals that can be long-lasting in the contaminated environment, can cause toxic effects in aquatic organisms and threaten human health as a result of accumulation in the food chain, do not biodegrade as most organic pollutants. Contaminated aquatic systems, especially with heavy metals which have high toxicity, constitute a major risk to aquatic life live in and on sediment and constitute one of the greatest sources of stress threatening ecosystem health. Turnasuyu Stream, sourced from Çambaşı Plateau of Ordu, has 275 km² of precipitation area, 56 km total length, and 1900 m of the total elevation with the annual flow rate of 7.16 m³/sn. The aim of the present study is to determine the water and sediment heavy metal levels of Turnasuyu Stream by using some ecological index.

Material and Methods: The water and sediment samples were taken from three fixed stations monthly between February 2017 and January 2018 according to standard methods. Sediment samples was dried at 103 degrees for 24 hours and sifted from a 63-micron sieve. After digestion of 0.5 g sample by Cem Mars 5 brand microwave. Heavy metal found in water/sediment were determined by Bruker 820-MS brand ICP-MS Spectrometer. Water Quality were evaluated by Surface Water Quality Management Regulation’s (SWQMR), sediment quality were evaluated according to Sediment Quality Guidelines (SQG), Geo-Accumulation Index (Igeo) and Enrichment Factor (EF).

Results: The levels of heavy metals in sediment as ppm were as follows; Al:6416-Cr:5,67-Mn:361-Fe:15080-Co:6,74-Ni:4,35-Cu:19,1-Zn:33,06-As:0,193-Se:0,584-Cd:0,29 Pb:60,23, the levels in water as ppb as follow;Al:83-Mn:11,64-Fe:101-Cu:2,35-Zn:11,61. There were no Cr, Co, Ni, As, Se, Cd and Pb on either any months or any stations. One-way ANOVA results showed that only Zn level from the third station was different from the rest of the stations (p˂0,05).

Discussion: The assessment of the water and sediment quality of Turnasuyu Creek is important, as it is the source of drinking water for Gulyali town. According to levels of water heavy metals, Turnasuyu Stream water is considered as I.class water quality according to SWQMR. According to geoaccumulation index, Se and Cd were in unpolluted to moderately (0˂Igeo˂1) polluted class; Pb was in moderately polluted class (1˂Igeo˂2). According to Enrichment factor (EF) only Pb was in moderate (2≤ EF≤5) category and the rest of the metals were at minimum level. The creek is considered non-threatening any danger to aquatic life when assessed in general according to water and sediment quality.

Acknowledgement: We would like to express our appreciation to the Giresun University Scientific Research Project Commission, which supported this study (FEN BAP-A-11016-133).

Keywords: Turnasuyu Stream, water quality, sediment quality, enrichment factor, geoaccumulation index.
Biochemical Effects of Naringin and Naringenin Flavonoids Against Malathion Toxicity on Saccharomyces cerevisiae

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Introduction: In this study, the effects of naringin and naringenin flavonoids against malathion toxicity on Saccharomyces cerevisiae were investigated. Flavonoids comprise a large family of secondary plant metabolic intermediates that exhibit a wide variety of antioxidant and human health-related properties. Malathion is an insecticide in the chemical family known as organophosphates. Products containing malathion are used outdoors to control a wide variety of insects in agricultural settings and around people’s homes. Malathion has also been used in public health mosquito control and fruit fly eradication programs. S. cerevisiae is the best cell model used in molecular, biochemical and genetic studies. For the past two decades S. cerevisiae has been the model system for much of molecular genetic research because the basic cellular mechanics of replication, recombination, cell division and metabolism are generally conserved between yeast and larger eukaryotes, including mammals. Antioxidants mainly include endogenous enzymes, antioxidant vitamins and flavonoids. Flavonoids are a large group of antioxidants naturally occurring in vegetables, fruits, cereal, tea. Naringin and naringenin are molecules in flavonoids. They were found to display strong anti-inflammatory and antioxidant activities and also protect individuals from the development of cancer, cardiovascular disorders and chronic diseases.

Material and Methods: In this study, low (40 mg), medium (80 mg) and high (160 mg) doses of malathion were applied to S. cerevisiae cultures. At the end of the incubation, fatty acid, vitamin, glutathione and MDA levels were examined on cell pellets.

Results: Differences were observed in fatty acid levels of yeast cells depending on the dosages of malathion and flavonoids. In the low-dose (40 mg) applied group, palmitic acid (C16:0) and stearic acid (C18:0) were partially reduced in malathion-treated group (p<0.05), but they were found to be high in the group treated with malathion and naringenin. It was also determined that malathion affected the activity of Delta-12 desaturase enzyme, which increased the amount of linoleic acid. In the medium (80 mg) and high (160 mg) dose application, C16:0, C16:1n-7, C18:0, C18:1n-9 and C18:2n-6 levels were found to be affected. Depending on the doses administered, differences in the levels of vitamin E, ergosterol and stigmasterol were observed. It was also found that malathion increased the MDA level and lowered glutathione (GSH) levels at low (40 mg) and medium (80 mg) doses. The amount of total protein was also found to be higher than control group.

Discussion: According to the results obtained, it was observed that Naringenin flavonoid was more effective than Naringin. In vitro study, it was determined that naringenin against DPPH radical had more cleaning effect.

Acknowledgement: This work was funded by the Research Fund of FIRAT UNIVERSITY (Number: FUBAB FF.16.26) (ELAZIĞ, TURKEY).

Keywords: Saccharomyces cerevisiae, naringin and naringenin, malathion, flavonoids
Investigation of Radiological Cancer Risk in Baby Clam (Chamelea gallina) and Sediment Samples in the Coastal Area of Sinop Province, Turkey

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Introduction: Mussels are found abundantly in the seas in all seasons of the year and they are fed by filtering the seawater. Mussels accumulate some heavy metals and radionuclides in the water environment at high concentrations in the soft tissues. So they are bioindicator organisms that are considered the main indicator of pollution in the aquatic environment. Also, sediments are widely used in environmental pollution studies due to their being environmental indicators. Therefore, the main objective of this study is to determine concentration levels of 137Cs radioisotope in mussel and sediment samples collected from stations determined in coastal area of Sinop province, Turkey. Additionally, radiological parameters of 137Cs were calculated from ingestion of mussel.

Material and Methods: Mussel and sediment samples from 3 sampling stations (Akliman, Ayancık and Sarıkum) determined in the coastal area of Sinop province were collected as a single season in 2016. All the mussel samples were washed and cleaned with marine water obtained from their respective stations. Later, the mussel shells were opened and the soft tissue was extracted from the shells. Each sediment and soft tissue sample was homogenized, dried in a temperature-controlled furnace to remove moisture and sieved through a 400 mesh. The dried samples were homogenized and put into 100 mL cylindrical polyethylene plastic containers and sealed for gamma activity analysis. Radioactivity levels of the 137Cs radioisotope were measured using a germanium (HPGe) detector.

Results: Activity concentrations in sediment and soft tissue of mussel samples were observed to vary in the range 0.72‒2.19 Bq kg⁻¹, 1.38‒1.52 Bq kg⁻¹ for 137Cs, respectively. Also, the highest 137Cs concentration in sediment and mussel specimens was determined in the sample taken from the Akliman station.

Discussion: When the average activity concentrations of 137Cs were compared with other studies in the literature, it was determined that the maximum value of 137Cs activity concentration was lower than the maximum concentrations measured in literature studies. Moreover, the lifetime cancer risk values are low compared with the acceptable cancer risk of 10⁻³ for radiological risk. As a result, it has been observed that there is no risk for public health considering the carcinogenic risk parameters calculated for 137Cs radioisotope in soft tissue of mussel specimens.

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Keywords: radioactivity, baby clam, Sinop.
**ORAL PRESENTATION**

**The Effects of Zinc on Growth Parameters of *Epilobium hirsutum***

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**Introduction:** Heavy metal pollution of freshwater is a serious issue worldwide, particularly in developing countries such as Turkey. Natural and anthropogenic activities, urban sewage, tanneries and textile industry, have contaminated the freshwater with various metals including Zn, As, Pb, Ni, Cr and Cd. Among these heavy metals, Zn is an essential nutrient for growth and development of plants. Even though Zn has important roles on promotion of the metabolism of carbohydrate, protein, auxin, pollen formation in plants, it causes toxicity and plant chlorosis at high concentrations. In this study, the effects of zinc on root, shoot and leaf development of *Epilobium hirsutum* L. were investigated by using hydroponic culture method.

**Material and Methods:** *E. hirsutum* seedlings were treated with 10 % Hoagland solutions containing 10, 20, 30, 40 and 50 mg Zn/L for 7 days to determine the changes in root and shoot length, number of leaves and fresh weight. 10 % Hoagland solution was used as control group. The results were analyzed using JMP 6 SAS program. t-test was used to determine the differences between the control group and applications treated with zinc at p<0.05 level.

**Results:** When root, shoot and leaf development of *E. hirsutum* grown in different zinc concentrations are compared to the control group, it was determined that percent changes of root and stem length and fresh weight were reduced. However, when numbers of *E. hirsutum* leaves grown in different zinc concentrations are compared to the control group, it was found percent increase in number of leaves weren’t showed statistically significant differences.

**Discussion:** Heavy metal pollution in fresh water environments, originating from geologic formations and anthropogenic sources, is one of the most important global environmental problems. While some of the heavy metals causing pollution, such as zinc, manganese, copper and molybdenum, are essential elements for plant growth, some heavy metals have toxic effects on plants, such as lead, cadmium and arsenic. Some plants, called hyperaccumulators, have the ability to accumulate these heavy metals in their roots, stems or leaves. However, accumulation of heavy metals in these organs causes toxicity in plants and affects the plant physiologically in a negative way, such as growth, germination, photosynthesis, enzyme activity and protein synthesis.

**Acknowledgement:** We would like to express our appreciation to the Dumlupınar University Scientific Research Project Commission, which supported this study (2016-63).

**Keywords:** *Epilobium hirsutum*, hydroponic culture, zinc.
ORAL PRESENTATION

Taxonomic Status of Turkish Vincetoxicum Wolf (Apocynaceae: Asclepiadoideae) Taxa

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Introduction: In the present study the latest taxonomic status of Turkish Vincetoxicum Wolf taxa were evaluated based on actual morphological, palynological, cytological and molecular data.

Materials and Methods: The plant samples collected from 105 different natural populations in Turkey over the period 2012-2015 and also a total of 434 Turkey originated plant specimens deposited in many national and international herbaria were examined. The collected plant specimens were stored in RUB, KTUB and KATO herbaria.

Results: We identified that V. parviflorum Decne. is an independent species and V. raddeanum Albov is the synonym of V. tmoleum Boiss. Our field studies showed that V. funebre Boiss. & Kotschy grows in a restricted area of northeast Anatolia and V. nigrum (L.) Moench and V. albovianum (Kusn.) Pobedimova, which were previously recorded from Turkey, are not natural plants of our country. This study also presents a functional diagnostic key and detailed descriptions of Turkish Vincetoxicum taxa supported by morphological drawings, habitat characteristics, distribution maps and threat categories. V. fuscatum Reichb. fil. subsp. boissieri (Kusnezov) Browicz and V. parviflorum which are endemic to Turkey, were re-assessed as Least Concern (LC) and Vulnerable (VU) in the light of IUCN (2012), respectively.

Discussion: This is the first detailed report dealing with Turkish representatives of Vincetoxicum based on biosystematic data. Our results showed that the genus Vincetoxicum is represented by 10 taxa (five species and five subspecies) including two endemics in Turkey. These findings provided significant contributions to the biosystematics of the genus in Turkey.

Keywords: biosystematic, Vincetoxicum, Turkey.

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Histology and Ultrastructure of the Testis in *Pseudochorthippus parallelus parallelus* (Orthoptera, Acrididae)

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**Introduction:** The differences in reproductive systems of insects can be used as a taxonomical character among species. Moreover, disclosing the detailed structure leads to have more knowledge of the biology of insects. The male reproductive system in insects is comprised of testis that produces and secretes sperm, vas deferens, seminal vesicle, ejaculatory duct and accessory glands. In this study, the testis structure of *Pseudochorthippus parallelus parallelus* (Zetterstedt, 1821) (Orthoptera, Acrididae) which is a widespread species in Europe and West Asia was examined with the use of light and scanning electron microscopes (SEM).

**Material and Methods:** The male individuals of *P. parallelus parallelus* were collected from the terrains around Akyurt-Çankırı road in June, 2017. The testes were dissected out, were fixed in 5% glutaraldehyde and prepared separately for the light microscopy and SEM. For the light microscopy, the specimens were washed and dehydrated in a grade series of ethanol solutions. Then they were embedded in paraffin blocks. Finally, the paraffin sections were cut, stained and examined. For SEM examinations, after fixation with 5% glutaraldehyde, the specimens were dehydrated in a grade series of ethanol solutions and dried with Polaron, CPD 7501 critical point dryer. Then, the specimens were mounted stubs with double sided adhesive tape, coated with gold and examined with JEOL JSM 6060 SEM.

**Results:** The male reproductive system in *P. parallelus parallelus* is consisted of a pair of conjugated testis, a pair of vas deferens, an ejaculatory duct and accessory glands. Each testis contains numerous slender follicles produce sperm.

**Discussion:** The aim of this study was to provide more data about the biology of male reproductive system by revealing the histology and ultrastructure of testis of *P. parallelus parallelus*. Besides, this data can be used as the basis of the further studies about the male reproductive systems of insects.

**Keywords:** insect, male reproductive system, sperm, light microscope, electron microscope.
Introduction: In Turkey, about 60 million tones hay is required for ruminant every year. This unfortunately could not be produced. For this reason, sowing area of forage plant should be increased. Orchards can be used for this aim. Although the herbaceous plants naturally grown in hazelnut orchards are utilised as hay or for animal grazing, forage production of these areas is limited.

Material and Methods: The aim of this study was to determine the hay yield of different common vetch + cereal mixtures sown under hazelnut orchards. Additionally, their weed suppression was determined. This study was carried out in Giresun province, Turkey. 50% common vetch + 50% oat and 50% common vetch + 50% triticale mixtures were sown in October 2017. Also natural vegetation under trees was used as control. 20 quadrats were harvested from both mixtures and 10 quadrats from control area. Data were first tested for normality with the Kolmogorov–Smirnov test and for homogeneity of variance with the Brown-Forsythe test. Because these assumptions were violated, data were compared using the Kruskal-Wallis test for three groups or by the Mann-Whitney U-test for two groups.

Results: As a result, it is determined that hay yield of mixtures was considerably higher than in control plot as a natural vegetation statistically and these mixtures suppressed weed under hazelnut trees.

Discussion: In the study common vetch, oat and triticale had high yield because they are annual plants and have large habitus and also common vetch as a legume in the study stimulated the biological nitrogen fixation. These are the reasons of high yield of mixtures. Even though it is not possible to cultivate forage plants as an undersowing in all hazelnut gardens in the region, the forage production in the hazelnut orchards should be suggested in the areas where the land structure is suitable. This provides also weed control in the area.

Acknowledgement: We would like to express our appreciation to Aydın Kabaca for his help in the study.

Keywords: Corylus avellana, fodder crop, hazelnut plantation, pasture
Identification of Late Embryogenesis Abundant (LEA) Proteins in Jujube

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Introduction: Late Embryogenesis Abundant (LEA) proteins were firstly defined in the seeds and found in the vegetative tissues of variable organisms. LEA proteins have important roles in the normal plant development stages and in stress conditions to protect plant tissues. This group of proteins was classified into seven distinct groups which including LEA1, LEA2, LEA3, LEA4, LEA5, dehydrin and SMPs. Jujube (Ziziphus jujuba Mill.) is a deciduous tree or large shrub from the Rhamnaceae family. Fruits of the jujube are economically important based on their nutritious vitamin and mineral content. Whole genome data of jujube was published in 2016, but in our knowledge, there is no study about the detection of LEA proteins in jujube genome.

Material and Methods: Protein sequences were retrieved from NCBI database and LEA domains were scanned in these proteins by Pfam search. Biochemical properties of defined jujube LEA proteins were analysed by Expasy Protparam tool. Preserved motifs in the proteins were defined by Meme Suit Program. Gene ontology analysis were conducted by Blast2GO. Phylogenetic classification of jujube LEA proteins was formed by Mega7 program. psRNATarget software was utilized to determine miRNAs targeting jujube LEA transcripts. Homology modelling of the LEA proteins was performed by Phyre2 software.

Results: Totally 93 LEA proteins were identified in the jujube genome. These proteins were called as ZjuLEA based on their placement on the jujube chromosomes. Their amino acid lengths were varied between 89 and 477 aa. More than four different motifs were determined in the ZjuLEA proteins. Response to stimulus was the main role of ZjuLEA proteins which were mostly found on the membrane according to gene ontology analysis. ZjuLEA proteins were well divided into 6 clusters based on the phylogenetic tree. ZjuLEA-88 gene was the most targeted gene by 29 different miRNAs. Alpha helix structure was mainly found in the predicated three dimensional structure of the ZjuLEA proteins.

Discussion: Current study might provide valuable data from this economically important tree for future studies about the fruit molecular breeding and improvement under stress conditions.

Keywords: LEA, Ziziphus jujuba, genome-wide identification, miRNA, phylogenetic tree
Characterization of Hsp70 (Heat shock proteins) Proteins in Genome of Ziziphus jujube Mill.

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Introduction: Jujube (Ziziphus jujuba Mill.), a thornily fruit tree, is mostly grown in the West and South regions of Turkey. In recent years, the increasing reputation of jujube gives the manufacturer an economical advantage. The Hsp70 protein group is one of the Hsp subgroups and helps folding of newly synthesized polypeptides. It also provides for the balance of mis-folding or non-folding proteins to protect the organism from stress. In our study, ZjuHsp70 genes were detected and characterized in the jujube plant.

Material and Methods: The protein sequences of the jujube plant were obtained from the NCBI database and the domains of the Hsp family were analyzed using the PFAM database. GSDS (Gene Structure Display Server) tool was used to determine the exons and introns of the obtained genes. In order to determine the conserved motifs of Hsp70 proteins, MEME-SUITE software was utilized. The three-dimensional structures of proteins were estimated using the PHYRE2 program. For determination of the evolutionary relationships, the phylogenetic tree was drawn using MEGA7 program. The biological and molecular functions and localization in the cells of jujube Hsp70 proteins was determined by Blast2Go program. To identify miRNAs targeting the Hsp transcripts of the jujube plant, the psRNATarget Server database was used.

Results: Twenty-one ZjuHsp70 genes belonging to the jujube plant genome was initially identified. First and second chromosomes of jujube were the most ZjuHsp70 gene containing chromosomes with five genes. Jujube Hsp70 proteins had amino acids whose lengths were ranged between 126 and 917. Four ZjuHsp70 genes did not contain introns. It was observed that the alpha helix motif predominates in the predicted three dimensional structures of ZjuHsp70 proteins. When the preserved motifs were screened, seven different motif patterns were identified in ZjuHSP70 proteins. MEGA 7 program stated that ZjuHsp70 proteins were clustered into 5 different groups phylogenetically. According to Blast2Go results, most of the proteins were localized in the organelles. It was found that ZjuHsp70 genes were targeted by 97 different miRNAs.

Discussion: Hsps have been described in many organisms, but very few studies have been conducted to identify these proteins in the jujube genome. Therefore, in this study, Hsp70 genes in the jujube genome were determined using bioinformatics tools. We think that the obtained results from this study will provide basic information for functional and comparative genomic researches.

Keywords: jujube, bioinformatics, heat shock proteins, Hsp70 genes
Temporal Variations of Elements Stocks in Fine Roots Under Different Tree Species

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Introduction: Tree root systems play a vital role in main functions of forest ecosystem, such as durability, the intake of water and mineral nutrients, and the synthesis of several key components, including growth regulators. The presence of tree roots provides many ecological benefits, and they are the important component of forest areas in terms of annual biomass growth and biomass accumulation. The concentration of nutrients in the roots can vary according to the stage of the annual growth cycle and the intensity of the intake of nutrients. The aim of the work is to expose seasonal variation change of the elements that accumulate in the root systems of oak, spruce and black pine species in the common garden experiment.

Material and Methods: The samples were collected with three month intervals in a year from four sampling points of each tree species with four replications in each sampling time, a total of 192 root samples to determine the seasonal change. The root of <2 mm diameter class was considered in the study. Samples were decomposed by pressurized a microwave oven digestion with nitric acid (HNO₃) and hydrogen peroxide (H₂O₂) mixture. In these solutions, P, K, Ca, Mg, Na, Mn, Fe, Al and Zn contents were determined by ICP-OES device.

Results: There was a significant temporal difference in element concentrations. Descending order of root element concentrations as Al>Ca>Fe>K>Mg>Na>Mn>P>Zn>Ni>Pb>Cu in oak and spruce while Al>Fe>Ca>K>Mg>Na>P>Mn>Zn>Pb>Cu>Ni in black pine.

Discussion: The contents of Al in the fine roots have the highest value in all tree species. This result is similar to the results in the literature. There is also difference in the inter-species and temporal changes of the elements, which may be the result of root growth, absorption and translocation interactions. The results of the present study provide important information about the nutritional and nutrient storage characteristics of species in the same site.

Acknowledgement: This work was supported by Scientific Research Projects Coordination Unit of Istanbul University. Project number FYD-2017-27635.

Keywords: fine root, micro elements, macro elements, forest trees
The Inhibitory Effect of Silver-Palladium Nanoparticles on Cervical Cancer Cells

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Introduction: Nanoparticles are microscopic materials whose sizes are ranged between 1 and 100 nanometers (nm). The widespread applications of nanoparticles including catalysis, imaging, medical applications, environmental applications and energy-based research are due to their unique properties. Physical and chemical approaches are mainly used to synthesize nanoparticles. However, these methods are often costly and harmful to the environment and human health. Therefore, synthesis of nanoparticles using plant extracts offers an alternative method which is eco-friendly and less expensive. Black tea is a drink obtained from leaves of tea plant (Camellia sinensis). In this study, silver-palladium nanoparticles (AgPdNPs) attached with black tea were used. Monomers in black tea were shown to inhibit ovarian cancer cell growth and were less toxic to normal ovarian cells. In this context, our aim is to investigate the effect of AgPdNPs on cervical cancer cells.

Materials and methods: AgPdNPs was dissolved in DMSO (Dimethylsulfoxide)/water (1:4). MTT assay was performed to determine the modulation of cell survival. HeLa cells were treated with AgPdNPs at different concentrations (2.5, 5, 10, 20, 40 and 80 μg/ml) and incubated for 24 hours. The cells were stained with DAPI to visualize the nuclei. Apoptotic cell death was examined by TUNEL assay.

Results: Microscopy of cells showed a decrease in cell numbers and changes in cellular morphology. AgPdNPs were found to have strong inhibitory effect against HeLa cells. Even 2.5 μg/ml concentration resulted in approximately 60% decrease in HeLa cell survival. The maximum reduction in cell survival was detected at 20 μg/ml concentration (95%). A significant decrease in the number of nuclei was observed in DAPI staining, which is in line with MTT results. TUNEL positive cells were detected in AgPdNPs treated HeLa cells confirming the apoptosis induction.

Discussion: In this study, we investigated the effect of green synthesized AgPdNPs on HeLa cells. AgPdNPs was found to possess strong growth inhibitory effect against HeLa cells by inducing apoptosis. This effect might be due to bioactive compounds found in black tea. The advantage of nanoparticles is that they can exert strong effects even at very low doses which is critical in terms of pharmaceutical use. In conclusion, these results show the potential of AgPdNPs to be used as the anticancer agent.

Acknowledgment: This study was supported by the Kastamonu University Scientific Projects Research Office (Project Number KÜBAP-01/2017-28)

Keywords: nanoparticle, silver, palladium, black tea, cancer
Introduction: Water quality of coastal lagoons is affected by human pressure such as dredging, recreation, domestic and industrial effluents and hydro-morphological modifications. Coastal lagoons are generally instable due to their location in the transitional zone between land and adjacent sea. Terrestrial runoff, nutrient loadings, depth and turbidity also effects the ecological quality of lagoons.

Assessment of ecological quality in aquatic systems is based on generally abiotic variables such as nitrogen, phosphorus and chlorophyll-a. Biological components such as macrophytes became key elements for assessing the ecological quality of coastal lagoons after the WFD/2000/60/EC was enforced in the European Union.

Balık Lake and Uzungöl are the most important lagoons of Kızılırmak Delta complex which are formed by the deposits of Kızılırmak river. These two lagoons are highly diverse ecosystems, protected by national legislation and included in the Ramsar site of Turkey as priority habitat types for conservation. The aim of the study is to identify the ecological quality of these lagoons with macrophyte and water quality indices.

Materials and Methods: Within the scope of the study different water quality parameters were monitored over a year period (2015-2016) for their biotic (submerged macrophytes abundance and coverage) and abiotic features (TP, TN, turbidity, chlorophyll a, depth) in Balık Lake and Uzungöl. In order to assess the ecological status of these lagoons four ecological indices based on water quality parameters (TSI-Chl-a, TSI-TP) and submerged macrophytes (ESMI, sEQRleafpacs) were applied. TP and TN is analyzed with Standard Method 4500 NO3-B, 4500-Norg-B and Standard Method 4500P-B, 4500P-E. Macrophyte samplings were performed in 95 different localities in the lagoons.

Result and Discussion: The water quality scores (TSI-Chl-a, TSI-TP) did not showed significant difference between lagoons (p>0.05). By contrast macrophytes indices had significant difference among lagoons. In Balık Lake and Uzungöl phosphorus is limiting factor due to high TN / TP ratios. Balık Lake’s turbidity level is high and Uzungöl’s level is moderate according to turbidity. TSI-Chl-a, TSI-TP indexes showed that both of the lakes are generally eutrophic but trophic level is attained to hypertrophic in summer months. Water Framework Directive chl-a criteria revealed that the ecological quality level of lakes is found at moderate level. Macrophytes indices results displayed that ecological quality in Uzungöl is poor and moderate in Balık Lake.

Acknowledgment: This study is supported by TUBITAK 114Y536 1001 project.

Keywords: Balık Lake, Uzungol, water quality indices, macrophyte indices.
A Preliminary Study of Assessment of Riva Stream (Istanbul) Water Quality by Using Benthic Macroinvertebrates and Some Physico-chemical Parameters

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Introduction: Benthic macroinvertebrates are easily spotted, widely distributed and found free standing or attached to the bottom substrate. They have a life cycle that allows for seasonal and annual changes that are caused by environmental influences. They also react quickly to different stress conditions and they are very sensitive to the changes in their environment as indicator organisms. Istanbul is one of the priority cities due to rapid high urbanization and increasing water demand. In this study, Riva Creek that is located within the provincial borders of Istanbul was chosen as the study area. The aim of this study is to determine the macrobenthic fauna of Riva stream and its tributaries with some physico-chemical parameters.

Material and Methods: First sampling was made in March 2018 at five stations (Riva, Kuzdere, Atdosun, Değirmendere, Kanlıdere). All of the materials from the streams were collected by a D-frame hand net which 0.5 mm mesh size. The water flow was reverse-screened using an area unit of 1 m². The bottom sediment was fixed with ethyl alcohol and washed under high-pressure water, through measured sieves and preserved in 75% ethyl alcohol in the laboratory. The macroinvertebrates were sorted to the lowest possible taxonomic level. Some physico-chemical parameters (water temperature, pH, dissolved oxygen, salinity and conductivity) were measured with multiparameter devices during sampling. The width was measured as the distance between two sides that constitute the border between water and the earth and the depth was measured. Measurements for flow rate were made with a digital stream speed measure connected to a propeller. Various chemical parameter values (NH₄-N (mg/L), NO₃-N (mg/L), NO₂-N (mg/L), PO₄-(mg/L), TP and TSS were analyzed according to the standard method.

Results: Benthic macroinvertebrate fauna which belonging to Oligochaeta, Bivalvia, Gastropoda, Malacostraca, Ephemeroptera, Odonata, Coleoptera, Trichoptera and Diptera was investigated in Riva Stream and its tributaries. Some physico-chemical parameters were also listed.

Discussion: Considering these properties of the streams, determining the pollution levels gains environmental and biological importance. This is the first preliminary study which determines the macrobenthic fauna of Riva Stream.

Acknowledgement: We would like to thank Istanbul University Graduate School of Science and Engineering and Istanbul University, Faculty of Aquatic Sciences, Inland Waters Department for their supports.

Keywords: Riva, water quality, macroinvertebrate, fauna, physico-chemical parameters.
ORAL PRESENTATION

Adsorption of Cerium (III) Using Magnetite Pumice Composite

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Introduction: Cerium (Ce) is a cheap rare earth element (REE) of the lanthanide series making up about 66 ppm in the earth's crust. Cerium characterized by two common oxidation states that are differ in basicity; Ce(III) is to be a strong base and Ce(IV) is to be a weak base one. It is commonly used in catalyst support, polishing powders, superalloys, electronics components, artistic glasses, optic filters and steel modifiers. It originates from radioactive wastes arising from nuclear power operations, mining and many industrial activities. There are still limited number of studies on cerium adsorption using hydrous manganese oxide, kaolina clay, bentonite, activated carbon derived from palm kernel Shell, biosorption by Platanus orientalis leaf powder, bisorption by tangerine (Citrus reticulata) peel. Pumice has been used to remove different contaminants by adsorption and oxidative processes, however there is no study on pumice adsorption of cerium. Literature studies showed that using hybrid pumice (impregnated with different metals) enhanced the adsorption efficiency. Hence, this study is as a part of the project NKUBAP.06.GA.17.094 that aimed to use magnetite pumice to adsorb cerium (III) from synthetic solutions as the first initiative.

Material and Methods: CeN₃O₉.₆H₂O was purchased from Sigma Aldrich. Distilled water was used to prepare Cerium (III) stock solution. Particle size of pumice powder varied in the range of nano to microns (nano to micron (≤125 microns). Pumice powder was doped with magnetite ferrous at 5.4% ratio considering the results of our previous studies. The effect of the amount of magnetite pumice (0.05-5 g), pH (3-11), mixing velocity (100-150-250 rpm), contact time (0-120 min), temperature (20-60°C), initial cerium concentration on the adsorption process pumice were investigated. Recovery of cerium was attempted by using three desorption media namely distilled water, NaOH and HCl. Cerium concentration was measured using ICP-OES. Surface structure and characterization of magnetic pumice was performed by scanning electron microscope (SEM), Fourier inductively (FTIR), Raman analysis.

Results: Cerium that was removed at a high efficiency using a dose of 0.5 g magnetite pumice composite. Adsorption data fitted Langmuir isotherm better than Freundlich isotherm. Adsorption data fitted Langmuir isotherm. Temperature affected adsorption efficiency up to 35 °C. Using HCl provided the highest desorption (46.7%) of cerium. Thus recovery and reuse of magnetite pumice composite was experimentated using HCl. As the adsorption efficiency of cerium dropped from 96.4% to 73% after 1st reuse of magnetite pumice composite the experiments were stopped to evaluate alternative methods for a higher recovery and reuse efficiency.

Discussion: It is useless to note that the results of this project are preliminary to reach technological conclusion yet. However, as the results of cerium are very promising for both adsorption and desorption-reuse further studies will focus on the development of new projects to perform further investigations.

Keywords: cerium, technology critical elements, adsorption, isotherms, thermo-kinetics, magnetite pumice
Introduction: The first maturity length and length-weight relationships of fishes are important in estimation of several biological characteristics. The first maturity length are key parameters in fisheries research. Correct forecasting of first maturity length in fishes are useful for fish stock management and production. Histological studies used in estimates of first maturity length are a reliable method for determine gonadal development stages. Histological estimations revealing the details of oocyte and sperm development gives more clear results. In this study aimed to determine the first maturity length and some reproductive characteristics of red mullet (Mullus barbatus) in Sinop Region of the Middle Black Sea.

Material and Methods: This study was carried out between January – December 2017 in the Middle Black Sea. In this study, 743 individual’s biometric measurements were taken. All samples were measured in centimeters using measurement board. The body weight and gonad weight was recorded as grams. Length –weight relationships were calculated using the equation $W = aL^b$. The GSI (Gonadosomatic Index) and CF (Condition Factor) values were calculated. The sex ratio of the male fish and female fish were determined. Fish samples in histological scales were classified. Tissues were fixed by %10 buffered formalin fixative. The slides were stained with hematoxylin-eosin (H&E).

Results: A total of 743 individuals were studied in this study. The mean total length and weight of samples were determined in the ranges of 13.10 cm and 23.99 g. Minimum and maximum size of individuals was determined as 8.1 cm and 21.2 cm. The value of exponent $b$ of the length-weight relationships was 3.05 for all samples. The male-female ratios were determined as 2:1 for all individuals. The gonadosomatic index value was found higher in June ($2.17 \pm 0.11$), the peak season. The Condition Factor value was calculated between 0.8-1.15 for the all samples. Fish gonads were classified according to development of the oocytes. The individuals containing mature oocytes were observed in May.

Discussion: The value of exponent $b$ of the length-weight relationships were found to be 3.05 for females, 3.04 for males and 3.05 for all samples. A result of the analysis was observed a positive allometric growth in female, male and all samples. The findings mature oocytes observed in May were supported the gonadosomatic index value. The maximum diameters of oocytes were determined for the month May (255.760µm).

Acknowledgement: This study was supported by Sinop University Scientific Research Project Commission (BAP), number (SUF-1901-16-31 “The First Maturity Length and Some Reproduction Characteristics of Red Mullet (Mullus barbatus) in the Middle Black Sea”). We would like to thank by Bezmi-alem Vakif University and Kirikkale University (KÜBTUAM) for tissue preparation procedures.

Keywords: first maturity length, red mullet (Mullus barbatus), histology, reproductive.
Introduction: Macrofungi, which have a medical importance thanks to chemicals they produce, are an important food source. That's why, studies on determining the fungal diversity are increasing in our country as well as in the whole world. Our aim in this study is to determine the macrofungal diversity of Pazar district of Tokat province. Pazar (Tokat) district is located to the west of Tokat province surrounded by Artova(Tokat) in the south; Turhal (Tokat) in the north; Tokat center in the east, and Zile (Tokat) in the west. Pazar district has a transition climate between the Black Sea climate and the continental climate.

Material and Methods: Macrofungi samples were collected from the research area in 2011. Color photographs showed the morphological and ecological characteristics of samples were taken in their natural habitats. Spore prints of fresh samples brought to the laboratory were taken. They dried and stored as fungary material for studies that will be carried out later. Microscopic features were determined using a research microscope. Identification of macrofungi emerged in macroscopic and microscopic features has been made. The herbarium specimens were deposited in a senior author’s private herbarium at Gaziosmanpaşa University, Faculty of Science, Department of Biology, Tokat, Turkey.

Results: As a result of the field and laboratory studies, 52 species belonging to 2 divisions, 28 families and 44 genera were identified. Of these, 7 species belong to Ascomycota, and 45 belong to Basidiomycota divisions. Detected macrofungi 27 are edible, 17 are inedible and 8 are poisonous.

Discussion: The results obtained in this study are showed similarities at certain rates when compared with studies conducted in neighbouring regions. When the distribution to families of detected species is examined, Families having the most species diversity are Psathyrellaceae (6 species - 11.3%), Tricholomataceae (5 species - 9.4%), Agaricaceae (4 species - 7.5%). Seven of the 27 edible macrofungi are known by local people. Macrofungi collected and consumed by local people are Morchella elata, Morchella esculenta, Agaricus bisporus, Lactarius deliciosus, Lepista nuda, Marasmius oreades, Verpa bohemica.

Acknowledgement: We would like to thank the Gaziosmanpaşa University Research Fund (GOU-BAP: 2010/115) for financial support. This paper is based on a master’s thesis study titled “A Taxonomic Investigation of Macromycetes Grown in the Region of Tokat City (Pazar)”.

Keywords: biodiversity, macrofungi, Pazar, taxonomy, Tokat
ORAL PRESENTATION

Species Composition and Seasonality of Leaf Beetles (Coleoptera: Chrysomelidae) in Uşak Province, Turkey

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Introduction: Leaf beetles (Chrysomelidae) are one of the most specious families within Coleoptera and represented with more than 50,000 described species all over the world. Among these, approximately 913 species are recorded from Turkey so far, including seed beetles (Bruchinae), a recently incorporated subfamily of Chrysomelidae. Only 6 leaf beetle species were reported from Uşak province before this study. The main aim of the study is to determine the chrysomelid species distributed in various habitat types of Uşak province and thus contribute the leaf beetle diversity of Turkey. Furthermore, seasonality of leaf beetle species in Uşak province is also discussed.

Material and Methods: The study site, Uşak province, is located in western Anatolia, at the border between Aegean and inner Anatolian Regions. The materials of this study are leaf beetle specimens collected between April and September in 2012 and 2013. Specimens were collected by sweeping from herbaceous vegetation and by beating from ligneous vegetation. Later, the specimens were mounted on card boards and identified to species level by using appropriate literature. All of the specimens are deposited at the Biology Department of Uşak University.

Results and Discussion: Totally, 1504 leaf beetle specimens from 61 localities of Uşak province were collected between April-September in 2012 and 2013. After the identification of specimens to the species level, it is concluded that 94 leaf beetle species belonging to 30 genera and 8 subfamilies. Before this study, only 6 species were reported from Uşak province and 5 of them were also recorded in this study, but one of them, namely Cassida seraphina Menetries, could not be recorded. This species was reported from neighboring provinces, thus it should be present in Uşak with a limited population density. Including this species, the number increases from 6 to 95. Among the 1504 specimens, Alticinae (or Alticini as recently used) was dominant with 878 individuals, followed by Clythrinae with 202 individuals and Chryptocephalinae with 187 individuals. According to number of species, Alticinae was the most specious subfamily with 47 species, followed by Clythrinae with 14 species. Because the surveys conducted in 2012 were irregular, seasonality of leaf beetles is discussed on the basis of 1246 specimens collected in 2013. Leaf beetles were found to be most active in May with 309 individuals belonging to 46 species, and the numbers were lowest in July with 61 specimens belonging to 10 species.

Acknowledgement: I would like to express my appreciation to Uşak University Scientific Research Project Commission, which supported this study (UBAP-2011/MF003).

Keywords: Chrysomelidae, leaf beetles, seasonality, Uşak, Turkey
Introduction: According to the latest recording, it is known to live more than 360 species of fish in Turkish inlandwaters. Of these, 158 (42%) were endemic, 28 (8%) were alien / invasive, while 3 were extinct. However, about 1/3 of our inland fish, which are formed by endemic taxa, it is constantly expressed that populations of our vulnerable species have been significantly reduced or even extinguished due to environmental impacts (pollution, drying, water structures, river improvement studies), foreign and invasive species, and illegal hunting, which have increased exponentially in the past quarter century. In the study, it was aimed that the fish fauna of "Ancient Great Konya Lake and the upper basin of Göksu River" which is in Karaman endorheic basin.

Material and Methods: The study was carried out between 2015 and 2017 in the Karaman endorheic basin within the borders of the “Ancient Great Konya Lake", which has contributed to the determination of inlandwater fish diversity and has been only traceable to the invasive species that have spread rapidly since 1984. Fish samples were collected using electrofishing equipment, gill nets, trammel nets and seine nets.

Results-Discussion: As a result of the study, 15 fish taxons were identified, 3 of which were invasive in Karaman endorheic basin and the Göksu River in the closed basin. A new record has been filed on the areas of spread of the Carassius gibelio (prussian carp), Pseudorasbora parva (topmouth gudgeon gravel fish) and Atherina boyeri (big-scale sand smelt) in the invasive property. However, these invasive fishes such as in Turkey inlandwater, there is no definite finding of its precence in Karaman inlandwater.

Acknowledgement: This work was supported by “EMS-Environmental Surveys and Social Services Consultancy Firm (Ankara)” for field survey.

Keywords: biodiversity, invasive species, freshwater fish Turkey
Effects of impoundments on feeding and body condition of *Squalius cephalus*

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Introduction: Most fishes exhibit an acute ability to shift food quickly as a response to changing environmental variations or food shortage in relation to impoundment. The differential use of food resources could also influence other phenotypic traits such as the digestive performance. This study aims to test whether dams influence digestive track length, feeding activity and condition factor of individuals of same fish species (*Squalius cephalus*). In particular, this study also seeks to investigate whether the changes in length of digestive tracts and other parameters are related to changes in diet.

Material and Methods: In order to reach this aim a total of individuals of *Squalius cephalus* were captured by electrofishing between May and June 2015 along lower Yeşilırmak River basin at 5 sites (upstream sites above the reservoirs, site between two dams, and downstream sites below the reservoirs). Stomach contents were analyzed by the volumetric method. In order to evaluate ontogenetic changes in diet, individuals were separated in juveniles (< 9.99 cm FL) and adults (> 10.0 cm FL). The length of digestive tract was measured and standardized to the standard length of the individuals. Feeding activity and body condition were inferred by the mean stomach repletion index and the mean condition factor. The spatial differences in digestive tract length, feeding activity and condition factor were tested with analysis of variance.

Results: Results indicated that diet diversity increased with increasing fish size, and the ratio of algae and other food sources (fish, macroinvertebrates) in the diet of this species showed a gradual increase with increase in its body size. Spatial analysis showed that *S. cephalus* substantially preferred insect in the river section below the dams (2), and algae, insect and fish at site above the dams (4). While, the feeding activity of fish did not change among sites, condition factors of fish from upstream sites of dams were higher than those from downstream sites, the opposite for digestive tract length.

Discussion: *S. cephalus* presented a great increase in abundance at site below the dam lakes despite the observed longer intestine and lower condition factor. This is probably connected to possess a good colonizing ability when facing unpredictable environmental variations being capable of population growth despite the condition factor, and associated with a more specialized for small and low nutritional food items, like insects. Changing in the diet composition of this species in this damming system can be associated to changes in feeding resources availability and competition in the novel environment.

Keywords: condition factor, feeding activity, dam effect, *Squalius cephalus*, Yeşilırmak River
The Effect of Streptomycin on Survival and Development of *Drosophila melanogaster*

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**Introduction:** In order to achieve rapid results in the chemical struggle of agricultural pest insects which cause significant losses to the economy of the country, the preference of organophosphate compounds that act directly on the nervous system constitutes a significant threat to the environment and other non-target organisms. Recent studies have been focused on the developing more both effective and eco-friendly struggle methods; for this purpose, the effects of new chemicals have been investigated through the product of many species at the laboratory on artificial diet mediums.

**Material and Methods:** The effects of streptomycin on insect’s survival rate, developmental time and adult longevity were investigated by adding to artificial diets used for cultivate *Drosophila melanogaster* (Meigen) larvae in laboratory conditions. The first-instar larvae were placed onto diets that contain 600 mg/L, 1200 mg/L and 1800 mg/L of streptomycin and were fed until the adult emergence.

**Results:** While the larval survival rate that reached to the 3rd. instar in control diet was 95.00 ± 3.02%, this rate in 1800mg/L, which is the highest tested concentration, decreased to 43.75 ± 2.72%. Similar effects were obtained on pupation rate. The time to reach adult stage was 7.73 ± 0.29 days in control, this developmental time in the highest concentration extended to 9.65 ± 0.65 days. Streptomycin significantly affected adult longevity. Adult longevity was decreased at the highest concentration of streptomycin 1800 mg/L (8.16 ± 0.77 days) compared with control diet (21.89 ± 2.46 days).

**Discussion:** It’s known that the using various antibiotics at specific concentrations have been used to treating of fungal and bacterial infections in humans and highly organized animals without detriment to host organisms. Also, some antibiotic types are added on artificial diets of reared insect cultures at laboratory conditions in order to inhibit generation of microorganisms and increase the quality of diets. It has also been shown that antibiotics have been used in struggle with pest insects due to its microbial effects on the endosymbiotic microorganisms which are located in the middle intestine and have an important role in providing the essential nutrients for the development and reprocessing of some harmful insect species.

**Keywords:** *Drosophila melanogaster*, streptomycin, survival rate, development time, adult longevity
Investigation of toxic effect of cerium (III) to Rocket plant (Eruca vesicaria subsp. sativa and Artemia salina)

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Introduction: Cerium (Ce) is a cheap rare earth element (REE) of the lanthanide series making up about 66 ppm in the earth’s crust. It is of particular interest due to their increased use as a catalyst in automobiles, as abrasives in chemical mechanical planarization slurries in the semiconductor manufacturing industry, and for their potential use in medical and therapeutic applications. Literature studies on toxicity of REEs have focused on both plant and aquatic species, however there is no study yet on Rocket plant and chronic toxicity to *Artemia salina* that are the subjects in this study which is as a part of the project NKUBAP.06.GA.17.094.

Material and Methods: Ce(NO₃)₃·6H₂O was purchased from Sigma Aldrich. Distilled water was used to prepare Cerium (III) stock solution. Cerium concentration in soil and plant was measured using ICP-OES. *Artemia* cysts were activated in a standard marine solution at 25 °C (35‰ salinity, Ocean®). *A. salina* nauplii (<48-h old) were exposed to six concentrations (1, 2, 4, 8, 16, 32) of Cerium (III) during 5 d in quadruplicate to score frequencies of immobilization of total 20 nauplii. Negative control with Ocean® was also performed. Ce was added to the pots (full with soil pre-analysed for structure and macro and micro elements) in the irrigation water at varying doses (25, 50, 100, 200, 400 ppm) versus control experiment. The soil was well mixed and Rocket plant seeds were planted. The plants were irrigated regularly with tap water during 1 month. All experiments were run in 3 replicate. At the end the green part of the plants grown over soil was analysed for dry (dw) and wet weight (ww).

Results: Cerium (III) decreased both dw and ww of Rocket plant which become significant (5%) starting from 8 ppm dose. Ce affected macro nutrients of the plant that varied with Ce doses, however there was no significant correlation with all macro nutrients and Ce concentrations. In the case of micro elements, Zn content of the plant increased with increasing Ce doses (1% significant) whereas no significant effect was observed for Fe, Cu and Mn elements. Chronic toxicity to *Artemia salina* become evident after 4th d starting from 4 mg/l dose that is a realistic concentration for engineered nanofactured elements in the environmental compartments.

Discussion: The results obtained in this study were slightly significant for both specie at the studied doses which are indeed in the range of the literature studies indicating environmental relevant intervals of Ce.

Keywords: cerium, technology critical elements, rocket plant *Eruca vesicaria* subsp. *sativa*, macro and micro elements, *Artemia salina*, chronic toxicity.
The Bryophyte Flora of Zihni Derin Campus in Recep Tayyip Erdoğan University (Rize-Turkey)

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Introduction: University campus sites are an important part of urban habitats. The Zihni Derin campus, which is the subject of the research, is a city campus integrated with the province of Rize. The increase in academic and administrative buildings in the university campus over time, and natural and exotic plant species established with new landscaping projects will affect the natural floristics in the campus. Therefore, investigating the plant species especially bryophytes in such areas provides comparing the results of future studies and to monitor the change of plant species. The study aimed to determine the bryophyte flora in the campus of Recep Tayyip Erdoğan University.

Material and Methods: The bryophyte flora of the campus in the university was investigated between March 2017 and February 2018. Collected samples were identified with the help of related flora works. The samples are kept in the private collections of ABAY in Recep Tayyip Erdoğan University. For nomenclature of the liverworts and mosses, related articles and literatures were considered. Bryophyte checklist of Rize has been used to determine the new record taxa of the province.

Results: A hundred-twelve bryophyte samples were collected from the study area and 57 taxa (53 mosses and 4 liverworts) belonging to 34 genera (31 of mosses and 3 of liverworts) and 16 families (13 of mosses and 3 of liverworts) were identified. The largest genera of mosses were found to be Brachythecium and Hypnum with four taxa each and the liverwort genus Pellia with two taxa. The largest families of mosses were found to be Brachytheciaceae with 13 taxa and Pottiaceae is with 12. In liverwort families; while Pelliaaceae has two species, the last ones Conocephalaceae and Marchantiaceae have one species each. Nine of the identified bryophytes are new records for Rize.

Discussion: Determining of flowering and cryptogamic plants is a very important step in the full understanding of plant biodiversity. In particular, it is important to investigate sensitive plant groups such as bryophytes as soon as possible before the settlement can show an increase over time.

Acknowledgement: I would like to express my appreciation to the Recep Tayyip Erdoğan University Scientific Research Project Commission, which supported this study (FBA-2017-708).

Keywords: Bryophyte, Campus, Flora, Rize, Turkey
Fenton-Like Oxidation Using Magnetite Pumice Catalyst for Removal of COD and Color in Wastewater from a Textile Chemicals Producer Industry

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Introduction: Industrial wastewaters containing recalcitrant compounds and color are classified to be hardly treated in biological systems. Thus, these effluents can also cause toxic and carcinogenic effects in discharged receiving waters. In this perspective, advanced oxidation processes are very favourable to comply with wastewater discharge limits. Fenton process has easy operation and is an effective method, but the main disadvantage is that it produces large amount of iron sludge. Fenton-like process operated with heterogeneous catalyst which contains iron precursors on the surface of support materials, does not necessitate the settling of iron sludge. The main objective of this study is to study the COD and color removal from a textile chemicals producer industry wastewater using magnetite pumice catalyst in the Fenton-like process.

Material and Methods: Wastewater sample was taken from the equalization tank of wastewater treatment in the textile chemicals producer industry located in European Free Zone in Cerkezköy (Tekirdağ), Turkey. Fenton-like experiments were performed in 100 mL sample volume that were shaked at constant temperature using water baths (Nüve ST30). The effect of the amount of magnetite pumice catalyst (6-9 g), H₂O₂ concentration (0.03-0.4 mL) and pH (2-9) were investigated to effectively remove COD and color in wastewater. When optimum conditions were assessed the COD and color removal efficiencies were investigated varying temperature in the range of 25-45 °C and oxidation time from 0 to 120 min. Aromaticity and color were monitored using a UV–vis spectrophotometer (Schimadzu UV-2401 PC). The particle size of pumice powder ranged from nano to micron (≤125 microns). The magnetite pumice catalyst was synthesized using Fe³⁺ and Fe²⁺.

Results: Maximum COD removal (79.7%) was obtained at the experimental conditions of 7.5 g magnetite pumice composite, 0.15 mL H₂O₂ concentration and pH of 3 during 120 min oxidation time that yielded absorbance removals regarding UV₂₅₄, UV₄₃₆, UV₅₂₅ and UV₆₂₀ that indicate aromaticity and main color peaks (which are refereed for color limits in the regulations), were to be 92.7%, 91.7%, 95.6% and 98.2% respectively. Fenton-like oxidation with magnetite pumice catalyst data fitted well the second order kinetics and the k₂ of COD removal increased with enhancing the temperature.

Discussion: Fenton-like oxidation process was found to be effective to remove COD and color from a textile chemicals producer industrial wastewater. Furthermore, the magnetite-pumice composite was easily separated from the wastewater due to its magnetite feature and iron sludge is not produced like Fenton process as well.

Keywords: fenton-like, oxidation, magnetite pumice catalyst, textile chemicals, wastewater, color, COD
Introduction: Nearly one fifth of the European reptiles are listed among the threatened species in the IUCN European Red List of reptiles and Scincidae as one of the 12 families of European Squamata order are facing human-induced threats. Scincidae family is one of the most diverse families of lizards and has 1,642 described species. Here, we reviewed distribution, biology, ecology and potential threats of Skinks in Southwest Anatolia (5 species) and discussed possible solutions on its sustainability.

Material and Methods: Field studies were conducted at Antalya and Muğla. Habitats and ecologies of the skinks were investigated. After a making a distribution map we used The Reptil Database (last accessed 05.04.2018) for the distribution comparision. And the major threats were checked from IUCN Red List.

Results: There are 10 skink species distributed in Turkey and of of them live at Southwest Anatolian Region. These species are *Chalcides ocellatus*, *Heremites auratus*, *Heremites vittatus*, *Ophiomorus punctatissimus* and *Ablepharus kitaibelii*. Distributions and the major threats were designated and the necessary precautions for species sustainability were determined. Hereunder the major threats for Turkey Scincidae family can be declared as the following: urbanization, industrialization, forest fires, wood harvesting and clear-cut.

Discussion: Turkey is rich in biological diversity with more than 130 reptile species. Scincidae is a 10 species family among this reptil diversity and distributed all over Anatolia, both shorelines and inlands and especially in forestlands. But species are facing lots of human-induced threats. These threats must be eliminated in terms of species conservation and sustainability. As for the first step the species must be familiarised for the local people at the distribution area. Secondly the precautions must be taken for habitat preservation. Tourism activities, power plants and factories must not be established in spite of environmental damage and habitat loss, naturally induced (by lightening, desertation etc.) forest fires must be responded immediately, and for accidently and/or deliberately induced forest fires, there must be prior precautions and disincentive punishments.

Keywords: Scincidae, Turkey, distribution, conservation
**Introduction:** Pharmaceuticals and pharmaceutically active substances are used for years as a support for growth, in sustainment of life for the organisms and in the protection of their health. Irrepressible rising of using this type of chemicals lead to great pressure on aquatic ecosystems. Parabens are esters of para-hydroxybenzoic acid, containing alkyl or benzyl group and due to high and wide spectrum of antimicrobial activity have been using for about a century. Propranolol is a beta adrenergic receptor antagonist in a selective type and with hydrophobic character whose molecular weight is 295,3 g/mol and prescribed widely for cardiovascular diseases. Propranolol shows various toxic effects on aquatic organisms in different ecological levels. In the current study it’s aimed to detect the effects of mixture of methylparaben and propranolol on the growth of *Scenedesmus dimorphus*.

**Material and Methods:** Methylparaben and propranolol were purchased from Sigmaaldrich (Cat no: respectively) and dissolved in DMSO and 5 different concentrations were assessed separately and combined. Algal growth inhibition assay was conducted to detect the effects of mixture of methylparaben and propranolol on the growth of *Scenedesmus dimorphus* according to OECD 201 Guideline. Cell growth was done by fluorometer (Turnerdesign). EC$_{50}$ was calculated at the end of 72$^{th}$ h. by the formula given at OECD201 guideline.

**Results:** Methylparaben has very low toxicity to algal growth as the EC$_{50}$ value was 31,1441 mg/L which is parallel to literature data and propranolol was more toxic (EC$_{50}$ 0,7288 mg/L)). When we combined it together the toxicity was elevated nearly 3 times (Table.1).

**Discussion:** Pharmaceuticals and its ingredients are being together in the environment and should be considered combined effects of them. Synergistic effects of chemicals make them more hazardous. Banning or decreasing of the use of drugs and active substance just like other industrial chemicals are not possible as well as it is not rational. Exposure to only the active substances or auxiliary substances in the toxicity studies does not give opportunity to complete understanding of the impact. For this reason; it is ultimately important to examine their impacts also in mixture state.

**Acknowledgement:** We would like to express our appreciation to the Ege university Scientific Research Project Commission, which supported this study (16-SUF-007).

**Keywords:** algal growth inhibition assay; phytotoxicity, pharmaceuticals, paraben, propranolol
Investigation of Kombucha Tea by Phytopathological Study

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Introduction: Kombucha tea; an extract obtained by the fermentation of tea with sucrose consisting of acetic acid bacteria and yeast symbiosis. In previous studies with kombucha, the effects of antimicrobial and antioxidant effects on prostate cancer and apoptosis in culture medium were investigated. Kombucha has also been investigated as a microbial fertilizer in agriculture. In this study, the preventive effect of kombucha on chestnut cancer was investigated using in vitro methods. Chestnut cancer (Cryphonectria parasitica (Murrill) E.M.Barr) infects the wounds and shakes on the stem and branches. Due to the disease, the sudden death of bark cambium occurs. As a result of cancer growth, the nutrient flow in the tissues is cut off and the tree dies over time. Biological control of chestnut cancer is caused by the use of hypovirulent strains of C. parasitica, which are alleviated by a virus. This study also examined that the effects of Kombucha tea against chestnut cancer.

Material and Methods: In this study, fragments were first taken from trees with chestnut cancer. Small pieces of PDA were placed on the medium (Potato Dextrose Agar) and C. parasitica was provided to produce stock. In this study, seven petri dishes containing PDA were used. One petri dish was used for positive control and the other petri was used for negative control. C. parasitica was inoculated by spread plate technique. The kombucha tea adjusted to pH value 3.6 was sucked into the discs and the results were observed. We had three repetitions of experience.

Results: Zone diameters were measured seven days after the discs sucked with kombucha were placed. Zoned diameters were measured as 17 mm and 12 mm for Petri dish 1, 16 mm and 9 mm for Petri dish 2, 9 mm and 10 mm for Petri dish 3, respectively.

Discussion: Due to the rich content of kombucha tea (acetic acid bacteria and yeasts), we believe that chestnut cancer can be stopped without chemical or drug use. We have shown in this study that kombucha tea can be used as a natural medicine nowadays when the organic agriculture revolution begins.

Keywords: chestnut cancer, kombucha, Cryphonectria parasitica, in vitro
Investigating Microbial Load of *Mytilus galloprovincialis* from Two Stations of İzmir

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Introduction: Mediterranean mussel (*Mytilus galloprovincialis*) is a bivalve distributed in the coasts of Turkey. It is both a source for food and an indicator organism for environmental pollution. Besides some of the pathogenic microorganisms, *Escherichia coli* (*E. coli*) and *Salmonella* spp. are both threatening factors for the human health and ecological balance. Thus, the aim of this study was the determination of microbial loads of Mediterranean mussels from coastal lines.

Material and Methods: Mussels were collected from two stations of İzmir coast; Urla and Foça. Samples were collected by hand without giving harm to mussels, 20-50 cm deep from the sea surface. At least seven organisms were taken from a station to a sterile container with adding the seawater also to keep microorganisms alive until reaching the laboratory. After bringing mussels to the laboratory within 24-hours, they were cleaned and meat-liquor of mussels (~25 gr/station) were homogenized in stomacher bags. In order to determine microbial pollution, most probable number (MPN) method was used. And the number of fecal coliforms and culturable heterotrophic bacteria were reported as CFU/100 g. Moreover, the presumptive *E. coli* and *Salmonella* spp. colonies were determined by selective culture media.

Results: The mean number isolated heterotrophic bacteria $9 \times 10^2$ CFU/100 g and $2.3 \times 10^3$ CFU/100 g for Urla and Foça, respectively. The concentration levels of fecal coliform $1.1 \times 10^2$ and $7 \times 10^2$ MPN/100 g for Urla and Foça stations respectively. Presumptive *E. coli* isolates which are a fecal indicator and suspected *Salmonella* spp. colonies were observed in this preliminary study.

Discussion: The investigation techniques are easy to use and economic. Thus it is possible to propose these tests for routine use. However, the results may be bewildering with these tests. So the isolated microorganisms must be evaluated with more robust molecular techniques. Still, it is possible to propose that the microbial load is not appropriate for ecological balance and environmental health. The detection of fecal coliforms and presumptive *Salmonella* spp. colonies show that there is a microbial pollution in Urla and Foça stations.

Keywords: *Mytilus galloprovincialis*, microbial load, Urla, Foça
Species Composition, Abundance and Temporal Variations of Fish Larvae around Gokceada Island, Turkey

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Introduction: Knowledge on an early life history of fishes is an important tool for fisheries management. Life cycle of the species can be understood better. Additionally, information on abundance and variation of fish larvae can be used in determining area and time restrictions, stock estimate and biodiversity. The studies have been conducted on ichthyoplankton around Gökçeada Island is scarce. Accordingly, the purpose of this study is to determine the species composition, abundance and temporal variations of fish larvae with a frequent sampling interval.

Material and Methods: This study was carried out by weekly intervals in between of 3 May 2015 – 3 February 2016, at 6 stations that were localized around northeastern part of Gökçeada Island. Fish larvae collected with WP-2 type plankton net equipped with 500 μm mesh size net. The density was standardized to the number of individual specimens in 1000 m³ sea water.

Results: A total of 2281 larvae representing 29 family and 55 species were identified from the 27 hauls during the 10 month sampling period. Total fish larvae abundance varied between 6.4 – 8341.2 n/1000 m³ with a mean 250.5 n/1000 m³. Sardina pilchardus had the highest fish larvae density with 57.4% of the total larvae abundance. 89.9% percent of total larvae density stemmed from Clupeidae, Myctophidae, Engraulidae and Sparidae families with 59.2, 11.5, 11.4 and 7.8% percent, respectively. Fish larvae density was lower in spring and autumn than summer and winter. Highest density in winter arised from high abundance of S. pilchardus larvae. Highest species richness was seen in June with 17 larvae species.

Discussion: The abundance and diversity were determined at a relatively high rate in the survey area. Black Sea water discharge and freshwater input around area affects primary production and cause higher larvae density in comparison with more temperate and saline waters of the Aegean Sea (Zervakis et al., 2000; Somarakis et al., 2002). Relatively high density of small pelagic fish larvae overlap with the findings of the authors. Consequently, the the high larvae abundance and species richness around Gokceada island suggests that this area is a significant spawning area for adults and important growth area for fish larvae. Changes in early life stages must be monitored continuously to ensure biological sustainability. So it is recommended that these and similar studies will be increased in our waters.

Acknowledgment: This study is a part of PhD Thesis of İsmail Burak DABAN. Thanks are extended to Kamil Çakır and Captain Yılmaz Tokoğlu who helped with the field samplings.

Keywords: fish, larvae, abundance, diversity, North Aegean Sea
Investigation of Antimicrobial Activity of Narince Cultivar of Grape (Vitis vinifera subsp. vinifera)

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**Introduction:** Grape is one of the most cultured and consumed fruit in the world. Today it is estimated that there are over 10000 cultivars (cv.) of grape (Vitis vinifera subsp. vinifera) are being cultivated all over the World, among them 1200 cultivars are currently cultivated in Turkey. Scientific studies show that grape varieties containing various biologically active substances such as flavonoids, polyphenols, anthocyanins, proanthocyanidins, procyanidins, and the resveratrol exhibit many biological activities such as antioxidative, anti-inflammatory, antimicrobial, cardioprotective and hepatoprotective. The main objective of this study is to evaluate the antimicrobial effect of Vitis vinifera subsp. vinifera cv. Narince on eighteen gram positive and negative bacteria and one fungi.

**Material and Method:** Fruit of grape (fruit juice, seed and fruit bark) were extracted with 60% ethanol solution. These extracts were tested in-vitro for their antimicrobial activity against 19 microorganism (Enterobacter aerogenes, Salmonella infantis, Listeria monocytogenes, Klebsiella pneumoniae, Pseudomonas fluorescens, Pseudomonas aeruginosa, Salmonella kentucky, Enterococcus faecalis, Listeria innocua, Salmonella enteritidis, Enterococcus durans, Salmonella typhimurium, Enterococcus faecium, Staphylococcus aureus, Staphylococcus epidermidis, Bacillus subtilis, Escherichia coli, Saratia murescens and Candida ablicans) by disk diffusion (DD), minimum inhibitory concentration (MIC) and minimum bactericidal/bacteriostatic concentration (MBC) tests.

**Results:** while Ethanol extracts of Narince cultivar showed antimicrobial activity against 13 bacteria, it does not show any activity against 6 (E. aerogenes, L. monocytogenes, K. pneumoniae, P. fluorescens, S. murescens) microorganism at tested concentration. According to the disk diffusion test results 10 µL extract exhibit antimicrobial activity (between 7-18 mm zone diameter) against three bacteria, 50 µL extract show antimicrobial activity (7-18 mm) against eleven bacteria and 100 µL extract show antimicrobial activity (7-21.66 mm) against thirteen bacteria. Extract exhibit inhibition between 10-0.039 mg/100 mL value in MIC test.

**Discussion:** the strongest antibacterial effect observed in 100 µL extract against E. faecalis with 21.66 mm zone diameter while the lowest antibacterial effect observed in all concentration of extract against S. epidermidis with 7 mm zone diameter. MIC value determined between 10-0.039 mg/100 ml for thirteen bacteria. While MIC value observed as bacteriocidal for P. aeruginosa (0.625), S. enteritidis (0.039), E. faecium (0.039), it determined as bacteriostatic for other microorganism.

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**Keywords:** grape, Narince, Vitaceae, antimicrobial effect, MIC, disk diffusion
Introduction: It is known that the most complicated stomach among mammals is found in ruminants, they have a unique digestive system which has four stomach compartments: rumen, reticulum, omasum, and abomasum. The rumen has many small microorganisms consisting of protozoa, bacteria, archaea, and fungi. Rumen protozoa comprise the ciliates and flagellates. The majority are ciliates and several factors seem to influence the concentration and composition of the ciliates in the rumen. The aim of this investigation was to identify the rumen ciliate fauna of domestic sheep (Ovis aries) living in Kastamonu, Turkey, and to compare this information with studies from sheep in another region of Turkey.

Material and Methods: Rumen samples were obtained from 15 domestic sheep (Ovis aries) at slaughterhouses in Kastamonu, Turkey, between September 2015 and October 2016. A well-mixed rumen sample was fixed with 18.5% formalin immediately. A portion of each sample was also immediately added to methyl green formalin saline (MFS) solution for total and differential counts. The MFS was used as a nuclear stain, and Lugol’s iodine was used to indicate skeletal plates. Some samples were prepared for scanning electron microscope examinations.

Results: The mean number of ciliates in the rumen contents from 15 domestic sheep (Ovis aries) in Kastamonu, Turkey was 108.2 ± 150.8×10⁴ cells mL⁻¹. Twenty-four species and 8 morphotypes belonging to 10 genera identified. The majority of ciliates present in all 15 animals were Entodinium species, which constituted from 6.7% to 100% of the total protozoa. All Turkish domestic sheep harbored Entodinium nanellum. Of the other species, the frequency of appearance of individual species ranged from 6.7% for Diplodinium quinquespinosum, Eudiplodinium rostratum, and Metadinium tauricum up to 93.3% for Dasytricha ruminantium. For individual sheep, the total number of species ranged from 4 to 18 with an average of 10.7 ± 4.6 species. Diplodinium quinquespinosum and Eudiplodinium rostratum are new host records for sheep from Turkey.

Discussion: In this study, the rumen ciliate fauna of domestic sheep (Ovis aries) living in Kastamonu, Turkey was detected and this information was compared with studies from sheep in another region of Turkey. Diplodinium quinquespinosum was the first report from the ruminants in Turkey and third report from the ruminants in the world. In conclusion, the host animal species and its diet, transfaunation and antagonism among ciliate species, and geographical distribution of the host species are important factors in establishing both the composition and concentration of the rumen ciliate community.

Acknowledgement: We would like to express our appreciation to the Kastamonu University Scientific Research Project Commission, which supported this study (KUBAP-01/2015-11) and to the Research and Application Center of Kastamonu University for the SEM images.

Keywords: rumen, Ciliate, fauna, sheep, Kastamonu
Determination of Effect of Hypochlorous Acid on Bacterial Populations in Putrefied Chicken Meat

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Introduction: Contamination of poultry meat with foodborne pathogens remains an important public health issue, because these food can be contaminated with pathogen bacteria if there are malpractices in handling, cooking or post-cooking storage of the product. Purpose of this study application of hypochlorous acid prevent or not the spoilage of chicken meat by microbiom analysis.

Material and Methods: In present study we have tested the effects of hypochlorous acide on microflora of chicken samples stored at 2-8°C during 7 days. A total of 5 different chicken samples were purchased from retailed markets. Hypochlorous acide were sprayed on 5 chicken samples and 5gr of same samples were used as control. All samples were incubated for one week at +2-8°C. The microflora of the chicken samples with or without hypochlorous acid treatment were identified for each sample by microbiom analysis using V1-V8 16S primers.

Results: Except minor differences hypochlorous acide treatment did not change the microbiom of the samples. A total of 11 genus (Acinetobacter sp, Arthrobacter sp, Brochothrix sp, Carnobacterium sp, Flavobacterium sp, Myroides sp, Pseudomonas sp, Psychrobacter sp, Janthinobacterium sp, Oxalobacteraceae sp, Vagococcus sp) and 19 species (Brochothrix thermosphaeta, Carnobacterium maltaromaticum, Carnobacterium divergens, Flavobacterium antarcticum, Oxalobacteraceae bacterium, Psychrobacter cryohalolentis, Psychrobacter urativorans, Psychrobacter glacincola, Pseudomonas fragi, Pseudomonas psychrophila, Pseudomonas chlororaphis, Pseudomonas libanensis, Pseudomonas jessenii, Pseudomonas fluorescens, Pseudomonas azotoformans, Pseudomonas wheistenstephanensis, Vagococcus salmoninarum, Vagococcus fessus, Vagococcus fluvialis) were detected from the samples. While Oxalobacteraceae bacterium and Pseudomonas azotoformans, were detected only from hypochlorous acid applied samples, Flavobacterium antarcticum, and Pseudomonas fluorescens were detected only from non hypochlorous acid applied samples.

Discussion: Although minor differences were found between hypochlorous acid applied and non-applied samples, hypochlorous acid application did not prevent the spoilage of chicken.

Acknowledgement: We would like to express our appreciation to the Adnan Menderes University, BAP which supported this study (CMYO-17-001).

Keywords: microbiome, chicken, hypochlorous acid, spoilage
Relationships Between Plant Species Diversity of Black Pine Forests and Site Factors in The Sütçüler District of Turkey

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Introduction: This study was addressed examine the relationships between alpha species diversity based on abundance data of plant species, species richness and environmental variables of black pine (Pinus nigra subsp. pallasiana (Lamb.) Holmboe) forests.

Material and Methods: For this purpose, abundance data of plant species was recorded according to the Braun-Blanquet method and converted into partial values ranging from 0-1 in the sample areas taken from the natural black pine stands in the Sütçüler district. As well as, plant species, the slope position, soil depth, land surface form, soil stoniness were recorded in each sample plots. The maps of elevation, slope and aspect were obtained from the Digital Elevation Model (DEM) of the region. Also, heat and radiation index maps were derived from aspect and slope maps. Alpha diversity values were calculated from Shannon, Brillouin, Simpson and Berger-Parker indices and species richness was determined for each sample plots. Pearson Correlation Analysis and Principal Component Analysis were applied to demonstrate the relationships between all diversity values and environmental site factors in the district.

Results: As a result of the statistical analyzes, species diversity derived from all alpha indices showed a negative correlation with altitude and percentage of stoniness whereas it is positively associated with slope degree and mean temperature rates of the plots.

Discussion: According to the results from this study, although alpha diversity indices are related to environmental variables, there is not a significant relationship between species richness and environmental site conditions. This situation has led to the conclusion that the consideration of species richness would not be sufficient in the studies on the diversity-environment relations. In addition, there are partial different results obtained from different diversity indices. Therefore, it is also important to consider this situation in the studies to be carried out.

Keywords: biodiversity, climate, black pine, shannon index, site factors
Introduction: In today’s changing conditions, the individuals need to have sufficient knowledge about environmental components, the soil-air-water-plant, to be able to develop the environmental protection consciousness. Strengthening the subjects in the formal educations with the support of out-of-school learning is important to ensure permanent attitudes. The scientific phenomena should be presented not within a conceptual framework but as series of connected-entertaining-magical events. Therefore, this study aims of determine students’ knowledge about soil and its’ importance in their lives; investigate effects of given day-to-day applied education on students’ perspective on soil; observe the effect of out-of-school learning on conceptual education; and emphasize the importance of practical activities to be ensuring permanence on the soil, environment and nature education.

Material and Methods: Soil Science School conducted the soil science applied education project with 226 students of fourth grade from elementary schools in Nallıhan-Ankara in 2015. Applied education was given in relation to the mineral-rock-soil, the soil-living, the soil-erosion-conservation. The document analysis techniques were used in the examination of the drawings before and after the applied education program. Before program, nine main themes were created. After program, each drawing has been analyzed separately and completed by determining different themes.

Results and Discussion: It has been observed in the first drawings of students that the emphasis of nature was given. In the drawings after education, it has been determined that included the totality of soil-nature themes, underground creatures, soil formation, erosion and soil conservation. Also, it has only been seen that some students have drawn a few themes that are new and important to them and put in the foreground. In the drawings made by students, it was determined that the awareness desired to be created about the importance and protection of soil was established through applied education. Especially in the soil and environment education, educators need to provide children with sufficient material to enable them to adopt concepts of soil-environment-nature as well as information about the subject, and should be concreted the concepts with incentive experiments to children, and should support students as individual forming own values judgments and developing their attitudes, with related to soil, environment and nature.

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Keywords: soil science, the applied education, elementary schools students, out-of-school learning.
Determination of Cytotoxic Effect of Novel 2,4-Dihydroxyquinoline Dyes on Cancer Cell Lines

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Introduction: Azo dyes have been known as their pharmacological activities. Quinolines derivatives are specific class of nitrogen-containing heterocycles and found to be effective against some types of cancer. For example, chelidonine, chelerythrine, and sanguinarine derivatives are effective against lung and pancreatic cancers and a berberine derivative is effective against colon cancer. It was discovered that some compounds of quinolines derivatives reversed MDR (Multi-drug Resistance) of tumor cells effectively and caused low toxicity. Drug resistancy is a significant problem, because MDR causes the activation of P-glycoprotein efflux pump in cell membrane by blocking penetration of drugs to the cancer cells. In this study, it was indicated that cytotoxic activity of 2,4-dihydroxyquinoline derivatives disazo dyes in HeLa cervical cancer cells and PC3 prostate cancer cells. In addition, compounds were evaluated whether they would be potential chemotherapy drugs or not.

Material and Methods: 2,4-dihydroxyquinoline derivatives disazo dyes were synthesized by the reaction of 5-amino-4-phenylazo-3-methyl-1H-pyrazole derivatives with 2,4-dihydroxyquinoline. A total of 10,000 HeLa cervical cancer cells and PC3 prostate cancer cells were seeded in 96-well plates. Cells were treated with different doses of quinoline derivatives called as compound (I) 3-(3'-methyl-4'-(3-chlorophenylazo-1'H-5-ylazo) pyrazole-2,4-dihydroxyquinoline) and compound (II) (3-(3'-methyl-4'-(2-nitrophenylazo-1'H-5-ylazo) pyrazole-2,4-dihydroxyquinoline) for 24, 48 and 72 hours. Following exposure time, anti-proliferative activity of compounds was observed under inverted microscope for detection of apoptotic cell morphology. Viability of cells were tested by MTT-cytotoxicity based test. The absorbance of samples was calculated at 570 nm.

Results: Cytotoxicity was observed in cancer cells after treatment of compounds (I) and (II). For HeLa cells, effect of compound (II) can be considered as dose and time dependent. However, effect of compound (I) might be only dose-dependent for HeLa cells. Especially 25 mM of both compounds had cell viability ranged from 20% to 40%. In PC3 cancer cells, cell viability decreased to 60% after the 24 h treatment of compound (I). It was observed no change in the same compound of treatment with 48 h and 72 h. Compound(II) was observed as most effective in the concentration 25 mM at 24, 48 and 72 h.

Discussion: The activity of compound (II) was observed to be dose and time dependent, while the activity of compound (I) was considered to be dose dependent for HeLa cell lines. Compounds (I) and (II) exhibited cytotoxic effects on PC3 cell lines. This might be explained by the presence of different functional groups in compounds.

Keywords: cytotoxicity, cancer cells, disazo dyes
Introduction: In this study, geological, hydrogeological and soil properties of the selected landfill area on the northern skirts of stone quarries 3 km southwest of Tekirdağ province Çorlu district center were researched and ground improvement was made accordingly. Pits were drilled in the ground and tube samples were taken from the ground. Determination of soil properties and geotechnical parameters were carried out in the laboratory. Underground waters are thought to be deep.

Material and Methods: This study area is located on the northern skirts of stone quarries located 3 km southwest of the center of Çorlu town in Tekirdağ province. A study was conducted to determine the basic engineering properties of the ground in the study area and 3 research pits were opened. Unconditioned tube samples were taken from the exploratory pits by means of 4 flashing methods. In the samples, natural water content, void ratio, unit volume weight, specific weight, saturation ratio, porosity elasticity, liquid limit, plastic index, sieve analysis, cohesion, internal friction angle measurements were made.

Results: According to the same classification and standards, samples taken from the second place are determined as "SC (clayey sand) and CS (sandy clay). The CH samples have a natural water content of 31.3%, a porosity of 47%, a liquid limit of 65.2%, a plastic limit of 29.7%, cohesion 0.85 kgf / cm², internal friction angle 3°, natural unit volume weight 1.89 t / m³. The sample with SC (clayey sand) has a water content of 12.8-15.3%, a porosity of 35-36.3%, a void ratio of 53.8-56.9%, a liquid limit of 29.2-31%, plastics limit 20-20.9%, internal friction angle 21°-26°, natural unit the volume weight is 1.93-1.99 t / m³.

Discussion: The clay layer should be laid on the ground with a thickness of 60 cm and compressed. The impermeability coefficient of this clay layer can not be bigger than 1x10⁻⁸ m/sec. Compaction technique should be carried out in accordance with the standards and suitable water content in order to avoid contamination of surface and ground waters. 2 mm thick artificial impermeable membrane (HDPE) should be laid on the clay layer.

Keywords: landfill, soil properties, geomembran
Introduction: This study analyzed the relationship between the vertical distribution of root carbon and soil organic carbon (SOC) content in the semi-arid grasslands of Olur sub-basin in Turkey.

Material and Methods: Samples were collected in 2016 (July to August), we randomly distributed 44 sampling across the study area using data management tool of ArcGIS 10.1TM. They were stratified based on their elevation (1000-1500, 1500-2000 and 2000-2500 m) and aspect (shaded and sunny) classes. To estimate root biomass, 196 root samples were collected from soil depths of 0-30 cm in 44 sites. The soil was dug by steel cylinder with a diameter of 6.4 cm and a length of 30 cm. They were washed in order to remove from the soil using a 0.2 mm-sieve, then these samples were oven-dried at 80°C (24 hours) and weighed. In each sampling plots, 30 cm deep soil profiles were excavated, each separated into two layers with a depth of 15 cm to collect soil samples. After being air-dried and sieved (using of 2 mm mesh), the soil samples were carefully handpicked to extract the surface organic debris and fine roots for SOC analysis. The Walkley–Black method was used to determine SOC.

Results: There was not a significant difference in root carbon by elevation levels at the three sites (p < 0.01). On average, root carbon amount of Olur sub-basin grassland were 1.83 ton ha\(^{-1}\) (1000-1500 m), 1.95 ton ha\(^{-1}\) (1500-2000 m) and 2.09 ton ha\(^{-1}\) (2000-2500 m). There was a significant difference in the amount of SOC between elevation levels and soil depths (p < 0.01). The SOC was greatest for the 0-15 cm layer, at about 56% (1000-1500m), 58 % (1500-2000 m) and 60 % (2000-2500 m) of total SOC, and it was lowest at 15-30 cm. The results showed that the root carbon content generally increased as elevation levels increased and the SOC content generally decreased as soil depth and elevation levels increased. There was an acceptable relationship between SOC and root carbon at all 3 elevation levels. With all data pooled, SOC and root carbon were strongly correlated, as the relationship between root carbon and SOC (R\(^2\) = 0.608). More root carbon and SOC stored in the sunny aspect than shaded aspect.

Discussion: Our results showed that, there was a significant correlation between SOC and root carbon. In the semi-arid regions such as the study area, root carbon is the largest percentage of total carbon and the proportion of above-ground carbon to total plant carbon is small. Root and humus from the root residues is the main source of SOC.

Acknowledgement: This study was partially supported by the Çoruh River Watershed Rehabilitation Project (2012–2019). The authors would like to thank the project funding agencies General Directorate of Forestry (OGM) and the Japanese International Cooperation Agency’s (JICA) managers and staff for their contributions to the work.

Keywords: root carbon, soil carbon, Çoruh River, grassland
Introduction: Textile wastewater can be characterized very differently due to process variability. In general, the textile sector can be grouped as yarn, weaving and dyeing. In textile industry, contamination is caused by pre-process and post-process operations applied to fabric. In this study, it was tried to improve sedimentation in textile factory wastewater. These wastewaters are not suitable for sedimentation due to high fiber content (SVI > 250 ml/g).

Material and Methods: Samples were taken from the activated sludge tank (Sequencing batch reactor) during a month from a textile factory operating in Çorlu region. These wastewaters contain dense fabric fibers. These wastewaters have been chemically precipitated in the laboratory with organic polymer, ferric chloride (FeCl₃) and alum (Al₂(SO₄)₃). Due to the aeration and dense fiber in the activated sludge process (SBR) these waters have a high sludge volume index (SVI > 250 ml/g). In addition, the effects of the aeration and filtration (100 and 200 μm porosity) processes on sedimentation were investigated.

Results: Control samples (30 min sedimentation SVI > 278 ml/g), 1 ml polymer, 1 ml polymer+1 hour of aeration, 2 ml polymer+5 minutes aeration were applied to the first samples taken from the activated sludge tank (SBR). At the end of 4.5 h precipitation, 400 mL/L (SVI=125 ml/g), 410 mL/L (SVI=128 ml/g), 370 mL/L (SVI=116 ml/g) and 370 mL/L (SVI=116 ml/g) precipitate were obtained, respectively. The same samples were filtered through 100 μm and 200 μm porous filters and after 4.5 hours, a precipitate of 200 ml/L (SVI = 80 ml/g) and 280 ml/L (SVI = 112 ml/g) was obtained, respectively.

The second samples were taken from the activated sludge tank, 10 days after the first sample. Examples were control sample (30 min sedimentation SVI > 246 ml/g), 2 ml polymer+5 min aeration, 2 ml FeCl₃+5 min aeration, 100 μM and 200 μM filtration. After 4.5 h sedimentation, 435 ml/L (SVI=115 ml/g), 460 ml/L (119 ml/g), 420 ml/L (SVI=109 ml/g), 180 ml/L (69 ml/g) and 370 ml/L (SVI=142 ml/g) of precipitate were obtained, respectively. In the experiment with alum (3 ml alum+5 min aeration), 505 ml/L (SVI=183) precipitate was obtained.

Discussion: As can be seen from the results (control samples), the precipitation is not enough due to the fabric fibers. At the end of the 4.5 h sedimentation time, rather than the use of polymer, iron and alum, these samples have to be precipitated after being passed through at least 100 μm filters.

Keywords: textile industry, sludge volume index, settling characteristic
ORAL PRESENTATION

**T-2 Mycotoxin Triggers Apoptosis in SerW3 Cells by Caspase-3 and Caspase-9 Dependent Pathway**

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**Introduction:** T-2 toxin, which is a toxic secondary fungal metabolite produced by *Fusarium* species, is a common mycotoxin found in agricultural products including cereals such as maize, wheat, barley and oats. Exposure to T-2 toxin by contaminated products was known to cause several adverse effects in reproductive system and testis is one of the main targets of T-2 toxin. T-2 toxin is known to induce apoptosis in immune system cells, chondrocytes and rat granulosa cells. However, apoptosis mechanism of T-2 toxin was not precisely clear. The purpose to the present study is to clarify the apoptotic mechanism of T-2 toxin in SerW3 cells.

**Material & Methods:** SerW3 cells (17-days old rat Sertoli cells) were exposed to 0, 0.005, 0.01 and 0.05 µg/ml T-2 toxin for 24 hours. Crystal violet and AO/PI cell viability assays were performed in SerW3 cells exposed to T-2 toxin. Additionally, caspase-3 and caspase-9 levels were measured by spectrophotometer and apoptotic SerW3 cells were detected by terminal deoxynucleotidyl transferase dUTP end labeling (TUNEL) assay.

**Results & Discussion:** Apoptotic cell death is a normal process in developmental phase and provides homeostasis. Besides, apoptosis was known to contribute several disorders. In the light of the experiments, viability of SerW3 cells exposed to T-2 toxin decreased in dose dependently according to crystal violet and AO/PI viability assays. T-2 toxin increased the caspase-3 and caspase-9 activity in SerW3 cells exposed as compared to non-treated group. Additionally, TUNEL positive cells increased in dose dependent manner in T-2 toxin exposed SerW3 cells. Apoptosis is regulated by several proteins including cysteine proteases namely caspases. Caspase activation is the final step in the apoptotic process. In summary, T-2 toxin activated caspase cascade by caspase-9 as an initiator caspase and triggered caspase-3 which is an executioner caspase, and caused apoptosis in SerW3 cells.

**Acknowledgement:** This study was partially supported by Scientific Research Projects Coordination Unit of Hacettepe University (Project No: 012D08601003).

**Keywords:** T-2 toxin, SerW3 cells, apoptosis, caspase-3, caspase-9, TUNEL
Preliminary Results Of Small Scale Aquaponic System

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Introduction: Aquaponics is a bio-integrated food production system, consisting of closed recirculating aquaculture combined with hydroponics. This study presents data obtained through trial on small-scale aquaponics system. The aim of the study is to determine the impact of aquaponics on physical properties of the water quality.

Material and Methods: The trial was conducted on Goldfish (Carassius auratus)(11 fish in each aquarium) and lettuce (Lactuca sativa) over a period of 30 days in small scale ebb flow aquaponics. Aquarium with gold fish was used as a control. DO, pH, salinity and EC were measured daily by Hach HQ40D portable meter. Turbidity was measured daily Hach 2100Q portable turbidity meter.

Results: Mean (± S.D.) values of water temperature, DO, pH, EC, pH, and turbidity during the trial were 19.4±1.1°C, 7.8±0.8 mg/L, 7.5±0.2, 362±30 µS/cm, 1.03±0.1 NTU in aquaponic system. Mean (± S.D.) values of water temperature, DO, pH, salinity, EC, pH, and turbidity during the trial were 18.9±0.9°C, 6.6±0.5 mg/L, 7.4±0.1, 362±30 µS/cm, 3.68±2.5 NTU in control aquarium. There was a significant differences between aquaponics and control aquarium for DO and turbidity (p≤0.0001). There was an algae growth in both aquariums and 5 of the 11 fish were died in control aquarium whereas all fish were alive in aquaponic system. High survival rate (100 %) was noticed during the trial. During the trial external filter of control aquarium was cleared twice.

Discussion: Our preliminary results showed that aquaponic system has a positive impact on dissolved oxygen and clarity. The system was efficient in purging the toxic waste from water, resulting in remediation of water quality for the recirculating aquaculture system and needs less operation cost and labor. The results revealed that the system does not adversely affect the fish.

Keywords: aquaponic, Turkey, water quality
Freshwater Hydrobiidae (Gastropoda: Rissoidea) Fauna of the Mount Kazdağı (Çanakkale; Biga Peninsula) with Some Ecological Data

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Introduction: The family Hydrobiidae represents the largest group of the superfamily Truncatelloidea with regard to species diversity. The members of this family have been frequently used in biological monitoring studies due to their indicator value—might be able reflecting the ecological status of the habitat live in. Also, they are highly suitable for allopatric speciation because of their dioecious characteristic. Thus, studies focused on the species diversity and the ecological value of the family. This study aims at determining the species diversity and distribution of the Hydrobiidae, besides revealing its ecological demands with some water quality parameters in the Biga Peninsula region.

Material and Methods: In this study, a malaco faunal sampling from 17 sampling stations was carried out at the Mount Kazdağı in May 2016. Hand net, forceps and a sieve were use in order to collect of gastropods from various habitats such as stony, gravelly, muddy, vegetation and wooden debris. In the same time, some physical and chemical parameters of the water i.e. pH, redox potential (ORP), dissolved oxygen (both % and ppm), electrical conductivity (EC), total dissolved solids (TDS) and temperature were recorded in situ by multiparameter (Hanna Instruments 98194). Besides, some elemental analysis of water were performed at the laboratory.

Results: According to the faunistic data, two different genera, Byhinella and Grossuana, were detected belong to the family Hydrobiidae that living in various biotops and ecological conditions.

Discussion: According to the earlier studies that subjected to freshwater Mollusca in the Mount Kazdağı and its adjacent locations, only one Byhinella (B. kazdaghensis Odabaşı & Georgiev, 2014) and Pseudamnicola (P. natolica (Küster, 1852)) were recorded. In this study, we found several different types of Bythinella and Grossuana but no Pseudamnicola.

Acknowledgement: We would like to express our appreciation to the Çanakkale Onsekiz Mart University Scientific Research Project Commission, which supported this study (COMUBAP-588).

Keywords: freshwater Gastropoda, Hydrobiidae, species diversity, Mount Kazdağı (Çanakkale).
Importance and Role of *Phytophthora* Species on Some Park Tree Decline Occurring in Ankara

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Introduction: Widespread occurrence of many *Phytophthora* species on forests, nurseries and parks and their severe impact was well documented by many researches. In this study, *Phytophthora* species causing dieback on various trees in the parks in Ankara were determined. These pathogens affects many tree species by causing root and collar rots and are distributed by movement of soil and water by various ways including human activities. Continuous movement of people in the parks facilitates the spread of these diseases. With this study, the role of *Phytophthora* species on the decline of the trees in the large parks of Ankara, namely Botanik, Kurtuluş, Gençlik, Dikmen vadisi and Demetevler, was investigated.

Material and Methods: Sampling was done in September-October, which is suitable for isolation of *Phytophthora* species. The trees showing dieback were first examined for the presence of necrosis on the lower stems and samples from the adjoining parts of the intact and diseased tissues were taken. Soil samples were collected around the trees, 100-150 cm away from the main stem from the northern and north-eastern directions. *Phytophthora* species were isolated from the baits showing necrosis during the incubation on the watered soils by plating the samples on *Phytophthora* selective medium of P₅ARPNH. This medium contains Grated carrot agar (as g/l; thinly grated carrot 40, agar 15, water 1000 ml) as base medium and the following ingredients (as μg/ml; pimaricin 5, ampicilline 250, rifampisin 10, PCNB 50, nystatin 50, hymexazole 50) to provide selectivity (Jung et al., 1996). Bark samples were plated on the selective medium after rinsing in water, which is necessary for isolation of *Phytophthora* spp. The *Phytophthora* spp. obtained were identified according to the descriptions given by Stamps et al. (1990) and Gallegly and Hong (2008). Identification of the species obtained from horse chestnut which was found widespread and the other *Phytophthora* species recovered from Gençlik Park were confirmed by comparing the sequences of their ITS regions with the sequences deposited in Gene Bank.

Results: Following *Phytophthora* spp. were obtained from the trees; *Phytophthora citrophthora* from Horse chestnut from Gençlik Park, *Phytophthora nicotianae* from heaven tree (*Ailanthus* sp.) and *Phytophthora* sp. from oaks from Botanik Park. These *Phytophthora* species caused sudden death to the above mentioned hosts. Besides *Phytophthora* spp., the following pathogenic fungi; *Cytospora* sp. from poplars, *Fusarium solani* and *Acremonium* sp. from heaven tree cankers from Kurtuluş Parkı, *Fusarium solani* from the cankers from elms from Demetevler Parkı were isolated.

Discussion: Recently, dieback and decline diseases on park trees showed an increase. The main reasons of these diseases are; 1) excessive watering of the trees that preventing aeration of the root system of the trees, 2) Planting flowers around the root crowns which cause water logging and transmit *Phytophthora* spp. 3) Planting diseased saplings 4) Defects on the irrigation systems on lawns which may cause water logging. Correction of the above mentioned inadequacies will decrease disease incidences

Acknowledgement: Keywords: *Phytophthora* spp., elms, heaven tree, nicotianae
Importance of Immune System in *Galleria mellonella*

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**Introduction:** Vertebrate experimental animals are used widely in the laboratory investigation of many diseases. In recent years, invertebrates have been preferred as a model organism because of many factors such as various equipment and material problems, especially ethical concerns. Greater wax moth, *Galleria mellonella* is an invertebrate model organism that is used especially for the investigation of the pathogenesis of infectious diseases. This insect is more advantageous than mammalian model organisms for such reasons as an easy to use in experiments, a mass production ability, to obtain large amounts of haemolymphs and high survival rate at 20-37°C in the medicine, pharmaceutical, agriculture, biology research areas.

**Material and Methods:** Larvae of *G. mellonella* (greater wax moth) were used in all experiments. The insects were reared in 1,000-ml glass jars with an artificial diet (Bronskill 1961) to lay eggs at 30 °C in constant darkness. We injected *G. mellonella* larvae with indomethacin prior to injection of BHSV-1. Using Bovine Herpes Simplex Virus-1 (BHSV-1) and larvae of the greater wax moth, *G. mellonella*, we found that wax moth larvae form hemocytic nodules in response to viral infection.

**Results:** In many studies, it has been shown that eicosanoids mediate nodulation reactions against to bacterial infections. Similar to previous studies, we inferred that this anti-viral nodulation reaction is mediated by eicosanoids. Generally, we recorded highest nodulation than any of the control treatment groups. Nodulation reactions were found to be strongly reduced in the larvae treated with co-injection of indomethacin and BHSV-1.

**Discussion:** In *G. mellonella* the presence of innate immunity similar to mammals and although it does not have the ability to produce antibodies, the presence of antibacterial peptides and proteins with similar properties is a particular reason for preferring in immune studies. There are three basic defense systems against to microorganisms that cause disease in insects. These are called anatomic barriers, cellular and humoral immunity. Important proteins and peptides identified in humoral immunity of *Galleria*: apolipphorin (apoLp-III), metalloproteinase inhibitor (IMPI), protease inhibitors, lysozyme, prophenoloxidase, antimicrobial peptides (AMPs) (Gallimycin, moricins, gloverins). In addition, some other proteins identified at the mRNA level are also indicated. Insect hemocytes known as a blood cells are responsible for cellular immunity. The well-known immune system of *G. mellonella*, using for determination of the virulence factors of many medical important microorganisms, will be so benefit for these studies.

**Keywords:** *Galleria mellonella*, immunity, insect, eicosanoids
**Introduction:** Water is essential for organisms to live. Because of this, physico-chemical investigation of aquatic ecosystems that provide habitat to living beings is an important issue. Studies on the investigation of the physico-chemical properties of aquatic ecosystems are frequently carried out in Turkey and in the world. In this study, some water quality properties of Meke Lake were investigated.

**Material and Methods:** Our study area, Meke Lake is located in Karapınar District at a distance of 106 km from Konya Province and the lake consists of salt water. In this study, some physical and inorganic parameters were studied between July 2014 and January 2015 in Meke Lake. During the study, the water samples were taken seasonally from two stations. Results were compared with according to water pollution control regulation (WPCR) and water intended for human consumption standards (TS 266). According to Pearson Correlation Matrix (PCA) analysis of physical and inorganic parameters relationships were determined.

**Results:** Due to the salinity that is caused by excessive evaporation, some physical and inorganic parameters results differ from the regulation values. According to Pearson Correlation Matrix (PCA) analysis, physical and inorganic parameters showed positive and negative correlation with each other in Meke Lake.

**Discussion:** As a results of our study, high amount of salt was observed in the lake water. It can be said that, lake water can not be used for human consumption and the high level of physical and inorganic parameters detected in lake water depends on the environmental characteristics of the area where the lake is located.

**Keywords:** inorganic parameters, Meke Lake, PCA, physical parameters.
Introduction: Plant production is a process continued with procedure like choice of seed, seedling and sapling, planting, irrigation, fertilizing, control of plant diseases and pests. One of important problems is loss caused plant diseases in this production period. Chemical control is necessary to get further and more quality product from unit area and to avoid this loss. Of late years, role of unconsciously and excessive use of pesticide is big on environmental pollution and break down of natural balance. Also, effects on human health and other living, gain resistance of target organism direct to develop alternative control methods to pesticide. One of this alternative methods, use of plant growth promoting rhizobacteria (PGPR) against plant disease. This study is aimed to observe the effects of plant growth promoting rhizobacteria against some important plant fungi disease under in vitro conditions.

Material and Methods: In this study, eight PGPR isolates and Sclerotinia sclerotiorum, Rhizoctonia solani, Monilinia fructigena, Phytophthora infestans, Verticillium dahliae, Fusarium oxysporum, Alternaria solani were used. PGPR isolates were isolated tomato production areas in Tokat province in Turkey. PGPR isolates were planting in form hoop to the most end part of the King’s B medium in 90 mm diameter sterile plastic petri dish. Also, the 5 mm diameter mycelial disc of the pathogen were placed in center of the medium. As control, the mycelial disc of the pathogen was placed on medium without PGPR isolates. The petri dishes were incubated at 26±2°C. The experiment was ended when pathogens were coated on the control petri dishes. The mycelial growth diameters of pathogens in control and PGPR were measured. The experiment was repeated twice with three replications. The effects of PGPR were determined as percentage inhibition ration.

Results: Based on the results of the study, the maximum effect on tested phytopathogen fungi was on mycelia growth of S. sclerotiorum. The used PGPR were effective on S. sclerotiorum at 29,04-80,27%. As for on mycelia growth of the other pathogenic fungi, the PGPR isolates weren’t effective. The PGPR isolates were inhibited the mycelia growth of P. infestans, V. dahliae, F. oxysporum, M. fructigena, R. solani and A. solani at 17,36-53,02%, 22,26-51,46%, 13,14-28,39%, 17,5-39,30%, 13,97-29,93% and 16,57-36,24% ration, respectively.

Discussion: As a result, biological control takes an important part in control of the plant diseases in plant production. In this study, used PGPR isolates were only effective on S. sclerotiorum, they were not inhibited mycelial growth of the other pathogens. In this study researched in vitro activities of PGPR isolates, in vivo activities in greenhouse and field of hopeful isolates need to research.

Keywords: plant growth promoting Rhizobacteria, PGPR, biological control, Sclerotinia sclerotiorum
Change in Some Soil Properties with Erinc Drought Classes in the Grassland Areas of Coruh River Basin

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Introduction: The soil characteristics change with the increasing of elevation from the arid climate to humid climate. In this study, we aimed to determine whether some soil characteristics of the Coruh River Basin change with the climate zones.

Material and Methods: For this purpose; stratified random sampling method was performed to determine the current state of some soil characteristics in the grassland areas by selected sub-basins under the "Coruh River Basin Rehabilitation Project". A total of 155 sampling points were selected, 60 on the semi-humid climate zone, 67 on the humid climate zone and 28 on the very humid climate zone. A total of 301 soil samples were taken from the sampling areas at the depths of 0-15 cm (155) and 15-30 cm (146). In these soil samples; texture (sand, clay, silt (%)), soil pH, organic matter (OM) (%), lime (%), electrical conductivity (EC), dispersion ratio (DO), clay ratio (KO), soil erosion factor (K factor) were determined.

Results: According to our results; the amount of sand, DO, KO and OM values were increased; clay, dust, lime, pH, EC and K factor values were decreased from semi-humid climate to very humid climate due to increasing of elevation in the 0-15 cm soil depth. In 15-30 cm soil depth, sand, DO and KO values were increased and silt, lime, EC and pH values were decreased. Clay, OM and K factor values were increased from semi-humid climate to moist climate.

Correlation analysis showed that; there was a strong positive relationship between elevation and sand, DO, KO and OM in the 0-15 cm soil depth (p <0.01). However, we found significant positive relationship between clay, lime, DO, KO and OM (p<0.05) and OM (p<0.01) values and there were significant negative correlation between lime, pH and EC (p<0.01) values in the 15-30 cm soil depth. The results of the variance analysis show that; both (0-15 and 15-30 cm) soil depth showed significant differences according to climatic zones in terms of sand, clay, pH, OM, lime, EC, DO, KO and K factors (p <0.05).

Discussion: Our results indicated that, some soil characteristics had significant differences with the climate zones. Therefore, climatic zones and soil characteristics should be taken into consideration for the purpose of preserving or improving the existing situation of the grassland ecosystem of the study area.

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Keywords: Coruh Basin, grassland, soil properties, erinc, drought classes, Coruh River
Zerconid Mites (Acari: Zerconidae) of Turkish Thrace, with Some Ecological Preferences of the Species

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Introduction: Zerconid mites, belonging to family Zerconidae, are free-living organisms distributed in Holarctic region. Most of them live in soil, litter and moss, while some others were rarely recorded from wood substrates, ant-hills, nests of birds and small terrestrial mammals. This family is represented about 120 species in Turkey and most of them are endemic. This study was aimed to reveal species list, search height zones and habitat types of zerconid mites in Turkish Thrace.

Material and Methods: Soil, litter and moss samples which include zerconid specimens were collected from European part of Turkey between November 2012 and April 2014. Samples were collected from 40 different habitat types (e.g. Acacia sp., Alnus sp., Cedrus libani, Ceratonia siliqua, Crataegus monogyna, Cupressus sempervirens, Erica arborea, Fagus orientalis, Juniperus communis, Mesipilus germanica, Morus alba, moss, Olea europaea, Pinus brutia, Pistacia sp., Populus sp., Prunus dulcis, Pyrus elaeagrfolia, Quercus petraea, Rhododendron luteum, Rosa canina, Rubus sp., Salix sp. and Urtica sp.) in research area. Also, height zones (between 0-800 meters) of collected samples were noted during field surveys. Extracted zerconid specimens were identified according to Mašán & Fend’a (2004) terminology and were preserved in 70 % ethanol.

Results: After identification studies, 42 zerconid species belonging to two genera (18 Prozercon and 24 Zercon species) were found totally in research area. Although, at least single Zercon species was found in all habitat types, no Prozercon species was found in 11 different habitats. Species diversity was found most abundant in oak and moss habitats. In addition, some zerconid species were not detected at various height ranges.

Discussion: When distribution informations are interpreted, Z. marinae and Z. colligans are most abundant species in genus Zercon. On the other hand, P. carpathofimbriatus and P. bulbiferus are most abundant species in genus Prozercon. Distributions of zerconids according to habitat types were compared. In accordance with all datas, it is predicted that zerconids have different habitat and altitude preferences.

Acknowledgement: We would like to express our appreciation to the Pamukkale University Scientific Research Projects Unit, which supported this study (PAUBAP-2012FBE067).

Keywords: Mesostigmata, biodiversity, ecology, preference, Thrace region
Introduction: The pumpkinseed *Lepomis gibbosus* is a native fish of North America, has a nearly worldwide distribution now. It is considered as a color full aquarium fish and interested in fish behavioral studies. It was introduced to Europe and parts of the Mediterranean Region more than a century ago. The species was reported firstly in 1983 in Thrace region’s water of Turkey. Presently it is found several still and running waters in western Anatolia and the Thrace. The distribution and occurrence of the exotic fish species can be traced and reported reliable spatial and temporal basis. But, their adaptability to new habitats, established populations’ structure and dynamics, feeding, reproduction and growth characteristics, ecologic interactions in freshwaters, possible potential ecological impacts on native and other fishes (i.e. on biodiversity and fisheries) is little known and need to study. Furthermore, for last 20-30 years the exotic fish invasions and their effects are common ecologic and fisheries problem in Turkey. Therefore as the public and scientific awareness rise and studies are concentrated on exotic fish species, including the pumpkinseed, and their effects.

Material and Methods: Fish samples were taken from Büyük Menderes river basins’ reservoirs (Kemer, Azizabat, Eşen, Yenidere, Gökpınar), Akçay and other streams of the river using electroshocker and hand nets. Some biologic population treats, such as age, condition, growth, reproduction and feeding were analyzed. Characteristics of sampling sites were observed and cohabitating fish species identified. Based on the studies, distribution ranges ecological effects and invasive potential also reviewed and discussed.

Results: At present, the pumpkinseed is distributed in many waters, including pools, reservoires, dam lakes, rivers and streams in Thrace, Marmara, Aegean and some west parts of Mediterranean regions’ freshwaters of Turkey. Distribution concentrated in artificial water sources such as dam lakes and reservoirs, it also found in slow running, warm and vegetated streams and channels. Individuals accumulated densely near the edge of waters and sub lacustrine areas, they share the habitats with other native and exotic fish species. Maximum age was determined as IV+ and maturity as age II., spawning was observed between May to end of July, they feed as omnivore mainly on chrinomids.

Discussion: The species established self-sustained populations in good condition, having strong age classes, reproduction and competition for habitat and feeding with other fish species. They can save themselves owing to occupying the water’s edge, even ditches that predator fish could not reach and have aggressive habits to other small fishes cohabitating. It can be concluded that the pumpkinseed is successful and have superiority especially in artificial, warmer water bodies. If they find those favorable conditions, further invasions of fish to South, south-east wards and Black Sea region in Anatolia is possible.

Acknowledgement: We would like to thank to Forestry and Water Ministry Wildlife and National Parks General Directorate’s Denizli Branch for supporting field samplings by a biodiversity Project.

Keywords: pumpkinseed, *Lepomis gibbosus*, ecologic interactions, invasiveness, exotic, Büyük Menderes, Turkey
Cultivation of *Spirulina platensis* by Using Layer Manure and its Potential to Use in Layer Feed as A Feed Additive

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**Introduction:** *Spirulina platensis*, which is cyanobacteria, is a crucial functional food additive. *Spirulina platensis* which is a photosynthetic micro algae, contains high crude protein content (62-70%) as well as precious metabolites. Recent studies have propound that chicken manure can be used as low-cost nitrogen source in cultivation of *Spirulina platensis*. In this study, dried laying chicken manure (DLCM) was used as nitrogen source in *Spirulina platensis* culture. *Spirulina platensis* starter culture was 0.6 g/L (dry weight) and maintained in jars (20 L) in fully-controlled shelf systems. 20 g/L DLCM and 40 mg/L Sodium Bicarbonate were added to culture, as nutrient source. Cell density was counted and dry biomass were analyzed. The usability of the harvested and dried spirulina in chicken rations were evaluated in terms of using as a functional feed additive.

**Material and Methods:** Pure *Spirulina platensis* culture was supplied from The Culture Collection of Algae and Protozoa (CCAP) / U.K. DLCM was provided from Çukurova University Faculty of Agriculture, Research and Application Farm. DLCM (200g/L) and sodium bicarbonate (40mg/L) were added to culture medium. Culture volumes were extended from 250 ml to 20 L. Cultures were illuminated with daylight fluorescents and aerated with air pump. The biomass was harvested by using 42 µm mesh filter at 22nd day of the cultivation when culture reached maximum density. Then algae was rinsed with tap water, dried in drying oven at 60°C - 6 hours and floured. Dried *Spirulina platensis* meal was analyzed for nutrient contents (dry matter, crude oil, crude ash, crude protein) according to Weende method.

**Results:** Growing parameters of *Spirulina platensis* cultivated in DCM medium (20 days); 421.8 mg/L cell, 3.40 mg/g chlorophyll-a density. Nutrient composition of *Spirulina platensis* cultivated in DCM medium; 93.90 dry matter, 8.35 ash, 1.50 oil, 61.77 protein, 2.61 cellulose.

**Discussion:** Main factor of Spirulina produce that make up the cost are nutrient substances. While using of Zarrock and Spirulina medium necessitate high-cost chemical substances. Dry laying chicken manure (DLCM) contains various elements especially N and P that requiring by microalgal cells for growing.

In the present study, it was observed that *Spirulina platensis* cultivated in DLCM was grown up (412.8 mg/L DM). High protein content in Spirulina (% 61.77) has been remained constant thanks to N/P rate of the DLCM. It is provided that the poultry manure has been converted by culturing Spirulina into feed additive which has ecological and economical importance. Spirulina production cost have been reduced by recycling of the manure which causing environmental problem.

**Acknowledgement:** We would like to express our appreciation to the Çukurova University Scientific Research Project Commission, which supported this study (CUBAP-09/2017-9767).

**Keywords:** nitrogen source, bicarbonate, spirulina, chicken manure, feed additive.
A Research Study into Consumers’ Attitudes to Mussel Consumption

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Introduction: Healthy and secure food consumption perception, which is getting more and more important each passing day, is increasing not only on new packaged products but also on traditional / organic foods. The food safety of the fried mussel, which is a local snack product consumed frequently in coastal areas during the summer months, is the main theme of this study.

Material and Methods: In order to measure the “food safety” of fried mussel in view of consumer, a survey was applied to the consumers in places where mussels are sold in Sinop city center in 2017 summer. 320 people participated in the survey. The number of participants was determined by “proportional sample volume”.

Results: Surveys during summer suggest that more than half of those who consume fried mussel believe that the mussel is not a healthy food, and that they are primarily paying attention to hygiene conditions at purchase. 75% of the respondents consume aquatic products other than fish and 74.7% have knowledge of the mussel. In consumer preferences, fried mussel are preferred in second place after mussel stuffing. 77.2% of the participants in the survey consisted of fried mussel once before, and 52.7% of the consumption frequency indicated 1-2 times a year. Where to buy a mussel panther is 56.3% of the street marketers have indicated that the 10% portion of the house itself is also done.

Discussion: Street vendor, restaurants and etc. selling fried mussels, increasing the hygiene conditions of the places and sharing the results of these study with the sellers will increase the quality of the fried mussel preferred by both domestic and foreign consumers.

Acknowledgement: This research has been supported by Sinop University Scientific Research Projects Coordination Unit. Project Number: TOY 1901-16-44, 2016.

Keywords: fried mussel, mussel pan, survey, consumer, food security
Carbon Nanotube Applications in Wastewater Treatment: Case Studies in Activated Sludge Process
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Introduction: In recent years, numerous studies have been conducted with the discovery of nanomaterials on wastewater treatment. Nanomaterials has superior electronic, mechanic, physical and chemical properties. Carbon nanotubes (CNT) is one of the most used nanomaterials for environmental sectors. CNT’s is utilized as absorbent and adsorbent to remove heavy metals and organic compounds. As a result of CNTs usage in many areas, it has become inevitable to their entering in to aquatic ecosystem and wastewater treatment systems. The toxic effect of CNT have been investigated in many studies due to the interactions of CNTs (Single Wall Carbon Nanotube-SWCNT and Multi Walled Carbon Nanotube-MWCNT) with microorganisms. Some studies have been carried out on their toxic effect on the activated sludge process. Respiration inhibition of the microbial communities in the activated sludge has been focused on by these studies. The effect of SWCNT and MWCNT on the surface charge of the activated sludge flocs and sludge settleability were investigated by considering recent studies. Moreover, COD and organic matter removal (NH₄⁺ and PO₄³⁻) were investigated in the activated sludge process with SWCNT and MWCNT. The aim of the investigation is to make an assessment by comparing the studies in the literature with our data.

Material and Method: Studies on the toxicity and removal efficiency of SWCNT and MWCNT to activated sludge processes have been reviewed. The results of these studies have been compared with our nutrient and heavy metal removal studies in activated sludge process with MWCNT.

Results: Recent studies have shown that the usage of CNT in activated sludge processes has a positive effect on flocks. Also, it has been found that CNT’s activated sludge process contributes to the efficiency of the treatment. It has been reported that the extracellular polymeric substances (EPS) provide significant effect on microorganisms to protect against the toxic effects of CNTs. When these results are compared with our data, MWCNT’s nutrient removal efficiency is quite weak in our study.

Discussion: CNTs (MWCNT or SWCNT) have significant role nutrients, heavy metals and various organic substances removal. However, activated sludge process has to be designed according to the pollutant to be removed in the process and the operating conditions must be selected appropriately. When design criteria and working conditions are taken into consideration, it is possible to treat different wastewaters at the same time by using CNTs in activated sludge processes.

Keywords: SWCNT, MWCNT, activated sludge, toxicity
The Relationships Between Otolith Dimensions-Fish Length and Otolith Features of Common Carp, *Cyprinus carpio* Sampled from Samsun Province

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Introduction: Recently, studies on otolith morphology and shape have gained momentum due to improvements in imaging systems. Relationships between otolith biometrics and fish species have been studied by many researchers. In this study, it was aimed to determine otolith features and the relationships between otolith dimensions-total length of *C. carpio* living in Altınkaya Dam Lake (ADL) and Bafra Fish Lake (BFL).

Material and methods: *C. carpio* samples were obtained from two different localities in Samsun. All fish were measured (±0.1 cm) for total length (TL) and weighted (±0.01 g). Lagenar otoliths were removed by making left and right distinctions. Otoliths were weighted (±0.0001 g) and photographed on distal side. Otolith length (OL) and breadth (OB) were measured (± 0.001 mm) with an image analysis program. Otolith measurements were standardized when comparing ADL and BFL in terms of OL, OB, OW. Power and linear models were applied to estimate the relationships between the otolith measurements and TL.

Results: The min-max total length of individuals were 63.8-36.4 cm and 17.8-69.3 cm sampled from ADL and BFL, respectively. There are no differences in terms of OL, OB between right and left otoliths for both ADL and BFL (P>0.05). So, the right otoliths were used in analyzes. While the left and right otoliths are different from each other in terms of OW for ADL (P<0.05), there are similar in OW for BFL (P>0.05). OL, OB, OW are similar between female and male for both ADL and BFL (P>0.05). When the two localities are compared with each other, it was found that OB and OW were different between ADL and BFL of carp (P˂0.05). When the relationships between TL-OL, TL-OB and TB-OW were examined, best fit was obtained among TL and OW for ADL, TL and OB for BFL.

Discussion: Otoliths are widely used in different studies, such as species identification. This information is useful for stock discrimination, population management, predator-prey studies, archaeological research. According to the results, OB, OW can be used for discriminating ADL and BFL populations.

Acknowledgement: This research was supported by Ondokuz Mayis University PYO.1901.17.003.

Keywords: *Cyprinus carpio*, otolith morphometrics, total length, population, Samsun
Otolith Features and the Relationships Between Otolith Dimensions-Total Length of the Pike (*Esox lucius*) Inhabiting Lakes Ladik and Simenlik (Samsun, Turkey)

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**Introduction:** Pike are widely distributed throughout in Europe, Asia and North America. Relationships between otolith dimensions and fish length are commonly used in fisheries science, but there are limited studies about the otolith features of this species. This study aimed to determine otolith features and the relationships between otolith dimensions and total length of *Esox lucius* in Lakes Ladik and Simenlik.

**Material and methods:** *E.lucius* samples were obtained from two lakes in Samsun. All fish were measured (±0.1cm) for total length (TL) and weighted (±0.01g). Otoliths were removed by making left and right distinctions, weighted (±0.0001g), photographed on distal side. Otolith length (OL) and breadth (OB) (±0.001mm) were determined by Imaging Software. Power and linear models were applied to estimate the relationships between the otolith dimensions and TL. Statistical analyses were tested by normality test, paired t-test, independent t test.

**Results:** The minimum-maximum total length of individuals sampled from the Lakes Ladik and Simenlik varies between 33.0-74.0 cm and 28.5-58.1 cm, respectively. There is no difference in terms of OL, OB and otolith weight (OW) in Ladik samples for right and left otoliths (P>0.05), while OL of Lake Simenlik samples were different from each other (P<0.05). There is statistically difference in terms of TL between female and male individuals in Lake Ladik (P<0.001). So, the values of otolith measurements were standardized while comparing female and male otolith measurements. The female and male individuals were sampled in Lake Ladik are different in terms of OL and OB (P<0.001). There is no difference in Lake Simenlik in terms of OL, OB, OW (P>0.05). Comparing the two localities, there was no difference in terms of OB and OL, but a difference was found in OW. When the relationships between TL-OB, TL-OL and TL-OW were examined, the best fit was obtained among TL and OL for two localities (r²>0.910).

**Discussion:** Fish length-otolith biometry studies are useful for population management, stock discrimination, predator-prey studies, and archaeological research. This study has provide information to be used in fisheries biology.

**Acknowledgement:** This study was supported by Ondokuz Mayis University PYO.FEN.1901.17.003.

**Keywords:** *Esox lucius*, otolith biometry, fisheries, Samsun
Investigation of the Effectiveness of Some Entomopathogenic Nematodes (*Steinernema feltiae*-Balıkesir izolate and *Heterorhabditis bacteriophora*-Çanakkale izolate) Against Potato Moth (*Phthorimaea operculella* (Zeller) (Lepidoptera: Gelechiidae)) by Greenhouse-Potting Experiments

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**Introduction:** Most important part of produced potato in Turkey is held in rustic farm stores for consumption as well as seed for the next crop. The potato tuber moth, *Phthorimaea operculella* (Zeller) (Lepidoptera: Gelechiidae) (PTM), is considered one of the most important potato pests, seen all potato produced regions in Turkey. Development of resistance of pests to pesticides, requirements of residue free food by supermarkets and consumers, as well as use of strict rules of food standards by governmental institutions will all result in better possibilities for biological control in the World as well as Turkey. Entomopathogenetic nematodes (EPNs) are efficiently used against insects spending a portion of their life in the soil and cryptic habitats. As biological control agents, EPNs have ideal properties such as: the broad host spectrum, to be able to kill their hosts within 24-48 hours, to be producible commercially easily *in vivo* or *in vitro*, having ability to search actively their hosts, settling in application areas and staying effective for a long time, having easy applicability, being in compliance with many chemicals and being safe for the environment.

**Material and Methods:** Within the scope of this study, the EPN species [*Steinernema feltiae*-Balıkesir isolates (*S.f*) and *Heterorhabditis bacteriophora*-Çanakkale isolates (*H.b*)] detected in our country (Turkey) were obtained from the experiments in the greenhouse-pot studies. Cultured and produced PMT larvae and pupae were infected with potato plants grown in pots under greenhouse conditions. Each experiment was arranged in a randomized parcel design (RPD) with three replicates (10 insect were used each replicate). The experiments were conducted in parallel and repeated twice during the 2016 seasons.

**Results:** As a result of the research, it was determined that potato PTM had a death rate of 0.17 in the control tests at the end of the 10th day and 9.33 in the control experiments against the larval stage. In addition, it was determined that *S.f* (*Steinernema feltiae*-Balıkesir isolates) applications had 6.33 deaths in the larvae (63.3% mortality) and 2.83 live pupae. *H.b* (*Heterorhabditis bacteriophora*-Çanakkale isolates) was also determined to be 3.67 in the larval counts (36.7% mortality) and it was determined that 5 individuals were live pupae. In the experiment of PTM against the pupa period, it was found that 5.83 of the controls were alive and 3.17 of them became adults. At the end of *S.f* application, 3.5 (mean) pupae were determined as dead (35% mortality). Besides, when 2.83 live pupae were detected, it was found that the pupae were adults rapidly and 3.67 of them were live adults. In the case of *H.b*, the highest mortality was determined as 4.83 pupae (48.3% mortality).

**Discussion:** For the first time in Turkey, greenhouse-post studies have been carried out against this harmful group. These findings and further studies should be considered under natural conditions of potato produced regions to determine nematicidal ability of these biopesticides in Turkey.

**Keywords:** entomopathogenic nematodes, potato moth, *Phthorimaea operculella*, *Steinernema feltiae*, *Heterorhabditis bacteriophora*, biological control

*This work is the master thesis accepted by Gaziosmanpaşa University, Institute of Science, TOKAT.*
The Impact of Meteorological Parameters on Urban Air Quality (PM\textsubscript{10} and SO\textsubscript{2}) in Kastamonu Province

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Introduction: Previous studies have shown that global climate change will have a significant impact on both regional and urban air quality. As air temperatures continue to rise, reduction in rain events and observing more stable conditions, the overall air quality is expected to degrade. In this study air pollutant concentrations, PM\textsubscript{10} and SO\textsubscript{2} and meteorological parameters namely, air temperature and precipitation have been analyzed by using statistical methods for the years 2008 - 2017 in the Kastamonu city.

Material and Methods: The temperature and precipitation measurements were taken from the General Directorate of Meteorology of Ministry Forest and Water Works. Also the PM\textsubscript{10} and SO\textsubscript{2} data derived from the air quality monitoring station of the Ministry of Environment and Urbanization at Kastamonu province. The data were calculated and analyzed statistically daily mean by the occupancy rate of 75%.

Results: The relationship between monitored ambient air quality data and meteorological factors, such as temperature and precipitation was investigated. According to the results obtained by the correlation analysis, it was found that there is a strong relation between SO\textsubscript{2} and PM\textsubscript{10} concentrations in Kastamonu with meteorological variables. The correlation coefficients for air temperature (r) range from -0.46 to -0.58 for PM\textsubscript{10} and SO\textsubscript{2}, respectively. The higher concentrations of SO\textsubscript{2} and PM\textsubscript{10} correlate with low ambient air temperatures. Based on annual mean SO\textsubscript{2} and PM\textsubscript{10} concentrations during the years 2008-2017, significant improvement have been identified for SO\textsubscript{2} however, PM\textsubscript{10} levels were almost stable. During the recent three years period (2015-2017), the mean PM\textsubscript{10} levels were doubled most probably related with prolong drought conditions as well as the ongoing urban renewal activities at the city center. The sum of rainfall amount is dropped as 300 mm in 2017 that shows a serious decrease as compared with other years. In other words, 2017 is the least rainfall in the last 9 years. Correspondingly, the average value of the PM\textsubscript{10} is measured as around 50 μg/m\textsuperscript{3}, which is above other years’ average.

Discussion: Air pollution concentrations and meteorological parameters in the Kastamonu city were analyzed from January 2008 to November 2017. Severe air pollution condition has occurred in Kastamonu, especially during winter season, and December and January were the most polluted months and July was the cleanest month during the examining period. The high air pollutions in December and January are due to low temperature, low wind speeds and high air pressure. As the effects of climate change continuous, more strict precautions are needed in order to keep the safe air quality levels.

Keywords: precipitation, temperature, pollutants, Kastamonu
Introduction: Actinidia deliciosa (A. Chev.) C.F. Liang & A.R. Ferguson is a worldwide economically important crop, with a total 4.274.870 tonnes production. Kiwifruit were first introduced to Turkey in 1988. According to FAO statistics, Turkey has the second largest kiwifruit area but total production is only 43.950 tonnes. Weeds are responsible for significant crop yield losses and for financial losses in agricultural production and one of the important problems in kiwifruit orchards. This study was conducted to determine weed species, their frequencies (%) and general coverage areas (%) in kiwifruit orchards in Giresun, Trabzon, Rize and Artvin provinces of Turkey in 2014–2015.

Material and Methods: A total of 22 kiwifruit orchards located in Giresun, Trabzon, Rize and Artvin provinces was surveyed on May – June. Weeds species, their frequencies, and general coverage areas was determined. For sampling, the 0.25 m² frame was thrown 8-12 times depending on field size.

Results: Forty-nine weed species belonging to 27 families were determined. Poaceae with 8 species, Polygonaceae with 5 species and Asteraceae with 5 species were the largest families. Conyza canadensis (75.00% in 2014, 87.50% in 2015) Oplismenus undulatifolius (75.00% in 2014, 100.00% in 2015) and Poa annua (75.00% in both years) in Giresun, Aethusa cynapium and Oplismenus undulatifolius (66.67% in 2014 and 2015 for both two species) in Trabzon, Oplismenus undulatifolius (80.00% in 2014, 100.00% in 2015) and Artemisia vulgaris (60.00% in 2014, 100.00% in 2015) in Rize, and Artemisia vulgaris, Commelina communis, Fragaria vesca and Poa compressa (100.00% for all 4 species) in Artvin were the most frequent weeds observed. Poa annua (15.13% in 2014, 14.38% in 2015) in Giresun, Oplismenus undulatifolius (21.67% in both years) and Poa compressa (14.17% in 2014, 19.17% in 2015) in Trabzon, Artemisia vulgaris (24.00% in 2014, 26.00% in 2015) in Rize, and Poa compressa (20.00% in both years) in Artvin took first place in terms of general coverage areas of weeds.

Discussion: Oplismenus undulatifolius, Commelina communis Poa spp. and Artemisia vulgaris was determined as the most important weeds in kiwi fruit orchards in Eastern Black Sea Region. It is necessary to combat these weeds in a correct and effective way. Commelina communis deserves extra attention because of its invasive situation for Turkey. Invasive species often cause dramatic declines in biodiversity.

Acknowledgement: We would like to thank to the General Directorate of Agricultural Research and Policies which supported this study [(TAGEM–BS–13/08-09/01-22 (3)].

Keywords: Eastern Black Sea Region, kiwifruit, weeds, frequency, general coverage area
Glucagon and Somatostatin Immunoreactive Cells in Stomach and Intestines of the White Bream (Blicca bjoerkna L., 1758), in Lake Uluabat

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Introduction: In the study, it was aimed to compare immunohistochemical the density and distribution of endocrine cells in the stomach and intestine regions of the White Bream and to fill the gap in research related to this fish species. White Bream (Bliccabjoerkna L., 1758) is a species that usually prefer calm waters and lives predominantly in large river sand lakes. It has also been detected in Uluabat, Sapanca, Manyas and Ladik lakes in our country. It is generally used as bait in the cultivation of economic fishes.

Material and Methods: Ten adult White Bream (Blicca bjoerkna L., 1758) obtained from Uluabat Lake was used. After being anaesthetized, the intestinal tract of White Bream was divided into four portions from proximal to distal; stomach and anterior, middle and posterior intestine. All samples were fixed for 12 h in Bouin’s solution and embedded in paraffin. Serial, transverse 6–7 μm sections of these portions were cut. Each representative section was deparaffinized, rehydrated and immunostained using the peroxidase anti-peroxidase (PAP) method.

Results: In the posterior intestine the presence of endocrine cells which were glucagon and somatostatin immunoreactive, were of an intensive frequency. Glucagon and somatostatin immunoreactive cells were also moderate staining in this region. No glucagon and somatostatin immunoreactive cells were observed in the stomach, anterior and middle intestine. These cells were detected in the lamina epithelialis. Glucagon and somatostatin immunoreactive cells were not localized lamina propria, submucosa, tunica muscularis.

Discussion: A large number of endocrine-type secretions are produced in the gastrointestinal tract mucosa of the fish. The secretions, which are called peptide and/or amine, are detected in lamina epithelialis, glands, several connective tissue cells, mucosal nerve ganglion sand inter muscular nerveplexus. Both peptides used in this study were intensely observed in the posterior intestine area. But these cells were not determined in other areas.

Keywords: alimentary tract, glucagon, somatostatin, white bream
Introduction: Planning discipline is not just a technical process, but a technical process that guides the construction of the physical environment. The social, economic, political and spatial dimensions of planning in the framework of the developments over time have also begun to come to the forefront. Especially when considering the fact that the basic element in planning is human being, the importance of socio-cultural dimension comes out.

In the study; the stages of planning are explained, and the importance of socio-cultural point of view is emphasized in this process. In order to ensure cultural sustainability, the importance of people having their own cultural life with this consciousness is explained. Different experiences and ideas are being tried to show how the approaches developed in the framework of the socio-cultural point of view, which is rarely applied in our country, can be passed on. The importance of cultural sustainability and how it can be preserved is evaluated by Bolu sample field study.

Material and Methods: In this context, culture is considered as the main component of planning and in this context, it is emphasized in conceptual framework as an indispensable part of sustainable planning approach. First, the selected cultures of the world and Turkey focused models and practices will be examined. Then, the scope, targets and applications of planning studies focused on strategy development and vision definition in our country are compared with planning studies in Bolu city, which is chosen as the study area. Based on the data obtained as a result of literature review, a 'culture-oriented vision' is defined for Bolu in the direction of the previously defined concept of culture-oriented, and the example of suggestion action application plan is opened to debate.

Discussion: In the case of the culture-oriented planning examples examined in the study, although the method observed by the cities is the same, it is seen that the planning process is different according to the identity of each city. The fact that the plan process consists of all the complementary strategic programs and projects reduces the amount of mistakes in the planning process to a minimum. If the targets change, it can evolve rapidly.

Results: In this study conducted to analyze the effect of cultural and cultural resources on urban development, cultural-oriented planning approach has been shown to provide urban and social development with the strategic use of cultural resources.

Keywords: sustainability, cultural sustainability, sustainable planning, culture-focused planning, Bolu
Life-History Traits of the Eastern Spadefoot (*Pelobates syriacus*) from Kızılırmak Delta, Samsun Province

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Introduction: There are four spadefoot toad species belonging to *Pelobates* genus in Europe and only Eastern spadefoot, *Pelobates syriacus* (Boettger, 1889) is found in Turkey. In the present study, age structure and growth of the *P. syriacus* from Kızılırmak Delta in Turkey were assessed using phalangeal skeletochronology. Investigation of age structures of populations with skeletochronology is very important to learn about the lifespan of the species and directly related to the life history of the populations.

Material and Methods: Twenty-five adults (12 males and 13 females) were caught by hand in 5-8 September 2017. All toads were measured from the tip of the snout to the cloaca (SVL) with a digital caliper with 0.01 mm precision. The standard skeletochronological technique was used to determine individual age. Because the snout-vent-lengths (SVLs) were normally distributed for all specimens, a parametric test (Independent sample T-Test) was used for comparison of the means. However, age classes were not normally distributed and Mann Whitney U Test was used.

Results: Snout-vent length (SVL) was ranged from 42.05 to 76.10 mm (mean ± SD: 60.01 ± 13.65, n = 12) in males while it was changed from 42.54 to 53.27 mm (mean ± SD: 42.59 ± 5.42, n = 13) in females. Age was ranged from 2 to 8 years in males (mean ± SD: 5 ± 2.08) while it was found 3-5 years (mean ± SD: 3.38 ± 0.76) in females. For both sexes, SVL was significantly correlated with age. The toads were attained maturity at the age of 3 years.

Discussion: This study revealed that the mean age and longevity of *P. syriacus* from Kızılırmak population were lower than the data reported in previous studies. The individuals of Kızılırmak population reached sexual maturity after their third hibernation. This result is similar to previously reported data in the literature.

Acknowledgement: The animals were treated in accordance with the guidelines of the ethics committee of the Karadeniz Technical University (KTU.53488718-336/2017/21). Capture permission no: 72784983-488.04-155663 issued by the ministry of forest and Water affairs of Turkey.

Keywords: longevity, skeletochronology, growth, Turkey
Age and growth of in a Turkish population the Balkan Green Lizard, *Lacerta trilineata* (Bedriaga, 1886)

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**Introduction:** In this study, information about life history traits of *Lacerta trilineata* (Bedriaga, 1886) was given in the Sergen (Vize, Kırklareli) population. Age at maturity, SSD and growth rate of the species were presented for the first time. Cross-sections of the phalangeal bones were examined based on the skeletochronology method.

**Material and Methods:** In total, 26 (14 males and 12 females) specimens were caught on 12-16 August 2017. All lizards were measured from the tip of the snout to the cloaca (SVL) with a digital caliper with 0.01 mm precision. The standard skeletochronological technique was used to determine individual age. Because the snout-vent-lengths (SVLs) and ages were normally distributed for all specimens, a parametric test (Independent sample T-Test) was used for comparison of the means in all specimens.

**Results:** Age ranged from 7-13 years in males and 6-10 years in females. Age at sexual maturity was 3 years for both sexes. There was no correlation between the lizards’ body size (SVL) and age for both males and females. Slightly male-biased sexual size dimorphism (SSD = 0.014) was observed in the Sergen population.

**Discussion:** The longevity in Sergen population was found higher (13 years) when compared the results (which were found as 4 and 5 years for *L. trilineata*) given in the current literature. Significant differences in longevity and sexual maturity can be explained by trait characteristics specific to species affected by environmental factors. We found the mean age as 9.07 years in males and 8.42 years in females for *L. trilineata*. For another Lacertid species, *L. agilis*, it was reported as 2.4 years in males and 2.5 years in females in the literature. As reported in some studies, sexual size dimorphism in many adult lizards arises due to sexual differences in the growth rates. Accordingly, SSD was not statistically important in our study and growth rates were not different between sexes of *L. trilineata* in Sergen population.

**Acknowledgement:** The lizards were treated in accordance with the guidelines of the ethics committee of Karadeniz Technical University (KTÜ.53488718-417/2016/38). Capture permission no: 72784983-488.04-42844 issued by Ministry of Forest and Water Affairs of Turkey. This study was supported financially by the Karadeniz Technical University Scientific Researches Unit (FYL-2017-6945).

**Keywords:** longevity, skeletochronology, growth, Turkey
Investigation of Antibacterial Properties of *Thymus praecox*

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Introduction: In recent years, there has been a growing interest in medical and aromatic plants and the active ingredients obtained therefrom. One of the most studied aromatic plants is thyme. It is known that phenolic compounds present in the structure of thyme plants show antimicrobial activity. In this study, antibacterial activities of the extracts of *Thymus praecox* collected from Kastamonu region in five different solvents (ethanol, methanol, methanol-water, ethyl acetate and water) were investigated.

Material and Methods: Thyme used in the study was collected in the morning hours of July, 2017 from the rocky area on the road of Devrekani-Abana. The collected thyme was extracted with the soxhlet method using pure water, ethanol, methanol, methanol-water and ethyl acetate solvents. The applied concentration was 50 mg/mL of each extracts. The disc diffusion method was used to determine the antibacterial activity of the extracts. A total of five Gram (+) and five Gram (-) bacteria were selected for in vitro analysis.

Results: The resistance of the thyme extract obtained from different solvents was examined and indicated different zone formation against bacteria. According to the disk diffusion method, thyme extracts showed antibacterial properties against some bacteria. The most effective solvent were water and methanol-water extracts. The highest inhibition zone ranged between 8 and 12 mm diameter was obtained from *Staphylococcus aureus* ATCC 25923. Other bacteria strains also exhibited small antibacterial effects.

Discussion: Work on plant-derived and natural-based antibacterial substances continue rapidly. In our study, *Staphylococcus aureus* ATCC 25923 was the most affected bacteria from different solvents of thyme extracts. This study has expanded our literature knowledge about determination of the antibacterial activity of thyme, a medicinal and aromatic plant, by various methods. In future studies, antibacterial effects of thyme extracts on different bacteria might be also investigated.

Acknowledgement: We would like to express our appreciation to the Kastamonu University Scientific Research Project Commission, which supported this study (KÜ-BAP03/2017-14).

Keywords: thyme extract, disc diffusion method, antibacterial properties.
The Role of Botanic Gardens for Raising of Environmental Awareness, Case Study: Çukurova University Ali Nihat Gökyiğit Botanic Garden

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Introduction: People need to understand ecological systems in order to make the best decisions about the use of natural resources. In this respect, it is important for the environment to raise awareness of the environment in the individual, and nature education is of great importance for the human to understand the importance of biodiversity and the seriousness its loss. The botanic gardens can play an important role in making nature education accessible to the public, with applying the different educational strategies. Environmental education is not just about providing environmental information to people, but also, environmental education in botanic gardens encourages a change in nature conservation messages, attitudes and behaviours. The training programs implemented at Ç.U. Ali Nihat Gökyiğit Botanic Garden provide opportunities for adults and students to safely increase their environmental attitudes and awareness.

Material and Methods: As well as adult individuals, Adana Provincial Directorate of National Education and Çukurova University signed a cooperation protocol to bring together students from all age groups to the nature to create nature awareness. In addition, students from different age groups have been selected to educate as kid gardeners, this course includes soil training, seedling planting, plant care and cultivation.

Results: Within one year's education-training programs, 4800 students from 160 schools were given natural education at different times. As a result of the training, the changes in the environmental awareness of the students are measured by a measuring method developed in the form of a game. Due to the successes in the development of the biodiversity, ecosystem and nature conservation consciousness in the botanic garden, there has been an increasing demand for education in the surrounding provinces and districts on similar issues. Ç.Ü. Ali Nihat Gökyiğit Botanic Garden will continue to serve as a candidate for closing the educational gap that emerged in this area in our region.

Discussion: Nature education in botanic gardens provides opportunities for people to learn about plants, habitats and the threats they face. It can help people to increase their role and awareness of nature conservation and play an important role in improving the attitudes, behaviours, and skills required to solve environmental problems. In this way, people can learn about places in the ecosystem and discover ways in which they can reduce their impact on the environment. The role of botanical gardens has been clearly articulated at target 14 of the Global Strategy for Plant Conservation (GSPC) objectives: The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes.

Keywords: botanic garden, Adana, environmental education
**ORAL PRESENTATION**

**Pollen Morphology of Eight *Alyssum* L. (Brassicaceae) in Turkey**

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**Introduction:** Brassicaceae is one of large angiosperm families. It contains 419 genera and almost 4130 species. The genus *Alyssum* L. with 113 and 56 of these are endemic to Turkey (Yılmaz, 2012) species is generally dispersed in the region of Iran-Turanian, western North America and Mediterranean area. In this study, pollen of 3 out of 8 taxa are endemic to Turkey.

**Material and methods:** According to Wodehouse method (1935), pollen samples were taken from plants and slides were prepared by using basic fuchsine mixture. After the examination of each species, measurements were done for polar axis length, equatorial axis length, colpus length, colpus width, exine and intin thickness, apocolpium and mesocolpium length. Pollen morphology of 8 species of *Alyssum* was studied scanning electron microscopy dried specimens were used. Samples were mounted using double adhesive tape on aluminium stubs, sputter-coated with gold and examined with a Jeol Tescan scanning electron microscope at the Bartın University Central Research Laboratory. At least 30 pollen grains for each species were examined by light microscope then micrographs were taken by Leica DM 750 digital imaging system.

**Result:** In this study pollen morphology were examined in 8 taxa of the genus *Alyssum*. The pollen grains are tricolpate, subprolate and prolate. Each species has reticulate or microreticulate ornamentation. Pollen grains of *Alyssum* polar axis is 17.83 – 27.58 µm and equatorial axis 12.91 – 20.26 µm. The colpus length is 13.88 – 22.49 µm and the colpus width is 0.77 – 1.57 µm. The apocolpium length is 3.71 - 10,91 µm. The exine thickness is 0.85-1.58 µm while intine thickness is 0.41 – 0.56 µm. Lumen widths are in the range of 197 - 1818 nm. Murus widths are in the range of180-563 nm.

**Discussion:** By this study, similarities and differences between the species of *Alyssum* L. genus is revealed and contributed to taxonomic studies.

**Keywords:** pollen, *Alyssum*, Brassicaceae, micromorphology, SEM.
Introduction: Currently, seaweeds (macro algae) are gaining increasing interest as a feedstock for sustainable biofuels production. Seaweeds have numerous advantages over other terrestrial oil crops, such as higher mass productivity, no need for internal transport of nutrient or water. In the conversion of seaweeds to biofuels, the technological drawbacks are also present, namely the high water and salt contents. One of the alternative processes for algal biomass may be the hydrothermal processing of algal biomass. For wet biomass containing large amounts of water up to 90%, hydrothermal processing appears as a useful technology. Depending on the temperature range, solid, liquid or gaseous products are formed predominately by hydrothermal process.

In this study, conversion of Ulva rigida into biochar and hydrogen rich gas was investigated by hydrothermal processes. In this context, hydrothermal carbonization (HTC) of algal biomass was performed to produce biochar. Hydrothermal gasification (HTG) was performed to produce hydrogen rich gas.

Material and Methods: The collected Ulva rigida samples from the İzmir were washed in water and dried in oven at 60 °C. HTC and HTG experiments were carried out in 450 mL stainless steel autoclave under autogenic pressure with a mixture of algae and water (ratio of 10:90). In the case of HTC experiments, different temperatures (210 - 250 °C) were tested for a reaction time of 1 h. HTG experiments were conducted at 450 °C under supercritical water extraction.

Results: Biochar with a 19.9 wt% of mass yield and a calorific value of 18.6 MJ/kg was produced via HTC process. The temperature had no effect on the yields. The ash content of biochars was lower than that of algae due to the dissolution of inorganic salts in algae. Since most of the degradation products and inorganics in seaweed were dissolved in the aqueous phase, TOC value of spent liquors were ranged between 15035 and 16325 ppm. The fuel characteristics of biochars was close to that of lignite coals. HTG produced the biogas with a gross calorific value of approximately 14.0 MJ/m3. The biogas yield was 0.12 Nm3/kg algae.

Discussion: The results obtained in this study showed that hydrothermal processing of seaweeds for both biocoal and hydrogen production is promising ways.

Keywords: algae, hydrothermal processing, biochar, biogas
Changes in Some Soil Properties According to Different Land-Uses in Artvin

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Introduction: The land use and land cover changes (LUCC), based on human activities, affects the environment at different scales, and therefore have important impacts on soil, being one of the elements of the ecosystem. Many studies showed that significant changes in some soil properties such as soil texture, organic matter, pH and plant available water. Artvin has recently come into question with LUCC due to the construction of hydropower plants and mining activities. The present study aimed to reveal the changes in some soil properties depending on different land uses in Artvin province.

Material and Methods: The material of the study is consisted of data from the earlier studies carried out in Artvin province to determine the soil properties such as pH, organic matter and the amount of sand, silt and clay. Those soil samples were taken from different land uses including 62-forest, 20-agriculture and 19-pasture. The soil samples evaluated in the present study include only those taken from 0-20 soil depth. The forest lands included different tree species such as spruce, oak, Scotch pine, stone pine, locust and alder. The soil properties were evaluated using descriptive statistics and one-way-ANOVA performed in SPSS 20.0 to determine whether or not the soil properties significantly changed according to different land-use types.

Results: According to descriptive statistics: The amount of sand changed between 43% and 83% in forest areas, 42% and 82% in pastures, 43% and 78% in agricultural areas. Amount of clay changed between 3% and 38% in forest areas, 1% and 44% in pastures, 4% and 41% in agricultural areas. Amount of silt changed between 8% and 42% in forest areas, 13% and 28% in pastures, 13% and 42% in agricultural areas. pH ranged from 4 to 8 in forest and pastures, and 4 to 7 in agricultural areas. Organic matter content ranged from 0.2 to 18 in forest areas, 2 to 7 in pastures, 3 to 8 in agricultural areas. As a result of ANOVA, while organic matter, sand and clay were not affected by land use change, the silt content (p=0.015) and pH (p=0.004) were significantly affected by land use change. According to Tukey test, the silt content of agricultural soils was higher than that of pasture soils (p=0.016) and that of forest soils (p=0.042). The pH of agricultural soils was lower than that of forest soils (p=0.019) and that of pasture soils (p=0.004).

Discussion: Human being has adversely and increasingly changed land use and land cover by their activities because of some reasons such as opening new settlement and making more money. As many researchers reported adversely affected soil properties, the present evaluation also showed significant effects of land use on at least soil pH and the silt content. The lower pH of agricultural soils can be attributed to periodically using of fertilizers such as ammonium sulfate. Due to fertilizations of soils, H+ and Al+++ concentrations increase, which causes a decrease in pH; on the other hand Ca++ and Mg+++ concentrations decrease. The higher silt content of agricultural soils can be attributed to intensive soil tillage.

Keywords: forest, pasture, agriculture, soil, landuse, Artvin
Introduction:

Aladağlar and Bolkar Mountains are situated in the C5 grid square according to the system adopted by Davis. The region is located in the eastern part of the Central Taurus Mountains complex in southern Anatolia and surrounded by Kayseri in the north east, Niğde and Ereğli in the north west, Karaman in the west, Mersin in the south and Adana in the south east. The southern slopes of the study area have the characteristics of Mediterranean climate features, while the northern slopes of the study area reflects the semi-arid climate.

Research area (Mersin, Adana, Niğde, Kayseri) are rich in vegetation, vascular plants flora and number of endemic species. The number of microfungi species increases in proportion to the number of vascular plant species. Because of this reason, we chose this area as a research area.

After the rust fungi (Uredinales), the smut fungi are the second most important group of plant parasitic Basidiomycota. There are approximately 1200 smut species known that together can infect more than 4000 different plant species. Most of the smut fungi are recognized by the black or brown spore masses or sori forming in the inflorescences, the leaves, or the stems of their hosts. They develop usually dark, powdery masses of teliospores (“spores”) in sori. The teliospores are liberated, dispersed, and germinate with basidia. After a more or less prolonged saprophytic stage, dikaryotic hyphae infect susceptible host plants.

The present study aims to make contribution to the smut mycota of Turkey.

Material and Methods:

Fungi samples were collected from were collected from were collected in 2013 and 2016 from Aladağlar and Bolkar mountains in Turkey. The host specimens were prepared according to established herbarium techniques. Host plants identified use the Flora of Turkey and the East Aegean Islands. Spores were scraped from dried host specimens and mounted in lactophenol. Microphotographs were taken under a light microscope (Noveks B series 1000). Analysis LS Starterwas software was used to measure. Identification was performed with the aid of literature. The identified samples are deposited in the İnönü University Herbarium (INU).

Results:

After field and laboratory studies, 8 genera and 17 smut species on 15 different host species were determined. The distribution of the species are as in follows; Ustilago (8), Anthracoidea (2), Tranzecheliella (2), Urocystis (1) Melanopsichium (1), Anthracocystis (1), Sporisorium (1) and Tilletia (1).

Discussion:

As a results of this study, we make contribution to the smut mycota of Turkey

Acknowledgement:

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Keywords: smut fungi, Aladağlar, Bolkar, Turkey.
Chemical Composition and Biological Activities of the Essential Oils of *Vaccinium myrtillus* L. (Bilberry) in the Northernmost of Turkey

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Introduction: *Vaccinium myrtillus* L. (Bilberry) is a deciduous shrub growing to 50 cm, with elliptical leaves. The flowers are single on short stems. The fruits are berries, globular, dark purple, juicy and sour. In many European countries, the bilberry is one of the most economically important wild berry species. Bilberry is one of the richest natural sources of anthocyanins. These polyphenolic components give bilberry its blue/black color and high antioxidant content, and they are believed to be the key bioactives responsible for the many reported health benefits of bilberry and other berry fruits.

Material and Methods: *Vaccinium myrtillus* specimens were collected during the flowering stage in August from Black Sea region in Turkey. Air-dried aerial parts of the plant materials (100 g) were subjected to hydro distillation using a Clevenger-type apparatus for 3 h to yield the essential oil. The essential oil was analyzed by using Gas Chromatography (GC) and Gas Chromatography-Mass Spectrometry (GC-MS). The antibacterial and antifungal activity of the essential oil of *Vaccinium myrtillus* was evaluated by using disc diffusion method. The antioxidant potential of the essential oil on the stable radical 1,1-diphenyl-2-picrylhydrazyl (DPPH) was determined by Blois and Kumar method.

Results: The major volatile components of the *Vaccinium myrtillus* were 1,8-cineole (38.6%), α-Pinene (21%), Linalool (19.5%), α-Terpineol (5.8%). The results were discussed with the genus patterns in view of natural products and chemotaxonomy. The methanol extract were screened for their antimicrobial activities against the 9 bacteria and 3 yeast species by using disc-diffusion and MIC procedure. The extract displayed more effective against to all the tested bacteria (especially, *S. aureus* ATCC 6538 and MRSA) and yeast (only *C. krusei*). In vitro the antioxidant activity based on the 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical was evaluated for the essential oil extract, and it was found that the extract had good antioxidant activity in the range of the IC₅₀ = 583.4 ±11 µg mL⁻¹.

Discussion: There are few of studies on chemical compositions of the essential oils obtained from the leaves of *Vaccinium myrtillus*. For all that, *Vaccinium myrtillus* leaves essential oils have similar chemical compositions with much lower concentration of the first major compound, 1,8-cineole (38.6%), followed by low or high concentrations of the other constituents. In addition, this study also indicates that the essential oils of *Vaccinium myrtillus* have a potential with regard to antimicrobial, antifungal and antioxidant activities. It has also been determined as a result of the examination of the compositions of the essential oils of *Vaccinium myrtillus* samples that they can be used as raw material for medicinal, pharmaceutical purposes, cosmetics industries and as natural products.

Acknowledgement: This work was supported by Sinop University Scientific Research Coordination Unit. Project Number: 1901. 14-05, 2015.

Keywords: essential oil, *Vaccinium myrtillus*, antimicrobial activity, antioxidant activity.
An Assessment Regarding Postgraduate Theses About "Green Buildings" in Turkey

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Introduction: Architectural structures consume water, use energy and cause emission of greenhouse gas and CO₂. Green buildings which are regarded environment friendly and academic studies conducted on them are important. In this context, it is aimed to review and assess the postgraduate theses written in Turkey about "green buildings", interpret the change in the way that the issue is addressed in those theses and present the results that might guide us regarding "green building" implementations.

Material and Methods: Within the scope of the research National Thesis Data Centre of the Council of Higher Education is scanned by using "green building" as key words and the theses the contents of were reached have been classified in terms of year released, university, institute and department, purpose, scope and method and the obtained findings are interpreted.

Results: It is determined that the earliest theses written on "green building" is dated 2009 and there is only one doctoral thesis among the theses written between the years of 2009 and 2017. When the distribution of the 34 theses reached over is examined it is seen that the highest number of studies conducted belongs to Istanbul Technical University with 38%. When the distribution of the theses is examined with regard to the institutes their writers are affiliated with, it is seen that 94% of theses were written at Institutes of Science. When professions of the writers are examined, it is understood that the writers in the field of architecture have written 47% of them and remaining theses have been written by writers from different occupational groups. It is seen that problem definitions used in the studies and their purposes, scopes and methods vary in time.

Discussion: As almost all of the theses reviewed in the study are postgraduate theses, it is important as it reveals the need for more detailed academic studies. It is considered that the number of universities and academicians studying this topic should increase for the sake of environmental responsibility. Although construction of green buildings is under the responsibility of architects, the nature of the issue necessitates joint studies conducted with various engineering disciplines. In this context, it is considered that developing postgraduate thesis studies within interdisciplinary studies will be beneficial. Problem definitions, purposes, scopes and methods of theses that underwent changes in time are important for the progress of academic researches.

Keywords: ecology, green building, sustainability, Turkey
Effects of Some Stand Parameters and Physiographic Factors on Above-Ground Biomass of Calabrian Pine Stands

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Introduction: In this study, it was aimed to reveal the changes in the amounts of biomass components such as stem, bark, branches, needles and above-ground biomass of all Calabrian pine (Pinus brutia Ten.) trees within a stand by the age, the site index and the density, mean elevation, mean slope, and mean aspect.

Material and Methods: For this purpose, the stand parameter data that were collected from trees within 432 sampling plots that were randomly selected from the even-aged and pure Calabrian pine stands located in the Central Mediterranean Region of Turkey were used. The sample size was chosen to reflect the variability in 8 age classes, 3 site index classes and 3 stand density classes. In the sample plots, the biomass values for stem, bark, branches, needles and total above-ground per hectare were calculated before and after the oven-dried process separately for the trees in each sampling plots. The three-way ANOVA analysis was used to test the effects of three independent variables such as age, site index and stand density index on stem, bark, branches, needles and above-ground biomass variables. The one-way ANOVA was used to measure the significance level between biomass component and physiographic factors including elevation, slope and aspect.

Results and Discussion: The results showed that as the age and density of stands increased, the amounts of all biomass components increased in general. The correlation coefficients between the biomass component variables (stem, bark, branches, needles and above-ground biomass) are 0.628, 0.694, 0.630, 0.714, 0.658 for stand age and 0.880, 0.660, 0.901, 0.762, 0.880 for the stand density index. We determined a weak and statistically insignificant correlation between the biomass components and the site index. The results of the three-way ANOVA test revealed that age, site index and stand density had a significant effect on each biomass variation at a significance level of 0.05, while no significant effect is found on interactions of age-site index, age-stand density index and age-site index-stand density. The one-way ANOVA results indicated that the effects of elevation and slope on biomass components were highly significant (P < 0.01), while aspect had no significant effect (P > 0.05). According to the results of Duncan grouping test, the slope classes of 37-58% and > 59% had the highest biomass values for all components and the slope class of 0–17% and 18-36% had the lowest biomass values. The biomass values, on the other hand, decreased in the high (>800 m), low (<400 m) and middle (401-800 m) elevation zones respectively.

Keywords: biomass, stand parameters, physiographic factors, correlation, ANOVA

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Assessment of the Environmental Factors Affecting on the Productivity of *(Pinus nigra* J. F. Arnold subsp. *pallasiana* (Lamb,) Holmboe var. *pallasiana*) Species in the Yenişarbademli Region of Isparta

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**Introduction:** Black pine is in the Pinaceae family and it is coniferous species. The family is 4 genus (*Pinus, Picea, Abies, Cedrus*) of species 9 and accordingly 22 taxon in Turkey. *Pinus nigra* J. F. Arnold subsp. *pallasiana* (Lamb,) Holmboe var. *pallasiana* is a black pine species in Turkey. The aim of the study is to investigate the relationship between Anatolian Black Pine and environmental variables.

**Material and Methods:** In the study, 70 sample areas were taken in Yenişarbademli region. In the sample areas, the height and age of three plus trees were recorded. Environmental factors (latitude, longitude, slope, elevation, aspect, surface roughness) were recorded in the sample areas. Plus trees, the site index of the black pine tree was calculated with the help of age and height values. Relationships between the site index and the continuous environmental factors were assessment by Pearson Correlation Analysis. Relationships between site index and the categorical environmental factors were assessment by the Spearman Correlation Analysis. Spearman Correlation Analysis was applied between presence and absence data and the continuous environmental factors for the black pine distribution model. Interspecific Correlation Analysis between presence and absence data environmental factors was applied. Analyzes were performed with SPSS and PC-ORD programs.

**Results:** In the study, 47 different woody plant species were identified in 70 sample areas. According to the results of Spearman and Pearson Correlation Analysis, LONGITUDE, ELEVATION, BIO17 variables are important. According to the results of Spearman and Interspecific Correlation Analysis, negative correlation was found with ELEVATION and BIO17 variables, and positively correlated with surface stone change. The results indicate that it has been decided to concentrate on height variable in terms of distribution and productivity of black pine.

**Discussion:** Anatolian black pine is widely used in afforestation activities due to its wide spread in our country. It is thought that the results obtained from this study will provide valuable information in terms of species distribution models, which are especially important in ecological studies in recent years. Modeling and mapping studies on black pine species can be done later in the later stages. For this reason, this study will be the source for many studies to be carried out in the field of ecology.

**Acknowledgement:** We would like to express our appreciation to the Süleyman Demirel University Scientific Research Project Commission, which supported this study (SDÜ-BAP 5031-YL1-17).

**Keywords:** *Pinus nigra*, environmental factors, productivity, Yenişarbademli
Bryophyte Diversity of the Eastern Part of the Küre Mountains

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Introduction: Bryophytes are non-vascular plants that consisting of three main groups; liverworts, hornworts and mosses. These groups are represented approximately 20,000-25,000 species in worldwide and 1,000 species in Turkey. Although many researches have been carried out on bryophyte diversity in Turkey, many areas have not been studied in detail. Eastern part of the Küre Mountains, within the borders Kastamonu, Sinop and Samsun provinces, is one of them. This region is situated in the A2 and A3 square according to the Henderson grid system of Turkey. Phytogeographically, this area is included in the Euro-Siberian region. Main climate types are Mediterranean and Oceanic. Deciduous forest, pine forest, fir forest, riparian forest, maquis, steppes, meadows are main vegetation types seen in the area. With this study, we were aimed to reveal the bryophyte flora of the area in detail.

Material and Methods: Materials were collected from 244 points in 7 field trips between September 2014 and June 2016 at different seasons in the Eastern Küre Mountains (Kastamonu, Sinop, Samsun). Collecting specimens were examined using a light microscope and identified by related literatures. All specimens were deposited the Bülent Ecevit University Bryophyte Herbarium (ZNG).

Results: 321 bryophyte species (62 liverworts, 2 hornworts and 257 mosses) were identified from specimens collected the research area. Two species are new to bryophyte flora of Turkey, 6 taxa for A2 grid square, and 66 taxa for A3 grid square.

Discussion: As a result of this study, it is seen that Eastern Part of the Küre Mountains have rich bryophyte diversity compared to the many other areas in Turkey. The reason for this is that the area has different microclimates, topography and habitats. Because of these factors, there are many species have very different ecological features in the floristic list. Also, it is seen that species distributed in both Eastern and Western Black Sea regions are found in the area.

Acknowledgement: This study was financially supported by The Scientific and Technological Research Council of Turkey (Project number: 114Z149).

Keywords: Bryophyte, diversity, flora, Eastern Küre Mountains.
Effect of Insecticide on Pollen Germination in in-vitro Conditions On Pear (*Pyrus communis*) Plant

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**Introduction:** Pollination is the process by which pollen is placed on the stigma. Fertilization requires that the pollen grain grow a tube that penetrates the style until it encounters the ovary. The pollen grain germinates after it adheres to the stigma of a carpel. Fruit formation, which is the agricultural production target, is the result of pollination. The factors that lead to the emergence of environmental pollution are in the foreground also in agricultural applications. While the Fruit production is aimed the other side is aimed at increasing the crop by combating harmful species such as insects, weeds and fungi. The growers resort to methods other than standard when dealing with pests for various reasons. This way is negatively affecting living things while polluting the ecosystem. Deltamethrin is a synthetic insecticide paralyzes the insect nervous system give a quick knockdown effect. The amount of insecticide sold to dealers in Turkey in 2013 stood 12 thousand tons. In this study, the effects on pollen germination of Deltamethrin, which is used for insect control in *Pyrus* plants, are investigated in in vitro conditions.

**Material and Methods:** The pollen obtained from the flowers of *Pyrus* varieties was directly cultivation in 2% agar, 15% sucrose medium. Deltamethrin was added to the experimental groups at different concentration ratios. After 24 hours of incubation the germination and development of pollen tubules at were observed in the light microscope.

**Results:** Depending on the presence of deltamethrin in the medium, the germination of the pollen tube was affected at different levels. Pollen germination over a certain percentage completely stopped.

**Discussion:** The chemicals that are used affect not only the ecological problems but also the reproductive mechanisms that occur in living things. In order to increase fruit production in agriculture, such chemical applications should not be done in flowering plants; pollen germination time should be considered.

**Keywords:** pollen germination, deltamethrin, ecosystem, pollution, pear
The Use of Rosemary (*Rosmarinus Officinalis*) Tomato Canned Bonito (*Sarda Sarda*)

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Introduction: The aim of this study was to increase the shelf-life of homemade canned bonito through the addition of a natural antioxidant, and to determine the quality parameters of the resulting canned bonito. This study was carried out in order to benefit from both the aroma and antioxidant properties as a result of the investigation of the studies done with the addition of rosemary. Treatment with natural products the current availability of interest in plants and the spices that make up a very effective group increased.

Material and Methods: The study was performed by using fish purchased from the fish market in Sinop, tomato paste, rosemary (a known antioxidant) and oil. The canned bonito with tomato sauce were stored at room temperature for 510 days. The effect of rosemary on shelf-life and certain quality parameters were determined by using sensorial, chemical and microbiological methods for controlling freshness.

Results: Before the canning process, bonito fillets proximate compositions were calculated. Crude protein, crude fat, moisture and crude ash levels was found as, %23.125 ± 1.062, %2.783 ± 0.339, %72.717 ± 0.652 ve %1.150 ± 0.212, respectively. During the storage period; the Total Volatile Basic Nitrogen (TVBN), the Thiobarbituric Acid level (TBA), the Total Aerobic Mesophilic Bacteria count (TAMB) of the canned bonitos in both groups were determined.

Discussion: Rosemary-added group had not lost its freshness at the end of the 510 day storage period, while the control group had lost its freshness and became inedible following the 450th day of storage. The TBA and microbiological analyses of the samples in both groups indicated that the limit values for consumability were not exceeded during storage. However, it was observed that the group in which rosemary was added had better results than the control group. It has been reported that the antioxidant addition is an additive effect on the shelf life of studies done with many plants thought to be rosemary or antioxidant properties.

Keywords: Atlantic bonito (*Sarda sarda*), rosemary (*Rosmarinus officinalis*), canning
The Effect of Quinine, Tannic Acid and Nicotine Mixtures on Feeding and Development of Female *Lymantria dispar* L. (Lepidoptera:Lymantriidae) Larvae

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Introduction: *Lymantria dispar* is a polyphage herbivore. It causes ecological and economic damages to the forests. Many plants produce secondary metabolites that influence the behavior, growth, or survival of herbivores. These chemical defenses can act as repellents or toxins to herbivores. Secondary metabolite mixture may act more deterrent than a single secondary metabolite or vice versa. The food consumption and development of male and female individuals are different for this species. So, in this study, the effect of quinine, nicotine and tannic acid mixture on food consumption and development of *L. dispar* larvae was investigated.

Materials and Methods: Thirteen groups were set up with ten replicate in feeding experiments. Artificial diets have been prepared to examine the food consumption of larvae. Diets were identified to adding secondary metabolite to control food and named is respectively: A (no secondary metabolite), T1 (1.25% tannic acid), T2 (5% tannic acid), N1 (0.125% nicotine), N2 (0.5% nicotine), K1 (0.125% quinine), K2 (0.5% quinine), T1- N1, T1- K1, T2- N2, T2- K2, T2- N2- K2 and T1- N1- K1. Given foods, residual foods and larval weight were weighed every other day during the feeding experiment. This procedure was repeated until all of the larvae entered the pupal stage. The total lipid amount was calculated by modifying from Loveridge (1973). After the procedure, the pupae were re-dried and re-weighed to calculate their per cent lipid contents. The lipid free pupae were analyzed for their nitrogen content with Dumas method. The amounts of % nitrogen were multiplied by the constant of 6.25 to convert to the crude protein quantities.

Results and Discussion: It were determined that consumption amount (mg), dry pupal weight (mg), pupal lipid amount (mg) and pupal protein amount (mg) of individuals at different artificial diets are as below: A(1062.13±7.1;334.05±1.7;45.44±0.7;208.61±0.9), T1 (608.44±1.3;162.23±1.03; 19.19±0.7;103.58±1.1), T2 (726.82±1.8;117.42±1.2; 10.95±0.5;65.37±1.0), N1 (956.22±298.5; 261.9±0.9; 37.52±0.6; 172.97±1.4), N2 (987.65± 1.9; 167.54±2.1; 23.80±0.8; 109.41±3.9), K1 (1065,66±1,5;268,61±1,6;38,63±0,7;176,41±1,2), K2 (969,12±1,84;142,46±1,02;23,45±0,9; 87,20±1,3), T1- N1 (800,18±2,1;205,59±1,5;25,59±0,7;150,51±1,8), T1- K1(820.29±29.9; 263.03±1.6; 34,24±0.7; 163,05±1.6), T2- N2(427,49±1,4;148,48±1,8;15,37±0,6;109,26±1,3), T2- K2 (779,42±1,8;121,84±1,2;13,31±0,6;70,91±1,5), T2- N2- K2 (546,09±1,5;88,45±0,6;4,05±0,2; 58,24±0,8), T1- N1- K1 (700,49±1,61;178,71±1,6;22,34±0,9; 129,80±1,3). Alkaloids cause a decrease in the amount of pupae lipid and protein. As the number of secondary metabolite in the diet increased, the deterrent effect of the secondary metabolite increased. As the number of secondary metabolite increased, the consumption of larvae, pupa dry weight, pupa lipid and protein amount decreased.

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Keywords: *Lymantria dispar*, secondary metabolite, quinine, tannic acid, nicotine, feeding
Introduction: Pacific cubed oyster (*Crasostrea gigas* Thunberg, 1793) is a commercial, alien and cosmopolitan marine species. Formerly, it was endemic species for Japan Sea, afterwards it has been distributed worldwide mainly by aquaculture facilities since the resistance to diseases, strong adaptability to environmental changes, and higher potential for rapidly growth and reproduction. *C. gigas* was firstly introduced to European coasts in 1960 for aquaculture activities, so it has spread to the coasts of Mediterranean countries. The introduction of *C. gigas* into seas of Turkish was detected in Marmara Sea (2004) and Aegean Sea (2007) by morphological studies and in Marmara Sea (2018) by genetic study. The aim of this study was to examine reproductive of the Pacific oyster in Bandırma Bay.

Material and Methods: Samples were collected by monthly sampling from November 2013 to October 2014 in Bandırma Bay. At the same time hydrological parameters were also monitored in the study area. Monthly variations in gonad development stages and sex ratio were determined according to histological observation.

Results: The gametogenetic cycle of Pacific oyster began in January 2014 after resting stage. Spawning was observed mainly from August to October. Female individuals were dominant and the sex ratio (F/M) was found 1/0.89.

Discussion: The flat oyster *Ostrea edulis* has a wide distribution in the Aegean Sea and Sea of Marmara. It has a 3–5 times higher market value than the Pacific oyster. Determination of Pacific oysters’ reproductive biology provides effectively conservation strategies and management action to minimize its harmful impacts on native biodiversity, especially over populations of *Ostrea edulis*. Consequently, it is important that measures must be taken to conserve the native flat oyster populations in Turkey.

Keywords: Pacific oyster, *Crasostrea gigas*, alien species, gonad development, sex ratio
Introduction: The olive fly, *Bactrocera oleae* (Gmelin) (Diptera: Tephritidae), is an important insect pest of olive crops worldwide and causes considerable production losses of olives and its derivatives in the Mediterranean area, where most of the world’s cultivated olive trees are grown. Considering the economic impact of olive, a detailed understanding of the population architecture of olive fly is a critical step for designing effective control or eradication strategies. The basic aim of the present study is to provide detailed information about the population structure, genetic diversity and contemporary colonization route of this organism at the macrogeographic level.

Material and Methods: The literature reported since 1970’s for the olive fly worldwide range, mainly from central Africa, Mediterranean basin and central America, were comparatively analysed and reviewed in this study.

Results and Discussion: The genetic studies for olive fly have indicated that (i) African origin for the species followed by a spread into the Mediterranean basin and more recently because of human intervention into the American region (ii) the presence of a certain level of genetic variability on a regional geographical scale is characteristic for this species, (iii) eastern Mediterranean basin seems to be an important area for the colonization of this organism to northern Mediterranean region, America and western Asia (specifically to Iran), (iv) although geographic limits of population ranges are poorly defined, so far, there are four population substructures have been reported; eastern Mediterranean-America, Aegean, Italian and western Europe. However, together with ecological investigations from the potential source populations, a larger-scale study and a bigger sample size per population from potentially critical areas, such as Africa and North America, need to be genotyped to precisely understand and confirm the genetic structures and colonization route of this species around the world.

Keywords: *Bactrocera oleae*, population structure, olive, polymorphism
Determined Ant and Aphid Mutualism from Adıyaman, Malatya and Şanlıurfa Provinces

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Introduction: The 37% of worldwide distributed aphid species are ant attended. The ant attendance of aphid species is affected by various conditions. One of the indications is feeding side of aphid. If aphid is feeding on stem or branch they will have a longer rostrum. Longer rostrum gets longer the escaping time of aphids from their predators. In this circumstance they need ant attendance to defend against the natural enemies. For example Stomaphis members feed on trunk of Quercus spp., in turn their rostrum two times longer than their body, so they have obligatory relationships with ants. Another dangerous feeding side for aphids is roots of their host plants due to high risk of revealing by many insect land predators. This aphid species secreted more honeydew to attract ant species. To understand ant aphid relationships better needs to be more knowledge about which factors affect the ant-aphid mutualism and outcomes of the relationship. This study is aimed to give information about determined ant-aphid mutualism from Adıyaman, Malatya and Şanlıurfa provinces.

Material and Methods: Aphids specimens were collected from different host plant between November 2015-September 2016, from Malatya, Şanlıurfa and Adıyaman province. Aphid species were identified according to Blackman and Eastop (2018) and ant species were determined by Nihat Aktaç and Yılmaz Çamlitepe. Collected samples were preserved at Niğde Ömer Halisdemir University, Biotechnology laboratory.

Results: 167 aphid and ant samples collected from different localities in Malatya, Şanlıurfa and Adıyaman provinces. 47 aphid species and 25 ant species demonstrated mutuality. The most common ant species was Tapinoma simrothi that was observed with 32 aphid species.

Discussion: Although, 37% of worldwide distributed aphid species attracted ant species, nearly 21% percent of Turkish distributed aphid species attracted ant species. The more study should be performed to understand why aphid and ant species show mutualism and to find out which aphid species are attracted by which ant species in Turkey.

Acknowledgement: The authors thank to the Scientific and Technological Research Council of Turkey (TUBITAK; Project Number 115Z325) for supporting this study.

Keywords: Anatolia, ant, aphid, Hemiptera, mutualism
Final State and Distinctive Characteristics of Genus *Astragalus* L. (Fabaceae)

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**Introduction:** *Astragalus* is represented in 474 taxa of 64 sections in our country. 163 taxa are endemics and endemism rate is 34%. 273 of them are Irano-Turanian, 45 taxa are Mediterranean, 11 taxa are Euro-Siberian phytogeographic elements; others are widespread or these are whose regions cannot be determined. Life forms (annual, biennial, perennial); herbaceous, woody at base, woody, shrub; caulescent – scapose, peduncles are not; leaves ± simple (basal leaves), paripinnat, rachis spiny or not, numbers of leaflets pairs; hairs the simple, bifurcate or furcate, adpressed or not, black-and-white; stipules herbaceous or glumaceous; with or without bracts-brakteole and structure; calyx inflated or not; standard hairy or not, stenonychioid or platonychioid and coloration of the corollas; ovary stipitate or sessile, structure of fruits are used as a separator characters.

**Results and discussion**

Evaluation at the level of sections:

1) Annual sects.:
   1) Perennial sects.
      1) Simple hairy, herbaceous, ± caulescent, flowers sessile
      2) Simple hairy, herbaceous, ± caulescent, flowers pedicillate
      3- Simple hairy, herbaceous, scapose, flowers pedicillate
      4- Simple hairy, spiny, acaulous, flowers pedicellate, fruit very seeded.
      5- Simple hairy, spiny, acaulous, flowers pedicellate, legume 1 (-2) seeded.
      6-Simple hairy, spiny, leaves paripinnate, calyx inflated, even when in fruit
      7- Simple hairy, leaves imparipinnate, legume unilocular
      8- Simple hairy leaves imparipinnate, legume bilocular
      8- Leaflets bifurcate-hairy, calyx inflated when in flowers
      10- Leaflets bifurcate-hairy, herbaceous, ± woody at base, caulescens, calyx not inflated when in flowers
      11- Leaflets bifurcate-hairy, herbaceous, ± woody at base, scapose, calyx not inflated when in flowers
      12- Leaflets bifurcate-hairy, woody, calyx not inflated when in flowers

**Keywords:** *Astragalus*, sections, Turkey.
ORAL PRESENTATION

Effects of Physicochemical Parameters on Zooplankton in a Brackish Coastal Lagoon
(Uzungöl, Kızılırmak Delta)

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Introduction: Zooplankton is one of the most important biotic elements that impact all functional aspects of aqueous ecosystems including food chains and trophic networks and energy flow. The occurrence and distribution of zooplankton depend on a number of factors such as climate change, habitat physicochemical properties, and biotic factors. The instability of environmental conditions is a typical feature of brackish waters and changes in abiotic factors are affected activity of zooplankton. Uzungöl, located in the eastern part of the Kızılırmak Delta, is typical brackish water bodies and the lagoon have considerable value for biodiversity. Although some environmental factors influencing aquatic communities have been noticed, only faunistic research has been undertaken on zooplankton within Uzungöl lagoon. The objective of this study is to determine whether physicochemical properties significantly impact zooplankton occurrence.

Material and Methods: During the study, water and zooplankton samplings were carried out five sampling stations at approximately monthly intervals from 2015 to 2016. At each sampling point temperature, EC, TDS, pH, salinity, turbidity, dissolved oxygen and were Secchi depth measured in situ. Total nitrogen (TN) and phosphorus (TP) was analyzed with Standard Method 4500 NO2-B, 4500-Norg-B and Standard Method 4500P-B, 4500P-E. The Shannon Diversity (H’), Pielou Evenness (J) indices were computed. The results were processed with statistical methods using XLSTAT and PAST (3.20). Before statistical analyses, zooplankton and environmental data was log-transformed to improve normality. Pearson’s Correlation and Canonical Correspondence Analysis (CCA) was used to evaluate relationship between environmental parameters and zooplankton taxa.

Results and Discussion: In total, 39 species were recorded, most of which belonged to Rotifera (34), followed by three Cladocera and two copepod species. Keratella quadrata and Filinia terminalis was eudominant species, Brachionus angularis, Polyarthra vulgaris, Filinia longiseta was considered as dominant species. CCA was performed for 39 taxa and eleven environmental variables. The first and second canonical axes explained 35.57% (eigenvalue 0.258) and 21.65% (eigenvalue 0.157) respectively of the variance in species-environment relationships. The species-environment correlation of all axes became significant in the permutation test (P < 0.01). Along the gradient of the first axis, the largest correlation was found for pH (r = 0.54), along the second axis this was negatively correlated with TP (r = -0.46) and was positively correlated with temperature (r = 0.59). Pearson’s Correlation results indicated that H’ and J indices was positively correlated with temperature and chl-a, was negatively correlated with salinity, TP and Secchi depth.

Acknowledgment: This study is supported by TUBITAK 114Y536 1001 project.

Keywords: Uzungöl, physicochemical parameters, zooplankton, species-environment relationship
Introduction: It has been observed that the "green offenses", which express the harms given to the environment and neglect of the damage by the state without giving the necessary importance, appeared in 4 basic subjects. These are air pollution, deforestation, decline of animal species and animal rights and water pollution. Green crime is thought to be an important problem that must be overcome because of its numerous negative effects. The purpose of this movement is to examine the green crimes committed during the environmental transformation process.

Material and Methods: This study was designed to analyze green crimes around the world, using four basic indicators. We analyzed situations in countries around the world, using data obtained from The World Bank official web site. We used spatial cartogram maps to determine similarities and dissimilarities among countries, in terms of green crimes. GeoDa and the R-INLA package program were used for this purpose.

Results: In this study, we use four indicator. For air pollution, two classifications can be analyzed. First is the high-high area, meaning high homogeneity and high similarity. The countries classified in high-high areas have a high air pollution level. Among these countries, Iran, Iraq, and Saudi Arabia are the same in terms of air pollution. For deforestation, two classifications can be analyzed. The first is the high-high area, meaning high homogeneity and high similarity. The countries classified in high-high area have high deforestation levels. Among these countries, the United States and Canada are the same in terms of deforestation. For animal rights, two classifications can be analyzed. First is the high-high area, meaning high homogeneity and high similarity. Countries classified in high-high areas have high animal rights levels. Among these countries, Venezuela and Peru are the same in terms of animal rights.

Discussion: Negative effects caused by green crime are actually much greater than what is seen. The harms from these crimes lead not only to tangible and intangible damages, but they also cause the victim (directly) and the victims’ close relatives and the entire community (indirectly) to lose. Therefore environmental crimes are considered to have become globalized in nature, and they’ve grown to the extent that countries cannot solve them alone.

Keywords: green crimes, eco-crime, environmental crime, geoda packet program
Nocturnal activity of *Darevskia rudis* in Central Black Sea Region, Turkey

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**Introduction:** Lizards display a broad activity pattern variety due to interactions between their internal rhythms and environment. Moreover, Lacertids normally considered to represent diurnal activity patterns in their habitats as a result of their heliothermic strategy. Although several reports in the literature have noted nocturnal activity in primarily diurnal reptiles, such as the desert tortoises (*e.g.* Gopherus agazzii), Iguanids (*Gambelia wislizenii*) Phrynosomatids (*Sceloporus clarkii*, *Phrynosoma platyrhinos*, *P.cornutum*, *P.modestum*, and *P.asio*), and a few observation have been given for Lacertids (*Timon lepidus*, *genus Gallotia*, *Podarcis muralis*) up to today. Here, we officially report the first time nocturnal activity for a diurnal lacertid species in Anatolian peninsula.

**Material and Methods:** Individuals were observed during herpetofauna expedition on July and August 2014. First observation was recorded on 12 July 2014 at 00.20 h. We observed two males and two females spiny-tailed lizard, *Darevskia rudis*, active and foraging at night on the walls of the historical Sinop prison, Turkey. Since that time, this activity pattern continued to be recorded during night herpetofauna expedition till the end of August 2014. Although activity pattern of Lacertids may vary external factors, it is well known that these organisms tend to abide their circadian cycle even if they are under artificial light-sourced laboratory conditions.

**Results and Discussion:** According to our observations, the individuals were active because they were found in a rocky area that the environment conditions, such as substrate temperature might restrict their time for diurnal activity. After sunset, however they can extend their potential foraging time, as high diurnal temperatures (mean 23 °C, range= 20-26 °C for July-August). in the air and rocks that might be enough for lizard’s body temperature in the activity range till midnight or more. In addition to environment temperatures, artificial lights could contribute the lizard’s foraging. Here the highlighted point of this observation is the nocturnal activity strategy of a diurnal lizard without any experimental transaction. Therefore, this activity pattern suggests the possible way to go beyond ordinary for *D.rudis* that this species might complete its biological activities at night in this location, because of the high daytime and substrate temperatures with the help of artificial lights.

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**Keywords:** *Darevskia rudis*, night time activity, Black sea region, Anatolia, Turkey
Does altitude effect erythrocyte morphology of European Pond Turtle *Emys orbicularis* (Linnaeus, 1758) in Mediterranean Turkey?

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**Introduction:** Reptiles are a heterogeneous group among vertebrates in terms of their blood cell morphology, and demonstrate considerable variations among orders, even within the same family members. The studies on the comparative morphology of peripheral blood cells (erythrocytes, leucocytes, thrombocytes) in reptiles mainly focus on the seasonal and sexual variation of counts. The objective of the present study was to obtain and discuss the morphological characterization of red blood cells/erythrocytes of *E. orbicularis* from different altitudes. Thus, it was questioned whether the relationship between altitude and erythrocyte morphology in Southern Anatolia, Turkey.

**Material and Methods:** The field surveys were conducted on April and May 2011 to 2013 at lowland (Muğla, Mersin and Hatay; sea level – 11 m a.s.l.) and highland localities (Isparta, Burdur, and Konya; 900 – 1200 m a.s.l.) in Southern Anatolia, Turkey. The blood samples were obtained from caudal vein using heparinized glass capillaries in 1 juvenile, 18 males and 20 females. The blood smears prepared were stained with Wright’s stain. From each blood smear, the randomly chosen 40 erythrocytes (erythrocytes lengths, widths, volume, nuclear lengths, widths and volume) were measured under a light microscope. The variations of erythrocyte morphology among localities were compared via one-way ANOVA and t -test.

**Results:** In the examined blood smears, the erythrocytes of *E. orbicularis* are nucleated, oval cells. Their nuclei are also oval and almost located at the center. The nucleus is stained dark purple; the cytoplasm is stained light red. In the blood smears considerable variation regarding length (range = 19,86-19,57 µm for erythrocytes, 5,65-5,65 for nuclei), width (11,13-11,59 µm for erythrocytes, 4,26-4,18 µm for nuclei) and volume (1310,32-1403,45 µm³ for erythrocytes, xx-xx for nuclei) of the erythrocytes (lowland-highland respectively) was detected among localities. The species did not show the statistically significant difference with respect to erythrocyte morphology.

**Discussion:** During continuous exposure to high altitude, animals develop several physiological responses to make it possible to live in a low O₂ environment. These differences include an increase in erythrocyte count and a decrease in red blood cell volume. As for *E. orbicularis*, several reasons could support the insignificance at RBC size difference: smaller body size at high altitude may imply that total energy need is lower, cloacal respiration during hibernation may affect the number and volume of erythrocytes.

**Keywords:** altitude, erythrocyte morphology, physiology, *Emys orbicularis*, Turkey
**Introduction:** Garlic (*Allium sativum* L.) is the most common species of the *Allium* spp. In 2016, about 26.5 million tons of garlic were produced worldwide about from 1.5 million ha. In Turkey, total garlic production is about 135,000 tones and yield area is nearly 15 ha. Phosphorus by using some biological sources such as mycorrhiza and plant root mechanisms for plant growth and P uptake under such condition. This recent experiment was conducted to determine the effects of P fertilization on garlic yield, and P use efficiency in garlic.

**Material and Methods:** Determination of P efficiency in garlic, we applied 0, 6, 8 and 10 kg P$_2$O$_5$ da$^{-1}$ from TSP (Triple superphosphate) in Balıkesir and Kastamonu locations. The experiments set up as a random block and 3 replicates and parcel size was 1.60 x 1.80= 2.88 m$^2$. Garlic cloves were sewn with the help of a template with parcel size and spacing between rows (16 cm) x spacing (12 cm). The Plant P concentrations were determined by ICP-OES Perkin Elmer 1200DV and garlic diameter and size were determined, which are quality parameters. For the basal fertilization

**Results:** The maximum increases of yield were determined by 8 kg of P$_2$O$_5$ da$^{-1}$ application in Balıkesir and Kastamonu location (respectively, %22.6 and 23.2). In both locations, depending on the P fertilization, the diameter and size of the tuber were increased. The highest P concentrations of garlic plants were determined by 10 P$_2$O$_5$ da$^{-1}$ application in Balıkesir and Kastamonu locations.

**Discussion** It was determined that the yields of garlic plants were increased in the experiments carried out with P application, which are called because of the low content of P in the soil where garlic cultivation is conducted on both locations. And it has been determined that in the experiments carried out with the P applications, there is not only increase in yield in garlic but increase in properties such as size, water-soluble dry substance which determine quality. In this work, for the P fertilization, the useful dose was determined 8 kg of P$_2$O$_5$ da$^{-1}$.

**Acknowledgement:** This work was supported by The Scientific and Technological Research Council of Turkey (TUBITAK, 104O506).

**Keywords:** garlic, *Allium sativum* L., phosphorus fertilization, yield
ORAL PRESENTATION

Effects of Exogenous Enzyme Supplementation in Diets on Growth Performance of Siberian Sturgeon, Acipenser baerii

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Introduction: Reduction of feed cost, which accounts for 50-75% of production costs in aquaculture and efficient feed conversion are important parameters for sustainable aquaculture. The decrease at feed cost is achieved by reduction of fish meal used in aqua feeds and replacing these with alternative additives. As a result of being alternative additives accessible and cost effective, vegetable protein sources are utilized effectively. In recent years, studies focusing on improving the utilization of feed supplemented with vegetable sources by using enzymes in carnivorous species are becoming popular. This study was conducted to investigate the effects of supplemental exogenous enzyme addition to hazelnut meal based diet on growth performance in Siberian sturgeon.

Material and Methods: This study was carried out to determine the effects on growth performance of diets based on hazelnut meal (30%) supplemented with different rates of exogenous enzymes in Siberian sturgeon (Acipenser baerii) (960.23±0.55 g, average initial weight). The experimental diets consisted of 45% protein - 12.7% fat as the with no added enzyme in the control group (G1) and diets supplemented with 0.25, (G2), 0.50 (G3) and 1.00 g/kg (G4) phytase enzyme, respectively. Each group was fed three times a day for 90 days of experimental period at 2% of live body weight. In total, 10 fish were stocked in to each tank and experiments were triplicated.

Results: As a result of the research, it was determined that the addition of exogenous enzyme in 30% hazelnut supplemented diets had a positive effect on the growth with weight gain (WG, g), specific growth rate (SGR, %), feed conversion ratio (FCR), protein efficiency ratio (PER) and condition factor (CF,%). In terms of growth performance, the developmental performance of all exogenous enzyme-supplemented groups was found to be more successful than the control group (P<0.05). The G4 enzyme group among others was found to be statistically better than the others (P<0.05). In this group, the weight gain, feed conversion ratio, protein efficiency ratio and condition factor were 1433.18±1.85 g, 0.46±0.35%, 1.41±0.03, 10.43±0.22 and 0.45±0.04%, respectively.

Discussion: In the study, it was determined that addition of 1.00 g/kg of exogenous enzyme to the nutrition of 900-1000 g / unit of Siberian sturgeon fed with 30% hazelnut meal as a protein source was more successful than the control group.

Acknowledgement: This work was supported by the Recep Tayyip Erdogan University Scientific Research Projects Unit with Project Number: 2015.53001.103.02.3.

Keywords: Siberian sturgeon, Acipenser baerii, fish meal, hazelnut meal, phytase enzyme
Effect of Chemical Fertilizers Used in Tea Farming on Nitrate Pollution in Groundwater

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Introduction: Water is vital for humans and the other living beings. The compounds of nitrogen can accumulate and cause pollution in still waters by rains, by artificial or natural fertilizers that are used for agricultural purposes mixing in rain water and by drain waters mixing in surface waters. In this study, water samples were taken pre (April) and post (August and November) fertilization period in tea farming from the drinking water of 12 villages selected as sampling from villages (1 village representing the district from each district) in Rize province. Nitrate analyzes were performed on all samples and it was aimed to determine the effect of chemical fertilizers on nitrate pollution in groundwater.

Material and Methods: Drinking water was collected from 12 different villages (Karasu, Gürgen, İhlamur, Geçitli, Çakmakçıl, Büyükçiftlik, İncesırt, Boğazlı, Yaltkaya, Dikkaya, Ortaalan and İhlamura) in April, August and November 2017. Nitrate analyzes were determined using Hach Lange LCK 339 kits and were measured using a spectrophotometer (Hach DR 3900) at 340 nm absorbance.

Results: When the pre and post fertilization periods were considered, nitrate (ppm) values in the drinking waters were statistically significant (P < 0.01) among. The highest and lowest nitrate values were in August and April, respectively. There were statistically significant differences (P < 0.01) in nitrate values in terms of all villages. The highest and lowest nitrate values were in Dikkaya (Çamlıhemşin) and İhlamur (İkizdere) villages, respectively.

Discussion: According to the obtained mean results, it has been observed that the nitrate levels of water taken from the villages belonging to Çamlıhemşin (Dikkaya with 49.67 mg/l) and Kalkandere (Geçitli with 41.21 mg/l) districts are very close to the nitrate limits (50 mg/l) reported by World Health Organization, European Union and Environmental Protection Agency. When the nitrate values of the working villages are evaluated separately in terms of periods, it was determined in August that the nitrate values of waters taken from villages belonging to Çamlıhemşin (59.1 mg/l) and Kalkandere (60.4 mg/l) districts were above the nitrate limits (50 mg/l) declared by World Health Organization, European Union and Environmental Protection Agency. Considering these results, it is necessary to take precautions to reduce nitrate levels in drinking water.

Acknowledgement: This study was supported by a grant from the Scientific and Technological Research Council of Turkey (TÜBİTAK) with the Project No: 1919B011602666.

Keywords: chemical fertilizer, groundwater, nitrate, Rize
Evaluation of Biological control potentials of Local Beauveria bassiana Isolates Against Strawberry Root Rot Pathogens

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Introduction: Strawberry black root rot is a serious, yield limiting disease of strawberries everywhere. In general, it is accepted that a complex of fungal pathogens is the primary cause of this disease such as Rhizoctonia spp., Fusarium spp. and Macrophomina sp. Currently, management of strawberry root rots relies on chemicals, particularly fumigation. Management practices that favor biocontrol activity are needed. The goal of our study is to evaluate the effectiveness of local entomopathogenic Beauveria bassiana isolates against two root rot pathogens, Rhizoctonia solani and Macrophomina phaseolina invitro.

Material and Method: The effect of five different Beauveria bassiana isolates ( GN-4, GN-12, GN-22-3-2, HP-15, and HP-27) were screened against the pathogenic fungi (Rhizoctonia solani and Macrophomina phaseolina) invitro. The antagonistic fungi spores suspensions (1x10⁸ spores/ml) were spreaded on solidified Potato dexrose agar medium(10 ml/plate). Each of the treated plates was inoculated at the center with discs obtained from the periphery of 5 days old cultures of R. solani, and M. phaseolina. Plates contained media without antagonists were served as control. Three plates were used for each treatment. Inoculated plates were incubated at 25±1°C. The experiment was terminated when mycelial mats covered the medium surface in control, and percentage of reduction in mycelial growth of pathogenic fungi were calculated using the following formula: % Reduction in linear growth = 100 – (G2/G1X 100) G2= Growth in treatatment, G1= Growth in control.

Results and Discussion: Results of the present study showed that variation in antagonism between all the tested isolates on R. Solani but they exhibited similar level of suppression on M. phaseolina. The highest decrease in growth of R. solani was produced by isolate GN-12 where, the reduction in growth was 95.4%, followed by isolate GN-4 with 75.7%. Some isolates showed less antagonistic effects on R. solani. However they exhibited similar effects on M. phaseolina. The growth reduction produced by isolates GN-12,GN-4, and HP-15 were 92.8, 93.0 and 93.4% respectively. Several studies have characterized B. bassiana with the potential to control plant diseases. The antagonistic abilities of different isolates of B. bassiana were investigated against R. solani, and Pythium myriotylum (Griffin 2007). In conclusion, GN-12 has the potential to be used as a biocontrol agent against R. solani and M. phaseolina. Further study will be conducted with some of these isolates under field conditions.

Keywords: entomopathogen, biocontrol, Rhizoctonia, Beauveria.
Introduction: Cicadellids are economically important because they prevent plant growth by sucking and transmit plant disease. For this reason, it is necessary to determine Cicadellidae species which especially found in agricultural lands. This study aimed to determine the Cicadellidae species in apple orchards in Amasya. Because apple is an important agricultural crop for Amasya, this study is important for crop quality and protection of existing trees. A detailed study of Cicadellidae species distributed in apple orchards was not found in the literature.

Material and Methods: Materials were collected from apple orchards in different localities in Amasya by insect nets from different plant parts in 2016. Specimens were prepared according to standardized method and taxonomic characters like body shape, size and structures, genital structures, colouring, spotting and designing were examined detailed. Specimens were identified by comparing taxonomic characters of specimens with dichotomous keys and descriptions given for related taxa.

Results and Discussion: 23 species belong to Cicadellidae were determined in apple orchards in Amasya. List of species were given according to systematic order in the catalogue of Nast (1972). Determined species were Anaceratagallia laevis (Ribaut, 1935), Anaceratagallia ribauti (Ossiannilsson, 1938), Eupelix cuspidata (Fabricius 1775), Aphrodes albifrons (Linnaeus 1758), Aphrodes bicinctus (Zachvatkin 1948), Cicadella viridis (Linnaeus, 1758), Empoasca decipiens Paoli, 1930, Zygina pullula (Boheman, 1845), Zygina flammigera (Fourcroy, 1785), Arboridia versuta (Melichar, 1897), Neoaliturus fenestratus (Herrich-Schäffer 1834), Balclutha punctata (Fabricius, 1775), Recilia schmidtgeni (Wagner, 1939), Doratura homophyla (Flor, 1861), Doratura stylata (Boheman, 1847), Platymetopius undatus (De Geer, 1773), Phlepsius intricatus (Herrich-Schäffer 1838), Mocydia crocea (Herrich-Schäffer, 1837), Euscelis lineolatus Brullé, 1832, Arocephalus longiceps (Kirschbaum, 1868), Psammotettix confinis (Dahlbom, 1850), Psammotettix provincialis (Ribaut, 1925), Artianus manderstjernii (Kirschbaum, 1868).

By this study, Anaceratagallia laevis, Anaceratagallia ribauti, Eupelix cuspidata, Aphrodes albifrons, Arboridia versuta, Recilia schmidtgeni, Doratura homophyla, Platymetopius undatus, Psammotettix confinis, Psammotettix provincialis, Artianus manderstjernii were reported as new records for the first time for Amasya. This study also provides preliminary information for agricultural protection.

Acknowledgement: This study was funded by Amasya University Scientific Research Foundation (Project No: FMB.BAP.16.0196).

Keywords: Cicadellidae, Hemiptera, apple, fauna, orchard
Investigation of Mosquito (Diptera: Culicidae) Species with Vectorial Importance in the Central District of Edirne

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Introduction: Edirne has a widespread paddy field of paddy farming, but also is exposed to frequent floods due to location by major rivers. Due to the aforementioned factors, but also due to the climate structure, most mosquito species can easily reproduce and most of the new or invasive species can easily be settled. The region is also situated on one of Turkey's most important bird migration routes; Moreover, the city is the gateway to Europe for illegal immigrants from the Middle East, Asia and Africa. All these factors make Edirne one of the most risky illusions of our country in terms of mosquito-borne diseases. This study was carried out in order to determine important vector mosquito species in the central district of Edirne.

Material and Methods: The study was carried out between July-December 2017. Mosquitoes have been collected in areas determined to be suitable for different mosquito species. For this purpose; samples were collected from damp basements of the buildings, abandoned building interiors, poultry and barn interiors, toilets and similar damp interiors with mouth aspirators during the daytime resting or diapose in the winter. In addition, larval inspections were also carried out in suitable areas and adult flies were reared from the collected larvae in the laboratory. In particular, ovitraplas have been established for the detection of the presence of the Aedes albopictus strain, which has been detected in seven localities in the Thrace Region so far. Moreover, larval and adult samples were taken for the detection of Anopheles species which are at risk for malaria.

Results and Discussion: The results demonstrated that a total of 2908 females and ve 334 males were belong to Anopheles maculipennis s.l. (except Anopheles sacharovi), Anopheles sacharovi, Aedes caspius, Aedes geniculatus, Aedes vexans, Culex pipiens s.l., Culex theileri, Culiseta annulata, Culiseta longiareolata and Uranotaenia unguiculata türleri olduğu tespit edilmiştir. Eggs, larvae and adults of Ae. albopictus were not found. An. sacharovi is found in two localities which is the primary vector of malaria in Turkey. The dominant species in the research area were Ae.caspius, Cx.pipiens s.l. ve An. maculipennis s.l. In the coming years, the likelihood of joining the population of Ae. albopictus is very high. All these data clearly demonstrate the need for an integrative and well organised mosquito fighting programme for the province of Edirne.

Keywords: mosquitoes, bird migration routes, mosquito-borne diseases, Aedes albopictus, malaria, Edirne
Removal Of Cr(VI) By Adsorption on a Mesoporous Silica Nanoparticle Mag-MCM-41 From Waste Water

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Introduction: Metal ions contamination in aqueous medium cause serious environmental pollution. Heavy metals are highly toxic and accumulate in human and other living organisms in time. Today, various methods are being developed to remove them from environment water[1]. Adsorption methods are the most effective ways to remove heavy metals from waste water. Recently developed mesoporous materials are candidate to effective and common used materials for adsorption of heavy metals from ambient water due to their large surface area, ordered pore structures and adjustable pore dimensions. Magnetic composite silica nanoparticles are obtained reaction between mesoporous silica nanoparticles and nano magnetit (Fe₃O₄). It was revealed that magnetic mesoporous silica nanoparticles (mag-MSNPs) show strong adsorbent character and easily leave from aqueous medium because of magnetism. This kind of sorbent in order to remove metals from ambient water are quite new method and include new method. The aim of this study, to investigate of Cr(VI) adsorption by mag-MSNPs from aqueous solution and to remove it from water, and calculate adsorption efficiency.

Material and Method: In this study, MCM-41 (a mesoporous silica nanoparticle) was synthesized by sol-gel method. MCM-41 was treated with nano sized magnetit (Fe₃O₄) and a magnetic mesoporous silica nanomaterial (mag-MCM-41) was prepared. Surface morphologies and structures of both bare-MCM-41 and mag-MCM-41 were investigated by BET, TGA ve FTIR techniques. Adsorption of Cr(VI) from aqueous solution was studied on bare MCM-41 and mag-MCM-41. In this purpose analytical grade of K₂Cr₂O₇ was dissolved in buffered (pH=7) water. Cr(VI) solutions are prepared in concentration range 0,5–2,0 mmol/L. 25 mg of sorbent (bare MCM-41 or mag-MCM-41) was mixed with 25 mL of related Cr(VI) aqueous solution and shaked for 24 h at room temperature. Amount of adsorbed Cr(VI) by bare MCM-41 and mag-MCM-41 was determined via ICP-MS and UV-vis spectrophotometer. Adsorption efficiency was calculated.

Conclusion and Discussion: According to BET analysis, BET surface area (1064,8 m²/g and 880,34 m²/g), pore volume (0,497 cm³/g and 0,705 cm³/g) and mean pore radius (2,6432 nm and 3,2037 nm) of bare MCM-41 and mag-MCM-41 sorbents were found, respectively.

The total Cr(VI) concentration in the supernatant resulting after batch experiments calculated by a combination of ICP-OES and UV-vis spectrophotometry. Because of high surface area and convenient pore volume, both bare and mag-MCM-41 are good sorbent for Cr(VI) from water.

Keywords: Cr(VI), mesoporous silica nanoparticle, Mag-MCM-41
Introduction: Davultepe beach is located southern Mediterranean Coast of Turkey, and it is approximately 15 km far from the center of Mersin. Davultepe is located between Kandak Stream in the northeast and Onur Resort in the southwest of Mersin, totals 2.8 km in length, and includes Davultepe public beach, the picnic area and Gümüşkum Natural Park. The Gümüşkum Natural Park, designated on 7 November 2011, is 1.8 km long and located between Kandak Stream in the northeast and Kuğu Resort in the southwest and on 25 August 2017, for the Gümüşkum Natural Park, reviewed tender for the work of business administration.

Material and Methods: All field observations were conducted between July and October by daily patrols of the beach. Daytime (05:00–10:00 and 16:00–19:30 hrs) and nighttime (22:00–01:00 hrs) beach surveys and collection of data were done by our teams. These nests were protected with wire cages against predation After the sea turtles had completed their nesting process, nests were marked and their coordinates were taken by means of Global Positioning System (GPS). The nests were excavated one week after the first emergence of hatchlings. The total number of eggs and hatchling success was calculated by counting unhatched eggs and hatchled shell fragment.

Results: A total of 129 Chelonia mydas nests and 9 Caretta caretta nests were recorded during in 2017 nesting season. The nest density of Ch. mydas (129 Nests/ 2.8 km) and C. caretta (9 Nests/ 2.8 km) was calculated as 46.07 nests/km and 3.21 nests/km, respectively. The highest number nests has been determined for two species in 2017 nesting season with the number of nests considering in the Gümüşkum Natural Park.

Discussion: In the beaches of Turkey, 21 important nesting areas have been identified in the studies conducted for both loggerhead and green turtles and an additional Davultepe was found to be one of the most important nesting sites for green turtles, and also has a small number of loggerhead turtle nests annually. The population of green sea turtle (Chelonia mydas) and Loggerhead sea turtle (Caretta caretta) nesting on Davultepe Beach (Mersin,Turkey) research over the 9 nesting seasons (2009-2017). The new data in 2017 nesting season was added from Davultepe, demonstrating the importance of this nesting beach for green turtle in the Mediterranean. In Davultepe, the basic threats facing sea turtles and their nests are human impacts, light pollution, sand removal, and predation. In this study, some suggestions were presented for the conservation of sea turtles in this beach. Davultepe beach is an important new significant nesting area.

Keywords: Davultepe beach, Gümüşkum natural park, Chelonia mydas, Caretta caretta, 2017 nesting season.
Nesting Activity of Sea Turtles (Chelonia mydas and Caretta caretta) on Alata Beach (Mersin) in 2017

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Introduction: Alata sea turtle nesting beach are located in the Alata Horticultural Research Institute, 30 km from the center of Mersin, 3 km from the Erdemli. In this study the population of Caretta caretta and Chelonia mydas which nest on Alata Beach. There are 21 important nesting grounds for both Caretta caretta (loggerhead) and Chelonia mydas (green) sea turtles along the Mediterranean coasts of Turkey. Five of these nesting beaches (from west to east: Anamur, Gökku Delta, Alata, Davultepe 100. Yıl, Kazanlı) are located in Mersin province. The beach have natural sand dunes which is also natural habitat of sand lilies (Pancratium maritimum).

Material and Methods: All field observations were conducted between July and October by daily patrols of the beach. Daytime (05:00–10:00 and 16:00-19:30 hrs) and nighttime (22:00–01:00 hrs) beach surveys and collection of data were done by teams. These nests were protected with wire cages against predation. After the sea turtles had completed their nesting process, nests were marked and their coordinates were taken by means of Global Positioning System (GPS). The nests were excavated one week after the first emergence of hatchlings. The total number of eggs was calculated by counting unhatched eggs and hatched shell fragment. Hatching success was the percentage of eggs that produced hatchlings.

Results: Alata Beach, which is 3 km in length, were identified a total of 387 sea turtle nests (368 Chelonia mydas ve 19 Caretta caretta nest) during the 2017 nesting season. For Chelonia mydas, the nest density was 122.67 (368 nests / 3 km), while the nest density for Caretta caretta was 6.33 (19 nests / 3 km) nests / km.

Discussion: Alata beach that studied since 2002 is an important nesting area for Ch. mydas. The conservation studies should be conducted without interruption on this beach. In the 15 years-period of investigation on Alata beach resulted in sucessfull conservation of sea turtles. Same time the local people have been informed about the importance of Alata beach for sea turtles.

Keywords: Alata Beach, Mersin, Chelonia mydas, Caretta caretta, 2017 nesting season.
The Effect of Different NaCl Doses on Germination and Plant Growth of Buckwheat
(Fagopyrum esculentum Moench)

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Introduction: 1.5 million ha of Turkey’s land is affected by salinity which is equal to the 7% of agricultural land. The response of plants to the salt may be various depending on the growth period of the plants, the concentration of the salt and the duration that the salt is effective. In studies on salt stress many plant species were used until today. However, there are also plant species which grow easily in many soil structures such as buckwheat. Even though buckwheat plant is grown for grain, it is used as nectar source for bees and fodder crop.

Material and Methods: Pot and petri experiment were carried out in this study to determine the effect of different NaCl concentrations (0, 25, 50, 75, 100, 125, 150 mM) on germination and plant growth of Fagopyrum esculentum Moench. These experiments were done in the plants chamber with 25°C±1 temperature with 16 hours light/8 hour dark photoperiod. In the petri study, germination rate (%), plant height (cm), root length (cm), root and stem bioamass, and in the pots study, plant height (cm), number of leaves (number/plant), stem diameter (mm), aboveground fresh and dry weight (g), root fresh and dry weight (g), chlorophyll a and b values (mg FW) were determined.

Results: Petri experiments: The highest plant height and root length were determined in 0 mM NaCl treatment (11.92 and 5.71 cm respectively), while they were lowest in 150 mM NaCl treatment (0.10-0.56 cm respectively). Stem and root biomass were ranged between 7.67-1965.7 g/ha and 36.08-629.63 g/ha respectively and the highest root and stem biomass values were determined in 25 mM NaCl treatment.

Pot experiments: The highest plant height was determined in 0 mM NaCl treatment, while it was the lowest in 150 mM NaCl treatment. Number of leaves and stem diameter were ranged between 5.55-7.77 and 2.50-2.84 mm. The highest chlorophyll a and b were determined in 25 mM NaCl traetment (0.0052 and 0.0025 mg fresh weight respectively).

Discussion: In a study which determines the effect of different NaCl doses on germination and plant growth of buckwheat, it is found out that experiments, when salt concentration increased, germination and plant growth were affected negatively as a result of experiments. In addition, the root and stem biomass with chlorophyll a and b values were promoted by 25 mM NaCl. However, it was found out that 50 mM NaCl and higher concentrations had significant negative effect on the plant.

Keywords: buckwheat, salt, germination, plant growth.
Spatial Differentiation of Population Change in Rural Settlements: The Case of Kastamonu

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Introduction: The development and change in the basic economic sectors have caused migration from rural to urban areas. This one-way population movement, which has been a part of the urbanization process, has caused a variety of problems in urban and rural areas and thus the level of development between urban and rural has changed. The reasons like inadequate development of non-agricultural sectors, inadequacy of employment and social facilities, and physical infrastructure problems has caused poverty and deprivation which have contributed to the increase of migration. In a period of rural and urban integration, rural areas in connection with urban areas need to be examined in term of socio-spatial interaction. In this context, the aim of the study is to examine the spatial differentiation of population change in rural areas taking into consideration of their spatial relations with the urban area.

Material and Methods: The study has been carried out in 178 rural areas of the Central District of Kastamonu city. Firstly, the increase/decrease rates of the population of these rural settlements between the years 2007 and 2017 were determined using the data obtained from Turkish Statistical Institute, then population change rates were analyzed spatially. In the spatial analysis, the effect of distance to the city on population change was examined.

Results: It is observed that the population have decreased in 65% of the researched rural areas. During this period, 24% of these areas have declined over 61%, 12% have 51-60%, 17% have 41-50, 13% have 31-40%, 14% have 21-30%, 10% have 11-20% and 9% have %10 and lower. According to the spatial results, it is seen that the high population losses were from the rural settlements which are either the closest or the most distant from the urban area. In addition, the population decreases in the settlements associated with the north, south and northeast axes of the city. On the other hand, it is determined that the population of the settlements near the city on the southeastern axis of the city has increased. However, on the southwest of the city, there is a balanced distribution of the rural settlements with increasing and decreasing population.

Discussion: The results show that dissolving in the rural areas continues. In order to ensure the balance of population in rural and urban areas and to create the necessary policies for this, it is important to determine the current situation firstly. In a spatial system where the time-space perception changes and the importance of the distances are lost, the distinction between rural and urban areas is also diminishing. In this case, it is thought that the building up the interrelations of the settlements will contribute to create of a base for the production of new spatial and sectoral policies.

Keywords: rural settlements, spatial differentiation, migration, Kastamonu
**Genome Wide Identification of Hsp100 Protein Family Members in Jujube Plant**

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**Introduction:** Heat shock proteins (Hsps) have key roles in great number of cellular processes like cell growth, viability and differentiation. The essential responsibility of these proteins is to manage the folding mechanism of denatured proteins under stress conditions. Hsp100 proteins play an important role in some protein folding mechanism including maintenance of cellular protein quality control, folding of newly synthesized proteins, refolding and reactivation of unfolded and misfolded proteins, assembly and disassembly of macromolecular protein constructs and targeting of abnormal and inactive proteins for degradation.

**Material and Methods:** Protein sequences belonging to jujube were gained from NCBI. The sequences were compared to Hsp domains defined in PFAM database. GSDS (Gene Structure Display Server) was used to determine exon-intron structure. Conserved motifs in ZjuHsp100 proteins were established by operating MEME-SUITE. The 3D construction of specified proteins was designed via PHYRE2. Gene ontology analysis were performed using Blast2GO to detect biological functions, cellular localization and molecular functions of the proteins. For defining of miRNAs targeting ZjuHsp100 proteins, psRNATarget database was utilized. Phylogenetic tree was generated by MEGA7 after the sequences were aligned with ClustalW.

**Results:** We classified 162 ZjuHsp100 genes in jujube genome. They were distributed on 1-12 chromosomes of jujube. Chromosome 2 contained 19 ZjuHsp100 genes. Furthermore, 31 of them were located on scaffold regions. Also, we discovered physical properties of ZjuHsp100 proteins which were composed of 75 to 5470 amino acids and the molecular weight of them was ranged from 8.3 to 617 kDa. The predicted three-dimensional structures of ZjuHsp100 proteins showed the alpha helical structural motif which was predominant in line with the literature. It was determined that ZjuHsp100 genes were targeted by 315 different miRNAs. More than one gene targeted by a few miRNAs was observed among them. When the conserved motifs were scanned, over 20 different motif patterns were detected. The exon-intron regions of the ZjuHsp100 genes were examined and found that 24 genes have no intron. The phylogenetic tree of ZjuHsp100 proteins was divided into 8 district regions. ZjuHsp100 genes were assigned to metabolic and cellular processes and biological regulation; located in organelles and different parts of cell. In addition, their molecular function was catalytic activity and nucleic acid binding activity.

**Discussion:** This study is intended to develop tolerance to stress conditions and may offer new opportunities for researchers in functional analyzes.

**Keywords:** Ziziphus jujuba, Hsp100, bioinformatics.
Post-Fire Regeneration Strategies of Mediterranean Region Pines

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Introduction: Many plant species demonstrate various adaptations at the point of survival or self-renewal after the fire. These adaptations, shown by plants, are evidence that the adaptive properties found in the structures vary with the end of the fire. The most common adaptations are; (1) fire-induced seed germination, (2) resprouting, (3) seed bank, and (4) bark thickness. The aim of this review is to bring out the post-fire regeneration strategies of the Mediterranean region pines and to provide results to discuss key points for further research.

Material and Methods: In this study, post-fire regeneration strategies of pine species (Pinus brutia, Pinus halepensis, Pinus nigra, Pinus sylvestris, Pinus pinaster, Pinus Pinea) exposed to fire most in the Mediterranean basin have been compared. The distribution of working species in fire sensitive areas, renewal strategies, relations between fire frequency and the success processes of the development of these species after fire are compared based on the data obtained from field surveys.

Results: In the study conducted, Pinus halepensis and Pinus pinaster species, which can generally produce abundant seedling production, directly regenerated by sprouting after the fire, on the contrary; Pinus nigra and Pinus sylvestris species, which can produce a few seedlings, have been identified as seed germination after the fire. The continuity and renewal of Pinus brutia and Pinus halepensis, which are from seeds germinated by compulsory seeds, and not capable of excretion, are carried out by cones called serotiny which are found in the top seed bank.

Keywords: fire ecology, regeneration strategies, pinus species
Determination and Bioinformatics Analysis of Hsp60 Genes in Jujube Genome

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Introduction: Molecular chaperones are very important machines for cell cycle, organismal growth and protein homeostasis. Especially, heat shock proteins (Hsps) have expression activities on various environmental stress conditions such as temperature, drought and salinity. Hsp60 is a type of heat shock proteins and participates in folding and aggregation of many proteins that are transported to organelles such as chloroplasts and mitochondria. They also play crucial roles in environmental stress tolerance in plants. Ziziphus jujuba is a type of crops and cultivated in India, Russia and especially in China. It belongs to Rhamnaceae family. In this study, possible functions of Hsp60s in jujube were determined by using bioinformatics tools.

Material and Methods: Protein sequences of Hsp60 gene family members from Ziziphus jujuba were obtained from NCBI databases and specific domains of Hsp60s were used for selection of these proteins. GSDS (Gene Structure Display Server) program was utilized for detection of exon-intron sites. Compositions of motifs located in Ziziphus jujuba proteins were determined by using MEME-SUITE database program. ZjuHsp60 proteins were analyzed in PHYRE2 program to predict their 3-D structure. Blast2GO program was used for identification of gene ontology analysis of Hsp60 genes which are grouped as biological process, cellular component and molecular function. miRNA target of ZjuHsp60 genes were also searched using psRNATarget Server database. Evolutionary interactions were detected by ClustalW alignment program and phylogenetic tree was created with MEGA7 program.

Results: A total of 39 ZjuHsp60 genes were detected in Ziziphus jujuba genome. ZjuHsp60 genes were distributed between 1 and 12 chromosomes and the most genes were occurred in 10th chromosome with 7 different genes. 11 ZjuHsp60 genes were determined in scaffold level. Amino acids length of ZjuHsp60 proteins were ranged from 80 to 1900. 3-D structures were also analyzed according to 90% reliability using PHYRE2 program and α-helix structure was detected dominantly in ZjuHsp60. Among conserved motif of ZjuHsp60 genes, it was detected that one of them does not have intron.

Discussion: In this study, ZjuHsp60 genes were identified using with bioinformatics tools. A possible functional characterization of ZjuHsp60 genes were highlighted. Such a like study has been extended our knowledge about usage of Hsp60 genes in comparative and functional genomics researches.

Keywords: Ziziphus jujuba, Hsp60 protein, genome wide analysis.
ORAL PRESENTATION

Re-Evaluation of Some Endemic Taxa in Terms of Risk Categories

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Introduction: During some botanical study in Bingöl and Elazığ, important data concerning new spreading areas and populations about some endemic taxa that are Silene hamzaoglui Budak, Nepeta baytopii Hedge & Lamond, Cephalaria elazigenesis Göktürk & Sümülb var. elazigenesis, Cephalaria elazigenesis Göktürk & Sümülb var. purpurea Göktürk & Sümülb have been obtained.

Material and Methods: In this study, risk categories were reassessed by taking into account the populations of taxa and their distribution areas. The material of the study consists of 4 endemic taxa whose distribution was determined in Bingöl and Elazığ. Flora of Turkey and the East Aegean Islands and articles related species were used to identify these plants. The IUCN version 12 was used to interpret the risk classes.

Results C. elazigenensis var. elazigenensis is known to occur in a single locality of Maden (Elazığ) was also found in Akdağ (Elazığ). This species is accepted in the category of Critically Endangered (CR), but in this study it will be counted in the category of Risk Endangered (EN). C. elazigenensis var. purpurea is known in Maden (Elazığ) and Kırşehir was also found its intensive populations in Arıcak, Palu (Elazığ). Considering the number of individuals and localities of this taxon which was evaluated in the EN risk class, it was accepted in the Vulnerable (VU) risk class. The spreading of the Silene hamzaoglui that was known in one locality of Yozgat was also determined in Bingöl and Ağın (Elazığ). This species was assessed in the CR category and was considered in EN risk class. The extending area of Nepeta baytopii generally is known between Bingöl and Diyarbakır but its intensive populations was determined in various parts of Bingöl. Considering the number of individuals and localities of this taxon which was evaluated in the EN risk class, it was accepted in the Vulnerable (VU) risk class.

Discussion: According to IUCN 2016, it is appropriate to include of C. elazigenensis var. elazigenensis in EN (criteria B1 a b (iii)) category, since its spreading area is more than 100 km² and the number of localities is 3; it is appropriate to include C. elazigenensis var. purpurea in the VU (criteria B1 a b (iii) risk class, since its extent of occurrence is more than 5000 km² and its number of locality more than 5, it is appropriate to include of S. hamzaoglui is included in EN (criteria B1 a b (iii)) category, since its extent of occurrence is more than 100 km² and the number of localities is 5; it is appropriate to include N. baytopii in the VU C2 a(i) risk class since it has a locality number of more than 5, mature individuals’ number in populations is more than 5,000.

Keywords: risk categories, Akdağ, Bingöl, Elazığ, IUCN.
Ecological Wood Anatomy of the Field Maple Taxa (Acer campestre-Sapindaceae) Naturally Growing in Turkey

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Introduction: The genus Acer L. is represented with 12 species and 11 subspecies in Turkey. Acer campestre is one of these Acer species and is distributed over Turkey, Europe, UK, Western Asia and North Africa. Within its distribution area, 2 subspecies (Acer campestre subsp. leiocarpum (Opiz) Schwer. and Acer campestre subsp. marsicum (Guss.) Hayek) together with main species of Field maple, live in mesophytic areas up to 2100 m above sea level. Field maple (Acer campestre L.) is a medium-size tree and can be found in mixed deciduous forests as secondary tree species. In Turkey, in addition to Acer campestre, Acer campestre subsp. leiocarpum can also be seen in natural habitats. These taxa are distinguished from each other by their nutlets, young shoots and petioles.

In this study; ecological wood anatomy of the Field Maple was conducted northern part (Black Sea Region) of Turkey by dividing study area into three growing sites as "Eastern Black Sea Region", "Middle Black Sea Region" and "Western Black Sea Region".

Material and Methods: 27 wood samples and 17 soil samples were taken from altitudes between 167 m and 1878 m from the Eastern Black Sea Region. 16 wood samples and 13 soil samples were taken from the 3 m to 1295 m altitudes in the Middle Black Sea Region. Lastly, 8 wood and soil samples were taken from altitudes between 371 m and 1430 m from the Western Black Sea Region. Wood samples were obtained by entering under the bark at 1.30 m height of the tree. Soil samples were taken from the top soil (0-20 cm) at the points where the wood samples were taken. Measurements and counts on vessel, ray and fibers on the wood samples. Hygroscopic moisture, soil reaction (pH), organic matter, field capacity and moisture at the fading point, available water capacity measurements and soil mechanic composition and soil type identification were realized on soil samples.

Results: According to the result of variance analysis made with wood anatomy and soil data; it has been understood that wood and soil properties such as the number of vessels at 1 mm², vessel tangential diameter, vessel radial diameter, multiseriate ray width, numbers of ray at 1 mm², numbers of multiseriate ray at 1 mm², numbers of uniseriate ray at 1 mm², fiber width, fiber lumen width, fiber wall thickness, the sand ratio, dust ratio, clay ratio, available water capacity, pH, electrical conductivity, amount of organic matter and total amount of lime vary one region to another.

Discussion: According to the Duncan test, the number of vessels at 1 mm², the number of ray at 1 mm², the number of multiseriate ray at 1 mm², the number of uniseriate ray at 1 mm², the sand ratio and the total amount of lime are collected under 3 homogenous groups. The number of vessel at 1 mm², the number of ray at 1 mm², and the number of uniseriate ray at 1 mm² were decreased from Eastern to Western Black Sea Region.

Acknowledgements: This research is funded by the Karadeniz Technical University Scientific Researches Projects Department (2007.113.001.3)

Keywords: Acer campestre, ecological wood anatomy, soil properties, Black Sea
Determination of Flea Beetle Species Which is Harmful on Rocket and Cress in Ankara, Konya and Eskişehir Province of Turkey

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Introduction: Vegetables are important for human nutrition in terms of macro and micro nutrients such as carbohydrates, fat, protein, vitamins and minerals. In Eskişehir, Ankara and Konya provinces, 38000 decares are cultivated and 93000 tons of products are produced. Vegetables are often subject to quality and quantity loss during growing period due to biotic and abiotic factors. Plant protection studies are of great importance to prevent these losses. In this study, it was tried to determine the pest of rocket and cress. In this study, flea beetle species damaging the rocket and cress in Central Anatolia Region were determined for the first time. Alticinae species, the largest subfamily of the Chrysomelidae family known as flea beetle, cause damage by feeding on vegetables, industry and culture plants. This pest is causing damage by opening holes in the leaves of plants.

Material and Methods: The surveys were conducted in Ankara, Konya and Eskişehir provinces within 2 weeks intervals. Adult individuals of the flea beetles on the plant were drawn by oral aspirator. The insects were then transferred to glass bottles containing 70% alcohol. Land studies were carried out between 2015-2017.

Results: Phyllotreta cruciferae (Goeze), Phyllotreta atra (Fabricius, 1775) and Epithrix sp. were determined in the rocket cultivation areas. Phyllotreta atra (Fabricius, 1775) was detected in cress cultivation areas.

Discussion: Alticinae species, the largest subfamily of the Chrysomelidae family known as flea beetle, cause damage by feeding on vegetables, industry and culture plants. Identified species were identified previously in different parts of our country. Flea beetle is determined to have caused significant damage in the rocket and cress cultivation areas. It was determined that the most damage was seen during the seedling period due to these insects.

Acknowledgement: This study was supported by the General Directorate of Agricultural Research and Policy. We would like to express our sincere thanks to Diğdem CORAL ŞAHİN (Plant Protection Central Research Institute, Turkey) for identification of the flea beetle species.

Keywords: rocket, cress, flea beetle, Ankara, Konya, Eskişehir, survey, damage
A Checklist of the Solifugae (Sun-spiders) of Iraq (Arachnida: Solifugae)

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**Introduction:** Solifugae are commonly known as “solfugids”, “camel spiders”, “sunspiders”, “walzenspinnen”, “false spiders” or “wind scorpions”, are known from more than 1075 species worldwide. They are solitary animals with a pair of enormous jointed pincer-like chelicerae and have no venom glands. Solifuges are distributed throughout the tropical and semi-tropical regions, usually in hot or warm arid environments. The known distribution of Solifugae families in Iraq is still fragmentary, with large areas without records. Solifuges represent one of the worst investigated groups of invertebrates in Iraq. The aim of this study is to present data on the solifuges species (Arachnida, Solifugae) recorded on the territory of Iraq during the whole period of the study.

**Material and Methods:** A checklist of Solifugae of Iraq is presented here based mainly on published records.

**Results:** A total of sun-spiders represented by 27 species and two subspecies and 12 genera in five families, Daesiidae, Galeodidae, Gylippidae, Karschiidae and Rhagodidae. All species are provided with references to the papers where they were mentioned.

**Discussion:** In spite of the fact that some of the records might be considered doubtful, they were included in the checklist due to the absence of evidence that they are incorrect. Four species that was not recorded previously is included in the list.

**Keywords:** Solifugae, solifuges, fauna, Iraq, checklist
Roles of WRKY Transcription Factors on Biotic Stress in Wild Potato

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\textbf{Introduction:} Transcription factors are proteins that bind to DNA-regulatory sequences to regulate the rate of gene transcription. They play an important role in many biological functions. In organisms, the response to stress is generated by the complex interaction of many genes at transcriptional level, and a large number of transcription factors are involved at these stages. Wild species with higher tolerance to stress conditions have very high potential for use in increasing yield studies. Therefore, the identification of genomic structures of wild plants is of great importance. We previously identified WRKY transcription factors in wild olive using bioinformatic tools. In the concept of this project, expression levels of the identified WRKY type transcription factors in wild potato (\textit{Solanum commersonii}) have been identified \textit{in silico} in two transcriptome libraries. The data was compared between the libraries, and the effects of WRKY transcription factors on biotic stress in potato plant have been investigated.

\textbf{Material and Methods:} In order to identify expression of WRKY transcription factors, transcriptome libraries of \textit{Ralstonia solanacearum} pathogen infected and control plants have been used. The sequences of two transcriptome libraries were mapped to wild potato genome via Bowtie software. After assembly, differential expressed regions have been identified by EpiCenter program. The retrieved sequences have been annotated via Blast analysis against known WRKY TF sequences.

\textbf{Results and Discussion:} The differential expressed WRKY TFs have been identified within the libraries. A number of WRKY TFs have been found to be regulated upon biotic stress The obtained results will be discussed.

\textbf{Acknowledgement:} This work was supported by Cankiri Karatekin University Scientific Research Committee (Project Number: FF200217B23).

\textbf{Keywords:} bioinformatics, potato, stress, transcription factor
Assessment of Zonguldak Province’s Potential Scope of Ecotourism by GIS Method

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Introduction: In the twentieth century, as a result of the mass tourism becoming more and more pervasive, ecological systems began to deteriorate, the environment polluted, cities became increasingly crowded and natural resources are consumed rapidly. Individuals’ education level and income increased, environmental awareness improved, and interest in natural, cultural, historical resources increased in course of time. In this manner, modern tourist profiles have turned into ecotourists who are environmentally sensitive and observe protection-usage balance during the vacation instead of tourism activities based on sea-sand-sun. Zonguldak province, located in the Western Black Sea region, has ecotourism potential thanks to its natural, cultural and historical resources. The aim of this study is to evaluate the ecotourism elements in Zonguldak, using the GIS (Geographical Information System) method and map out the Zonguldak’s ecotourism potential.

Material and Method: In this study, GIS method which utilizes in many areas such as the private-sector and the public-sector, has been used. GIS method is a computer-aided design and drawing program that enables an areas’ geographic and verbal datas to evaluate and analyze them together in a specific connection and to display the result reports on smart maps.

Results: Zonguldak province has an important potential for ecotourism in terms of its natural, historical and cultural resources. These resources in Zonguldak, allow tourists to participate in a various alternative tourism activities such as sportive fishing, cave tourism, trekking, botanical tourism and cultural tourism. Zonguldak province is also convenient for weekend activities due to proximity to cities like Istanbul and Ankara. As a result of the research, areas with potential for ecotourism for the province of Zonguldak have been identified and mapped using the GIS method.

Discussions: Thanks to Zonguldak Ecotourism Map, which created as a result of this study, Zonguldak province’s tourism promotion activities could be done more efficient and tourists could be informed correctly about the areas they want to visit. By using the GIS method, scientifically based maps could be created that show Zonguldak province’s other touristic/nontouristic resources. Also this ecotourism map could be developed over time and could lead to future studies.

Keywords: ecotourism, ecotourism potential, GIS method, Zonguldak.
Some Population Parameters of Golden Grey Mullet (*Chelon aurata*)

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**Introduction:** Golden grey mullet, *Chelon aurata* is widely distributed in the Mediterranean, Black, and southern Caspian seas, as well as along the northeastern Atlantic coasts. They inhabit coastal lagoons and estuaries where they constitute target species for artisanal fisheries with about 20,000 ton/year catch. Golden grey mullet is also cultured in lagoons and ponds. They also play a crucial ecological role as food of large predator fish and as biotic vectors of organic matter between littoral habitats and the open sea. There has been a decline in fry availability of some mullet species in recent years due to pollution and overfishing of parent stocks. In many countries there is a minimum allowed fish length for golden grey mullet of 20 cm. Golden grey mullet populations need to be monitored continuously for sustainability of stocks and responsible fisheries. In the study some population parameters and length distribution of *Chelon aurata* were investigated caught in 2016-2017 fishing season.

**Material and Methods:** 212 golden grey mullet were collected between September 2016 and February 2017. Total lengths (cm) and body weights (g) were measured for all specimens. Size distribution, Fulton’s condition index (K), length-weight relationship were estimated by following equations;

\[
K = \frac{W}{L^3} \quad W = aL^b
\]

**Results and Discussion:** The total length of individuals ranged from 11.5 to 42.8 cm, while the weight ranged from 8.66 to 591.71 g. Average total length and average body weight was determined as 30.24 ±0.327 cm and 257.58 ± 6.851 g. Minimum allowed landing size of golden grey mullet is 20 cm in Turkish fisheries legislations. Proportion of small fish than 20 cm are only 2% (4 specimens). It is very compatible to legislation and sustainable fisheries. Length weight relationship was estimated as \( W=0.0438 \; TL^{2.532} \) (\( r=0.95, \; N=202 \)) and Fulton’s condition index (K) was as 0.0093±0.00012. Estimated LWR parameters and FCI are consistent with previous studies both from Turkey and other Mediterranean countries.

**Acknowledgement:** We would like to express our appreciation to the Sinop University Scientific Research Project Commission, which supported this study (SÜF - 1901-15-02).

**Keywords:** golden grey mullet, *Chelon aurata*, sustainable fisheries, population dynamics,
Introduction: Many studies have been conducted about Brutian pine which is a primary forest tree species in Turkey. However, the studies on the relationships between alpha diversity of species and ecological site factors are very few. In recent years, biological diversity has become one of the most important issues in ecological research. From this point of view, in this study, it is aimed to reveal the relationship between the plant species diversity and environmental factors in Brutian pine forests of Gölhisar district.

Material and Methods: The study was carried out in natural Brutian pine forests and the data were obtained from 42 plots in 20x20 m dimensions. Coverage values (%) of plant species in sampling areas were converted to Braun-Banquet method. These values were then subjected to a second transformation process as suggested by Fontaine et al., (2007). In the study, altitude, slope, radiation index, height index, aspect favourability index and climate variables are included as environmental factors. After the alpha plant species diversity according to the Shannon index was calculated by the PAST software and site factors-diversity relations were determined by Pearson Correlation Analysis in SPSS package program and Principal Component Analysis in PAST software.

Results: In this study, 100 different plant species were identified in 42 sampling sites. The Shannon diversity index values calculated in the sampling areas range from 1,466 to 2,834. Pearson correlation analysis showed that there was a positive correlation between the alpha species diversity and the limestone bedrock. As a result of Principal Component Analysis; alpha species diversity is negatively associated with mean temperature and sandstone in a positive relationship with the slope and limestone bedrock.

Discussion: Such as many other countries, Turkey has become a party by signing the biodiversity convention. Scientific studies are needed to fulfill the requirements of this convention. Thus, in recent years, many valuable studies have been carried out on biodiversity. However, there are few studies that can reveal the relationship between alpha species diversity and environment characteristics. In this respect, this study has been carried out in which important information can be provided for the biodiversity concept. On the other hand, Brutian pine is an important forest tree species which has the widest distribution in Anatolia. This situation increases the widespread effect of the results obtained in the study. It is also aimed that this information will be an important reference source for future researches about biological diversity.

Acknowledgement: We would like to express our appreciation to the Mehmet Akif Ersoy University Scientific Research Project Commission, which supported this study (0295-NAP-16)

Keywords: biodiversity, alpha species diversity, environmental factors, Gölhisar district
Evaluation of the Heavy Metal Pollution in Bishkek-Kyrgyzstan Using *Mentha longifolia* As Biomonitor Organism

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**Introduction:** As being major economic center, Bishkek, capital of the mountainous Central Asian country Kyrgyzstan shows a continuous high rate of urbanization as a result of economic and industrial development in recent years; therefore, urban pollution, showing a negative impact on environment continuously raises up in the city. Hence, a biomonitoring research was launched for the estimation of the rate of heavy metal pollution in the city.

**Materials and Methods:** This study was carried out along the Alamedin River passing the city to understand the rate of heavy metal pollution using *Mentha longifolia* as a biomonitor organism. Water from the River is used for drinking and watering in a wide area. The plant and co-located soil samples collected from different localities were used for the determination of heavy metal and nutrient element contents by employing ICP-MS.

**Results:** The lowest and highest heavy metal and mineral element contents of the plant samples (in mg.kg\(^{-1}\)) were found to be as: 22.57 (in stems) and 460.11 (in roots) for Al in stations 3 and 5; 250.03 (in stems) and 2651.67 (in roots) for Ca in stations 10 and 5; 0.328 (in stems) and 2.454 (in roots) for Cr in stations 3 and 8; 1.69 (in roots) and 10.47 (in stems) for Cu in stations 8 and 10; 13.014 (in washed leaves) and 138.37 (in roots) for Fe in station 4; 255.6 (in roots) and 1680.9 (in stems) for K in stations 4 and 10; 157.6 (in stems) and 1761.4 (in unwashed leaves) for Mg in stations 1 and 10; 0.354 (in stems) and 4.955 (in unwashed leaves) for Ni in stations 3 and 1; 11.036 (in washed leaves) and 75.45 (in roots) for Pb in stations 6 and 1; 75.58 (in stems) and 238.5 (in unwashed leaves) for Zn in stations 3 and 10, respectively.

**Discussions:** According to our data, the normal limits were exceeded or close to upper limits in all or some stations for Cr, Ni, Pb (in toxic or close to toxic range) and Zn whereas the concentrations of Cu and K were found to be in ranges of lower than normal limits. The levels of Al (except station 1), Ca, Fe, Mg (except station 1) were found to be within the normal limits in all stations. Our data indicated that the presence of heavy metals influenced the uptake of mineral elements as a consequence of heavy metal depositions in the plant.

**Keywords:** *Mentha longifolia*, Biomonitoring, Heavy metal pollution, Bishkek
An Unrealized Dream: Homo Economicus and Environmental Awareness

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Introduction: As the environmental problems become a global crisis, the search for solutions has been made. The removal of environmental damage caused by basic human activities is dependent on the struggle of the human. Just at this stage, homo economicus emerges which defines the motive for profit. Humans, who prioritize the motive of profit, have never found a way of giving up the added value created by their activities in order to prevent environmental destruction. While trying to overcome the environment and development dilemma with the theories like sustainable development, mankind always listen the voice of homo economicus. Homo Economicus started to deal with environmental problems after started to incur losses human health especially his economy. He explained the problem in general for economic reasons and tried to reduce the solution proposals to economic concepts. While Homo economicus' profit motive that incurred losses, produces sharp resolutions in environmental protection and prevention of environmental pollution in the short span, it creates a series of problem areas with socio-economic facts. The aim of the study is to try to argue that homo economicus defined by the economic profit motive, have environmental awareness or not.

Material and Methods: The study method was based on the literature search. A general review was made with the research on the subject via academic resources.

Results: This study emphasizes the market mechanism have resultant solutions on environmental problems. But at the same time it causes deepen problems especially for poor people. Because homo economicus always prefers own profit instead of environmental awareness. When homo economicus gains and pollutes the environment, poor people can not even meet their basic needs. Homo economicus' activities that make up his profit also harmful for the environment. Just like all facilities of the development. Thus it defined that it is difficult to walk together with the profit motive of environmental awareness.

Discussion: It is necessary to abandon the profit motive at the point of contributing to the solution of environmental problems. It emphasized the necessity of changing the angle of view.

Keywords: Profit Motive, Environmental Problems, Environmental Awareness, Homo Economicus, Market Mechanism.
Comparison of Invertebrate Soil Fauna in Fir Ecosystems in Different Sites

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Introduction: Litterfall and soil organic matter are decomposed into nutrients for plants by the decomposing microorganisms. The invertebrate soil fauna, which plays an important role in decomposition, consists of animals sheltered and fed in the soil and litter fall habitat. These animals create a dynamic food web with bacteria, fungi and each other. In this study, the amount and the diversity of the soil fauna in the natural Uludağ Fir (Abies nordmanniana subsp. bornmulleriana Mattf.) forest ecosystems in Bolu and Safranbolu were compared to each other.

Material and Methods: This research was conducted over the vegetation season in pure fir forests growing at altitudes of 1400 meters in Bolu and Safranbolu. The samples were taken once in spring, summer and fall seasons. Four samples of litterfall and soil samples were taken from the sampling points determined in two forests and in each season. Litter samples used in the extraction of invertebrate soil fauna were taken from the sampling point using a cylinder of 5-cm diameter being as thick as the litter cover, while 5-cm thick soil samples were taken from the upper mineral soil to a depth of 5 cm. Invertebrate soil fauna were collected from the litterfall and soil samples using the Berlese funnel method and counted and classified using a 7x-180x stereo zoom microscope.

Results: The results of the analysis indicated that the fir forest in Bolu has a higher biological diversity than the fir forest in Safranbolu. The Shannon's diversity index (H’) of the invertebrate soil fauna in both forests was found to be higher in the litterfall (H’ = 2.71) than fauna diversity in the soil (H’ = 2.44). Similarly, the taxonomic richness (S’) is greater in the litterfall (32) than in the soil (28). The amount and variety of invertebrate soil fauna varies between seasons. Additionally, Acarina and Collembolans comprising the faunal community in both forests are the most dominant taxonomic groups.

Discussion: We determined the amount and diversity of invertebrate soil fauna in soil and litterfall in Bolu and Safranbolu fir forests. It was shown that similar taxa were found in both forests. The most dominant taxa are Acarina, Collembolans and Insecta classes, respectively. Similar studies indicated that 60% of total fauna consists of Acarina, 30% Collembola and 10% other taxonomic groups. Although some of the taxa that constitute the community structure of the fauna within the soil and litterfall shelter or live in litterfall and some other generally live in soil, there are also some taxa commonly found in both layers or habitats.

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Keywords: Soil, litter, Berlese funnel, ecosystem, biological diversity
The Morphological Comparison of *Darevskia rudis* (Bedriaga, 1886) and *Darevskia bithynica* (Mehely, 1909) from Turkey

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Introduction: *Darevskia rudis* complex have a series of taxonomic revisions. Based on the external morphology and osteology, *Darevskia rudis bithynica*, one of the subspecies of *D. rudis*, was raised to species rank with two subspecies and *D. rudis* remained with its 6 subspecies in Turkey. However, mtDNA and microsatellite DNA data suggested that *D. rudis* complex still continues.

Material and Methods: A total of 92 adult specimens (35 specimens for *Darevskia rudis rudis*, 14 for *Darevskia rudis bischoffi*, 4 for *Darevskia rudis bolkardaghica*, 6 for *Darevskia rudis macromaculata*, 7 for *Darevskia rudis obscura*, 4 for *Darevskia rudis mirabilis*, 5 for *Darevskia bithynica bithynica*, and 17 for *Darevskia bithynica tristis*) which were collected from different localities in Turkey were included in the univariate (ANOVA) and multivariate (Discriminant) analyses in terms of 20 morphological characters.

Results: ANOVA based on pholidosis characters (DOR, MG, TVP, LVP, MARP, PA1, M-TP, PT, VENDOR, FPa, FPb, C, SCPa SCPb, and M-ST) confirmed differences among the taxa except SRLa, SRLb, SCGa, SCGb and PA2. However, morphometric measurements (SVL, lenght of tail, SVL/tail lenght) did not show significant differences among the taxa. In the discriminant analysis the first two dimensions were meaningful (Eigenvalue > 1). The main part of the variability was concentrated in the first axis, whereas the second one had less importance. The first axis showed that *D. r. bischoffi* was located in its positive part while *D. r. bolkardaghica* was in the negative part and the remaining *D. rudis* and *D. bithynica* spp. were in both positive and negative parts. The second axis showed *D. r. macromaculata* was in its positive part while *D. r. bolkardaghica* was in the negative part and the remaining *D. rudis* and *D. bithynica* spp. were in both positive and negative parts.

Discussion: Although the results of the present study showed that *D. r. bischoffi* and *D. r. macromaculata* located in their positive parts, the distances among group centers were not much and ANOVA did not show significant differences among the taxa. Our results are similar to findings of the phylogenetic study suggesting that polytomy of *D. rudis* continues. More comprehensive comparisons including more individuals belonging to all taxa of *D. rudis* complex are necessary.

Acknowledgement: The animals were treated in accordance with the guidelines of the ethics committee of the Karadeniz Technical University (KTU.53488718-336/2017/21). Capture permission no: 72784983-488.04-70542 issued by the ministry of Forest and Water Affairs of Turkey. This study was supported financially by the Karadeniz Technical University Scientific Researches Unit (FDK-2017-6794).

Keywords: pholidosis, morphometry, polytomy, Spiny Lizard
Introduction: Mammal fur has been used as an important material throughout the human history. In this sense, especially carnivorous mammal fur trade became important in the world as of the 19th century. Hair structure features shows differences in considerable details of wild animal life. Hair morphology is widely used to elucidate some criminological cases. In fecal analysis, the hair morphology is again accounted for providing important information about nutrition ecology. Furthermore, it is quite often that fur colour and hair structure take part in some taxonomic and systematic studies. The purpose of this study is to determine fur and hair structures features of wolf, one of the largest carnivore in Turkey.

Material and Method: This study was based on 25 wolf specimens collected from various regions of Turkey. Specimens were examined fur colour according to age, sex and geographical region. Guard hair sample collected from dorsal part was examined on a light stereomicroscope with imaging system. Guard hair samples of specimens collected from different age, sex and geographical region were examined and then photographs were taken by scanning electron microscope.

Results: Even if the young and mature furs of the specimens are more or less different, the fur is gray tinged blackish on dorsal and extends in a narrow strip from the shoulders to the tail. Each sides are slightly reddish tinged pale grayish yellow. Ventral is very light pale yellowish tinged dirty white. Guard hairs were generally examined in terms of structure of root, shaft and tip part and it was determined that they were irregular wavy crenated type.

Discussion: In samples taken from Sweden, Russia and Italy, it was noted that the general colour on dorsal was yellowish brown or buff and pale buff or whitish buff on ventral. In the former Soviet Union specimens, it was determined that on summer fur the dorsal colour was grayish rusty with black tips and ventral colour was pale yellowish brown. In our samples, the colour of the dorsal is very light gray, the ventral is very light pale tinged yellowish duty white. It is thought that the difference in fur colour in different geographies may be related to the the representation of subspecies. It was recorded that the structure of hair taken from the wolf fur in Turkey was "wavy crenated" type. When the hair samples were examined under electron microscope, it was determined that they are "irregular wavy crenated" type.

Keywords: Pelage colour, Hair structure, Scale patterns, Wolf, Turkey
Production and Characterization of Edible Films from Two Different Plant Proteins

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Introduction: Edible films and coatings are materials that can be consumed with them without being removed, used in packaging to extend the shelf life of various foods. In this study, composite edible films were produced from soy and pea protein by adding cappa carrageenan, xanthan gum, maltodextrin and glycerol after that their properties (thickness, solubility, water vapor permeability and mechanical properties) were determined. In addition, soy protein isolate(SPI) and pea protein isolate(BPI) films with the same formulations were compared.

Material and Methods: Edible films were prepared modified from the method used by Choi and Han, 2001. SPI and BPI as a protein source, cappacarrageenan, xanthangum, maltodextrin as polysaccharides, pure water as a solvent and glycerol solution as plasticizer were used in this study. The thickness of the films was determined by a digital micrometer with a precision of 0.001mm. Resolution of films were determined according to Gontard et al.(1992). The water vapor permeability analysis of the films was carried out at 25°C according to ASTM E96-80 (ASTM, 1983) Standard method. The mechanical properties of the films were determined according to the Standard method of ASTM D638 (ASTM, 1993).

Results: The highest resistance strength was measured as 10.9178±1.119 MPa in sample1(1S) prepared using soy protein. The lowest resistance strength was observed as 0.0978±0.001 MPa and 0.2060 ± 0.001 MPa, in sample4 and sample8 respectively. The highest water vapor permeability was shown in sample8 as 1.949 ±0.020 g mm / m²kPa. The lowest water vapor permeability was found in samples 1S and 2S as 0.2558±0.013g mm / m²sa kPa and 0.3087±0.016g mm / m²sa kPa, respectively. The highest elongation % values were found in samples 17S and 18S respectively. The lowest elongation% was determined to be 1.66±0.20% in sample12B prepared using pea protein. The highest solubility % values were measured in samples 10S and 12B respectively. The lowest solubility % value was determined as 7.550 ± 0.12%, in sample 16S The lowest solubility % value was determined in sample16S as 7.50%±0.12.

Discussion: Films with pea protein isolate was slightly weaker than films with soy protein isolate, but comparable results were obtained. Only maltodextrin was insufficient to formation a film, but if it is used with an other components, it enchances the cohesiveness of the films.

This study was supported by Karadeniz Technical University, Department of Scientific Research Projects, cod no: BTAP 8648.

KeyWords: Edible coating/film, Pea protein, Soy protein, Composite films
Al and Cd Accumulation in Kalanchoe Clones and Their Impact on Plant Mineral Nutrition

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Introduction: Cadmium (Cd) is a phytotoxic heavy metal and thus its accumulation in crops poses serious threats for public health. Its toxicity reduces photosynthesis, distorts mineral nutrient and water uptake, and causes visible symptoms such as growth retardation, chlorosis, browning root tips and even plant death. Aluminum (Al) is another toxic metal in plants and its pile-up has been also a major agricultural problem, especially in the acidic soils. Due to its solubility in acid soils (low pH), plants could not fully develop their root systems and show various nutrient deficiency symptoms, resulting in reduced plant yield. Al hinders uptake, transport and use of essential mineral elements such as Ca, Cu, Fe, Mg, Mn, K, P and Zn. So, present work attempted to investigate Al and Cd accumulation in kalanchoe clones and their impacts on plant mineral nutrition.

Materials and Methods: Young plantlets (clones) were raised from kalanchoe bulbiferous spurs. During 75 days, plants were watered on alternate days with 20ml Hoagland solution including 0, 50, 100 and 200 μM AlCl₃ and CdCl₂ mixed. Sulfuric acid (0.2%) was applied by spraying on plant soils of test groups, following each irrigation day. At the end of study period, Al and Cd accumulation in plant roots, stems and leaves, and their impacts on plant mineral nutrients were analyzed using ICP-MS.

Results: Al concentrations (mg.kg⁻¹) in control, 50, 100 and 200 μM applications were 55.573, 129.311, 143.457 and 186.370 in roots, 5.749, 6.853, 7.186 and 7.477 in shoots, and 11.520, 12.244, 12.256 and 12.958 in leaves, while Cd concentrations (mg.kg⁻¹) were 0.544, 11.674, 17.596 and 41.310 in roots, 0.123, 5.411, 7.726 and 12.054 in shoots, and 0.249, 11.268, 16.712 and 19.720 in leaves respectively. In addition, Ca, Co, Cu, Fe, K, Mn, Mo P and Zn levels in plant roots, shoots and leaves were found as altered upon Al and Cd treatments.

Discussion: Present work demonstrated that mixed Al and Cd applications/stresses could considerably affect the mineral nutrient status in kalanchoe plants. However, plants were also observed being able to survive/manage under this stress conditions.

Keywords: Kalanchoe daigremontiana, Mineral nutrition status, Heavy metal toxicity, Heavy metal stress
A Review of Microplastics and Additive Chemicals

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Introduction: Plastic debris, a large component of marine litter, is ubiquitous in the marine environment and internationally recognized as a matter of increasing concern. Microplastics (MPs) ingested by marine organisms exhibit a wide variety of physicochemical properties such as size, density, shape and composition and, at this size (<5mm), are extremely slow to degrade further and prone to ingestion by a range of marine organisms.

Material and Methods: Microplastic uptake can also lead to exposure of organisms to additive chemicals. Plastics usually contain additives depending on the type of plastic (composition), synthesis route, and degree of material purification. These additive chemicals, such as phthalates or phthalic acid esters (PAEs), bisphenol A (BPA) or parabens are typically employed to improve the mechanical performance of a specific plastic.

Results: Bisphenol A (BPA) associated compounds (alkylphenols) are found in several products used in daily life such as dental sealants, cladding layers of tin cans, bottle caps, CDs and DVDs, electronic equipment, and vehicle parts. In addition, thermal papers contain BPA in free or unpolymerized form and therefore BPA contamination can occur during paper recycling. Global production of BPA exceeds 3 million tons per year, of which 700,000 are produced and consumed in the European Union. BPA and alkylphenols are bioaccumulative and affect the endocrine systems of living organisms and are harmful to human health. On the other hand, phthalates (PAEs) are widely used as plasticizers in order to make plastics such as PVC more elastic and flexible. These compounds are found in a wide range of consumer products such as food packaging, including floor and wall covering, paints, furniture, toys, building materials, clothing, pipes and some medical devices. PAEs are also incorporated as fixatives in many cosmetic products: perfumes and lacquers. PAEs are not chemically bound in polymers. Therefore, migration or release of the product’s PAEs to water, air or other media in contact with the product is likely to occur. Some of PAE compounds are classified as toxic for reproduction and identified as endocrine disruptors by the European Commission.

Discussion: Finally, it is worth noting that the above contaminants are already included in the main European directives regulating the production and use of chemicals (REACH, European Water Framework Directive). However, little is known about the distribution, of these compounds in seawater as well as on their transfer in the marine food web, mainly because of analytical difficulties.

Keywords: Microplastic, Additive chemicals, Bisphenol A (BPA), phthalates (PAEs)
Introduction: The classis Mammalia has 29 orders including 5416 species all over the world. A total of 171 mammal species belonging to 9 orders in Turkey has been recorded. Each species plays an important role in natural balancing as a wildlife element. People have different approaches to wild animal. Recently, ecological researches have been carried out by direct and indirect methods. In this context, habitat, food diet and distribution area of a species using its nest, trace, feces and skeleton fragments is determined. The aim of this study is to determine existing of some wild mammal species using direct methods in Kırıkkale Province.

Material and Methods: This study is based on records of habitat features, skeleton fragments, footprints, teeth marks and feces encountered during field work in Kırıkkale Province between December 2015 and April 2017. Camera trap, camera, GPS, binocular and tape measure were used in the field work. Analyses of feces samples obtained from field were carried out in laboratory. According to the results of the analyses, it was determined that the animal nutrients are higher than those of vegetable. Taxa were identified and photographs of their food were taken.

Results: Sixty percent of Kırıkkale Province is agriculturally and, 40% is rural and degraded forest vegetation areas. Agricultural lands cover some plant species such as sunflower, wheat, barley, chickpeas and corn. Wildlife elements are almost encountered in everywhere from mountainous to suburban places. Nest, tooth mark and footprint were used for the determination of wolf, fox, brown hare, badger, stone marten, otter and wild boar. Characteristic features belongs to each species were determined.

Discussion: Footprints of fox, badger, marten, otter and wild boar can be clearly distinguished in every season. Wild rabbit footprints are more prominent in winter than they are in summer. Grey wolf footprint can be generally mixed with some dog footprint. Teeth marks of wild boar on the soil are easily noticeable. Each species has its own unique stool shape. By looking at these traces, information about the distribution of species and food diets can be obtained in the wildlife.

Keywords: Wildlife, Fecal analysis, Food diet, Footprint, Mammal traces
**Superoxide Dismutase and Catalase Activities in White Rot Fungus Phanerochaete chrysosporium exposed to Municipal Landfill Leachate from Elazığ, Turkey**

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**Introduction:** Leachate includes many hazardous chemicals such as environmental persistence, toxicity, mobility, and lipophilicity, resulting in bioaccumulation in food web. Composition of leachates is usually characterized by a high level of organic matter. Leachates also contain some metal trace elements and different kinds of organic pollutants. Therefore, these cocktails of pollutants may have possible toxic and genotoxic effects. White-rot fungi are important environmental microorganisms, which have been applied in many fields. *Phanerochaete chrysosporium* is a commonly studied white rot fungus to mineralize and degrade wide variety of agricultural and industrial pollutants. This present study aims to evaluating Superoxide Dismutase (SOD) and Catalase (CAT) Activities in *P. chrysosporium* exposed to LL.

**Material and Methods:** Physiochemical characteristics of leachate (chemical oxygen demand, electrical conductivity, pH, phosphate, turbidity, NH₃, Cl⁻, and color) were determined. *Phanerochaete chrysosporium*, ME 446 was maintained at 4 °C after sub-culturing at 28 °C on Sabouraud Dextrose Agar (SDA). Superoxide Dismutase and Catalase Activities in *P. chrysosporium* were tested after exposure of different dilution rates of leachate (1/10 and 1/20) to fungus pellets obtained during agitated culture conditions (in 150 rpm at 28 °C). At the end of the exposure period, pellets were filtered with Wathman filters, filtered pellets were weighed, then diluted with potassium chloride buffer (pH 7.4) and homogenized. Then, samples were centrifuged at 2,500 rpm for 5 min at 4 °C. The supernatant was assayed for Superoxide Dismutase and Catalase Activities.

**Results:** In this study, SOD activities were decreased in the group LL 1/10 diluted with tap water) (p>0.05) compared to control group for 24 hour. SOD activities were decreased in the group LL 1/20 diluted with tap water (p>0.05) compared to control group for 96 hour. CAT activities were increased in LL diluted 1/10, 1/20 diluted with tap water compared to control group for 24- and 96-hour but the differences among the application groups were not statistically significant (p<0.05).

**Discussion:** In conclusion, it has been demonstrated that LL stimulates oxidative stress and the positive correlations between antioxidant responses. Different LL concentration affected antioxidant biomarkers in different levels in *G. pulex*. Also, the biomarkers such as SOD and CAT clearly revealed metabolic changes after LL exposure.

**Keywords:** Glutathione and Malondialdehyde levels, *Phanerochaete chrysosporium*, Landfill leachate
Introduction: The increase in the use of fossil resources, urbanization and large proportion of the population live in cities and also topographical and meteorological conditions of the cities according to the incorrect positioning are causing increasing changes in the composition of the atmosphere. The adverse effects of the air pollution have wide range of effects. European Environment Agency studies on PM, O$_3$ and NO$_2$ parameters about the air quality limit values and their effects on health, ecology, economy and climate etc. on the negative way. Many countries around the world, people living in urban areas are particularly affected by the problems same as in our country. In Turkey air quality data is monitoring to prevent and reduce the harmful effects of air pollution. National and international legislation focus on minimize the negative impact of air pollution on the environment and human health. It has been found that no extensive similar studies have been conducted on the basis of air pollutant parameters and Clean Air Center in our country before.

Material and Methods: In our country, air quality data is monitoring with National Air Quality Monitoring Network in an efficient manner by establishing 8 Clean Air Centers. Considering the air quality monitoring stations, the data sets were grouped by parameters and included in the study with a 75% occupancy rate. Air quality was assessed according to the HKDY, EU and WHO limits.

Results: PM$_{10}$ and SO$_2$ parameters are monitoring with National Air Quality Monitoring Network at 81 provincial level. PM is the most common and problematic topic on air quality according to parameter-based evaluation for Turkey. O$_3$ and NO$_2$ parameters haven’t been monitoring comprehensively. By this study the most polluted areas are determined and the trend analysis is done for pollution levels by years.

Discussion: Parameter-based most polluted areas have a lot of adverse effects on the environment and public health so it should be assessed in areas where the air pollutant level is high and the limits are exceeded. Prevention of air pollution is the most effective step towards resolution thus pollution prevention techniques and policies should be implemented by multisectorial efforts.

Keywords: Outdoor air quality, Air pollution exposure, Air quality monitoring
The Effects of Potassium Applications on the Growth, Mineral Element Concentrations and Some Quality Parameters of the Garlic Plant

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Introduction: Nutrition, which is required for people to maintain their lives, has constituted an important problem these days as it had been in the past. As the world population keeps increasing fast, this problem also gradually increase. As nutrition is a significant requirement, it needs to cease to be a problem, and for that reason the agricultural areas need to be used most efficiently. Garlic, which is among the cultured plants used for medicinal and aromatic purposes, has been used for nutritional (seasoning) and health purposes for many years. In our country, the provinces that may be prominent in garlic production are primarily the provinces of Kastamonu and Balıkesir. When garlic is thought as a significant crop for those provinces, it becomes utmost importance to give the necessary attention to the fertilization of the garlic. In this study, it is aimed to determine the effects of potassium applications on the development, mineral matter concentrations and some quality criteria of the garlic plant.

Materials and Methods: In this study the field experiment have been conducted in the provinces of Balıkesir and Kastamonu provinces in two years. Potassium was given from the K₂SO₄ fertilizer as 0-4-8-12 kg K₂O da⁻¹. The garlic bulb samples which were grinded after the harvest was wet digestion with nitric acid by the microwave. In the wet decomposed plant samples, the total potassium was determined by the ICP-OES. Besides, some of the quality parameters in the garlic bulbs are also determined such as the weight and diameter of the bulb, and weights and numbers of the garlic cloves.

Results and Discussion: In the consequence of the field experiment conducted in the province of Balıkesir, the bulbs and the diameters and dimensions of the bulbs have increased due to the fertilizer with potassium which was applied in both years. On the other hand, due to the fertilizer with potassium which was applied in both years, the potassium concentration and potassium intake of the garlic bulb has also increased. In the province of Kastamonu, the dry weights of the garlic bulbs have increased due to the increase of the yields. This situation shows that the applied potassium not just increased the amount of the yields, it also increased the weights, the dry matter amounts and increased their quality.

Acknowledgement: This study has been prepared using the project data of TUBITAK “104O506”.

Keywords: Garlic, Potassium, Some Quality Parameters
Identification of Vibrio spp. in Black Mussels Harvested from Different Locations of Izmir Bay in Aegean Sea During Summer Months by Using Real-Time PCR Method

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Introduction: The species of Vibrio is a halophilic bacteria that is widely found in marine environment. Vibrio spp. have been isolated from marine waters, sediments, fish, shellfish, plankton and fishery products. The most important species of these bacteria are Vibrio cholerae, Vibrio parahaemolyticus and Vibrio vulnificus. These bacteria may cause number of diseases such as gastroenteritis, septicemia, ear and wound infections, etc. For this reason, the aim of this study was to examine the occurrence of Vibrio spp. in black mussels, which are harvested from different locations of Aegean Sea during summer months by using Real-Time PCR method.

Material and Methods: Black mussels were collected 3 times a month from the location of (Çandarlı, Bostanlı, Narlıdere, Ura and Mordoğan) in Aegean sea at June, July and August (n=45). During each sampling event, a sample bag in which containing 30 mussels were collected at each station. Analysis of the samples by Real-Time PCR for Vibrio species was performed according to the method of Dupot Q7 BAX system analysis kit (Dupont, BAX Part D12863877). 25 g samples were added into 225 ml alkaline peptone water and incubated 22-24 h at 37 °C for BAX® System Lysis Sample Preparation and Real-Time PCR Assay. After that the BAX® heating blocks were turned on. A rack file in the BAX® system software was created. Lysis reagent by adding 150 µl of protease to one 12 ml bottle of lysis buffer was prepared and then transferred 200 µl of lysis reagent to each cluster tube. A 5 µl samples from enriched alkaline peptone water to the corresponding cluster tube were added. The rack of cluster tubes on a pre-warmed heating block were placed at 37°C for 20 min and transferred rack to a pre-warmed heating block at 95°C for 10 min. The cluster tubes to a cooling block were transferred and allowed to cool for 5 min. The BAX® System Instrument was initialized. Vibrio Real-Time PCR Assay tubes in a chilled PCR cooling block were placed. The caps from the strip of tubes with the decapping tool were removed and transferred 30 µl of lysate from the cluster tubes to corresponding PCR tubes. New optical caps on the strip of tubes and secure tightly were placed and repeated this for all samples. Tubes into the BAX® System Q7 instrument were loaded and runned the program. After approximately 1 h, the results were readed for each species V. cholerae, V. parahaemolyticus and V. vulnificus.

Discussion and Results: In this study; V. vulnificus and V. cholerae was not found in any of the samples. V. parahaemolyticus were detected from samples 6 from Çandarlı, 4 from Bostanlı, 7 from Narlıdere, 5 from Ura and 4 from Mordoğan. It was found to be V. parahaemolyticus positive in 26 of 45 samples (%57.7). Bacteria were detected in 8 out of 15 samples collected in June, 7 out of 15 collected in July, and 11 out of 15 collected in August. Our study shows that there is V. parahaemolyticus in black mussels which are harvested from different locations of Aegean Sea environment during summer months. It indicates that those who harvest mussel and consumers may be exposed during these months.

Acknowledgement: This study was supported by Ege University Scientific Research Project Commission (2016/BIL/017).

Keywords: mussel, Mytilus galloprovincialis, Vibrio spp., identification, Real-Time PCR
ORAL PRESENTATION

Benthic Habitat Mapping With Multi Beam Echo Sounder System

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Introduction: Benthic habitat is defined as ecological environment where marine animals, plants and other organisms live in. Benthic habitat mapping is defined as plotting the distribution and extent of habitats to create a map with complete coverage of the seabed showing distinct boundaries separating adjacent habitats or the use of spatially continuous environmental data sets to represent and predict biological patterns on the seafloor. Fishing, mining, pollution and other human activities cause serious damage to seabed ecosystems and reduce benthic biodiversity. According to the latest studies, only 5-10% of the seafloor is mapped. Therefore, it is not possible to manage resources effectively, protect ecologically important areas. It is essential to map seafloor for identifying benthic ecosystems in order to manage resources and determine protection areas. In this study, it is aimed to produce habitat classification map of the study area using multi beam echo sounder bathymetry and backscatter data by means of biological and oceanographic information.

Material and Methods: Studies related to object detection and classification of earth’s surface have been made by researchers using remote sensing technologies. Due to being covered with water, seafloor cannot be observed directly. Bathymetry information can be obtained with radar altimetry. However, spatial resolution of these data is not sufficient for most of the applications. With the latest developments in acoustics and sonar technologies, it is possible to collect high accuracy data from seafloor. Multi beam echo sounders does not only survey seafloor topography, but also collect backscatter amplitude information. Integrated data having high spatial accuracy which obtained with multi beam echo sounders, are ideal source for seafloor studies. Multibeam echo sounder bathymetry and backscatter, CTD and ground truth data were collected in a coastal area in Gulluk Bay, Aydin.

Results: Preliminary results for high resolution bathymetry and backscatter has been produced. Studies revealed that it was possible to produce high resolution (0.5 m x 0.5 m) bathymetry which is compatible with IHO Special Order minimum standards for the study area using the proposed method. Ongoing research is in progress for further steps of the study.

Discussion: Proposed method provides rapid solution to produce high resolution seabed maps which is significant for resource management and monitoring marine protected areas.

Acknowledgement: We would like to express our appreciation to the Yıldız Technical University Scientific Research Project Commission, which supported this study (2015-05-03-KAP01).

Keywords: Marine, Benthic, Habitat, Multi Beam Echo Sounder, Backscatter, Classification, Mapping
Investigation of Pesticides Used in Plant Production in Niğde Province (2006-2016)

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Introduction: As a result of misuse of pesticides in agricultural production; air, water and soil ecosystems are adversely affected, pesticid residues can be obtained in the products obtained and natural balance can be degraded as a result of various effects. As a result, organisms, especially people and animals, are negatively affected. The purpose of this study is to examine the quantities and types of pesticides used in the cultivation of the plants that are produced in Niğde (2006-2016) and to examine the pesticides used in terms of risk of environmental pollution.

Material and Methods: The material of this study is the plants produced in Niğde; potato, apple, vineyard, wheat and so on, as well as data related to the pesticides used in vegetable growing. The kinds and usage amounts of the pesticides subject to the research were obtained from Niğde Provincial Directorate of Food, Agriculture and Animal Husbandry. Pesticides are grouped into plant groups, active substance groups, diseases and pests that they are used.

Results: According to the results of the study, it was determined that pesticide was used extensively in vegetable production areas. The average amount of pesticide consumed in Niğde in 2006-2016 is 259.824 kg-lt per year. The pesticide groups were determined as fungicide (116,650 kg-lt)>insecticide (79,300 kg-lt)>herbicide (26,177 kg-lt)>acaricide (25,569 kg-lt)>rodendicide (51 kg-lt)>others (12,077 kg-lt), respectively. In addition to this, besides the increase in the cost of crop production due to the use of wrong pesticides, environmental pollution can also occur.

Discussion: As a result of the research, the use amount of consumed pesticide groups and considering climate data; possible pollutant effects in soil, air and water ecosystems have been discussed. In order to avoid consumption of pesticide-induced environmental pollution, the manufacturers made efforts to encourage use of alternative methods of combating pesticides by trained and skilled in the use of pesticides has been proposed.

Acknowledgement: We would like to thank to Niğde Provincial Directorate of Food, Agriculture and Animal Husbandry administration and staff.

Keywords: Pesticides, Environmental Pollution, Niğde
Investigation of Industrial Areas in Urban Spaces in Terms of Landscape Urbanism

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Introduction: Converting the urban value and disused industrial areas into different uses within the scope of urban transformation and renewal projects continue to relevant in developed and developing countries. These transformations bring a strong urban image together with a rich identity of the city. It is necessary to design approaches that will prioritize public utility in the transformation of industrial areas. At the same time, these approaches should provide significant contributions to the quality of urban life as part of the urban design project. The interdisciplinary work of landscape architects, architects, urban planners and urban sociologists is of great importance in urban design studies aimed at transforming the city into a liveable place for human beings. In this respect, the concept of "landscape" and "urbanism" emerges. Nowadays, there are many ecological approaches to support the ecological balance of nature, increase bio-diversity, increase the ability to host flora and fauna. In this context "Landscape urbanism" which almost all, one of the contemporary approaches of landscape architecture with "designing with nature", is seen as one of the important approaches to integrate green spaces with the city.

Material and Methods: In this study, the industrial areas of Trabzon were examined and recommendations were made in order to regulate these areas to contribute to the city’s unique identity and urban quality of life. The present situation in the study and the prepared visuals were evaluated by the questionnaire.

Results: In this study; 176 people participated in the survey. It turns out that the majority are not satisfied with the current situation. Looking at preferences, parking preferences are on the front plan.

Keywords: Urban landscape, Urbanism, Industrial landscape
Introduction: Antimicrobial peptides have highly non-specific activity against gram-positive, gram-negative bacteria, protozoans, yeasts and fungi including viruses. These peptides are described in both vertebrate and invertebrate. These peptides should be found in the gut of the vertebrates, epithelial cells and blood, in the hemolymph of insects, poisonous secretions of bees, scorpions and spiders. Some of *Staphylococcus aureus* strains, which are very common pathogenic bacteria in hospitals, are methicillin and derivative resistant antibiotics. For this reason, antibiotic resistance to antibiotics currently used is thought to be an alternative to combating bacteria and producing new antibiotics, natural sources like peptides with antimicrobial activity. *Androctonus crassicauda* (scorpion) venom on microorganisms has been studied. In this study, it is aimed to determine the antibacterial and antifungal activities of venom from *Androctonus crassicauda* and their efficacy against bacteria causing nosocomial infection will be observed.

Material and Methods: The scorpion species of *Androctonus crassicauda* were collected from the Siverek district of Şanlıurfa. The poison samples were obtained from the samples of the scorpion type by electrical stimulation method. Antimicrobial activities of venom diluted 1: 1 with sterile saline were tested against some microorganisms and yeast using disk diffusion method. 5 ml of fresh cultures were developed at appropriate temperatures by inoculation in liquid media suitable for preparing bacterial and yeast stock solutions for use in antimicrobial assays. Bacterial and yeast stock solutions were then cultivated. Venoms were resuspended in sterile saline solution and then aseptically conditioned to 10 μL of each dynasty to sterile blank antibiotic discs.

Results: In this study the effects of the venom on resistant bacteria were observed. Various results have been observed in bacteria such as extended spectrum beta lactamase positive *Escherichia coli*, and *Acinetobacter baumannii*.

Discussion and Conclusion: Scorpion venoms may be basis for the production of alternative drugs that can be used against resistant bacterial strains. Nosocomial infections are resistant microorganisms. *Androctonus crassicauda* venom has been applied to these microorganisms by various methods.

Acknowledgement: This study was supported within the scope of project number KÜ-BAP 03/2017-03by Scientific Research Projects Coordination Department of Kastamonu University.

Ethics committee desicion number 2017/109; 396789

Keywords: Bacteria, nosocomial infection, scorpion, venom, species
Numerical Variations in the Body Setae of *Stigmaeus elongatus* Berlese (Acari: Stigmaeidae)

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Introduction: Stigmateidae is one of the most abundant families in raphignathoid mites (Acari: Raphignathoidea). The genus Stigmaeus is one of the most diverse in genera of Stigmaeidae with about 140 species. *S. elongatus* Berlese, 1886 is known from different areas of the world such as Argentina, China, Crimea, Egypt, Iran, Italy, Philippines, Turkey and USA. So far, any data on morphological variations in this species has not been reported yet. In the present study, we aimed to provide new data on variations observed in *S. elongatus* Berlese.

Material and Methods: Specimens of *Stigmaeus elongatus* Berlese were extracted in soil, litter and dung collected from Erzincan (Turkey) with the aid of Berlese-Tullgren funnels. The specimens were cleared in 60% lactic acid and mounted on microscopic slides in Hoyer’s medium. Setal variations were examined and photographed by using Olympus BX63-CBH DIC microscopes.

Results and Discussion: 94 females, 14 males specimens of *Stigmaeus elongatus* Berlese were found from Erzincan. During the examination, variations in the number of intercoxal setae (4a), suranal setae (h) and aggenital setae (ag) of 32 adult females and 1 adult male were observed. We noted that most of variations are in the form of unilateral or bilateral presence or absences of aggenital setae (on 29 adult females and 1 adult male). A few asymmetry and numerical variations in form of presence or absence a member of intercoxal and suranal setae (on 3 adult females) were observed. The current paper deals with asymmetry and numerical variations in *S. elongatus* Berlese. Numerical variations in the body setae are more commonly seen in members of the genus Storchia within the family Stigmaeidae. Such numerical variations in this species are mentioned here for the first time.

Keywords: Acari, asymmetry, intraspecific, Stigmaeidae, variation
The North Marmara Robber Flies (Diptera: Asilidae)

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Introduction: One of the predator groups Diptera within the suborder Brachycera is Asilidae that is also known as Robberflies. Asilidae robber fly family is a large family of insects that consists of approximately 7187 described species in eleven subfamilies and 821 genera worldwide, and 1581 species in 560 genus from Palearctic region and 220 species in Turkey. The family has some predatory habits such as feeding on other insects. Thereof, they make a significant contribution to the natural balance of insect populations and their preys are especially plant-feeding insects. Hymenoptera, Diptera, Hemiptera, Homoptera, and Coleoptera are get caught from robber flies. All adults are actively hunting during the day. They especially prefer sunny, dry mountainsides, sandbanks, meadows, forest edges and barren fields. The long and strong legs of robber flies bristled to aid in prey capture. Sexual dimorphisms are not extreme among the rubber flies. But it can be said that females are in tendency to have slightly larger abdomens than males. Most robber flies have brown, gray, or black coloration. Robber flies have been dealt with in many researches with many different methods. But however, this research which reveals the Asilidae fauna of North Marmara region is being studied for the first time. Therefore, this study will have a contribution to Turkish Asilidae fauna.

Material and Methods: North Marmara region, the research area of the study, is located between 26°05′-30°51′ east meridians and 42°05′-40°00′ north latitude. Asilidae adult specimens were collected from meadows, fields, rivers edges, bridges, forests and residential areas between 2002 and 2003. 1055 specimens (620 males and 435 females) were collected from 223 localities. The collection, preparation and protection of the samples have been carried out with the known standard methods. After that their abdomens were removed and macerated in 10% KOH for 24 h at 25 °C. Specimens have been preserved in the Entomology Laboratory of Eskişehir Osmangazi University, Arts and Science Faculty, Eskişehir, Turkey.

Results: 1055 specimens (620 males and 435 females) from 223 localities were collected and 39 species belong to 19 genera were identified. 22 species are new record for Trace region and 5 species are new records for Turkish Asilidae fauna. Genital parts of new records.

Discussion: The study area is divided into two parts as Thrace in the west and Anatolia in the east. Observation were made on identified species and stations. The fauna was assessed in the private living areas of the region. It has been tried to make observations about the stationing on the station and place preferences of the species detected during the study. Species have divided into 6 group as soil, stones, rocks, ground and grass, heath and shrubbery, broad-leaved high plants and trees using the ecological classification. Area preferences, positions in area, hunt-hunter relations of the Asilidae members were observed. 5 new records were detected for our country.

Acknowledgement: We would like to express our appreciation to TUBITAK, which supported this study (TBAG 2050).

Keywords: Asilidae, Robber Flies, Diptera
Amphibian Diversity of Kastamonu

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Introduction: Amphibian species and their distribution in province of Kastamonu were presented based on field works between 2016-2017 and literature records.

Material and Methods: The fieldwork were conducted particularly the breeding season of amphibians between April and September in daytime and night. They were captured by hand or dip net. Coordinates and altitude data were recorded using GPS.

Results and Discussion: A total of eight amphibian species were detected in Kastamonu, including (Ommatotriton ophryticus, Triturus anatolicus, Pelophylax ridibundus, Hyla orientalis, Bufo variabilis, Bufo bufo and Rana dalmatina, Rana macrocnemis). It has been determined Pelophylax ridibundus, is dominant species and always remain near to the water such as lakes, temporary pools, irrigation canals, rivers and share its breeding area with Bufo variabilis, Hyla orientalis, Bufo bufo, Rana macrocnemis, Rana dalmatina and Ommatotriton ophryticus, Triturus anatolicus. Pelophylax ridibundus and Bufo bufo is numerous in both urbanished and cultivated areas. Another most common species is Bufo bufo, but its not numerous. The environmental condition are almost optimal for two species. Ommatotriton ophryticus, Triturus anatolicus are isolated local populations and the latter is less abundant than the other amphibian species. The potential effects were also discussed on amphibian community.

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Keywords: Amphibia, Ommatotriton ophryticus, Kastamonu, Turkey.
Analysis of *matK* and *rbcL* Loci of Chloroplast DNA in Tertiary Relict Endemic *Phoenix theophrasti* Populations in Turkey and the Other Palm Species

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Introduction: *Phoenix theophrasti* is one of the few tree species tertiary relict endemic to the eastern Mediterranean and it is one of the two palm species native to continental Europe. It has local populations both in Crete-Greece and in southwest part of Turkey. Due to its restricted distribution and very fragmented populations it is at risk of extinction, which is the fate of most of the relict endemic species. The primary goal of this study was the determination of sequence variations in *matK* and *rbcL* loci of cpDNA in *P. theophrasti* populations in Turkey. The secondary goal of the study was to analyze 9 different palm species which are *P. dactylifera*, *P. reclinata*, *P. rupicola*, *P. roebelenii*, *P. canariensis*, *P. laureiri*, *P. acaulis*, *P. sylvestris* from *Phoenix* genus and *C. humilis* from *Chamaerops* genus in terms of the same loci of the cpDNA to determine the phylogenetic relations among them together with *P. theophrasti*. *C. humilis* was included in the study as the second natural palm species of the Europe, having a close natural distribution area with *P. theophrasti*. This study gives an idea about the molecular evolution of the studied cpDNA loci in the palm species.

Material and Methods: Five *P. theophrasti* populations from Datça-Hurmalıbük, Datça-Dimitri Bay, Datça-Eksera Valley, Patara and Kumluca-Karaöz, and one *P. theophrasti* ssp. Gölköy population from Bodrum-Gölköy were sampled and used in the study. Five individuals from each palm species were obtained from Köyceğiz-Palm Center by the direction of the Directorate of Forestry of Muğla Province. *matK* and *rbcL* loci of the cpDNA were amplified from total genomic DNA as a template using PCR. After the separation of the PCR products on a gel, the fractions of DNA were excised from the gel and purified. The sequence reactions were performed with an Auto Sequencer ABI 100 PRISM using the purified DNA as templates. The sequences were aligned using the ClustalW package and analyzed with MEGA program version 5. Aligned sequences were analyzed with DnaSP software version 5.10.01 to estimate polymorphism indices.

Results: 827 bp sequence analysis of *matK* locus of cpDNA resulted in only one haplotype in six *P. theophrasti* populations and six haplotypes for the ten palm species analyzed. Among these six haplotypes, Haplotype-4 was common in all species, except *P. roebelenii*, *P. dactylifera*, *P. canariensis* and *P. rupicola*. 595 bp sequence analysis of *rbcL* locus was also resulted in only one haplotype in six *P. theophrasti* populations. For this locus two haplotypes were detected for ten palm species. Among these two haplotypes, Haplotype-1 was common in all species.

Discussion: Results of this study indicated that analyzed cpDNA loci are highly conserved in palm species. *P. theophrasti* must be included in the Red List of IUCN under the critically endangered (CR) category. It is recommended that “in situ” combined with “ex situ” conservation precautions should be taken urgently. It seems to be not proper to classify Bodrum-Gölköy Population as a subspecies of *P. theophrasti*. Also, it seems there is an important need for re-evaluation of the taxonomy of palm species by using molecular data.

Keywords: *Phoenix theophrasti*, Palm species, Chloroplast DNA, Maturase K (*matK*), Ribulose bisphosphate carboxylase (*rbcL*).
Assessment of Ecological Adaptations of Plants Using Genome Size Data

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Introduction: Environmental variation is ubiquitous, and wide range of species is adapted to local abiotic or biotic conditions. Several characteristics can be indicative for searching local adaptation. Since plants are sessile organisms they evolve various traits to survive. Plant adaptation to different soil types have been studying for years however the role of genomic component and size has only begun. DNA content in the haploid genome is called the C value and the quantity is called the genome size. Genome size is accepted as one of the key biodiversity characters. The use of flow cytometry for the confirmation of genome size and ploidy changes in plants adapted to different ecological conditions is a valuable tool. In this recent study we aim to assess whether a relationship exists between genome size and soil type and genome size in plants growing wildly in different soils.

Material and Methods: Plant sampling was carried out during the 2017 vegetation period from Eldivan, Çankırı and soil samples were taken from 0 to 30 cm depth immediately from the root shade of plant samples. Genome sizes of plants were measured by flow cytometry. The mean values of the measurements were obtained from three replicates of each sample.

Results: We examine five different plant species belonging to different families growing wildly in serpentine, red limestone and marble parent material conditions. The species displayed altered genome sizes according to the parent material. Our results reveal Alyssum pateri subsp. pateri Nyar. to have one of the largest and expanded genome sizes. Genome sizes of some endemic and non-endemic plant taxa in local area were detected for the first time.

Discussion: Genome size was significantly correlated with soil types. Estimations of genome size and its variation in different soil types can serve valuable data regarding the genetic diversity of organisms and also their adaptation process.

Keywords: Biodiversity, Flow cytometry, Genome size, Parent Material
Liability For Damages Caused By Animals

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Introduction: The articles 67 and 68 of Turkish Code of Obligations, regulate the liability for the person animal possessor. According to Article 67, animal possessor must compensate the harm of the person who is harmed by the animal. Even if it is not the fault of the animal possessor, liability arises. But if animal possessor takes precautions to prevent harm, the liability ends. Additionally, if the animal is provoked by another person or someone else's animal, the liability still arises. But animal possessor is entitled to recourse against that person or animal’s owner. According to some scholars, damages caused by stray animals should be compensated by state.

Material and Methods: This study will examine the decisions of the Turkish Court of Cassation (Yargıtay) concerning the liability for damages caused by animals.

Results: According to the article 67 of Turkish Code of Obligations, animal possessor is liable for the damage caused by the animal. However, animal possessor is not liable if he proves that he is careful enough to prevent damage.

Discussion: Animals have a unique position in both ecology and human life. Compensations for the damages caused by animals also interest the field of law. In this respect, ownership of the animal is a very important criteria. According to Turkish Code of Obligations, animal possessor is liable for the damage caused by the animal. In Turkish legal doctrine, it is argued that the state should be liable for the harm caused by stray animals.

Keywords: Damages Caused by the Animal, Liability for Animal Possessor, The State's Liability
Estimating Surface Soil Erosion Using Coupled RUSLE and GIS Methodology in the Coruh River Basin, Turkey

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Introduction: Across the world, about 24 billion tons surface soil are lost every year causing a degradation in the top soil productivity. Among the other sources, surface soil erosion (rill/interrill) is the most important pathway of soil losses. The aim of this study is to assess surface soil erosion risk using coupled RUSLE and GIS methodologies for twelve sub-watersheds within the Coruh River Basin located northeast part of Turkey.

Material and Methods: The sub-factors of RUSLE equation are such cover management (C), soil erodibility (K), rainfall erosivity (R), slope length and steepness (LS), and conservation practice (P) were calculated to measure soil losses (A = C x K x R x LS x P).

Results: The estimated sediment yield from these sub-watersheds via overland flow ranged from 59863 to 987135 t yr⁻¹ with a mean value of 378243 t yr⁻¹. The highest and lowest total soil losses within the basin recorded from Tortum and Taht sub-watersheds.

Discussion: Because of its unique characteristics, the amount of soil losses from these 12 sub-watersheds covered a wide range. Along with its mountinous feature, the climate variation from continental to semi-arid plays major role in this alteration when goin up from leeside to the inner and upper parts of the the Basin. Addatinallly, in some watersheds where agriclutural land uses were intensified the effects of soil erosion on the land degradation become predominant.

Acknowledgement: This study was supported by the Coruh River Watershed Rehabilitation project (2012–2019) in a consortium with the Turkish General Directorate of Forestry and the Japanese International Cooperation Agency (JICA).

Keywords: Water pollution, hillslope erosion, Coruh River Basin, RUSLE, GIS
**Supplementary Studies and the First Molecular Identification of Myxobolus arrabonensis (Myxozoa) in Chondrostoma angorense (Cyprinidae) from the Northeast Turkey**

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**Introduction:** Myxosporean parasites have a significant role as pathogens of fish in wild and cultured stocks throughout the world. There are a few reports of *Myxobolus* species in freshwater fish in Turkey. The present study is part of an ongoing investigation into the characteristics of myxosporean parasites of freshwater fish in Northeast Turkey.

**Material and Methods:** Twenty freshly caught specimens of the *Chondrostoma angorense* were purchased from fishermen at Lâdik Lake, Samsun, Turkey. All organs were also examined for plasmodia of myxosporean parasites. The plasmodia type of gill-infecting species was classified lamellar, filamental, and gill arch type. Infected gills were fixed in 10% formaldehyde and routinely processed, embedded in paraffin. Tissue sections were stained with HE. Plasmodia were carefully removed from the infected gills and dissected with a fine needle on a slide. Some of the spores were preserved in glycerine-jelly as reference slide preparations; others were fixed in absolute ethanol until further molecular examinations. The SSU rRNA gene of myxosporean was amplified and sequenced in both directions with the same primers at Macrogen. The obtained sequences were assembled and compared with previously published data for identification by using BLAST via Genbank.

**Results:** *Myxobolus* infection was found in 5 (25 %) of 20 *C. angorense*. Plasmodia were located in the lumen of blood vessels of the gill filaments. The histological analysis revealed the development of the cyst-like plasmodia as intrafilamental-vascular type. Molecular analysis of the SSU rRNA gene confirmed the myxosporean species as a *Myxobolus arrabonensis*.

**Discussion:** Recently, the combination of spore morphology, ultrastructure, host, and tissue specificity with molecular biological methods are principally accepted for identification of a new or existing myxosporean species and redescription of inadequately described species. So, this is the first integrated data for the validity of *M. arrabonensis* in *C. angorense* in Turkish waters. Moreover, this is first report of *M. arrabonensis* in *C. angorense* from Turkey to date.

**Keywords:** *Myxobolus arrabonensis*, *Chondrostoma angorense*, Molecular identification, Pathology, Northeast Turkey
Determination of Distribution and Density of Seedhead Weevil, (*Bangasternus planifrons*) Harmful on Safflower in Ankara Province

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**Introduction:** Aspir (*Carthamus tinctorius* L.) is an annual oil crop plant whose seeds contain 30-50% oil. The extracted oil from aspir could be used as biodiesel and its residue could be utilized as animal feed. In our country, in 2016, the province where aspir is cultivated the most with respect to land area was Ankara with 175,870 decare, which makes up approximately 45% of the aggregate aspir production of Turkey.

*Bangasternus planifrons* Brulle mainly prefers plant species belonged to Asteraceae family to feed on and is a harmful pest for aspir plants in Turkey. Adult pests cause underdevelopment of the plant by feeding on its leaves and sprouts in spring time. Moreover, larvae that hatch out of eggs placed in newly developed capsules of aspir feed on its oily seeds and cause great economic losses. In this study, data related to distribution and density of *Bangasternus planifrons* Brulle for Ankara is provided.

**Material and Methods:** The materials of this study consist of aspir plantation fields located in Ankara and the specimens belonged to species *Bangasternus planifrons* Brulle that give damages in these fields. The sampling of the pest was conducted monthly, May through August, in the year of 2014 and 2015. After determining the invasion rate of the plantations by taking into account the size of the aspir fields, pest distribution for five county belonged to Ankara province was calculated by dividing the aspir plantation area invaded by the pest to the total area of the county.

**Results:** In order to determine the distribution of the pest, sampling and counting were executed in aspir plantation fields of Ayaş, Bala, Kalecik, Polatlı, and Şereflikoçhisar counties of Ankara province. The pests were detected in all five counties in 2014 and the invasion ratios were %4.17, 23.05, 1.16, 6.11 and 1.16 respectively. In 2015, the pests were also detected in each county except Ayaş and the invasion rates for Bala, Kalecik, Polatlı and Şereflikoçhisar were %24.06, 0.99, 43.57 and 1.75 respectively. The average density of adult specimens in invaded plantation areas were determined as 4.67, 9.34, 3.38, 6.64 and 3.44 in 2014 for the counties in the same order except Ayaş. In 2015, the average density for Bala, Kalecik, Polatlı and Şereflikoçhisar were 8.08, 2.75, 6.56 and 2.33 adult specimens respectively.

**Discussion:** As a result of this study, the whole province is found to be invaded by *Bangasternus planifrons* Brulle and average number of adult specimens found in invaded aspir plants changes between 2.33 and 9.34. The studied pest was recorded for Turkey in aspir plantation fields of Konya province as a first time. The species *Bangasternus orientalis* is also cited in previous studies as another harmful pest for aspir plantation in Russia, Ukraine, and Kazakhstan. The distribution of *Bangasternus planifrons* Brulle, which causes high losses in crop yield of aspir is determined for Ankara province with this study. Taking into account that aspir plantation display accelerated increase among Turkish farmers in recent years, more detailed studies for the management and control of the pest is necessary for Turkish aspir plantation and production.

**Acknowledgement:** We want to thank Prof.Dr. Osman SERT (Department of Biology, Hacettepe University) who identified the species of the Seedhead weevil

**Keywords:** Safflower, *Bangasternus planifrons*, Seedhead weevil, Damage, Ankara
Changing of the site index in conjunction with some environmental factors in the pure Scots pine (Pinus sylvestris) Forests of Giresun-Espiye

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Introduction: The determination and presentation of the local ecological conditions in the natural distribution areas of the forest trees are significant for forestry applications. Indeed, it would be helpful to know about the requirements of any tree species for the silvicultural interferences on the stands relating to this species and the right selection of the tree species that could be brought to these areas for silvicultural treatments. In this study, relations between some easily measurable environmental factors and site index in Scots pine (Pinus sylvestris) forests in Giresun-Espiye were evaluated by statistical analysis. Scots pine is the most important species of coniferous trees that spread in our country. Scots pine, in addition to providing an important contribution to Turkey’s economy is among the most important raw material for the forest products industry.

Material and Methods: Study area were chosen from pure Scots pine forests Giresun-Espiye. A total of 91 sample plots were determined systematically (325 x 325 m) on only south-aspect areas. Sample plots were selected on difference parent material (29 on granite, 32 on riodacite and 30 schist). The sizes of the sample areas were selected as: 400 m² and 600 m². Some topographic (slope, aspect, altitude) properties, and some stand characteristics (diameter, age, top height, etc.), and some soil properties (absolute and physiological soil depths, stoniness) were determined. In the study, correlation analyses were performed according to the parent material (granite, riodacite, schist). Aspect degrees were converted to RADIND values.

Results: Site index was determined average 17.38 m (10.76-26.40 m) on granite, average 17.72 m (11.80-22.63 m) on riodacite and average 19.27 m (12.51-29.80 m) on schist parent material. In the study, it was found significant relationships between site index and some easily measurable environmental parameters (altitude, slope, aspect, absolute and physiological depth, stoniness). Significant relations determined between site index and altitude (r = -0.387, p<0.001), and aspect degree (r = -0.323, p<0.001) on granite, between site index and aspect degree (r = 0.433, p<0.001), and slope (r=0.248, p<0.05), and absolute soil depth (r=0.239, r<0.05), physiological soil depth (r=0.325, p<0.01) and stoniness (r=0.300, p<0.01) riodacite, between site index and absolute soil depth (r=0.336, p<0.01), and physiological soil depth (r=0.253, p<0.05) on schist parent material.

Discussion: In the study, relations between site index and some easily measurable environmental factors were investigated. Altitude and aspect degree showed negative effect on site index in granite. All parameters (aspect degree, slope, absolute and physiological soil depths) except stoniness showed a positive effect on site index in riodacite. Absolute and physiological soil depths showed a positive effect on site index in schist parent material. Despite the fact that all of the sample areas were selected from the south-aspect areas, the aspect degree is still an effective factor in productivity. Interestingly, while aspect degree has a negative effect in granite, a positive effect in riodacite, no effect in schist parent material on productivity. This study has proved that although the entire of sample area on granite, riodacite and schist is south-aspect, aspect degrees show different behavior with the exception of the known literature on productivity.

Keywords: Scots pine, pure forests, south-aspect, site index
High Prevalence of *Hysterothylacium aduncum* Larvae in Marketed of Anchovies (*Engraulis encrasicolus*) from the Black Sea

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**Introduction:** Anisakid nematodes of the genus *Hysterothylacium* Ward et Magath, 1917 are common parasites in different fish species in marine, brackish, and fresh water environments. Infection with *Hysterothylacium* species can affect the health of the fish hosts and even cause their death, with consequent economic repercussions. In addition, accidental ingestion of *Hysterothylacium* spp. can rarely cause anisakidosis and hypersensitivity in humans. The aims of the present work are to investigate *H. aduncum* from *E. encrasicolus* in Black Sea, Turkey.

**Material and Methods:** A total of 100 anchovies (*Engraulis encrasicolus*) destined for human consumption were randomly obtained from fish markets from February to September of 2017. Fish samples had been caught in the FAO 37.4.2 fishing area (Black Sea). The presence of *Hysterothylacium* larvae was assessed by routine parasitological examinations. The nematodes were repeatedly washed in 0.9% saline solution, fixed in 70% ethanol, and cleared with lactophenol. Parasites were identified using the morphology of the labia, the position of the excretory pore, the intestinal cecum, ventricular appendix and the tail. Prevalence (P), mean intensity (mI), and mean abundance (mA) were calculated and presented with 95% confidence intervals (CI) and 95% bootstrap confidence intervals (BCI) and by using Quantitative Parasitology 3.0 program.

**Results:** The prevalence of *H. aduncum* larvae in *E. encrasicolus* was 100% (95% CI = 96–100%). The mean intensity of *H. aduncum* larvae was 3.87 (95% BCI = 3.44–4.33) and an abundance of 3.87 (95% BCI = 3.44–4.33) with a range of 1–10.

**Discussion:** The great number of *H. aduncum* larvae in *E. encrasicolus* can cause commercial problems for the fish industry, lowering the value of these fish. Consequently, the present study provides the first data regarding the high prevalence of *H. aduncum* larvae in anchovies in Black Sea. Although *H. aduncum* larvae not considered pathogenic for humans, the presence of *H. aduncum* larvae may cause depreciation of Black Sea anchovies because of the aesthetic problem, causing repulse from Turkish consumers.

**Keywords:** High prevalence, *Hysterothylacium aduncum* larvae, *Engraulis encrasicolus*, Black Sea
Exotic and endangered fishes from Edremit Bay (Northern Aegean Sea)

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Introduction: The marine ecosystem is constantly changing due to different reasons such as climate conditions and fishing activities. Therefore cosmopolitan, endemic, endangered and exotic part of the Mediterranean Sea fish fauna deserves particular attention from the viewpoint of biological diversity. In this study, the fish species of the Edremit Bay belonging to the Aegean Sea, which is part of the Mediterranean, have been examined according to the origin and red list.

Material and Methods: In this study, fishes were collected using various fishing gears (fishing line, trawl, etc.) between 2007-2017. In the determination of species obtained from field studies, Whitehead et al., 1989; Mater et al., 2003 and Golani et al., 2006 were used. In addition, species names have been checked from the FISHBASE database. From the samples, total length (TL) and body weight (W) were measured to the nearest 0.1 cm and 0.01 g, respectively. Foreign fish for the Edremit Bay were deposited in the collection of the Zoological Museum, Balikesir University, after morphometric and meridian measurements were recorded.

Conclusion and Discussion: 139 species belonging to 57 families were identified. In Edremit Bay, concerning their zoogeographical origin, ichthyofauna is dominated by Atlanto-Mediterranean species (82.73%), followed by, cosmopolitan species (7.92 %), Lessepsian migrants (7.19%) and Mediterranean endemics (2.16 %). (Lessepsian migrants is from Red Sea and Indo-Pacific). 4 fishes of total 139 fish species are endangered. The purpose of this study is to identify the existence of foreign and invasive species for the Edremit Bay, to direct necessary preventive studies for area, to determine the current situation of fish species and to contribute to the regulation of hunting activities.

Acknowledgement: We would like to thank the region fishermen.

Keywords: Edremit Bay, endemic, exotic and endangered fish species
Introduction: Large-sized mammals have relatively large entanglement areas compared to other vertebrates, and therefore need large, uninterrupted ecosystems for feeding and breeding. However, in Anatolia, many ecosystems suitable for these species are now fragmented or completely destroyed by human oppression, and this change poses a serious threat to the continuity of populations. While investigating the effects of habitat fragmentation, determining which species are present in a region and which habitats are used by these species has a key precaution in studies to protect these species. North Anatolian Mountains, starting with Köröglu Mountains in the west and continuing with Ilgaz Mountains, contain habitats suitable for sheltering and feeding of large mammal species. This area is one of the most important corridors of wildlife in Anatolia.

Material and Methods: Large mammalian species have fewer densities than lower trophic levels, and it is relatively difficult to detect the species in the field. Different techniques have been developed to determine species diversity in an area. In this study, camera traps were used to determine large mammals in the region. This technique was supported by nest determination, fecal and footprint counts.

Results: As a result, in field studies carried out between April-August 2017, 180 records of 9 large mammal species were obtained in 621 camera trap days. Brown bear, wolf, red fox, lynx, badger, red deer, roe deer, wild boar and European hare were recorded for the first time in the region. The most recorded carnivorous species is bear with 19 records and hare with 101 records as herbivorous species. It was evaluated that roe deer and hare showed a clustered pattern in the region. It has been determined that wolves, lynxes and hares prefer nocturnal activity, while other species can show activity in daytime and twilight. Although no large mammalian nest was encountered during the study period, cubs of black bear, lynx, red deer, roe deer and wild boar were recorded. In addition, results obtained with fecal and footprint counts were presented as evidence to help assess the field use of species.

Discussion: In this study, it was determined which large mammal species were in this region and which habitats were used by these species. The fact that no ecological studies have been done on these species in the area before has increased the importance of this study.

Acknowledgement: We would like to thank Scientific Research Division of Hacettepe University for financial support (FHD-2017-13111).

Keywords: Camera trap, large mammals, Ilgaz, Çankırı

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**Introduction:** The Arabic word "madrasah" mean to ‘school’. However, in the Islamic religion, madrasahs are important centers for learning not only on Islam, but also on other secular subjects as well. Hence, the history of madrasahs is long, and it was utilized as centers of learning throughout the world. Ertokus madrasah where located in Atabey township of Isparta city, was built by command of Seljukian Atabey Ertokus Gazi in 1224. After its built, hundreds of students and people were educated during the periods of Seljukian and Ottoman Empire. During its used, there were numerous red pine trees planted in the garden of Ertokus madrasah. Recently, a red pine tree stooded in front of the historical madrasah has started to dry. The madrasah is under the threat of the tree. There is debate about cutting this tree. For this reason, some studies have to be done about this tree in front of the madrasah. This study was mainly carried out to examine the strength properties (bending and compressive) of the *Pinus brutia* Ten. in the garden of Ertokuş madrasah with using non-destructive methods.

**Material and Methods:** In this study, six increment cores (5 mm thickness) was taken at 1.3 m height from ground from trunks of red pine trees. After removing increment cores from living trees, they were placed into plastic tubes and stored in cooler bag. The bending and compressive strength values of the increment core were determined using a portable device called Fractometer. Bending and compressive strength values measured in every 6 mm from pith to bark.

**Results:** When the obtained compressive strength values were evaluated, it was seem to decrease (20-25%) from pith to bark. When the obtained bending strength values were evaluated, it was seem to decrease (15-20%) from pith to bark.

**Discussion:** Compressive strength and bending strength values decreased (20-25%) from pith to bark. However, it has been realized that these values are acceptable and well correlated with former literature reports. The madrasah seems to be under threat of the tree but the tree has not lost its strength properties. Therefore, cutting of the tree is not suitable currently, but it should be done control continuously.

**Keywords:** Ertokus madrasah, *Pinus brutia* Ten., bending strength, compressive strength, non-destructive tests
Introduction: Butterflies are one of the most showy member of the insects. Butterflies were affect to the technology and art of humans besides their beauties. Also, they have important roles in the ecosystem and they were always popular on world. Rapidly increased environmental pollution is causing disappear of these animals too fast. For this reason, there are various activities performing around the world in order to raise awareness for the protection of livings. Konya Tropical Butterfly Garden (KTBG) was established for this reason in our country which intended that instil love of nature via bring together humans with the butterflies. KTBG consists of three main area. In the first area, tropical habitat for butterflies is provided. Guests can see growing, feeding and pupal development of the butterflies. Second area is a bug museum. Guests can observe pupal development steps of real dried butterfly as museum material behind the window during museum tour. Then, there is a short-film about bug world. Afterwards, guests are pass on to the butterfly classification part which the place several kind of butterfly exhibits. “Insect village” constitutes the last area of KTBG. Guests improve their knowledge with introduce different kind of bugs in egg-shaped models at “Insect Village”. Student-centered love of nature educations are performing with the primary-school students in KTBG in addition to tropical garden tour and museum visits. Objective of the love of nature education is develop knowledge, correct the wrong informations, break down the prejudices and fears and build the nature consciousness.

Material and Methods: Senior biologists and veterinarians are attend to the guests at the related areas in KTBG. Guests are getting informed about life of butterflies and bugs, improve nature awareness by the staff during group tours. Studies established that nature trainings has big impact for overcome the fears via leave an indelible impression on students.

Results: 830192 guest has been visited to garden since 2015. Also, scholastic informations were shared with the community amusingly via science festival and projects.

Discussion: Interactive relation of humans and livings in natural living area is very effective to build nature awareness. It was predicted these kids fit into society and nature in their future lives. Therefore, these kind of visiting and effective education areas should be augment and improve according to the scientific studies is needed.

Keywords: Konya Tropical Butterfly Garden, Insect
ORAL PRESENTATION

Nereididae (Polychaeta) Fauna of Rocky Shores along the Middle and Western Black Sea Coast

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Introduction: The family Nereididae is one of the most diverse and abundant taxa among benthic families both in marine and brackish water ecosystems. Its representatives play important roles in the energy transfer within a given ecosystem as customers of plants and small invertebrates, or as prey of many benthic animals.

Material and Methods: In this study 12 stations were investigated to determine Nereididae (Polychaeta) fauna of rocky shores of middle to western coasts between Samsun to İğneada (Kırklareli) along the Black Sea coast of Turkey. Benthic samples were collected by quadrat via free diving. Abiotic parameters and community parameters (e.g. the number of species, number of specimens) were calculated for each sampling period. To determine better spatial distribution patterns, the abundance data of all stations in each sampling period were analyzed using cluster techniques, based on the Bray-Curtis similarity (group average technique), using the PRIMER-6 package.

Results: Qualitative and quantitative analysis showed that total of 30600 individuals were found belonging to 7 species and 3 genus. Nereis zonata (Malmgren, 1867), and Platynereis dumerilii (Audoin and M. Edwards, 1933) were the species of Nereididae with the highest dominaney and frequency index in the study area. In terms of diversity index; the highest diversity level was at the Gerze station and the stations with the lowest value was the Sinop port.

Discussion: Among the investigated biotops, Cystoseira barbata showed the highest species and individual number whereas Zostera marina showed the lowest individual number. When all the stations in the research area were evaluated, the station with the highest number of individuals was Amasra station (1793.75 ind.m⁻²) whereas the station with the lowest number of individuals was determined as Dereköy station (25 ind.m⁻²).

Acknowledgement: We would like to express our appreciation to the Recep Tayyip Erdogan University Scientific Research Project Commission, which supported this study (2011.103.03.1).

Keywords: Nereididae, Black Sea, Polychaeta.
A Framework Based on Urban Metabolism Approach for Sustainable Urban Planning

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Introduction: For the last two decades, planning approaches have emerged for urban development patterns in which ecological elements are effective in the spatial and functional restructuring of cities on the basis of sustainability principle. Sustainable urban planning approach is one of them. The basis of sustainable urban planning is the sustainability of natural and cultural heritage values and biodiversity, the efficient and economically use of energy and resources, the creation of healthy and liveable urban spaces, dispose of the negative effects of the urban production-consumption-waste-recovery chain on environmental resources and values (ecological footprints) and dissemination of recycling or reuse possibilities. Urban planning to meet the environmental objectives of sustainability should be reflected local climate, ecosystems, materials, energy, water and resource flows. In this context, the concept of "urban metabolism" has been used to model, analyse and provide information on the environmental sustainability of cities. The concept of urban metabolism, as defined by Wolman, refers to the assessment of the amount of resources produced and consumed by urban ecosystems. Urban metabolism has become an important tool to understand how a city's development affects the local and regional environment and how it supports more sustainable urban planning. Urban metabolism analysis is a way of measuring the flow of materials, energy, water and waste in an urban neighbourhood. Urban metabolism analysis is a comprehensive assessment tool for planners, designers and policy makers and provides a concrete view of energy efficiency, emission control, material cycling, waste management and infrastructure activity within urban scape.

Material and method: In this paper, with the approach that urban metabolism in urban ecosystem is of great importance for urban ecology, assessment tools for urban metabolism are presented as a framework and ecological footprint is addressed as one of these evaluation tools.

Result and discussion: Qualitative and quantitative methods are used for urban metabolism analysis. There are many assessment tools developed to evaluate urban metabolisms, such as material flow analysis, input-output analysis, life cycle assessment, and ecological footprint. The ecological footprint stands out as a sustainability assessment tool for cities all over the world. Ecological footprint is one of the indicators of environmental sustainability, which quantifies the effects of human beings' production-consumption activities on nature. Ecological footprint analysis measures the environmental impact of human activities by asking the question "how much of what nature do we have?" which is the main problem of sustainable development.

This paper is a preliminary attempt to define the scope and content of the concept of "urban metabolism" in relation to the urban planning agenda in the context of sustainability and to establish a common language in the context of planning discipline.

Keywords: Sustainable urban planning, urban ecology, urban metabolism.
Introduction: It has been recorded 38 bat species represented 5 families and 14 genera in Turkey. One of the four species of the genus *Pipistrellus* belonging to family Vespertilionidae is *Pipistrellus pipistrellus* and widely distributed in Turkey. One of the reasons for frequent encounter to this species is the birth of twin youngs once a year. In this sense, *Pipistrellus pipistrellus* is one of the most common of insectivorous bats. The ultrasonic peak frequency of this species is from 106 to 116 kHz. This species emerges in the evenings with twilight.

Material and Methods: A total of 217 *Pipistrellus pipistrellus* specimens was obtained from Turkey between 1977 and 1989. Notes on diagnostic characters, habitat, pelage colour, measurements and karyology were recorded. Informations about active times of this species has been recorded using a bat detector in different geographies. Some ecological observations concerning the species have been continued with fieldwork conducted until 2018. Batcorder device were installed to record bat sounds in different habitat, such as near caves and open or forest areas.

Results: *Pipistrellus pipistrellus*, one of the smallest member of family Vespertilionidae is often encountered in vacant buildings. This species constitutes approximately a total of 100 individuals of nursery and maternity colonies. The sonogram of the voice record of *Pipistrellus pipistrellus* was recorded using bat recorder analysis programmes.

Discussion: There is no statistically significant differences between adult males and females in term of external and cranial measurements. Comparing the data of our samples with those of European, Russian and Arabian specimens of *Pipistrellus pipistrellus*, it is found that the nominate form and *P.p. aladdin* distribute in Turkey. *Pipistrellus pipistrellus* is one of the most recorded species in the field.

Keywords: *Pipistrellus pipistrellus*, Batcorder device, Active time, Turkey
ORAL PRESENTATION

Drought Analysis in Western Black Sea Region Using Standardized Precipitation Index

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Introduction: While the earth climate has changed over a long period of time in past geological periods, these changes are observed in much shorter periods in recent times. It is not known exactly how these climatic changes that take place in a fast way will result in an environmental sense. For this reason, in order to understand the complex structure of climatic phenomena, many studies have been focused on this problem, recently. Along with recent technological and scientific developments, more accurate estimates of climate events have been made with statistical and spatial techniques more efficiently. The drought that occurs as a result of changes in precipitation patterns is one of the most basic indicators of climatic variations. Drought has many negative consequences both natural and economical. For this reason, drought analysis is performed by various statistical methods (such as SPI) according to different purposes. According to climate projections, Turkey (including the western Black Sea region) and the surrounding area, it is one of the areas under risk of drought. Thus, the aim of this study is to analyze drought events in Western Black Sea region of Turkey using SPI.

Material and Methods: In this study, monthly total rainfall data obtained from meteorological stations of Kastamonu, İnebolu, Bartın, Bolu, Düzce, Akçakoca, Karabük, Zonguldak, Tosya and Devrekani were used between 1965-2013. Standardized Rainfall Index (SPI) technique was used to determine annual and seasonal dry periods in the study area.

Results: According to the results, when the annual, seasonal and monthly drought series are analyzed, it is seen that the rainfall character of the region has changed. Based on the annual SPI results, it is obvious that there has been a recent wet period in Zonguldak station. A similar situation happened within the İnebolu and Kastamonu stations. During the summer season, the Zonguldak and İnebolu stations have identified a significant dry season in the 2005-2010 period. In the Kastamonu station, during the period of 1988-1993, winter drought dominated and in the season of 2008-2011 there was a moderate rainy season.

Discussions: According to the recent changes in annual and winter drought values, it is likely that the basin will soon enter the drier period. Increased environmental pressure on water resources is expected to become evident in Kastamonu and its surroundings due to increased population and industrial activities. In this sense, the risks of drought must be taken into account in the relevant agricultural and environmental plans.

Keywords: Drought, Standardized Precipitation Index, Western Black Sea
Introduction: With the widespread use of concrete in the world, concrete properties have been improved and work has been carried out to produce concretes that are lighter, cheaper and have better insulation properties. The main feature of these studies is the production of lightweight concrete by using lightweight aggregate or by applying various methods to reduce the weight of concrete. Lightweight aggregate is the most common method of producing lightweight concrete and is an important material used to reduce the unit weight of both structural and non-structural components. The gas concrete, a product of these methods, is a porous lightweight concrete obtained by lightening and curing the mixture prepared with a fine and siliceous aggregate and an inorganic binder (lime or cement) by adding a pore forming agent. The purpose of this study is to be able to carry out detailed studies for specific purposes with natural light aggregates which are widely found in our country under the light of new technological developments in order to protect the natural resources and to evaluate without harming the environment.

Material and Methods: In the scope of the study, a powder pumice with 1 mm sieve under the gas concrete mixtures was used. The samples were prepared at a dosage of 250 kg / m³ and the mixtures were added to the mixtures while the pumice water was saturated. In addition, lime was added to the blends in addition to the cement at the rates of 20%, 40% and 60%. Aluminum coke cans obtained from the waste areas were broken down to be under sieve of 100 number and added to the mixtures at 1%, 2% and 5% of the cement. In this work, some mechanical and physical properties of hardened gas concrete were investigated.

Results: When the results were examined, the addition of 1%, 2% and 5% of the additive ratio resulted in a weight reduction of 7.99%, 12.82% and 32.49%, respectively. The effect of the water absorption additive ratio was increased by 28.12%, 38.98% and 71.31%, respectively. As a result, the porosity was found to increase by 55% and the loss of compressive strength was determined at a rate of 60% depending on the porosity increase. In thermal conductivity values was found to be maximally positive at the rates reaching 5 times of normal lightweight concrete due to the increasing vacancy.

Discussion: In this study, it was determined that 4 mm sieve material material remaining, which is called cement finishing material on the market, can be evaluated in the production of concrete and it can be used in production of gas concrete to be produced by pumice in single storey structures that do not carry different loads except their own weight.

Acknowledgement: We would like to express our appreciation to the Atatürk University Scientific Research Project Commission, which supported this study (BAP-2009-24).

Keywords: Waste, aluminum powder, pumice, lightweight concrete, gas concrete
Petroleum Biodegradation by Bacterial Consortia Isolated from Mud Pit

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Introduction: Petroleum is the most important raw material and energy source in chemical industry. However, the growth of petroleum and petroleum-related industries has led to an increase in environmental pollution and significant changes in ecosystem. In recent years, intensive studies are being carried out to determine the most effective method for the removal of petroleum pollutants from the environment. The main pathway for the removal of toxic pollutants such as petroleum is microbial transformation and biodegradation. Biodegradation is defined as the conversion of chemical organic compounds into living energy, carbon dioxide, biomass and biological waste products through living organisms. But there is no strain with a metabolic capacity that can biodegrade a complex organic compound such as petroleum. Petroleum biodegradation is accomplished with the cooperation of different microbial species in the environment. In this context, this study investigated petroleum biodegradation with different mixed bacterial cultures isolated from the mud pit sample.

Material and Methods: Mud pit sample was collected from an oil field area for the isolation of different bacterial strains. Enrichment and isolation of bacteria were carried out in Bushnell Haas Mineral Salt medium. 16SrRNA gene analysis was carried out for the taxonomic characterization of the isolated strains. Three different bacterial consortia were occurred with bacterial species adjusted for equal growth intensity. Biodegradation assay was carried out in 250 mL erlenmeyer flasks containing 50 mL Bushnell Haas Mineral Salt and 1% (v/v) petroleum as a sole carbon and energy source. All flasks were incubated at 150 rpm at 30°C for 7 days. The experiments were performed in triplicate. After the incubation period, petroleum biodegradation was determined with gravimetric analysis. The fractions of the hydrocarbons constituting the petroleum content were obtained by gas chromatography-mass spectrometry analysis.

Results: Enterococcus casseliflavus, Klebsiella pneumoniae, Bacillus subtilis, Leuconostoc mesenteroides, Pannonibacter phragmitetus, Bacillus halotolerans strains were isolated from mud pit. 80%, 77% and 47% of petroleum biodegradation was achieved by bacterial consortia 1, bacterial consortia 2, and bacterial consortia 3, respectively.

Discussion: In bioremediation studies it has been shown to be advantageous to use mixed cultures instead of pure cultures. While a single microorganism has enzymes that can metabolize hydrocarbons in a certain range, bacterial consortia have a wide enzymatic capacity. The wide range of biodegradation of petroleum can be achieved by the combination of different bacterial strains with large enzymatic capacity.

Acknowledgement: We would like to express our appreciation to Hacettepe University Scientific Research Projects Coordination Unit, which supported this study (FHD-2015-8871).

Keywords: Petroleum, Biodegradation, Bacterial Consortia, gas chromatography-mass spectrometry analysis.
Microbial Cellulose Production and Its Usage in Cyanide Removal

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Introduction: Cellulose, one of the natural polymers commonly found in nature, is an important material obtained by herbal, chemical, enzymatic and microbial pathways. Among these synthesis pathways, the production of cellulose through microbial synthesis is a highly preferred method because of its low cost, fast, continuous and being environmentally friendly. Therefore, it is aimed to investigate the optimization conditions for microbial cellulose production by using Kombucha culture in our study. Additionally, cyanide biosorption by using this polymer is also aimed.

Material and Methods: In this study, the effect of carbon sources (glucose, sucrose, maltose and lactose), different concentrations of selected carbon source (2%, 4%, 6%, 8% and 10%), rotation speed (static, 50 rpm, 100 rpm and 150 rpm), pH (3-10) and incubation temperature (25 °C, 30°C and 37°C) are investigated in order to optimize microbial cellulose production. By using these data, it is also aimed to examine the usage of microbial cellulose in the removal of different cyanide sources which are highly toxic, carcinogenic and mutagenic for living organisms.

Results: According to our results, it is found that microbial cellulose is highly effective in cyanide removal process. Additionally, it will be attempted to develop a rapid and efficient method for the removal of various pollutants by using this polymer.

Discussion: As a result, a new alternative material will be proposed, by means’ of the usage of microbial cellulose as a biosorbent. Therefore, this study will also lead to use microbial cellulose in the removal of different environmental contaminants in future.

Acknowledgement: We would like to express our appreciation to Hacettepe University Scientific Research Projects Coordination Unit, which supported this study (FHD-2017-16379).

Keywords: Microbial cellulose, Kombucha culture, biosorption.
An Investigation of the Post Fire Succession in Blackpine

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Introduction: Forest fires vary in terms of species, composition and age classes in many types of vegetation. There is a close relationship between the type of fire and destructive effect of fire intensity on vegetation. In Turkey, studies on post-fire vegetation development is limited and no articles related post-fire vegetation development in black pine stands were found. This study aims to determine development of post-fire vegetation in black pine stands, which has a wide distribution in Kastamonu. The research is ongoing and a part of it has been presented. In this study it was investigated that, how the vegetation changed in the first years after the forest fires that broke out on 2012 in Bayam Forest District belonging to Taşköprü Forest Management Directorate.

Material and Methods: In order to see the effect of the fire intensity, the test areas (25 × 50 m) were taken with the smallest area method in two regions (surface and crown fire) exposed to surface (low fire intensity) and crown (high fire intensity) fire. Monitoring were carried out by considering parameters of species composition and the covering grade. In order to determine the temporal change of the effect of high fire intensity on the vegetation, the sample area taken from the fire area in 2003 was compared with Shannon diversity index and chi-square analysis with other sample areas. The cover ratings of the life forms and the families were examined and chi-square analysis was applied to these parameters.

Results: As a result of chi-square analysis, the family Pinaceae having the highest difference. As a result of the study, some taxa belonging to Rosaceae and Fabaceae family with one and two year old were found in the area exposed to crown fire which has dominant species of blackpine. *Cistus laurifolius*, *Cistus creticus* and *Rubus sp.* taxa were found in the areas with broken closeness of stand. The species found in the test area exposed to crown fire, showed a great similarity of species composition with the area that exposed to surface fire with broken closeness of stand. *Cistus laurifolius* was observed as the dominant species in the area which is exposed to crown fire. According to the Shannon diversity index result, the most diversity was in 2003 crown fire.

Discussion: It is stated that the species rejuvenated after the fire are the first species to come to the area. Similarly, long-lived ovens were found to be the first to fill the area, and one-year-old ovaries were not as fast as others.

Keywords: forest fire, fire ecology, vegetation, blackpine
Investigation of Cytochrome-\(b\) Gene Variations in Three Sparrow Species \textit{Passer domesticus}, \textit{Passer montanus} and \textit{Passer hispaniolensis}

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Introduction: \textit{Passer} genus has four species in Turkey. Three of them (\textit{Passer domesticus}, \textit{Passer montanus} and \textit{Passer hispaniolensis}) have large range in Turkey. \textit{P. domesticus} mostly prefers urban areas, \textit{P. hispaniolensis} is extending into areas where \textit{P. domesticus} is lacking and \textit{P. montanus} is found mostly in cultivated areas, farmyards, orchards etc. In this study, interspecific and intraspecific variations and genetic differentiations were investigated; mutations and nucleotide diversities as well as substitution rates in synonymous and non-synonymous regions were calculated in Cytochrome-\(b\) gene region to reveal genetic differentiation level in \textit{P. domesticus}, \textit{P. montanus} and \textit{P. hispaniolensis} species.

Material and Methods: Total 90 samples belong to \textit{P. domesticus}, \textit{P. montanus} and \textit{P. hispaniolensis} species were used in analyses. CTAB DNA extraction method was performed using muscle tissues. Cytochrome-\(b\) gene region (700 base pair) was amplified using special primers. Alignment of Cyt-\(b\) sequences (591 bp) was performed in MEGA6 Program and number of haplotypes and mutations, haplotype and nucleotide variations and Ka/Ks values were calculated in DnaSP v5 Program.

Results: Number of haplotypes were found to be 60, 13 and 17 for \textit{P. domesticus}, \textit{P. montanus} and \textit{P. hispaniolensis}, respectively. Nucleotide diversity values were also calculated for synonymous and non-synonymous regions using Jukes and Cantor Parameter. According to the analyses, these values are considerably low for three species. Additionally, synonymous substitution rates were found to be higher than non-synonymous substitution rates (Ka/Ks<1) which shows negative selection.

Discussion: Analyses showed that nucleotide diversities as well as Ka/Ks values are notably low for three sparrow species \textit{P. domesticus}, \textit{P. montanus}, \textit{P. hispaniolensis}. According to the results, it could be concluded that intraspecific genetic differentiation level in these species are low in Turkey specimens.

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Keywords: \textit{P. domesticus}, \textit{P. montanus}, \textit{P. hispaniolensis}, Mitochondrial DNA, Turkey
Effects of Different Site Conditions on Fiber Morphology of Black Alder (*Alnus glutinosa* subsp. *barbata*) wood

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**Introduction**: Ecological factors are highly influential on the development of trees during the biological process. These factors are highly influential on the development of trees during the biological process. These effects, both in the morphological structure of the tree and in the inner structure, change the properties of the wood and give different properties to the wood. Different wood properties affect the suitability of the wood and the quality of its use. Wood is also used in the production of paper, besides the use as a massive sheet of cladding, chipboard, fiberboard. There is a significant effect of fiber quality on the properties of the paper to be produced. The fiber structure and quality vary in different species of trees and in different regions of a particular tree species, as well as in individuals of the same species growing in different regions / regions. For this reason, in order to determine the fiber properties, it is necessary to concentrate the investigations on the tree samples taken from different regions / regions in order to obtain more precise values about the fiber properties. Towards this aim, we investigated the variation of the fiber properties of black alder (*Alnus glutinosa* subsp. *barbata*) wood, especially in the eastern Blacksea region, according to the different sites in our country.

**Material and Methods**: The field studies were carried out in three different sites where the black alder was naturally distributed. In order to determine the fiber properties of the bearded alder wood, a tree was cut from each area and wood samples were taken. The Schultze method has been applied to the release of the wood elements in the test specimens in order to be able to measure the fiber properties. Using these values, Keckling ratio, Mesomorphy ratio, Runkel class, Runkel ratio, Elasticity coefficient, Rigidity coefficient and F factor of bearded alder wood were calculated. Variance (One-Way ANOVA) analysis was conducted to reveal the difference in fiber properties of black alder wood. Duncan test was applied to determine homogeneous subgroups.

**Results**: According to the ANOVA test results, the fiber length of black alder wood, fiber width in three regions, fiber lumen width, fiber wall thickness, felting ratio, Runkel class, Runkel ratio and elasticity coefficients (p <0.01) were different between the regions. The values related to the fiber properties were found in the highest Arhavi region, the lowest Espiye region.

**Discussion**: It is believed that black alder wood can be used in paper making in that it has the characteristics of “fibrillating fibers best suited to paper making” according to the Runkel classification, as well as the ability to flatten and thus provide good surface bonding due to the elasticity coefficient being in the range of 50-75 in terms of the matting ratio. In addition, black alder wood samples taken from different growth medium regions differ statistically (p<0.01) in terms of fiber properties. Therefore, it is considered that the use of wood samples of the same species taken from different sites in paper production may also be different.

**Keywords**: Fiber morphology, black alder, site conditions
**Introduction:** The aim of this programme is to develop awareness on plant biodiversity by observing their structures such as the leaves, fruit, flowers, seeds of 5 different tree species. The programme aims to facilitate students’ discovery of the properties, structures, sections and life cycles of plants through observation.

**Material and Methods:** ‘Discovery at NGBB’ has been practiced with pre-school and grade school students in groups of 20 and has served 1680 children since 2009. Within the framework of this programme at Nezahat Gokyigit Botanical Garden, groups of students are sent out for discovery and are introduced to 5 different trees (redwood, ginkgo, cedar, eucalyptus, linden). The students observe the morphological differences of the trees. In addition these trees are used as training material. In this phase of the experience, direct education strategy is used. At the beginning of the discovery souvenir cards are distributed to students which have been prepared with colored cardboards having tape on both sides. Students have the opportunity to paste leaves and little seeds which they find during the discovery onto the cards and study the pieces more closely. In this way, the observation becomes more tangible. It is intended that students learn by doing-experiencing-living. When the features of eucalyptus trees are being explained, a koala puppet drama technique is used in order to re-inforce the learning. Redwood, cedar, ginkgo and linden trees are introduced using laminated tree visuals. The dried leaves, seeds and cones of the trees are also used. At the end of the discovery riddles are given in a ‘Tree Adventure Game’ aiming at re-inforcing what has been learned. With this purpose at the end of the training ‘Tree Adventure Game’ papers and pens are used. The game aims at active learning with students using both their minds and their bodies.

**Results and Discussion:** At the end of the programme qualitative evaluation is conducted through the views of teachers and students. The success of the training is measured using the ‘Tree Adventure Game.’ Results of evaluations, show that students who participated in the study developed greater awareness through observation and examining 5 different tree types. This programme is important because students develop skills of observing nature in addition to increasing their knowledge about plants.

**Acknowledgement:** We would like to express our appreciation to the Nezahat Gokyigit Botanical Garden and the Ali Nihat Gokyigit foundation which supported this programme.

**Keywords:** Nature Education, Exploration, Observation, Biodiversity
Introduction: Today, the use of enzymes is becoming widespread in most industrial technologies, especially in biotechnological processes. However, the application of enzymes in some industrial fields is limited due to some disadvantages such as costs and problems with their availability. In this respect, there is a scientific interest in the discovery and development of enzymes resistant to high temperatures and various chemical environments. One of the most effective and successful methods for discovery of new enzymes is the isolation of microorganisms from natural habitats. While organisms isolated from natural sources can result in the discovery of new species, the compounds obtained from these organisms are of industrial significance. In addition, enzymes produced by local microorganisms contribute to the local economy. Therefore, in the study, we aimed to investigate industrially important enzymes from actinobacteria strains isolated from lake sediments in Black Sea region.

Material and Methods: The actinobacteria used in the study were *Nocardiopsis* sp. strains A1-14, A2-16 and U96. The enzymes studied in the study were amylase, lipase and protease. The submerged productions of enzymes were performed in liquid fermentation media containing starch, tributyrin and casein, respectively and their activities were assayed according to the methods recommended in literature. In addition, we also studied the thermal and pH stabilities of the enzymes.

Results: The actinobacteria isolated from lake sediments showed significant productions for all three enzymes. For amylase and lipase, *Nocardiopsis* sp. strain A1-14 gave the best activities (4.44 and 0.39 U/mL) followed by *Nocardiopsis* sp. strain A2-16 (3.17 and 0.19 U/mL) and *Nocardiopsis* sp. strain U96 (2.26 and 0.09 U/mL). For protease, *Nocardiopsis* sp. A2-16 showed the highest activity (0.97 U/mL) followed by *Nocardiopsis* sp. strain U96 (0.83 U/mL) and *Nocardiopsis* sp. strain A1-14 (0.68 U/mL). Among the amylases, the enzyme obtained from *Nocardiopsis* sp. strain U96 was stable over a wide pH range of 3-10 and up to 70°C. The lipases showed a narrow stability between 20 and 40°C and pH 6 to 10. In case of the proteases, the enzymes were stable over a wide pH range of 3-10 and up to 70°C.

Discussion: The enzymes investigated in the study have been used intensely in many applications in several industries such as chemical, medicine, detergent and textile, etc. For this reason, it is important to find new sources for these potentially useful enzymes.

Keywords: Production, stability, enzymes, *Nocardiopsis* sp., lake sediments
Determination of The Contents of Some Heavy Metals in Endemic Plants in Salt Lake Surroundings: in Case Study Salvia halophila and Hypericum salsugineum

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Introduction: In this study, it is aimed to assess the accumulation potential of heavy metals (Chrome, nickel, copper, zinc and lead) in Salvia halophila and Hypericum salsugineum which are endemic halophyte plant species growing around Salt Lake. The heavy metals contents of these plant and soil are analysed. We also compared the results to international standard levels of heavy metals. The findings of this investigation are the first reported results for this endemic species of Salvia and Hypericum located at Salt Lake, Turkey.

Material and Methods: Plants of Salvia sp and Hypericum sp and soil samples are collected from Eskil in Aksaray and Cihanbeylı in Konya. Chrome, nickel, copper and zinc heavy metal analysis of the derived plant and soil samples are made. The plant samples were determined by using an Atomic Absorption Spectrophotometer. The soil samples were placed on Wavelength Dispersive X-ray Fluorescence apparatus and heavy metals were determined.

Results: According to the results of analysis, varying amounts of heavy metals like Cr, Ni, Cu, Zn and Pb are accumulated in soil and in investigated species Salvia and Hypericum. The accumulated amounts vary according to the time and location that the plants are collected. The results showed that the highest heavy metal accumulation is seen in July-August. Because the evaporation is at the highest level in this period. When the results are assessed it is possible to say that Pb is higher than the standart values in S. halophila especially in Eskil. On the other hand, H. salsugineum was seen to accumulate Pb and Ni in both location.

Discussion: The data derived from the investigation for the endemic plants Salvia sp. and Hypericum sp. are important in terms of being newly discovered results. By the usage of the derived data in parallel studies the economic and ecologic value of the plant will be enhanced and the potential of usage in phytoremediation will be determined.

Keywords: Halophyte, heavy metals, Hypericum salsugineum, Salvia halophila, Salt Lake
Investigation of Phylogenetic Relationship in Some *Trifolium* Species from Istanbul/Turkey by Using CpDNA Regions

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Introduction: *Trifolium* is one of the largest and most important genus from Leguminosae (Fabaceae) family. The genus includes about 300 perennial and annual species naturally distributed at the subtropical and temperate areas in the world except Australia and Southeastern Asia. Members of this genus are used as manure, livestock feed and also in apiculture. Some authors report that phylogenetic relationships in plants could be investigated by using DNA barcodes, for example, some regions of chloroplast DNA (cpDNA) have been used for evaluation of phylogenetic relationships. In this regard, herein work investigated the molecular phylogenetic relationships in some *Trifolium* species by using chloroplast *trnL*–*trnF* intergenic spacer sequences.

Materials and Methods: *T. uniflorum*, *T. subterraneum* and *T. pachycalyx* species were used as study materials. *T. subterraneum* is a hermaphrodite annual clover. *T. pachycalyx* is an annual herbaceous plant and an endemic species of Istanbul. *T. uniflorum*, is a perennial and non-endemic plant. Plants were collected from their natural habitats, surrounding area of the Maltepe district in Istanbul/Turkey. DNA isolation from fresh leaf samples was performed using CTAB method. After standard PCR reactions, amplified replicons were sequenced with Sanger technique. Sequence analysis were done with DnaSP v6 software. Phylogenetic tree was constructed using maximum likelihood (ML) method in MEGA 6 software.

Results: Lengths of cpDNA *trnL*–*trnF* sequences were 187 bp in *T. uniflorum* and *T. pachycalyx* species, and 195 bp in *T. subterraneum*. GC content in these sequences was calculated as 33.16% in *T. uniflorum*, 34.22% in *T. pachycalyx* and 32.82% in *T. subterraneum*. Overall mean distance was found 1.783. Tajima's test of neutrality was performed and π, θ and Tajima’s D values were calculated as 0.449, 0.446 and 0.003565, respectively. In phylogeny analysis, *T. uniflorum* and *T. pachycalyx* clustered together with 100 bootstrap values while *T. subterraneum* diverged. Besides, other *Trifolium* species also grouped together as major cluster except *T. pratense*.

Discussion: Based on sequence analysis, *T. subterraneum* was found to be the most diverged one among species from Istanbul. Tajima's test of neutrality revealed that species has two distinct types and this was further confirmed by phylogenetic analysis. The investigated species clearly separated from other *Trifolium* members in phylogeny. Overall, it seemed that non-coding *trnL-trnF* intergenic spacer sequences could effectively reveal the genetic similarities/diversities among *Trifolium* members.

Keywords: *Trifolium*, *trnL-trnF*, intergenic spacer, molecular phylogeny
ORAL PRESENTATION

Effects of Acetamiprid on *Allium cepa*

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**Introduction:** Increasing pesticide usage will cause damage to the ecosystem and also human health. Acetamiprid is a neonicotinoid insecticide that affect the nervous system of insects and cause paralysis. It is a broad-spectrum pesticide that can be used on plants ranging from leafy vegetables and fruit trees to ornamental plants. In this study, cytotoxic effects of the insecticide Acetamiprid were investigated by using Allium test. Also physiological effects (length of root and MDA content) of Acetamiprid were examined on *Allium cepa* L.

**Material and Methods:** Neonicotinoid insecticide Acetamiprid (molecular formula: \(\text{C}_{10}\text{H}_{11}\text{ClN}_4\), synthetic organic compound) was used. Healthy and equal sized (15-20 mm in diameter) commercial *A. cepa* bulbs were chosen and used as test material. Bulbs were placed over the test cubs filled with tap water at room temperature (20°C) for 48h, three replicates of twelve (12) bulbs were used for control group and each concentration (0.1, 0.25, 0.50, 0.75g/l) of Acetamiprid. After 24 and 48 hours of treatment cytotoxic and genotoxic effects of Acetamiprid were investigated. Cytotoxicity has been determined by decrease of Mitotic index (MI) and genotoxicity has been determined on the basis of chromosome aberrations (CAs). Also, root length was measured and MDA content in root tissues were determined according to Lutts et al. (1996).

**Results:** Acetamiprid significantly decreased Mitotic Index (MI) and increased the chromosome aberrations.c-metaphase, anaphase bridge, sticky metaphase, disturbed anaphase, disturbed metaphase, tripolar anaphase, micronucleus were observed at all concentrations and treatment periods when compared with their controls. Acetamiprid has potencially genotoxic and cytotoxic effects. Acetamiprid treated plants show reduction in root length for all concentrations when compared to the control. Besides it caused an increase in MDA (malondialdehyde, a product of lipid peroxidation) content in root tissues at 24 and 48 hours of all treatments.

**Discussion:** Uncontrolled use of pesticides can lead to morphological, physiological and biochemical changes in plant tissues. The choice of best insecticide, proper application time and doses are important for all living organisms. The results of this study showed that all tested concentrations of Acetamiprid cause decreases in growth and increases in MDA contents. These results indicated that this insecticide should be regarded as a toxic agent for plants. Hence, the use of this insecticide should be under control at these concentrations.

**Keywords:** *Allium cepa*, Acetamiprid, cytotoxicity, growth parameters, lipid peroxidation.
Science and Nature in Kızılırmak Delta

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Introduction: Kızılırmak Delta is one of the largest wetland in Turkey. Delta has many habitats of different ecological characteristics such as sea, river, morass, marsh, meadow, pasture, forest, dune and agricultural areas. This study was carried out in Kızılırmak Delta for the purpose of determining the attitudes of the participants attending the Nature School towards the environment, the gains of the participants after the training, and their views on outdoor education. Trainings continued for 10 days in different habitats of Delta. After theoretical information was given by a specialist, participants and the specialist conducted different applied field studies related to the subject.

Material and Methods: Both quantitative and qualitative research methods were used in this study. New Environmental Paradigm (NEP) Scale is applied to 26 participants from different universities of Turkey before the training, and the same scale applied them again after the training. At the last day of the training, 2 different open-ended questions were asked to the participants for determining their gains and their views on outdoor education.

Results: The attitudes of the participants towards the environment were developed after the training. Furthermore, findings indicated that the participants consider that gaining new friends, getting new informations, and recognizing the importance of the relation between the human and the nature are positive gains. Also, results showed that outdoor education is more efficient and more enjoyable for learning.

Discussion: This study is produced favorable results. Participants developed positive attitudes towards the environment. Joining in nature and environmental activities will help people to realize nature. Also, outdoor education is important for the students to gain experience on the biodiversity and the nature. Therefore, this kind of projects must be supported.

Acknowledgement: We would like to express our appreciation to TUBITAK, which supported this study (117B115).

Keywords: Kızılırmak Delta, outdoor education, experimental learning, Nature School, nature training
Protective effect of Osage Orange on Cisplatin-Induced Toxicity in Drosophila melanogaster

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Introduction: Chemotherapy accepted as the standard among many methods in cancer treatment and frequently used against cancer, can cause toxic damage to different tissues and organs while killing cancer cells. Cisplatin (CP) well known as the antineoplastic drug is widely used in cancer therapy alone or with other antineoplastic agents and radiotherapy. Nowadays, complementary medicine is generally preferred to remove for the damage especially oxidative stress caused by agents like Cisplatin. In this study, the protective role of the Osage orange plant was investigated against the toxic effect induced by Cisplatin on the percentage of survival and the number of offspring in fruit flies.

Materials and methods: Maclura pomifera (Raf.) seed extract (MPSE) was used in experiments. 0.5 and 1.0mM CP, and 1.0 ve 2.0mg/mL MPSE were applied to the adult individuals with Standart Drosophila Medium (SDM) to determine the number of offspring. In all applied groups, in a set of experiment, CP, MPSE, and CP+MPSE applied to the female members (males were fed in only SDM), while in another set of experiment CP, MPSE and CP+MPSE were applied to male members (females were fed in the only SDM). Exposed individuals and unexposed individuals were mated in SDM. Offspring numbers in F₁ progeny developed from the eggs laid of pairing were counted. For survival rate experiments, a hundred larvae (72±4h) were transferred to control and application culture media containing different concentrations of CP, MPSE, and CP+MPSE. During seven days, the individuals that could develop from larvae to adults were recorded. The obtained data were analyzed with SPSS version 22.0 (Statistical Package for the Social Sciences Software, SPSS, Chicago, IL).

Results and Discussion: It was determined that the CP decreased the total number of offspring generations in the F₁ generation and that the percentage of survival in the treatment groups exposed only to CP decreased compared to the control group. CP+MPSE was found to have a protective role in MPSE by controlling the number of offspring and percentage of survival to control.

Conclusion: It is considered that strong nutrients and healing agents in the content of the plant core are effective in eliminating the toxic effect of CP exposure. We hope that this study will benefit the future work with the Osage orange.

Keywords: Drosophila melanogaster, Cisplatin, Maclura pomifera, Toxicity, Antioxidant
Evaluation of UAV Usage Possibility in Determining the Environmental Impacts of Construction Activities of Forest Roads: Preliminary Results

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Introduction: The impact of construction activities of forest roads on environment have become an important issue for forestry authorities. Thus, determination of these impacts in the planning phase and minimization during construction, are presently gaining more and more importance. Since forest roads are mainly constructed over steep slopes on mountainous areas, determining the level of impact requires detailed information. Unmanned aerial vehicle (UAV)-based photogrammetry has emerged as a new method in surveying and mapping which has many advantages. In the present study, the aim is to determine the impact from construction of forest road on environment using UAV data and evaluating its pros and cons.

Material and Methods: The present study was carried out over a section of forest road. The road length consists of 1271 km, and is located in the Alabarda/Bolu. Two UAV flights, one before construction and one after road construction, were carried out with a multi-copter equipped with a 12 MP RGB camera. The flights were carried out in order to determine the level of impact of construction activities. Structure from motion algorithm was used to create high resolution digital surface models and orthophoto mosaics. For both flights, all imageries were obtained with 70% of overlapping in both front and side. In the present study, only a visual evaluation was carried out in determining and mapping the spreading of land material formed from road construction via UAV-based orthophotos.

Results and Discussion: UAV-based high resolution (<5cm) orthophoto mosaics were created in an RGB format in determining maximum spreading area of land material formed due to road construction. In addition, the excavation area where trees were removed was also mapped. According to this, 3.2 ha area was cleared from the trees for road construction. Determining the impacts of construction of forest road on environment was done by using high resolution UAV-based orthophotos created from images obtained before and after road construction. The spreading area of the excavated land material such as rocks, boulders, and soil was determined by studying the UAV-based orthophotos. However, the success of this approach depends on many factors, such as flight altitude, light conditions at the moment of the flight, and the existence or density of vegetation cover over the slope. Especially due to the coniferous species that are common in the area, canopy cover became an important limitation. In the present study, degradation near to construction areas were able to be mapped. In addition, excavated land material near to road platform where trees were removed, and in the gaps in trees located at the side of filling area, were able to be determined.

Conclusions: UAV-based high resolution remote sensing data allows determining the environmental impact from construction activities of forest roads. However, optical sensors have limited abilities in mapping excavated land material due to road construction when dense forests exist. But it is possible to say that reduction in size of active sensors, such as LIDAR, that are able to be mounted on the UAVs, will allow the mapping of excavated materials even if they are under forest canopy.

Keywords: Environmental impact, Forest road construction, Orthophoto mosaic, UAV
Invasive Flora of Artvin

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Introduction: Invasive species show wide distribution in Turkey like other countries. Such species may arrive in new areas through natural migration, but they are often introduced by the activities of other species. This plant species pose a significant threat to the natural ecosystems in the world. The Artvin area reflects the eastern part of the Black Sea region’s rich floristic composition and an increasing number of adventive plants occur as naturalized populations in Artvin. The aim of this study was to determine invasive plant species in Artvin between 2015 and 2018.

Material and Methods: All data about invasive species in Turkey was screened from different resources. Then, according to characters of plant species (native, exotic, introduced..), list of invasive plant species were created.

Results: As a result of study, 87 plant species were determined as an invasive in Artvin. There are 86 Angiospermae, 1 Gymnospermae invasive taxa. All species are naturalized. The richest families are Poaceae (19 taxa), Asteraceae (13 taxa) and Solanaceae (7 taxa). The majority of taxa are perennial. Most of the 86 invasive species introduced to Artvin have their native ranges in America (28%) and Asia (23%). Among the taxa introduced intentionally, the vast majority are ornamental plants. Plants that occur as agricultural weeds are typically naturalized (90%) rather than casual (10%).

Discussion: This is the first study on invasive species in Artvin. Invasive species are spreading widely in and around Georgia border to Artvin. About 144 plant taxa are invasive in Georgia and this number almost twice as much of invasive species in Turkey. Invasive plant species distribute easily, their distribution must be blocked, took some precautions and tried to control them. Illegal transport of this species should be prevented.

Keywords: Artvin, invasive, naturalized, plant, Turkey.
The Plant Taxa and Communities with Priority at Conservation in Karaman Province (Turkey)

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Introduction: The Flora and vegetation studies carried out in the Karaman province revealed that this region was rich in endemic plant species and had important plant communities. The fact that Karaman province located in the transition zone between Mediterranean and the Irano-Turanian geographical regions, having elevations ranging from 300 m to 3000 m, the geographical structure of the deep valleys and the changing climatic conditions constitute the source of this richness. When the numbers of plant taxa registered in Karaman compared to the other provinces of Turkey, it can be said that Karaman had a very rich plant biodiversity to its surface area.

Material and Methods: Firstly, the results of the flora and vegetation studies carried out in Karaman province were evaluated, and then the plant taxa and important plant communities to be protected in the area were determined. In addition, plant samples collected during the field studies carried out between 2015-2017 years, were evaluated and new plant taxa added to the list.

Results and Discussion: As a result of literature and our field studies, it was determined that about 2100 plant taxa were distributed in the Karaman provinces, 530 of these taxa were endemic and about 60 of them were distributed only in Karaman province. Ten local endemic taxa and two previously identified plant associations were considered to have conservation priority. These taxa and Turkish names are as follow:


*Homalothecio-Quercetum vulcanici* and *Pistacio-Oletum europaeae* are the important plant associations to be conserved.

Keywords: Endemic plants, monitoring, Karaman
Use of Artificial Neural Networks in Forest Road Network Planning

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Introduction: In the past, forest road network planning was carried out with the perspective of open up forest areas for production, carrying out conservation activities, etc. Today, this perspective has turned into a perspective of planning a forest road network with minimum cost and maximum benefit, which can meet functional planning and multi-purpose needs.

Material and Methods: It is important to benefit from decision support systems because many criteria (construction purpose, slope, elevation, aspect, soil properties, lithology, precipitation, vegetation type, annual production, open up ratio etc.) are taken into consideration in this new and ideal forest road network planning perspective. As a matter of fact, depending on the size of the areas that need planning, evaluating more than one factor can mean a lot of calculations. In this context; artificial neural networks, which are "learning approaches developed through various algorithms in the computer environment" that are used in many disciplines that facilitate decision makers' work in multi-criteria studies, are an important tool that can be used in forest road network planning. In this study, artificial neural networks' learning and estimation features are presented as decision support system which can be used in forest road network planning.

Results: The artificial neural network models that can be used in forest road network planning and the criteria that can be used are presented with examples from the literature and the importance of utilizing artificial neural networks in order to create decision support system in today's forest road network planning has been put forward. In the forest road network planning, the long-lasting calculation works of the road network plans decided by the integrated use of artificial neural networks and geographic information systems can be concluded in a much shorter time and more accurately.

Discussion: Forest road network planning; it is considered that the artificial neural networks can be used in planning studies for the basic objectives such as determining the minimum length that can be served for construction purposes, low construction and maintenance costs and keeping the environmental damage due to construction works at reasonable limits.

Keywords: Forest road network, artificial neural network, planning criteria, decision support system
Effects of Silver Nanoparticles on In Vitro Adventitious Shoot Regeneration from Upper Half Leaf Explant of Water Hyssop (*Bacopa monnieri* L. Wettst.)

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**Introduction:** Aquatic plants are important part of water bodies and can be divided as aquatic or semi-aquatic plants. However, the potential of these plants are not exploited and these plants can be used as medicinal or alternative food plant. Water hyssop (*Bacopa monnieri* L. Wettst.) is one of the important medicinal aquatic/seemi aquatic plant that is native to India and important plant of traditional medicinal system. It contains bioactive compounds like Bacosides; the main ingredient of memory enhancer tonic in India. Besides that, it is also used for curing chronic diseases and disorders. It is not cultivated and wild collection of plant from nature make it near to endangered status. The plant is now mainly produced through plant tissue culture techniques mainly for its secondary metabolites. In recent years, application of nanoparticles has been reported for increasing biomass, in vitro regeneration and secondary metabolites production of different plants. In this study, effect of silver nanoparticles (AgNPs) on in vitro regeneration potential of upper half leaf explant was investigated.

**Material and Methods:** Silver nanoparticles were applied at the rate of 2, 4, 6, 8 and 10 ppm to Murashige and Skoog (MS) medium supplemented with 1.0 mg/l Benzylaminopurine (BAP), 3.0% sucrose and 0.7% agar. Upper half part of leaf of water hyssop plants were cultured on AgNPs containing medium as explant.

**Results and Discussion:** Shoot induction from explants was relatively slow compared to control (medium without AgNPs). Multiple shoot induction was recorded after 2-3 weeks of culture compared to control. Regenerated shoots were isolated after 8 weeks of culture and rooted successfully on MS medium supplemented with 1.0 mg/l IBA and acclimatized in the aquariums for further studies.

**Keywords:** Water hyssop, Silver nanoparticles, In vitro, Regeneration, Secondary metabolites
Evaluation of ORKÖY Activities of Support for Forest Villagers in Rural (A Case Study of Kastamonu Province)

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Introduction: Forest villagers in Turkey, besides being the poorest part of the country, is still one of the important cogwheels of the forestry sector today. Many factors, such as working in hazardous and temporary forest operations/works, inadequate education and health care and, as well as topographical difficulties in living areas, affect the poverty struggle of forest villagers in the negative direction. In addition to this, alluring aspects of cities, such as education and health facilities, developing technology, higher living standards were reduced forest-human relations of forest villagers. Also forest villagers were started to seek different sources of livelihood. The state provide financial support for forest villagers in rural, and both directly and indirectly make positive contribution of forest-human relation. In this study, individual supports for forest villagers provided by ORKÖY were examined.

Material and Methods: In respect to both forest asset and the number of forest villages, Kastamonu province is the important province. For this reason Kastamonu Province was chosen as the study area. From among 1071 villages in Kastamonu province, Forest villages which benefited from ORKÖY support between the years of 2012-2017 were identified. In the study, the forest villages which benefited from ORKÖY loans were examined in the spatial plane. And also the types of support the villagers receive, the economic magnitudes of the supports were analyzed.

Results: Supported villagers were found to be more than a quarter of the total number of villages in Kastamonu province between 2012-2017 years. However, it is also determined that there is a decrease in the number of villages supported and the number of supported villagers each year. The total amount of support to given the living forest villages of the Kastamonu was calculated. Then the annual average ORKÖY support amount per forest villager was determined. As a result of the study, in this study were determined that approximately 70% of the supports provided between 2012-2017 were social aimed supports and 30% of the supports were economic aimed supports.

Conclusion: As a result of this study, ORKÖY activities in Kastamonu province have positive effects on forest villagers and also indirectly on forestry were revealed.

Keywords: Forest villagers, support, ORKÖY, Kastamonu
Aquatic Invertebrate Diversity of Eskişehir Province and First Record from Eskişehir Surface Waters

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Introduction: Turkey is the country which has continental characteristic in respect to biodiversity in the form of outdoor museum. Eskişehir Province where is located in Central Anatolia Region is quite rich city in point of aquatic systems. The main aquatic system which inhabit aquatic invertebrates in the provincial borders is Porsuk Stream which flow into Sakarya River and its tributaries with 1 wetland (Balıkdamlı). In addition to these, there is many artificial systems with 7 dam lakes (Dam Lakes of Porsuk, Sarıyar, Musaözü, Gökçekaya, Dodurga, Çatıören and Kunduzlar). In this study, collected benthic invertebrates samples from Beşik River and Gürleyik Stream in Eskişehir Province between 2016-2017 years were identified, new records for province aquatic fauna were determined, also results of the studies concluded about Eskişehir aquatic invertebrate fauna until 2018 were compiled and composition of province aquatic fauna was given.

Material and Methods: Samples were collected from 3 stations in Beşik River and 2 stations in Gürleyik Stream both located in Eskişehir Province between April-October 2016 and May-November 2017 years by kick net method and fixed with 70% ethanol in situ. Collected samples were separated at ordo-family level and identified at species level in laboratory.

Results: According to results of studies which are about aquatic invertebrate fauna of Eskişehir Province until 2018, totally 441 species (as 1 Hydridae, 1 Planariidae, 59 Clitellata, 35 Gastropoda, 3 Bivalvia, 17 Branchiopoda, 5 Gammaridae, 18 Ostracoda and 302 Insecta) were reported and it is considered that Insecta has high diversity. As a result of study in Beşik River and Gürleyik Stream, Spericaria josinae from Clitellata, Perla bipunctata and Nemoura cinerea from Plecoptera and Hydropsyche fulvipes from Trichoptera were first record in Eskişehir surface waters.

Discussion: 441 species were reported from Eskişehir surface waters in studies which were concluded until 2018 and this number was going up 445 with 4 new record identified in Beşik River and Gürleyik Stream. Morphological characteristics of Spericaria josinae, Perla bipunctata, Nemoura cinerea and Hydropsyche fulvipes and their distribution in Turkey were given information in this study.

Keywords: Aquatic invertebrates, Eskişehir
Introduction: New chemicals come into our life to ease our daily activities, each year. On the other hand these chemicals that are thought to facilitate our lives create chronic ecological problems. Water and wastewater treatment plants have been designed to treat high concentrations of pollutants. Since the treatment of micropollutants did not specifically targeted, the removal rates of micropolllutants (C <0.5 mg / l) are low. Only advanced treatment processes (such as adsorption, advanced filtration and advanced oxidation processes) contribute to the remove of biocides in treatment plants, in recent years. The removal efficiencies of these processes are not fully established, yet. On the other hand, the effluents from traditional wastewater treatment plants are discharged to natural reservoirs. The remediation of small molecules at low concentrations is less, especially in molecules that are hydrophobic and have no electrical charge. The exposure from on-point sources is another major rout to the ecosystem for micropollutants (i.e. pesticides).

Material and Methods: We investigated the effect endosulfan exposure on plants at concentrations below the discharge criteria. Allium cepa L. was the selected species for the experiments. Genetic and physiological effects are evaluated at each concentration level, triplicates. Treated effluent from domestic wastewater was used, which was collected from the discharge point.

Results: It was observed that there was deformation in the Allium cepa L. fed with treated domestic wastewater in a quality that could be treated and discharged to the receiving center. Similarly, endosulfan (max. 300 μg / l), which is solubilized in purity, was found to cause deformation on onion roots, as well. Different genetic deformities is observed.

Discussion: Even at very low concentrations, negative effects of pesticides on plants are observe. This means non-target organisms are also effected from treated or untreated effluent discharges.

To prevent health and environmental effects of pesticides even at low concentrations from contaminating our water resources, it should be recognized that a broad stakeholder approach is needed, conscious producers and consumers and treatment experts. Control of the use of pesticides is an approach that should be assessed at the global level.

Keywords: Ecosystem, Environment, Microorganisms, Landfill, Land application, Wastewater sludge
Biomonitoring of heavy metal status in Bishkek-Kyrgyzstan using *Salix fragilis* (Oral Presentation)

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Introduction: Showing a progressive performance in carrying out industrial and economic development, the city of Bishkek has started to suffer from a widespread pollution in recent years. The most populated city, Bishkek is the capital and the largest city of Kyrgyzstan as cultural, economic and financial center. In present work, the heavy metal and mineral nutrient contents of the parts of (leaves, stems and roots) of *Salix fragilis* and their co-located soil samples collected from along Alamedin River passing Bishkek in Kyrgyzstan were investigated for a monitoring research for the evaluation of the possible heavy metal pollution in the region.

Materials and Methods: For the assessment of the possible heavy metal pollution, *Salix fragilis* was chosen as study material and the leaf (washed and unwashed), stem and root samples from the plant and co-located soil samples were collected from different localities along Alamedin River passing Bishkek. The Al, Ca, Cr, Cu, Fe, K, Mg, Ni, Pb and Zn concentrations of the plant and co-located soil samples were determined by employing ICP-OES.

Results: The lowest and highest heavy metal and mineral element contents of the plant samples (in mg.kg⁻¹) were found to be as: 6.53 (in washed leaves) and 101.86 (in unwashed leaves) for Al in stations 9 and 5; 305.54 (in washed leaves) and 2511.85 (in stems) for Ca in stations 5 and 6; 0.170 (in roots) and 9.65 (in unwashed leaves) for Cr in stations 4 and 8; 1.80 (in washed leaves) and 14.17 (in roots) for Cu in stations 8 and 7; 21.05 (in washed leaves) and 327.21 (in stems) for Fe in stations 4 and 8; 161.96 (in roots) and 1124.27 (in unwashed leaves) for K in stations 4 and 5; 339.61 (in stems) and 2654.16 (in unwashed leaves) for Mg in stations 6 and 9; 0.447 (in washed leaves) and 15.647 (in stems) for Ni in stations 4 and 6; 4.024 (in roots) and 196.80 (in unwashed leaves) for Pb in stations 1 and 4; 6.630 (in roots) and 218.52 (in unwashed leaves) for Zn in stations 3, and 10, respectively According to the literature, the normal limits (in mg.kg⁻¹) in plants are in ranges of 40-500 for Al; 400-15000 for Ca; 0.1-0.5 for Cr; 5-30 for Cu; 50-250 for Fe; 1000-7000 for K; 700-9000 for Mg; 0.05-5 for Ni; 5-10 for Pb; and 27-150 for Zn and between 5-30 for Cr; and over 30 for Cu; 500 for Fe are accepted as toxic levels, respectively.

Discussions: According to our data, the levels of Al (exceeded normal range in stations 5 and 9), Ca, Cu, Fe (exceeded normal range in station 1), Mg, and Zn (exceeded normal range in stations 10) in the plant samples in all stations in which research conducted were found to be within the normal ranges in comparison with literature whereas the normal ranges were exceeded in all or some stations for Cr, Ni, and Pb (in toxic or close to toxic range) and the level of K was found to be lower than normal range. Our data showed that the level of environmental pollution in Bishkek is getting for being a problem in terms of accumulations for at least some heavy metals.

Keywords: *Salix fragilis*, Heavy metal accumulation, Pollution, Bishkek
Molecular Fingerprinting of Some *Isoetes* members using ITS and *trnL–trnF* sequences; a case study from Istanbul/Turkey

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**Introduction:** Lycophyte genus *Isoetes*, a Lycopodiaceae family member is widely distributed in diverse habitats with more than 200 species. *Isoetes* members are commonly known as ‘quillwort’. They rely on plenty of water; mainly growing on wetlands but some can grow on wet grounds before the summer. Identification of *Isoetes* members can be difficult due to their conserved morphologies and simple forms. However recently, spore, chromosome and molecular analysis have provided some useful information for diagnosis and identification of *Isoetes* members. Three *Isoetes* members, *I. histrix*, *I. gymnocarpa* and *I. durieui* naturally grow on the Anatolian side of Istanbul in earlier spring. In this context, to contribute molecular phylogeny studies of this genus, phylogenetic relationships were investigated by using nuclear ITS and chloroplast *trnL–trnF* sequences.

**Materials and Methods:** Fresh leaf samples from *I. histrix*, *I. gymnocarpa* and *I. durieui* plants were collected in February 2018 from their natural habitats located at the Basibuyuk region of Maltepe, Istanbul/Turkey. DNA isolation was performed by employing CTAB method with some modifications. ITS1, 5.8S rRNA and ITS2 regions from nucleus and *trnL–trnF* intergenic spacer sequences from cpDNA were amplified by standard PCR reactions. Sequencing process was carried out with Sanger technique. Sequence analysis and phylogeny construction were done using DnaSP v6 and MEGA 6 tools respectively.

**Results:** Amplicon sizes were found 692 bp for ITS and 546 bp for *trnL–trnF* intergenic spacer. Average GC contents and number of variable sites were respectively calculated as 60.2% and 46 for ITS, and 30.5% and 14 for *trnL–trnF* intergenic spacer. Tajima’s D, π and θ values respectively were calculated 0.00096, 0.045279 and 0.044316 for ITS, and 0, 0.017094 and 0.017094 for *trnL–trnF* spacer. In phylogeny analysis based on ITS sequences, investigated *I. histrix*, *I. gymnocarpa* and *I. durieui* species clustered in the same subgroup along with other similar species obtained from NCBI database but they diverged from other *Isoetes* members. Besides, in phylogeny based on *trnL–trnF* intergenic spacer, *Isoetes* members clustered with *I. lacustris* (retrieved from NCBI) and clearly diverged from other Lycopodiaceae family members.

**Discussion:** The analyses revealed that ITS sequences show higher level of diversity than that of *trnL–trnF* intergenic spacer sequences. However, both ITS and *trnL–trnF* intergenic spacer sequences were implicated to be preferable in phylogenetic analysis. In addition, there have been few *trnL–trnF* intergenic spacer sequences belonging to *Isoetes* genus in databases. So, in terms of filling the literature gap in this regard, this study revealed sequences could significantly contribute to the molecular phylogeny of *Isoetes* genus.

**Keywords:** Lycopodiaceae, Molecular phylogeny, *trnL–trnF*, intergenic spacer, ITS
Reptile Fauna of the Kastamonu City (Northern Turkey)

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Introduction: Reptile species and their distribution in Kastamonu are examined between the years 2016-2017. Literature records also have been checked. A total of 20 reptiles were inhabited in Kastamonu, including 3 turtles, 9 lizards and 8 snakes. According to IUCN criteria, 1 species of Turtle (Testudo graeca) is in VU category, 2 species; Emys orbicularis, and Vipera ammodytes are in the NT category. Data on distribution and locality information for each taxon are reported.

Material and Methods: The field studies were carried out within the borders of Kastamonu province which covers all areas between February and June in daytime and night. Specimens were collected by hand or catcher stick, dip net and photographed. The coordinates of all sampling points were recorded by GPS.

Results and Discussion: According to our results, the most common reptiles were Darevskia rudis always occurs in rocky areas in temperate forest and in moistly grasslands with rocky habitats, walls of buildings in rural areas and other human structures share its habitat with Podarcis muralis in some localities. Another most common species is Lacerta viridis, this species has been observed from various locations in grasslands, especially bushes. Dolichophis caspius was also recorded in agricultural areas, Vipera ammodytes was sporadically distributed. The potential pressures were also discussed on reptile community.

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Keywords: Reptiles, Northern Anatolia, Kastamonu, Turkey.
On the Definition, Distribution Area and Phenology of Local Endemic Ranunculus munzurensis
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Introduction: Defined in 1983 and stated in the 10th volume of the Turkish Flora, the species of Ranunculus munzurensis S. Erik & Yıld. are known from the Mount Munzur (Tunceli). Important differences between R. munzurensis features in the original publication and the ones from Bingöl were revealed. A more realistic definition and periodicity status of R. munzurensis gathered from the area near Muş border of Bingöl by comparing the structural features and blooming periods with the features stated in the first publication was aimed at.

Materials and Methods: R. munzurensis samples from Bingöl were examined by considering the key and the definitions related to the genus of Ranunculus in the 1st and 10th volumes of Turkish Flora. The differences were determined by comparing the features of the related keys and the definitions with the samples from Bingöl (preserved in the Biology Department herbarium in the Faculty of Science and Literature of Bingöl University), and the knowledge regarding R. munzurensis definition and phenology were reformed.

Results: Some differences were detected when comparing R. munzurensis sample features from Bingöl with the features given first. Although the blooming period of the species is said to be May in the 10th Volume of the Turkish Flora, bloomed samples were gathered in the steppe areas at 1700-1800 meters altitude of the Yenibaşak Village (Solhan, Bingöl), in March, 2018. The samples’ petal dimensions (up to 12x8 mm) are larger than the previous ones (7-9x4-5 mm). Samples’ sepal dimensions (up to 7-8x2-4 mm) from Bingöl (sometimes in heteromer shape) are larger than those in the Turkish Flora (3-4 mm). The samples’ anther length (1.5-2 mm) are longer than previously known (1 mm). The species R. munzurensis, previously stated to bloom in May at 1300-1500m at the Mount Munzur (Tunceli), bloom towards the end of March at 1700-1800 meters in Southeast Bingöl and produce fruit in April. The expansion area and tolerance borders of this species is wider.

Discussion: R. munzurensis’ expansion was known only in Mount Munzur until now. The samples, the photos of which were gathered in Van and put in the Van Virtual Herbarium and defined as Ranunculus munzurensis (the photos of the samples no. Mehmet Firat 2130z and Nasip DEMİRKUŞ 5211), are falsely defined. Those photos belong to Ranunculus bulbilliferus species Boiss. et Hoh. since they have round bulbilis in 2-2.5 diameter at their web plates’ base. R.bulbilliferus was gathered from the Mount Erek as new Turkish records in 2001 was published. Therefore, R. munzurensis’ expansion from Bingöl outside of Mount Munzur was revealed.

Keywords: Ranunculus munzurensis, redescription, distribution, phenology
Introduction: The genus *Barbus* comprises of 33 species from small to medium-sized fish widely distributed from eastern Spain to the south-eastern Caspian Sea basin. The diversity of *Barbus* species in Europe is well understood and since the review by some researchers, only one new species has been discovered (*B. biharicus*). The species diversity of *Barbus* is still largely unresolved, in its Asian distribution area. Five phylogeographic lineages were identified with allopatric distributions among species of the genus *Barbus* that occupy tributaries of the Black Sea.

Material and Methods: Specimens were collected with electro-shocker device between 2005-2018. After anesthesia, fishes were fixed in 10% formaldehyde and stored in 70% ethanol or directly fixed in 99% ethanol. Measurements were made with a dial caliper and recorded to 1 mm. All measurements were made point to point (never by projections).

Results: The morphologic data show that there are 5 barbel species in Turkish Black Sea drainages: *Barbus rionicus* from Çoruh River, *B. tauricus* from most of the small coastal streams, *B. escherichii* from Sakarya River, *B. cyclolepis* from some coastal streams of Thracian Black Sea basin. The specimens from Kızılırmak differs from other species. Therefore, we suggest that it belongs to an unnamed species. We consider that *B. bergi*, from Kamchiya (Bulgaria) to Rezova stream, a synonym of *B. tauricus*.

Discussion: Interestingly, all records of *B. tauricus* are from small rivers entering the Black Sea while the other species all inhabit large rivers. Here we formulate the hypothesis, that *B. tauricus* belong to those freshwater fish species, which were dispersed through the Black Sea during the last glaciation, when it was a freshwater lake. In the Holocene, flooding of the Black Sea basin with salt-water from the Mediterranean Sea ended the freshwater conditions, and restored to a brackish water environment. It was suggested, that during its freshwater phase, the Black Sea did allow free dispersal of freshwater fishes now inhabiting rivers entering the sea.

Acknowledgement: We also would like to express our gratitude to Dr. Jörg Freyhof (Berlin) for his valuable comments of the study. This study supported by the Scientific Research Project Coordination Unit of Recep Tayyip Erdogan University (Project no: 2012.103.01.2).

Keywords: Distribution, barbel, Anatolia, Black Sea
Introduction: *Alburnus* is a freshwater fish belonging to the Leuciscidae and widespread throughout the Turkey rivers and lakes. The genus *Alburnus* contains 21 valid species in Turkey. Four of which were reported from the south-eastern Black Sea coast. The genus *Alburnus* has not been fully solved in the process. In the future, more detailed studies will be carried out.

Material and Methods: Fish samples were collected from 15 different stations in, 2007-2016 with electro-shocker device and gill net. After anesthesia, the fishes were fixed in 5% formaldehyde and stored in 70% ethanol or directly fixed in 99% ethanol. Measurements were made with a dial caliper and recorded to 0.1 mm. All measurements were made point to point.

Results: As a result, *Alburnus* is widely distributed in the southern Black Sea basin. Four species of *Alburnus* (A. derjugini [Çoruh River drainage], A. escherichii [Sakarya River drainage], A. istanbulensis [Bakraç stream], A. schischkovi [Resowska River drainage] were recognized in this region.

Discussion: The authors of this presentation have identified 4 species morphological methods. In this presentation the distribution area and diagnostic features of these species are discussed.

Acknowledgement: This work was supported by the Scientific and Technological Research Council of Turkey (Project No: KBAG-215Z074).

Keywords: freshwater fish, taxonomy, bleaks, shemeyas
Blue Sac Fry Syndrome in Trout Alevins

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Introduction: The mortalities in the hatching system in trout farms are being tried to explain with various reasons. The main reasons are listed as problems associated with broodstock, water quality parameters, fertilization failures and pathogenic effects. The Blue Sac Fry Syndrome (BSFS) is one of the pathogen occurs in the hatchery system. So far, the reasons of this syndrome have been explained with suboptimal water quality parameters and effects of some toxic substances. However, occurrence of the disease has not been associated with the bacterial contamination, yet. In the present study, the presence of BSFS in trout alevins have been studied and the causative agent for the disease have been identified as bacterial contamination and/or infection.

Materials and Methods: BSFS identified specimens of the rainbow trout and brook trout alevins, were examined in The Diseases Laboratory, Recep Tayyip Erdogan University, Fisheries Faculty. So as to monitor water quality, some parameters of hatching inlet water (pH, temperature, ammonia and water hardness) were recorded. Bacterial identification has been carried out from vitellus of the infected fish on Tryptic Soy Agar Medium (TSA). Parasitic examination was performed under the light microscope. Bacterial colonies on TSA were purified for identification. In order to determine whether or not bacteria causes diseases in alevins, healthy eggs from both species have been divided into two groups of which challenge experiments were carried out by using bacteria purified from infected fish. Experiments were triplicated in 2-liter glass aquariums.

Results: Species identification using both API 20NE (API profile 5577754) and molecular methods (97%) confirmed the presence of Aeromonas hydrophila in both rainbow trout and brook trout alevins. No parasites were found. In the control group fish, no findings were found for BSFS.

Discussion: Blue Sac Fry Syndrome (BSFS), generally characterize as non-infection disease factors. Particularly, the excess of nitrogenous compounds in the water, oxygen deficiency, etc has been reported as affecting the disease. Literature has reports of unknown factors for the causative of the disease. As the water quality parameters in the present experiment was in optimal values, the probable reason of the BSFS disease cannot only be explained by the suboptimal water quality parameters. This study provided evidence on A. hydrophila infection can cause BSFS alongside with the environmental stress factors.

Keywords: Trout, alevin, Aeromonas hydrophila, blue sac fry syndrome
Virulence Determination of Entomopathogenic Fungi Against *Beauveria bassiana* (Balsamo) Whitefly, *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae)

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**Introduction:** Production of vegetable is seriously hampered by severe attacks of various insects, whitefly, *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae). This insect is considered one of the most destructive pests of vegetable. Chemical control is an essential component of whitefly management programs worldwide. However, the use of chemicals has been compromised principally because of rapid emergence of resistance to various classes of insecticides, especially organophosphates, pyrethroids, and cyclodienes. As potential alternatives, certain chemicals derived either from plants or from microorganisms, termed biopesticides, have been promoted in recent years. These include the entomopathogenic fungus, *Beauveria bassiana* (Balsamo) Vuillemin (Ascomycota: Hypocreales), as well as the botanical insecticide – neem.

**Material and Methods:** *Beauveria bassiana* isolate was provided from the stock culture of the Plant Protection Department of the Bozok University. *Bemisia tabaci* is derived from the stock culture of the Department of Biological Control of Adana Biological Control Research Institute. The entomopathogenic fungi inoculated on *Bemisia tabaci* adults by spraying method. In the experiment, $1 \times 10^6$, $1 \times 10^7$ and $1 \times 10^8$ conidia ml$^{-1}$ concentrations were used. About 400 adults per concentration and 100 adults per recurrence were used within 4 recurrences. After the inoculation, mortality rates were calculated for day 1, 4 and 5 days. The mortality rate of adult mortality was calculated by the Abbott formula when the percentage mortality of entomopathogenic fungi was evaluated. The mortality responses across the whole assessment period were analyzed using analysis of variance test (ANOVA) for a completely randomized design and the means were compared using a Duncan test ($p < 0.05$). The test for statistical significance between appropriate LC values was failure of their 95% confidence limits to overlap.

**Results:** At 1$^{st}$ day, the mortality rates at $1 \times 10^6$, $1 \times 10^7$ and $1 \times 10^8$ conidia/ml doses were calculated as, 33%, 31%, 34% respectively. At 4$^{th}$ day, the mortality rates were calculated as 92%, 96%, 98% and; and for 5$^{th}$ day 98%; 99%, 100% respectively. LC$_{50}$ and LC$_{90}$ values for Metarhizium anisopliae were $26.085 \times 10^6$ and $11.911 \times 10^6$ conidia adult$^{-1}$, respectively ($df=2$, $x^2=1310.376$, $P=0.000$).

**Discussion:** The results of the study *Beauveria bassiana* isolates ($1 \times 10^7$ and $1 \times 10^8$ conidia ml$^{-1}$ doses) could be used as potential biological control agents in classical biological control programs aimed at managing the pest.

**Keywords:** *Beauveria bassiana*, *Bemisia tabaci*, Biological control, Entomopathogenic fungus
Effects of Alternative Dietary Protein Sources on Growth, Survival and Proximate Composition of Green Tiger Shrimp (*Penaeus semisulcatus*)

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**Introduction:** Aquaculture is the leading consumer of fishmeal (FM) in the animal feed sector around the world. The use of FM in aquafeeds has been remarkably reduced since 2006 to cope with limited availability of FM and ensure a sustainable fish and shellfish production. In the meantime, the use of alternative protein sources to FM in shrimp feed formulations has attracted a great deal of interest among researchers. The main objective of this study was to determine the effects of inclusion of locally available terrestrial plant protein sources (i.e. soy bean meal - SM, corn gluten meal - CGM, peanut meal - PNM and hazelnut meal - HM) or an animal protein source (poultry meal - PM) as replacers for FM in diets for the green tiger shrimp *Penaeus semisulcatus*.

**Materials and Methods:** A total of 7 different experimental diets were formulated to partially or completely replace FM with a mixture of four plant protein sources at equal levels (MIX-1, w:w), with only a mix of SM and CGM at equal level (MIX-2) or with 100% PM. Shrimps (5.67 ± 0.1 g) were randomly distributed into 21 pieces of 500 L round fiberglass tanks (n=3) connected to a recirculation system (RAS), at 20 shrimp per tank. Seven isocaloric/isonitrogenous experimental diets as follow: only FM (control), 10%FM+PM, 10%FM+MIX-1, 10%FM+MIX-2, only MIX-1, only MIX-2 and PM+MIX-2. Each diet was fed four times daily at 1% tank biomass for 8 weeks. At the end of the feeding trial, all shrimps were individually weighed to assess growth and five shrimp per tank (15 per group) were sampled for abdominal muscle proximate composition.

**Results:** The average final weights of shrimps fed with 10%FM+MIX-1, 10%FM+MIX-2, MIX-1 and MIX-2 were 9.13, 9.19, 9.16 and 9.15 g, respectively. These groups displayed comparable growth in terms of final weights to that of FM group (P>0.05). Among all treatments, 10%FM+PM and PM+MIX-2 were the poorest in terms of final weights. The survival rate varied from 45% to 70% among the dietary groups including plant protein sources, being similar to the control (52%), whereas diets with PM were inferior (7.5-15%). Shrimp muscle protein content was the lowest in the group PM+MIX-2 (20.6%) and highest in the group MIX-1 (22.3%). The muscle lipid content was found to be as low as 0.89% in PM+MIX-2 and 1.27% in 10FM+MIX1 (P<0.05). The ash contents of the groups ranged from 1.51% to 1.84% (P<0.05), while the dry matter content varied between 22.52% and 24.60% (P<0.05).

**Discussion:** A number of studies have reported that terrestrial plant protein sources and some alternative animal protein sources could be successfully used in various shrimp species. Our results also reveal that plant protein sources are utilized by *P. semisulcatus* as efficiently as (if not better than) animal protein feedstuffs. As a result, we conclude that partial or even complete replacement of fish meal by the blend of plant protein sources can be used in the diets for *P. semisulcatus* without inversely affecting growth, survival and nutritional quality.

**Acknowledgement:** This study was supported by TUBITAK with Project No 215O006.

**Keywords:** *Penaeus semisulcatus*, Plant Protein Sources, Diet, Poultry Meal, Growth
Introduction: *Upogebia pusilla* (Petagna, 1792) is the most common species in the Mediterranean Sea, which is a burrowing species of Thalassinid decapods living in littoral and sublittoral soft sediments. Sexes are separate. During copulation, male transfer sticky sperm-filled spermatophore onto the genital opening of the female. When the eggs are released from the gonopore, they pass through the sperm mass and are fertilized. When the spawning starts, sticky eggs cling to bristles on the pleopods of female.

Material and Methods: Mud shrimps were collected from the coast of Tuzla of Izmir Bay in March, 2018. Egg-bearing female individuals were separated and biometric measurements were taken. Total length (TL) in mm from the tip of the rostrum to the end of telson and carapace length (CL) in mm from the tip of the rostrum to the end of the carapace using digital calipers were measured, and total wet weight (W) in g was weighed. Eggs were separated from pleopods from each female, counted and examined under the microscope to determine developmental stages.

Results: Mean total length, carapace length and total wet weights of egg-bearing females were 56.63±1.90 mm, 17.92±0.73 mm and 3.15±0.36 g, respectively. The quantity of eggs for each female varied between 1593 and 12019. Egg color and diameter were changed according to the developmental stages. At the beginning of developmental stages of eggs, the color was green. When the eggs reached the final developmental stage, color turned to dark brown. From the first stage to last, diameter of eggs was varied from 456.47±24.31 µm and 648.83±34.16 µm. Different development stages of eggs were examined and photographed.

Discussion: In order to facilitate ecological and physiological studies, researchers artificially subdivide the process of embryonic development into a number of easily recognizable stages. In this study, egg development was studied from cleavage to larvae hatching.

Acknowledgement: This study was supported by The Scientific and Technological Research Council of Turkey (Project number: TUBİTAK, 116O646)

Keywords: Mud shrimp, *Upogebia pusilla*, egg, development, quantity
Investigation of Myxomycetes (Myxomycota) in Kumlu and Reyhanlı (Hatay-Turkey)

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Introduction: Myxomycetes or plasmodial slime moulds, investigated in kingdom Protista Mycetozoa which are usually present and sometimes abundantly in terrestrial forest ecosystems. Myxomycetes, are common and relatively cosmopolitan in their distribution. They have been widely studied in Europe and America, but those from Turkey are still poorly known. There are 998 species all over the World but in Turkey 262 species.

Material and Methods: Myxomycetes samples collected 10 different areas from Kumlu and Reyhanlı Hatay during 2015-2017. The samples were gathered from leaves, barks, litterfalls, decayed or unspoiled herbal materials. It was meant to try to develop myxomycetes sporophores by applying Moist Chamber Culture to collected samples. In addition, myxomycetes, which grew up in their natural environment were obtained.

Results: As a result of field and laboratory studies 31 taxa belonging to 7 families and 13 genera were identified. A total of 212 samples were collected in our study. In 95 samples, members of Myxomycetes were encountered. 3 taxa were detected naturally, and 89 of them were detected by the Moist Chamber Technique. 13 (42%) were occasional, 6 (19%) were common and 12 (39%) were abundant and rare species were not found in our study area. The ratio of the number of species to the number of species (T / C) is used as a sign of taxonomic diversity. In our study, T / C value of 31 taxa is 2.38. If we look at the substrate preferences of the 95 samples we have obtained; 57 lignicolous, 16 corticolous, 21 foliicolous and 1 fimmicolous species were obtained. When the 31 types detected are examined at the family level; the members of the Echinosteliaceae (1), Trichiaceae (2), Liceaceae (3), Arcyriaceae (4), Stemonitidaceae (6), Physaraceae (7) and Didymiaceae (8) has got species. When analyzes are made on the substrates developed by the samples; It has been found that Myxomycetes members often use materials from various coniferous trees as substrate in the rotten parts of woody plants. By examining 31 cases; The Trichiaceous plasmodium type, which is characteristic for the Trichiales team, was 6, the other plasmodium types phaneroplazmodium 15, aphanoplazamodium 6 and Protoplazmodyum 4. When 31 sports were examined; it is noted that wartime sports (21) are more intense. Spine spores (3) are least common. When our samples are compared to sporophore types; 2 aethalium, 1 pseudoaethalium, 3 plasmodiocarp and 25 sporangium species were recorded.

Conclusion and Discussion: In addition to these information Myxomycetes are known as bioindicator and in the research area Myxomycetes relationship with anthropogenic and pollution factors is discussed in detail. Also, considering the importance of species diversity of Myxomycetes in research area, highlighted the contribution of existing biodiversity.

Keywords: Myxomycetes, Diversity, Kumlu and Reyhanlı – Hatay
Life Strategies of *Escherichia coli* And Clinical Isolates In River Water In The Presence of Different UV-A Sources and Photosensitizer

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**Introduction:** There are important factors on the survival ability of bacteria in the sea, lake or river. Nutrient, toxic substance, sunlight, UV and photosensitizers are examples of these factors. Particularly in recent years there have been intensive studies on how the effects of light sources of different wavelengths on the life of microorganisms. PDT (photodynamic therapy) is a new antimicrobial strategy involving non-toxic photosensitizer and light source and is also called photooxidation. It has been determined that visible light sources are effective on bacteria and that this effect is faster and shorter after the addition of the photosensitizer agent. In this study, life strategies during photooxidation of *E. coli* and clinical isolates in river water were examined.

**Material and Methods:** Clinical isolates were taken from different regions of vagina, urine and wound. Isolated clinical isolates were identified in VITEK2 (bioMerieux, France) device. *Escherichia coli* W3110 and clinical isolates were grown in nutrient broth medium at 37 °C for 24 hours. Bacterial specimens were exposed to Philips 18w BLB (P-BLB) and Philips 18w Actinic BL (P-ABL) (UV-A) lights at 24 °C in the incubator. As a result of incubation, the colonies were counted. The life span of the bacteria was compared by calculating *T*₉⁹ values.

**Results:** According to the results obtained in the study, the life strategies of *E. coli* and clinical isolates were determined for 6 hours. Taking *T*₉⁹ values into account, it has been determined that bacterial P-BLB light source on life is less effective than other light sources. When clinical isolates from different regions were examined, it was observed that they survived longer than the clinical isolates isolated from urine, for example from other regions. In the control samples, it was determined that there was no significant change in the life of the bacteria after 6 hours. In photosensitizer added samples, the bacteria are seen to move away from the medium rapidly (6 hours).

**Discussion:** According to the results obtained, the vagen was isolated from urine showing the longest survival ability among the samples isolated from wounds and idiopathic. Determining that bacteria that reach out to the aquatic system through the urine and get into the body again become more resistant to it, poses a risk for human health.

**Keywords:** The photooxidation, photosensitizer, UV-A, *Escherichia coli*
Spat Availability of Bivalve Species at the Coast of Urla-Özbek
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Introduction: Wild spat collection from nature is very important for industrial bivalve culture. In order for a marine area to be evaluated in terms of commercial bivalve cultivation, collecting spat from nature in the area is an important parameter. Furthermore monitoring recruitment and larval settlement is a tool for evaluating the population dynamics of commercial species. Artificial collectors are successfully being used for many years in bivalve spat collection from nature industrially. In this study spat availability of bivalve species at Urla-Özbek coast was determined via polyethylene mesh bag collectors.

Material and Methods: This study was conducted at the coast of Özbek which is located on the west of İzmir Bay (38°20'47.67"N; 26°41'10.79"E). The study site has rocky and sandy bottom and partially covered with Posidonia oceanica meadows. Polyethylene mesh bags (onion bags) were used as spat collector material which has 5x5mm mesh size. Two bags used for one collector. An onion bag (inner bag) was put into the other (outer bag) and thus a collector was built. Totally 15 collectors were deployed in June 2013 at the study site and all collectors recovered in November 2013 (139 days). Collectors were observed in the laboratory at Urla Campus of Ege University Fisheries Faculty. All bivalve species which were detected on collectors were counted and recorded.

Results: Throughout the study nine bivalve species were observed and totally 1434 bivalve spats were collected. 55.09 % of totally collected spat were gathered from outer bags and the rest from on inner bags. Spat productivity was calculated as 47.8 spat/m². The bivalve species which were determined on collector bags were; Pinna nobilis, Chlamys glabra, Ostrea edulis, Pinctada radiata, Cardium tuberculatum, Anomia ephippium, Anadara inequavalvis, Tapes decussatus and Lima lima.

Discussion: Bivalve collector studies are crucial for bivalve cultivation. As the result of this study it is observed that Urla-Özbek coast is hosting commercially bivalve species such as O.edulis, P.radiata, C. glabra, T. decussatus, naturally. In addition to commercial bivalve species an endangered species Pinna nobilis were observed on collectors.

Keywords: Bivalve, Spat, Collector, İzmir
Introduction: Due to its low cost and resistance to mild steel, it can be used in various industries as well as in oil refining and storage tanks. However, the mild steel is damaged by the corrosive action of hydrochloric acid in the cleaning process. For this reason, inhibitors are often added to acid solutions to prevent metal solubility. The inhibitor action of organic compounds is related to parameters such as the presence of lone pair electrons in the pi bonds of the aromatic ring, the degree of saturation, the steric factors and the energy gap between HUMO and LUMO.

Material and Methods: 2-((Thiazole-2-ylimino)methyl)phenol (THYMP) was synthesized from the condensation reaction of 2-amino-thiazole (0.01 M) and salicylaldehyde (0.01 M) in 50 mL of methanol at room temperature. The mixture was heated to approximately 75°C for 3 h. The resulting mixture was then evaporated to half its volume and let to stand for 24 h. The dark orange precipitate was then filtered washed and recrystallized (yield 71%). After purification, the compound was characterized by IR spectroscopy and NMR.

Results: The inhibitor activity was investigated using electrochemical methods such as electrochemical impedance spectroscopy and polarization. Schiff bases were characterized by IR (Infrared spectroscopy). Quantum chemical parameters such as highest occupied molecular orbital energy (E_{HOMO}), lowest unoccupied molecular orbital energy (E_{LUMO}) and energy gap (ΔE) will be calculated using quantum chemical methods. These results, which are found by SEM analysis, were compared. The addition of THYMP has an inhibitive effect on both the anodic and cathodic parts of the polarization curves, shifting both the anodic and cathodic curves to lower current densities. This result suggests that the addition of the synthesized compound reduces the anodic dissolution and retards the hydrogen evolution reaction.

Discussion. THYMP was found to behave as a mixed type inhibitor, retarding both anodic metal dissolution and cathodic hydrogen evolution reactions. The adsorption process of THYMP obeys the Langmuir adsorption isotherm and the adsorption behavior of THYMP includes both physisorption and chemisorption. The SEM analysis shows that THYMP can exhibit good inhibition ability in hydrochloric acid. Quantum chemical results of the organic compound showed good correlation with the experimental results.

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Keywords: Mild steel, Corrosion inhibitor, EIS, SEM
Regeneration of Anatolian Black Pine (*Pinus nigra* subsp. *pallasiana*) with Seed Tree Method in Tandır, Eskişehir

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**Introduction:** The Anatolian Black Pine (*Pinus nigra* Arnold ssp. *pallasiana*) is one of the most important native tree species in Turkey. It constitutes 19% (4.2 million) of the total national forested area. Shelterwood natural regeneration method has usually been preferred in natural regeneration of *Pinus nigra* forests. On the other hand, the seed tree regeneration method particularly in Northern America has been applied in natural regeneration of some forest tree species, particularly in the light demanding trees with light seed weight. In this study, the use of the seed tree natural regeneration method in natural regeneration of Anatolian Black Pine were evaluated.

**Material and Methods:** The study site of *P. nigra* is located in Eskisehir-Tandır. The slope of the research area is about 5-30% and the altitude is 1200-1300 m. The whole area of the study site is 27.9 ha. The areas of natural regeneration are 14 ha and 13.9 ha in 2015 and 2016, respectively. About 17 seed trees/ha are left on the site. Before the seed dispersal, site preparation and deep soil tillage have been applied. In the spring of 2016 and 2017, one-year-old seedlings of *P. nigra* were also planted in the site. The untreated site (control) was chosen from around the study site. The seedling survival rate, the number, the distance of seedlings to the remaining trees, and direction of seedlings originated from the scattered seeds were measured in the autumn of 2017. The diameter, height, age, increment, volume, bark, and crown diameter of remaining trees were also recorded measured.

**Results:** The results indicated that the seedlings originated from the scattered seeds were mostly scattered between 4th, 5th and 6th meters and in northern direction according to the remaining seed tree. The total number of seedlings originated from the scattered seeds was calculated as 91,540 in 27.9 ha (3281 seedlings/ha) in the research site.

**Discussion:** At the low site class Eskisehir-Tandır, the seed tree method was partially successful in Anatolian black pine stand. The seed supplement in the study site may increase the success rate of the seed tree method. The potential use of the method should also be investigated for the other native tree species in Turkey, especially pine tree species.

**Keywords:** Black pine, *Pinus nigra*, Natural regeneration, Seed tree.
Ecotourism Opportunity in Bursa City And It’s Swot Analysis: Bursa Province Example

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Introduction: The negative effects of tourism on the nature and traditional cultures and the fears of them are putting forward alternative tourism and tourism in response to mass tourism. Ecotourism and sustainable nature tourism have emerged as a hope for the preservation of nature. This change in perception has led to an increase in the number of projects and studies related to tourism in the regional plans of natural areas, protected areas and surroundings. Tourism, on the other hand, has been moved to a different dimension with the development of rural areas, the reduction of poverty and the preservation of local cultural riches. Ecotourism is a type of tourism that can be done more intensely in the natural environments and the beauties. In this context, Bursa is one of the cities with the richest biological diversity of our country. In this study, tourism and ecotourism potentials of Bursa Province were examined and the results were given in the light of tourism statistics. SWOT analysis was conducted in Bursa to develop ecotourism. strengths, weaknesses, opportunities and threats.

Material and Methods: Today, in the face of increasing environmental awareness and challenges related to environmental protection, the tourism sector is now becoming more sensitive to the environment. As a result, environmental awareness has become an attempt to serve a growing tourist population. In this review, examples from the applications of ecotourism activities, especially transport capacities, made in economically beneficial countries of ecotourism have been given. The available data and resources were utilized, domestic and foreign literature were examined. Another purpose of this study is; Bursa ecotourism investments SWOT analysis, tourism investments to be more effective / efficient and successful what should be done. The development of ecotourism in Bursa is due to factors within the sector analysis of strengths and weaknesses, as well as the analysis of external environmental requires analysis of threats and opportunities. For this purpose, a qualitative examination was carried out and the preliminary reviews and the interviews with the subject experts were used to collect the required information.

Results: Our country can also provide the development of the backward regions by using the rich touristic potential that it has, and it can contribute to the elimination of the imbalances between the regions in the country. Bursa has an important place and potential in geographical location, touristic values and country tourism. Thanks to the countless natural beauties that it has, integration with nature can be an important center for ecotourists who want to recognize local culture and authentic values. In addition, the natural and cultural values in the region are very satisfying when eco tourists are presented with the hospitality of the local people.

Discussion: It is still being discussed that alternative tourism policies produced for sustainable tourism can not solve the problems created by mass tourism. Ecotourism is not just the activity of people heading towards nature. Ecotourism remains a product of the effort of the tourism industry and its capital to open up new areas of activity and profit for itself, to move out of traditional tourism areas and to increase its area and profit. Bursa is a country rich in natural and cultural resources.

Keywords: Ecotourism, Tourism, Ecotourism in Bursa, SWOT Analysis
Multiple Antimicrobial Resistance of *Escherichia coli* Isolated From Fish Farms

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**Introduction:** Coliform bacteria including *Escherichia coli* are generally used as indicator organisms. The presence of pathogens, pollutants and monitoring their effects on environment is determined with indirect evidence by testing coliform bacteria. A vast variety of environmental sources contain bacteria resistand against at least one antibiotic. Antibiotic resistance of *E. coli* strains is of a particular concern since it is one of the most common pathogen.

**Material and Methods:** In this study, Antibiotic resistance against macrolide (ErmC gene), Quinolone (ParC gene) and Sulfonamide (Dhfr I gene) were investigated in *E. coli* isolates obtained from water entry and exits of 7 different fish farms located in Eastern Black Sea Region. The Kirby–Bauer disc diffusion method was used with commercial discs.

**Results:** %15 of the *E. coli* isolates were carrying ErmC gene, while %5 and %2.5 of them carrying ParC and Dhfr I genes respectively. Of *E. coli* isolates, while %91 were resistant to Aminoglycoside (Streptomycin, Neomycin) and Sulfonamide (Sulfamethoxazole, Cotrimoxazole) group antibiotics, only %20 were resistant to Quinolones (Oxalinic acid, ENR) Phenicol (florphenicol, Chloramphenicol), Tetracycline (Tetracycline, Oxytetracycline) group antibiotics. Multiple antimicrobial resistance varies between fish farms.

**Discussion:** Antibiotic resistance genes carry a risk of spreading to other bacteria in the aquatic environment. Besides, these resistance genes can also spread to pathogenic bacteria among humans or animals

**Keywords:** antibiotic resistance, *E. coli*, multiple resistance
Introduction: Land application of sludge is a known and favorable method if the requirements of the regulations are fulfilled. The concern over land application of sludge originates from pathogens and toxic substances in its composition which may contain toxic matter, heavy metals and non-biodegradable components depending on the source of wastewater as well as the treatment process. Microorganisms in sludge are also an influencing factor on ecosystem. Bacteria, fungi, viruses, protozoa and rotifers are common microorganisms type in wastewater sludge. Microorganisms are dominant in sludge depends on sludge treatment types. When sludge is disposed, the amount of these microorganisms increases in the soil. These microorganisms have an important role to degrade organic matters in sludge, so they affect ecological cycles. For these reasons, the interaction between sludge and ecosystem becomes crucial. When wastewater sludge amount is considered in the world, organic load, toxic materials, heavy metals and microorganisms in sludge directly influence on the ecological balance. Effects and the risks of land application of domestic wastewater sludge is calculated and compared for Turkish, Canadian and US regulations.

Discussion: The sludge disposal method has significant effects on ecosystem because its content may change dumping area positively or negatively. Land application enables improving soil condition. Some microorganisms are beneficial for degradation of organic components in soil. Moreover, some sludge types, such as domestic wastewater sludge, have high organic matter. Therefore, soil with low organic load is enriched with help of wastewater sludge. However, most of sludge types includes harmful substances such as toxic materials and heavy metals. They accumulate microorganisms structure and prevent them to degrade organic matter. They can damage soil composition, therefore the ecosystem. Also, microorganisms cause some illnesses on human and animals since the disposal of wastewater sludge is a crucial issue for ecosystem.

Keywords: Ecosystem, Environment, Microorganisms, Land application, Wastewater sludge
Introduction: Remote sensing (UAV, LIDAR, Satellite imaging), GNSS, camera traps techniques provide important contributions in the development, conservation and control of wildlife. In order to make the right decisions in wildlife management, basic information about the number of individuals of wild animal populations, about of their age and gender, and the rate of survival of their offspring are required. As UAV’s can produce systematic data with high spatial and temporal resolution, they are particularly useful in wildlife observation and monitoring. As a result of increased attention to wildlife protection, an array of local and national institutions have worked to develop solution proposals through unmanned aerial vehicles to monitor and implement the conservation of biodiversity everywhere on the land. In this context, a project has been planned to realize object detection, classification and monitoring of wildlife in forests or open spaces. In this paper, the stages of the inventory work with the UAV will be explained within the scope of the project.

Material and Methods: It was decided to use thermal imaging camera system and multispectral camera-mounted UAV in the study. Conservation area in Konya Bozdağ was determined as the study site. The area is located within the borders of Karatay, Selcuk and Altinekin provinces and 59.296.5 ha area was declared as Wildlife Development Area with the Decision of the Council of Ministers No.2005/9453 on 07.09.2005. The flight plan and the work schedule were prepared by conducting the investigation of area. Due to the fact that the Anatolian wild sheep in the study area are in the pregnancy period, it is planned that the flights will be done at the beginning of June.

Results: We have aimed that the study of Anatolian wild sheep inventory made with UAV will yield more accurate results than the local techniques. Density maps produced as a result of this obtained data will help studies on the conservation and development of Anatolian wild sheep by explaining the relation of Anatolian wild sheep to habitat. When the study is completed, it will be the first work to be done in the field of geomatics engineering within the scope of conservation and development of wildlife and it is thought that this study will lead similar studies in our country.

Keywords: Remote sensing, UAV, Wildlife
Fabrication of BSA Incorporated Hybrid Nanoflowers with Their Antimicrobial and Enzyme Mimic Activities

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Introduction: Enzymes immobilization strategies have been commonly employed in order to increase the activity and stability of enzymes. Although free enzymes exhibits intrinsic high catalytic activity towards certain substrates, they are quite expensive lack of repeated use. They mostly loses their activities after immobilization. The reasons for that: 1) the limitation of mass transfer between enzymes and substrates, restriction of enzyme mobility and 3) changes in enzyme conformation. To overcome those limitations of free and conventionally immobilized enzymes, herein, we present the synthesis of novel organic-inorganic BSA incorporated hybrid nanoflowers with their antimicrobial and peroxidase like catalytic activities. BSA nanoflower acted as a Fenton agent for antimicrobial and peroxidase like catalytic activities.

Material and Methods: BSA incorporated hybrid nanoflowers were synthesized following modified novel immobilization method. Typically, bovine serum albumin (BSA) molecules were added into 0.8 mM Cu²⁺ ions containing 10 mM PBS (pH 7.4). The mixture was vortexed for 30 s, and then was incubated at 20°C for various times of periods (6, 12 and 24 hours).

Results: BSA is a widely used model protein and it is abundantly found in human body and cost effective. The isoelectric point (IEP) of BSA is 4.7. We used BSA protein to form nanoflower by reacting with Cu²⁺ ions in 10 mM PBS (pH 7.4). The mixture was vortexed for 30 s, and then was incubated at 20°C for various times of periods (6, 12 and 24 hours).

Discussion: We offered that the plenty of charged groups, porosities and Cu²⁺ ions in the BSA nanoflowers produced Cu¹⁺ ions and various radicals based on the Fenton chemistry in the presence H₂O₂ and imitate peroxidase enzyme against guaiacol used as a model substrate. In addition to that, Fenton like action may induce the cell death through oxidative stress and membrane damage.

Acknowledgement: This work was supported by the Scientific Research Projects Coordination Unit of Erciyes University [Project number: FBA-2016-6899]

Keywords: BSA, Cu²⁺ ions, nanoflower, antimicrobial agent, peroxidase like activity and Fenton reaction
Effects of Quercetin on Longevity of Parasitoid *Bracon hebetor* Say, 1836 (Hymenoptera: Braconidae)  
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**Introduction:** Parasitoids, carnivorous insects are commonly used as biological control agent against harmful organisms in agriculture ecosystems. Parasitoids have to utilize sugar containing foods in order to achieve maximum their longevity. Floral nectar, homopteran honey and honeys are the main sources containing sugar around the environment of parasitoids. Quercetin, a plant flavonol is found in various foods including apple, red onions, broccoli, and green tea. Quercetin is considered to be a strong antioxidant due to its ability to scavenge free radicals and bind transition metal ions. These properties of quercetin can allow it to prolong longevity of organisms. In this study, it was investigated the effects of quercetin on longevity of parasitoid, *Bracon hebetor*.

**Material and Methods:** Experiments were carried out in laboratory conditions at 25±2°C temperature and 60±5% relative humidity. Any photoperiodic regimen was not used during the experiments. Larvae of *Galleria mellonella* was used as host to rear parasitoid adults, they were separated according to sexes and they were divided to the four experimental groups. While male and female parasitoids in first group were starved, quercetin soaked cotton balls were given in second group, quercetin and sucrose soaked balls were given in third group, and 1:4 (w:v) diluted sucrose soaked cotton balls given in fourth group. Experimental sets are controlled every day until all parasitoids are dead, and the dead parasitoids are removed and recorded according to sexes. All experiments were repeated as three times with different adult parasitoids and at different times.

**Results:** Male parasitoids starved lived mean 6.81 days, fed with quercetin lived 6.28 days, with quercetin and sucrose lived 34.53 days, and with sucrose lived 29.53 days. Female parasitoids starved lived mean 15.15 days, fed with quercetin lived 9.34 days, with quercetin and sucrose lived 60.48 days, with sucrose lived 63.10 days. Female parasitoids in all experimental groups lived longer than male parasitoids. Feeding with quercetin and sucrose were increased longevity of male and female parasitoids.

**Discussion:** The use of quercetin and sucrose as food significantly increases longevity of male and female parasitoids. Antioxidant ability of quercetin probably allowed it to prolong longevity of *Bracon hebetor*. According to our results, *Bracon hebetor* can used as model organism in Ageing studies and effective biological control agent in Biological control.

**Acknowledgement:** We would like to express our appreciation to the Amasya University Scientific Research Project Commission, which supported this study (FMB-BAP 18-0331).

**Keywords:** *Bracon hebetor*, Hymenoptera, Longevity, Parasitoid, Quercetin
Pollens, Leaflet and Seed Morphology of two close endemic Astragalus species of Turkey (Astragalus victoriae and Astragalus melanophrurius)

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Introduction: Astragalus L. (Fabaceae) is generally considered to be the largest genus of vascular plants with an estimated 2500–3000 species. In this study, palynological, seed and leaflet morphology studies were carried out on the two close endemic Astragalus species Astragalus victoriae and Astragalus melanophrurius of Turkey. The aim of the study is to compare and systematically separate this similar two species from each other with regard to pollen, leaflet and seed morphology.

Material and Methods: Between April and October of 2017, Astragalus species were collected both flowering and fruiting. The microphotographs of the seeds were taken and necessary evaluations were made. Leaf surfaces of Astragalus species were examined by light microscopy and SEM. Pollen preparations were prepared according to the Wodehouse method (1935) of pollen from flower anthers in herbarium specimens and examined with light microscopy by staining with basic fucsin. In addition, in order to investigate the pollen in more detail, we have worked with Scanning Electron Microscope (SEM) at Kastamonu University SEM Laboratory.

Results: The pollens of two species are radial symmetric and isopolar. Aperture type is trizonocolporate. Ornamentation type is perforate at polar and aperture surround, microreticulate at the other sides at Astragalus melanophrurius; rugulate at polar and aperture surround, microreticulate at the other sides at Astragalus victoriae.

Seeds are reniform. The colour is light brown. Surface ornamentation determined as psilate in light microscope, reticulate-rugulate in SEM micrograph. Sizes ranging between 3.33-3.78x2.50-2.76 mm at Astragalus victoriae. 3.27-3.99x2.32-2.58 mm at Astragalus melanophrurius.

Leaflet elliptic-ovate, 5-13 x 5-8 mm, emarginate, densely single-celled trichomes were found on the lower surface of the leaflet and upper surface is glabrous. Trichomes have striate-granulate ornamentation at A. melanophrurius. Leaflet narrowly elliptic, 13-18(-20) x 3.5 mm, apiculate, densely single-celled trichomes were found on the lower surface of the leaflet and upper surface is glabrous at A. victoriae.

Discussion: Seed size, colour, weight, surface ornamentation, pollen size, shape and surface ornamentations were identified as important and distinguishing characters for systematics of studied taxa.

Acknowledgement: This study was founded by Aksaray University with project 2017-027 numbered project.

Keywords: Astragalus, pollen, leaflet, seed morphology
Introduction: Fine particulate matter (with an aerodynamic diameter less than 2.5 µm, PM$_{2.5}$) is one of the most important airborne pollutants due to its severe impact on air quality and human health. Therefore, it is necessary to determine the amount of PM$_{2.5}$ and its chemical composition in industrial areas having intense anthropogenic activities. Dilovası is one of the three major industrial zones in Turkey where residential areas are within major industrial sources the distinct is under the influence of heavy traffic. In contrast to this, there is no study to determine the composition of PM$_{2.5}$ in this region. This study aims to determine the ionic composition of the PM$_{2.5}$ during 2015-2016 in Dilovası.

Material and Methods: Daily PM$_{2.5}$ samples were collected on the PTFE filters using the Partisol 2025i (Thermo Scientific) sequential sampler between February 2015-February 2016 at a monitoring station, which was located at the garden of Dilovası municipality. The collected samples were analyzed in terms of major ions ($\text{Ca}^{2+}$, $\text{Mg}^{2+}$, $\text{K}^+$, $\text{NH}_4^+$, $\text{Na}^+$, $\text{SO}_4^{2-}$, $\text{NO}_3^-$, $\text{Cl}^-$, and $\text{PO}_4^{3-}$) using ion chromatography (Thermo Scientific Dionex ICS 1100).

Results: The highest cation concentration of water-soluble ions was found to be 1.41±1.00 µg/m$^3$ for $\text{NH}_4^+$. It was also determined that the highest anion concentration is 4.54±3.02 µg/m$^3$ for $\text{SO}_4^{2-}$. In the samples $\text{NH}_4^+$, $\text{SO}_4^{2-}$, $\text{NO}_3^-$ and $\text{Cl}^-$ were the dominant ionic species. A strong correlation ($R^2=0.91$) was observed between anions and cations. When the seasonal variations were examined, the $\text{SO}_4^{2-}$ was the highest in summer. On average, $\text{NO}_3^-$ and $\text{NH}_4^+$ levels in the winter were higher than those in the summer. It was found that there is a 14 % deficit in total cation concentration as compared to total anion concentration, which further implies that the aerosols in Dilovası show acidic character.

Discussion: Overall, anion and concentrations were found to vary between seasons. $\text{SO}_4^{2-}$ concentrations were 5.09 and 4.33 µg/m$^3$, in summer and winter, respectively. During winter, levels of $\text{NH}_4^+$ and $\text{NO}_3^-$ were found to be 2.02 and 2.50 µg/m$^3$, respectively. Moreover, the concentrations of $\text{Cl}^-$, $\text{K}^+$ and $\text{Na}^+$ were found to vary significantly between seasons. The $\text{Ca}^{2+}$ concentration was found to be low in summer while the $\text{Mg}^{2+}$ concentration was low in winter.

Acknowledgement: This study was funded by the Scientific and Technological Research Council of Turkey (TUBITAK) with a grant number 113Y500.

Keywords: Dilovası, PM$_{2.5}$, major ions, aerosol acidity
Licheniculous Fungi Species From Çamlık National Park (Yozgat)

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Introduction: The studies on licheniculous fungi systematic in Turkey have began recently and continues to increase. There are approximately 200 licheniculous fungi taxons in our country. Some licheniculous fungi species developing on lichens collected from Yozgat Province, Çamlık National Park have been determined.

Material and Methods: Licheniculous fungi species developing on lichens collected from Yozgat Province Çamlık National Park have been identified under the stereomicroscope. Anatomical sections have taken for examination in the light microscope. The characters that are important in species identification have been examined in detail. macro-micro photographs have been taken and have been identified using identification keys.

Results: As a result of the examinations, 5 licheniculous fungi species have been found. This species: Arthonia subfuscicola (Linds.) Triebel, Arthonia lecanorina (Almq.) Mussat, Cercidospora epipolytropa (Mudd) Arnold, Muellerella pygmaea (Körb.) D. Hawksw. and Carbonea vitellinaria (Nyl.) Hertel. These species have been reported on Lecanora carpinea (L.) Vain., Lecanora albella (Pers.) Ach., Rhizoplaca melanophthalma (DC.) Leuckert, Circinaria contorta (Hoffm.) A. Nordin, Savić & Tibell and Candelariella vitellina (Hoffm.) Müll. Arg. on lichen species, respectively.

Discussion: Licheniculous fungi are commonly found on lichens as host-specific parasites. they also live as broad-spectrum pathogens, saprotrophs or commensally. Licheniculous fungi are very important for the environment where they are present. Licheniculous fungi are the determinants of aged forests. We hope that this study will increase to works on these fascinating organisms by drawing attention to the largely unexplored biodiversity of licheniculous fungi.

Acknowledgement: This study was financially supported by 6602b-BMYO/17-121 coded Bozok University project.

Keywords: Licheniculous fungi, Çamlık National Park, Arthonia, Cercidospora, Muellerella, Carbonea.
Comparison of Ammonium Nitrate and Ammonium Sulfate Fertilizers’ Deleterious Effects on *Rana macrocnemis* Tadpoles

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Introduction: Because frogs have very important role both as a nutrition and as a predator in the ecologic balance which is gradually changing due to anthropogenic factors, contributing to the protection of frogs is very important matter of biodiversity nowadays. And in the populations belonging to *Rana macrocnemis*, a serious decrease was detected in certain areas within the distribution field and agricultural chemicals such as ammonium nitrate were reported among the possible factors that may cause this important decrease. Despite this, the effects of ammonium nitrate and ammonium sulfate, widely used fertilizers, have not yet been studied on *Rana macrocnemis*. In this research; it was aimed that investigation and comparison deleterious effects of ammonium nitrate and ammonium sulfate fertilizers, had intensely utilization in Eastern Black Sea Region and many countries in the world, on two different population of *Rana macrocnemis* tadpoles that belong one polluted and one clear habitat regarding nitrate and sulfate.

Material and Methods: Tadpoles of both populations was subjected to 0, 5, 10, 15, 20, and 25 mg /L concentrations of both fertilizers in the same way. The effects of fertilizers on growth-development, welfare and metamorphosis process were observed throughout the experiments.

Results: The research results were indicated that, there was a decreasing for body weight and body height values of all exposure groups for clean habitat tadpoles. Minimum and maximum decreasing values for the lowest and the highest concentration for weight was 1-11% for ammonium sulfate and 11-18% for ammonium nitrate. Minimum and maximum decreasing values for the lowest and the highest concentration for weight was 2-10% for ammonium sulfate and 5-11% for ammonium nitrate. There was no decreasing neither weight nor height for polluted habitat tadpoles. It was determined that time to complete metamorphosis elongated in all exposure groups for both habitats. Minimum and maximum elongation values for clean habitat in the lowest and the highest concentration was 9-13 days for ammonium sulfate and 8-13 days for ammonium nitrate. Minimum and maximum elongation values for polluted habitat in the lowest and the highest concentration was 9-14 days for ammonium sulfate and 10-14 days for ammonium nitrate. It was determined that hind limb joint malformation occurred in all exposure groups for both habitats. Minimum and maximum hind limb joint malformation values for clean habitat in the lowest and the highest concentration was 19-86% for ammonium sulfate and 59-79% for ammonium nitrate. Minimum and maximum hind limb joint malformation values for polluted habitat in the lowest and the highest concentration was 20-45% for ammonium sulfate and 33-60% for ammonium nitrate.

Discussion: Considering all these results, it may be mentioned that both fertilizer has significant deleterious effects for this amphibian species and this is a great biodiversity risk.

Keywords: Ammonium Nitrate, Ammonium Sulfate, *Rana macrocnemis* tadpoles
Introduction: The increase of greenhouse into the atmosphere due to industrialization has made may be felt today, signs of global climate change. In this process, the temperature is the most important factor except from moisture, precipitation, the light exposure, air movements. Heating of 1-2 °C that will occur in the temperature will affect the variety of vegetation zones and the general characteristics of the zones. There are not any criteria that are reached on consensus in relation to how fast this interaction will be, how the plant species will be affected and the difficulties which the process will bring about. Therefore, to detect any possible impacts for the research areas is extremely important in terms of following the process.

Material and Methods: The field of research is the Bartın forest district in the Western Black Sea Region in Turkey where located a field of approximately 1750 km\(^2\). The field of study is located between 32° 06’ 43’’ and 32° 45’ 39’’ East longitude and 41° 34’33’’ and 41° 50’ 31’’ North latitude. The whole area is covered by forest community (\textit{Quercus sp.}, \textit{Carpinus betulus}, \textit{Castenae sativa}, \textit{Fagus orientalis}, \textit{Pinus sylvestris}, \textit{Pinus nigra}, \textit{Abies bornmülleriana} mixed forest form) with the rest being pseudo-maquis land. The average temperature of the last 20 years has been obtained with the data received from three meteorological stations. The average temperature changes in five-year intervals for the years of 1995-2015 have been mapped by using the method of inverse distance weight (IDW) in the environment of Geographical Information Systems (GIS). The correlation of temperature changes with the altitude levels has been examined. The temperature changes in the years of 1995-2015, the primary tree species in the zone of vegetation and associated with the current problems of the other species have been analyzed using GIS.

Results: In a total of 5209.13 ha area within the study area, it has been determined that the highest temperature increase with an average of 0.40 degrees every five years since 1995. The average temperature difference between 1995 and 2015 was calculated as 1.28 degrees. The altitude of the area where the temperature is increased varies between 200 m and 1200 m. The average altitude is 400 meters. When examined as a forest area, 534.99 hectares of beech stands, 161.22 hectares of black pine stands, and 36.93 hectares of hornbeam stands are pure in the region. The largest area of mixed stands is consist of beech-dominated mixed stands (1125.69 ha). The total area of the other mixed stands is 1099.57 ha. Other mixed stands are consisting of hornbeam, black pine and other broad-leaved species.

Discussion: The average temperature within the study area has increased nearly 1.2 °C. This situation will have negative effects on the resistance of the beech especially which is the main tree of the region and the other species. It may cause the resin production to be adversely affected due to the increase in temperature towards the black pine stands in the region. In addition, fir bark infestation in the past years within the study area which is directly proportional to the increase in the average temperature in the region. This situation confirms that different adverse effects on other tree species can be observed. The measures can be taken to prevent direct or indirect damage caused by global warming to our forests should be increased. The controls should be intensified and more frequent observations should be made.

Keywords: Forestry, vegetation zone, IDW, Global warming
Green Synthesis of Magnetite Nanoparticles Using *Camellia sinensis* Extract for the Removal of Nonylphenol Ethoxylates from Water

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**Introduction:** Over the past decade there has been an increased emphasis on the topic of “green” chemistry (synthesis) and chemical processes. Green synthesis has advances over chemical and physical methods as it is cost operative, atmosphere friendly, and easily scrabbled up for large scale synthesis, and in this method there is no need to use high energy, temperature, and toxic chemicals. Green synthesis of nano materials is an emerging area of research in the branch of Nano science due to high initial cost of commercially available nanoparticles. Hence, techniques for obtaining nanoparticles using naturally available biomaterials like plant extracts, flowers, polymers and microorganisms are considered for synthesizing nanoparticles. Nonylphenol is a toxic xenobiotic compound resulted from biodegradation of nonylphenol ethoxlates (NPEO) and alkyl phenol ethoxylates, and it is considered to be an endocrine disrupter capable of interfering with the hormonal system of numerous organisms. In this study, the removal of environmentally harmful nonylphenol ethoxylates with green nanoparticles produced by green synthesis was investigated.

**Material and Methods:** In this study, tea (*Camellia sinensis*) coated nano magnetite (tea-Fe₃O₄ TCNM) was successfully prepared and used as adsorbent material to remove NPEO from aqueous solution by adsorption method. A series of batch experiments were performed to study the influence of various experimental parameters, such as pH, contact time, and adsorbent dosage to investigate the NPEO adsorption performance of TCNM.

**Results:** The maximum adsorption efficiency of NPEO in 80 ppm (87.17 %) obtained at pH 7.0, adsorbent dose of 4 g/L, and 90 min. The adsorption of NPEO by TCNM was more suitable with the Freundlich isotherm.

**Discussion:** According to the results obtained from the study showed that TCNM might be a promising adsorbent in the removal of NPEO from polluted water.

**Acknowledgement:** We would like to express our appreciation to the Kahramanmaraş Sütçü İmam University Scientific Research Project Commission, which supported this study (KSUBAP-2016/6-19 YLS).

**Keywords:** Green Synthesis, Nanomagnetite, Nonylphenol Ethoxylates, Removal
Recreational Fishing Competitions in Turkey

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Introduction: In recent years, our country made the internal water and marine areas sporting angling activities, there was a significant increase in terms of number and variety. Elements like these activities, tourism, entertainment, but its effects on natural fish stocks. Activity due to a contest, it is natural to include elements of the competition. As these activities made economic, social or fishing there has not been an academic review across the Board.

Material and Methods: This study was included the last five years; the contest was conducted an assessment of the organization. Activities organized institutions in different regions-enterprise, activity time, rules, has been taken into consideration features such as Federation. For obtain data was made with directly contact to the activity organization mainly Turkey sporting Angling Federation.

Results: In this study, 80 recreational fishing competition were evaluated. These competitions were made by municipalities, universities, other public institutions and sporting Angling Federation’s clubs in freshwater and Sea coastal areas from Turkey. In these competitions sustainable recreational fishing approach is essential but a number of deficiencies were seen in this study.

Discussion: This potential for tourism and fishing activities in accordance with the principles of sustainable fisheries have been analyzed and presented information about the vision of the future

Keywords: Recreational Fishing Activities, Turkey, Sustainable ecosystem and fishery
Changes in Urease and Catalase Enzyme Activities Depending on Shadow Conditions in the Soil where Pinus nigra Arn. Is Grown

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Introduction: Soil enzymes are used as an indicator of soil microbial activity and the fertility of soil. The heights of enzymatic activity are the most important indicators of soil quality and character. The identification of factors affecting the enzymatic activity may provide important information on efforts to increase soil fertility. This information is greater importance in the areas such as particularly plantations, landscaping and so on. In this study, it aims to investigate in the changing of urease and catalase enzyme activity in Pinus nigra (karaçam) grown in soil different shadow conditions. In research, the species of trees and shade conditions will try to find out how it affects urease and catalase enzyme activity in the soil. The study will be covered the 1 different plant species, grownof 5 different shade conditions during one vegetation period and done soil analyzes when the exchange of urease enzyme catalase activity are investigated. Thus, the enzymatic activity of shade conditions and plant species will be studied to determine by how it affects.

Material and Methods: In the project, it was aimed to determine some nutrients and enzymatic activities in the soil where Pinus nigra (larch) grows under different shadow conditions. Aiming to achieve this, firstly different shadow conditions were created. For this purpose, firstly the greenhouse skeleton was created and three different parcels were created in this area. The plants used in the study were used as tubaceous sapplings. Only one plant species was chosen as the case of the study. Since each experiment was planned to be done as 5 replicates, 25 individuals of one plant species were used within the study. Saplings were provided for the study, and different shadow conditions were created in February and so the plants were placed in experiment parcels before the vegetation season started. At the end of vegetation period, plants were removed, soil samples were taken and enzyme analyzes were carried out.

Results: Changes in enzyme activity in larch soil depending on different shadow conditions were statistically significant at least at 95% confidence level.

Acknowledgement: We would like to express our appreciation to the Kastamonu University Scientific Research Project Commission, that supported this study (KÜ-BAP01/2016-1).

Keywords: Soil, Enzyme, Shadow, Pinus nigra, Picea pungens
A Sustainable Campus Strategy - Ege University

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Introduction: Universities and education institutions have significant social responsibilities besides technical roles to promote sustainability in their society and should be a leader or co-organizer for their stakeholders. The number of universities which aim to be a sustainable campus has been increasing rapidly. Therefore, green ranking systems have started to consider sustainable methodology of universities and evaluate them. Greenmetric System from Indonesia University (IU-GM) was established 2010 and have evaluated the environmental sustainability of universities in the base of six main categories. Ege University (EU) which has a vision to be a sustainable campus entered the system to analyze and optimize the current situation in 2016 and 2017 with the awareness that pressure on the environment such as waste generation, transportation, water-electricity-energy consumption, etc. In this study, to determine the weakness and strengths of EU and to reduce the impacts on environment the environmental sustainability studies were interpreted in the base of IU-GM sustainable methodology.

Material and Methods: The methodology of the ranking system was based instruments on a broad philosophy that encompasses the three Es: Environment, Economics and Equity. The system specified the criterias in consideration to be of importance by universities concerned with sustainability. In order to analyze and compare the current situation of EU, the scores and success percentage for six main categories including indicators; education, water, waste, energy and climate change, transportation and infrastructure were used and interpreted.

Results: EU was ranked as 337 in 516 universities in 2016 and 343 in 619 universities with 4331 points in 2017. Waste management category and transportation category were the most successful categories with the percentage with 63% and 56%, respectively. Integrated Waste Management and Hazardous Waste Management of Ege University provided to get high score from this category. The success of transportation category came from bike ways and train station in the university. However, water management (12%) and energy categories got low scores (25%).

Discussion: Universities can be considered as “small cities” which may have heavy impacts on the environment. Hence, Ege University with 66,000 students and 5000 staffs has a strategic sustainable road map to reduce its impact on environment. So, the results showed that EU should take the first step for “Water and Energy Management”. Besides, EU needs organic waste management along with hazardous wastes and packaging wastes. Sustainable transportation strategies is another title to be considered. Consequently, EU has a strong potential of being more sustainable campus and should focus on the weaknesses. In addition, EU sustainable campus strategy could serve as a model for other national universities to be a sustainable campus.

Keywords: environmental sustainability, sustainable campus, Ege University
Comparative Analyses of Chemical Contents of Ostracod Carapace from Shallow Aquatic Habitats of Giresun

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Introduction: Ostracods are microscopic crustaceans that found in nearly all kinds of aquatic habitats but we know that stagnant aquatic habitats may be more convenient for them. They are used as bioindicators of aquatic habitats since each species shows species-specific habitat preferences. Besides, since their carapace can be fossilized, its chemical composition can provide sufficient information about the aquatic conditions. The aim of this study is observe possible relationships of the water and sediment chemistry and carapace structure.

Material and Methods: A total of 105 samples were collected in Giresun province between 3-8 October 2015. Major ions were determined with 100 ml of water while sediment samples collected in eppendorf were taken from each sampling site to analyse. Ostracod samples were collected by a d-frame hand net (200 µm) and fixed in 70% ethanol. Standard methods were applied for taxonomic identification. Multi-statistical analyses (e.g., C2 software and CCA) were applied for evaluation of data and Edx analysis was applied to determine elemental contents of the carapace in SEM photography.

Results: We encountered 16 ostracods from 9 different habitats in 69 of 105 sampling sites. CCA revealed 69.5% of relationships between species and environmental variables. Water temperature (P<0.05) was the most effective variable on species composition. Ilyocypris bradyi showed correlation with EC. Heterocypris salina has maximum optimum value for water temperature. Potamocypris fallax has minimum tolerance and optimum values for water temperature while H. salina has maximum optimum and tolerance values for EC. Sodium amount in the carapace of H. salina was the highest in the samples. There is no evidence of relationship among water calcium concentration and carapace calcium amount.

Discussion: This is the first study dealing the non-marine ostracods in Giresun and so all species are new record for Giresun. It is seen that ostracods have high tolerance to environmental conditions are easily adapt to severe habitats. Results did not show any clear relationship between water and carapace calcium contents. Further studies are requested.

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Keywords: Ostracod, Ecology, Habitat Types, Giresun
Physiological Alterations of Strawberry Plant Under PhotoSelective Nets

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**Introduction:** The sunlight management has been an important study in order to maintain optimum fruit production and quality in orchard systems. Optimizing of sunlight use can be performed with some cultural practices such as pruning, training system, orchard design, with regard to improve quantity of light. Therefore, we studied the effect of use of colored nets with differential sunlight transmission with red, green and black photoselective nets allowing 40% shade on strawberry plant physiological associated responses.

**Material and Methods:** The study was conducted in 2016 in the greenhouse of Department of Horticulture at Selcuk University in Turkey. A strawberry cv. Kabarla was chosen for the experiment with following a randomized plot design involving three replications, with three plants per replication and was planted in 7 L pots filled with mixture of soil, substrate and perlite in a volume proportion of 1:3:1 in May. Prior to the start of the experiment, all plants were grown outdoors, being regularly watered. For the shade treatments, sunlight was artificially reduced using red, green and black nets allowing 40% shade with covering from July until September (during 2 months). End of the study, SPAD and anthocyanin values, stomatal conductance, leaf temperature, leaf relative water content, soil and air temperature and air humidity were determined and evaluated.

**Results:** The results demonstrated significant differences among colored nets in quality of light. The green net presented the highest SPAD value (39.79), while red net had the lowest value (34.99). The highest anthocyanin were obtained from black net (12.13) and control plant had the lowest value (9.72). Red net (150.36 mmol m⁻²s⁻¹) leaded a remarkable decrease in stomatal conductivity compared to control (241.83 mmol m⁻²s⁻¹).

**Discussion:** We suggest that the tested photos elective shade nets modify light quality leading to protection water loss, higher air temperature and lower air humidity on phyllosphere as compared to the full sunlight. This protective effect against radiation could be needed to alleviate the detrimental effects of environmental stresses. However, the data are preliminary and more research is required for understanding the physiological mechanisms underlying changes in the plant responses and for evaluating the results with other fruit species, especially woody plants.

**Keywords:** Physiology, Spectral quality, Strawberry, Sunlight spectrum management
Introduction: Deadwood is an important key factor for functioning forest ecosystems. Nearly a quarter of biodiversity directly or indirectly associated with deadwood, both in boreal and coniferous forests. Anthropogenic factors and modern sylviculture practices create a great stress on forest ecosystems, as well as dead wood dwelling species. With this study, deadwood bryophytes of pine forests from Western Black Sea Region (Bartin, Bolu, Düzce, Karabük, Kastamonu and Zonguldak provinces) were examined.

Material and Methods: 128 pine logs (88 Pinus sylvestris and 39 P. nigra) were investigated from 39 sampling points between April 2016 and October 2017. During field studies, coverage of each bryophyte taxa on each log were recorded as percentage, also decay categories from 1 to 6 of woody material were noted. Bryophytes were identified using related literature. Data sets for statistical analyses were created using Microsoft Excel and Twinspan (Two-way Indicator Species Analysis) was conducted using CAP5 software.

Results: Total of 48 bryophyte taxa were identified on pine logs (44 on P. sylvestris and 16 on P. nigra). As a result of Twinspan analysis, bryophytes of early stages of decay (1-3) and late stages of decay (4-6) were clustered into different groups.

Discussion: Taxa list shows that woody material of P. sylvestris has richer bryodiversity than P. nigra. This richness could be explained with ecological features of P. sylvestris forests; Scots pine forests were located higher altitudes and has moister climate than black pine forests. Also, taxa list indicates that at the first stages (1-2) of decay, corticolous bryophytes, at middle stage (3-4) facultative epixylics, late stages (4-5) of decay true epixylics were colonize on logs. On most woody debris that at the final stage (6) of decay, ground species could be found, especially at moister sampling points. This results and field observations are coherent to Twinspan results.

Keywords: Deadwood, Bryophyte, Turkey, Western Black Sea Region
Comparison of Different Purification and Isolation Methods for Cryptosporidium Oocysts from Fecal Samples

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Introduction: Cryptosporidium species are an enteric protozoan parasite that infects a broad range of hosts including humans, domestic and wild animals around the world, causing asymptomatic or different course gastrointestinal disease in their hosts. Due to the wide host range and environmental persistence of this parasite, Cryptosporidiosis can be zoonotic and associated with foodborne and waterborne outbreaks. Effective drug treatments, vaccines are not yet available for Cryptosporidiosis. A large number of purified oocysts which is morphological intact and antigenically well preserved are required for the development of detection methods, in-vitro cell culture applications and efficient vaccines against Cryptosporidium infections. In this study, it was aimed to standardize and optimize an efficient and practical method by comparing some isolation and purification protocols which routinely used to obtain a large number of high-purified Cryptosporidium oocysts.

Material and methods: The study material consisted of fecal samples which brought to laboratory for diagnosis of diseases. Calve fecal samples identified as positive for Cryptosporidium infection by rapid diagnostic kit and were confirmed microscopically using carbol fuchsin (CF) staining method. Cryptosporidium oocysts were purified by using Sheather’s sucrose gradient purification, sucrose density gradient centrifugation and saturated NaCl flotation protocols. The intensity and morphological structures of the collected oocysts were evaluated under the phase-contrast microscope. Afterward, Genomic DNA (gDNA) from the purified oocyst was isolated using the two different DNA extraction methods and PCR were performed using previously described Cryptosporidium primers to confirm DNA extraction methods.

Results: The morphological structure of collected and purified oocysts by using Sheather’s sucrose gradient purification protocol was disrupted and also oocysts suspensions were contaminated with many fecal debris. It was determined that the intensity of oocysts obtained by sucrose density gradient centrifugation protocol was higher than Sheather’s sucrose gradient purification protocol, but it could not be completely purified from fecal debris. Higher intensity and more purified oocysts were obtained by saturated NaCl flotation protocol. It was also observed that the morphology of oocysts was better preserved than the other protocols.

Discussion: In conclusion, saturated NaCl flotation protocol is appears to be suitable detection (molecular and serologic), purification of Cryptosporidium oocysts from larger volumes fecal samples than the other protocols. Purified oocysts obtained using this protocol may be use in cell culture applications, development of vaccine and detection studies.

Keywords: Cryptosporidium, Purification, Saturated NaCl flotation, Sucrose gradient
**Introduction:** Some of the edible insects have pharmacologically highly active ingredients. Some contain secret toxic metabolites, some of which are chemical compounds, such as alkaloids, that are produced for defense or other purposes. Some other insects may store secondary organisms from host plants for their defense mechanisms by obtaining substances such as alkaloids, aristocolic acid, and glucosinolates. These features of insects have propelled scientists to search for new drugs from insect compounds. The aim of this study is to determine the anticancerogenic properties of protein extracts from some insect species belonging to the genus Helophorus around Bingöl province.

**Material and Methods:** Field studies were conducted in Bingöl provincial center, districts, and localities of the villages within these districts. Materials used in this study were collected from Bingöl province center, districts, and various localities of villages within these districts. Samples were collected between May and June 2017 by sifting between plants and moss in the shallow sections of various streams, springs, creeks, sediments and hot water sources. The species investigated in this study are some insect species belonging to the genus Helophorus. Insect specimens kept at -80 °C were subjected to several treatments to obtain a protein extract. Insect specimens were weighed. and then the sample was homogenized thoroughly by homogenizer. The samples were treated with 10% TCA. Then the sample was centrifuged (at 4500 rpm). After this process, the pellet part was collected and left to dry. The dried sample was pulverized. Pure water was added this samples and centrifuged again. The supernatant was collected and then alcohol was added. The protein extracts obtained as a result of centrifugation were applied to the PC3 cell line. Cytotoxic effects on the PC-3 prostate cancer cell line were determined using WST-1 test.

**Results:** The cell vitality test results were analyzed in the range of 1000 μg/ml-62.5 μg/ml, and all concentrations showed activity.

**Discussion:** The results of this study will provide guidance on future work, as well as information on whether it will be applied as a potential therapeutic treatment in cancer disease, one of the complex diseases.

**Acknowledgement:** We would like to thank Bingöl University Scientific Research Project Commission for supporting this study (BAP-FEF.2017.00.003).

**Keywords:** Anticancer, Bingöl, Helophorus, Insect, PC-3, WST-1
Introduction: The impact on the environment in which humanity is living continues to increase today. Humans need all the component of life in the ecosystem in order to survive. They grow useful products for themselves using the natural environment, but also affect the other species. The biological, ecological and social experiences of the past in agricultural production are transferred to today; farmers are farming old or new practices in order to reach their targets. Some of these practices preserve naturalness, while others ignore environmental heritage and cause the future ecological problems to increase. Garlic (Allium sativum) is an indispensable food produced in our country and all over the world since centuries and it is also used for the treatment of various diseases. In this study, the applications of garlic cultivators on soil and garlic were investigated.

Material and Methods: In this research, applications of garlic producers about the environment have been designed as qualitative research. The universe of research constitutes 40 garlic growers in selected villages of Kastamonu province Taşköprü district by random sampling method. Soil analysis, fertilization, weed control and the use of chemicals by producers have been investigated through semi-structured interview forms. The data are interpreted by descriptive analysis technique.

Results: The interaction of the communities with the environment has become important for the future of the ecological structure. As a result of the research, it has been found that farmers affected soil and other living things apply, conscious and unconscious chemicals are used, ancestral methods are used extensively and Farmers refuse to follow the recommendations agricultural engineers for some reasons.

Discussion: Human ecology and the environment are interdependent. Cultivators should be encouraged to use ecological methods in the economic development cycle. By emphasizing organic farming methods instead of chemical agriculture, training and seminars to inform growers about this issue should be increased. Sustainable agricultural model should be widespread.

Keywords: Garlic, Kastamonu, Ecology, Environment, Agriculture
Introduction: Nutrient resorption from senescent tissues, one of the most important mechanisms of nutrient conservation, enables plants to re-use nutrients and thereby be less dependent on environmental nutrient supply. *Betula medwediewii* is a relict species remained from tertiary period and also plays an important ecological role in Turkey. The goal of this research was to investigate variations in the foliar nitrogen and phosphorus resorption of *Betula medwediewii* along with altitudinal gradient.

Material and Methods: Fırtına Valley in Rize province was selected as a study area and the leaves collected along an elevation gradient (1400 m, 1664 m and 1932 m). From these chosen localities, leaves were monthly collected in May, June, July, August, September and October 2015. The leaf samples were dried at 60 °C until the constant weight, nitrogen (N) concentration by Dumas method and phosphorus (P) concentration by the stannous chloride method were determined. N and P resorption efficiency (RE) and proficiency (RP) values were calculated with the formulas.

Results: N-RE, N-RP, P-RE and P-RP (%) values of *Betula medwediewii* showed statistically significant differences (P< 0.01) among all altitudes. The highest and lowest N-RE (%) values were at 1664 and 1400 m, respectively. The situation was opposite in terms of N-RP (%) values. The highest and lowest P-RE (%) values were at 1400 and 1932 m, respectively. The situation was opposite in terms of P-RP (%) values. The mean N-RE, N-RP, P-RE and P-RP (%) values ranged between 93, 0.3, 90 and 0.42, respectively.

Discussion: According to the obtained data, N-RE (93%) and P-RE (90%) values were higher than those reported in previous studies when compared to the other deciduous species in the literature. N-RP value of *Betula medwediewii* were biochemically sufficient due to N-RP value was under of the stated limits (<0.7%) for N. P-RP value was above of the stated limits (<0.05%) for P and was insufficient. N-RE and P-RP values (%) of *Betula medwediewii* increased, while N-RP and P-RE (%) decreased with increasing altitudes.

Acknowledgement: This study was supported by Recep Tayyip Erdoğan University, Scientific Research Projects Unit [Project No: 2013.102.03.14].

Keywords: Altitude, *Betula medwediewii*, Foliar Resorption, Nitrogen, Phosphorus
Investigation of Anti-Cancer Properties of Protein Extracts Obtained from Some Insect Species of Hydrophilinae Subfamily

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Introduction: It is known that living things adapt to many condition to survive. and it is known that they compete with different living groups in an environment suitable for them and produce toxins against them. These features of insects have propelled scientists to search for new drugs from insect compounds. Cancer is a difficult disease to control in terms of its unique behavior in every cell. In the face of this mixed situation, another living thing can be used to find the way to survive in nature. The aim of this study is to determine the anticancerogenic properties of protein extracts from some insect species belonging to the Hydrophilinae subfamily around Bingöl province.

Material and Methods: Materials used in this study were collected from Bingöl province center, districts, and various localities of villages within these districts. Insect samples were collected between May and June 2017 by sifting between plants and moss in the shallow sections of various streams, springs, creeks, sediments and hot water sources. The species investigated in this study are some insect species belonging to the Hydrophilinae subfamily. Insect specimens kept at -80 °C were subjected to several treatments to obtain a protein extract. Insect specimens were weighed, and then the sample was homogenized thoroughly by homogenizer. The samples were treated with 10% TCA. Then the sample was centrifuged (at 4500 rpm). After this process, the pellet part was collected and left to dry. The dried sample was pulverized. Pure water was added this samples and centrifuged again. The supernatant was collected and then alcohol was added. The protein extracts obtained as a result of centrifugation were applied to the PC3 cell line. Cytotoxic effects on the PC-3 prostate cancer cell line were determined using WST-1 test.

Results: In the analysis of the cytotoxicity effect shown by different concentrations of insect protein extract on different PC-3 cell line, the concentration that prevented cell vitality the most was 1000 µg/mL, but in general, all concentration of the insect protein extracts showed cytotoxic effect.

Discussion: The insect protein extracts obtained in this study can be developed and made available in anticancer studies. That is, it can be applied in cancer cells by encapsulating the insect protein extracts the synthesized particle.

Acknowledgement: We would like to thank Bingöl University Scientific Research Project Commission for supporting this study (BAP-FEF.2017.00.004).

Keywords: Anticancer, Bingöl, Hydrophilinae, Insect, PC3, WST-1,
First Report of *Chloromyxum partistriatus* (Cnidaria: Myxozoa) from *Raja clavata* in Turkish Coastal Areas of the Black Sea

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**Introduction:** Myxozoans are among the most diverse parasitic groups in fishes and parallel to increasing studies on their occurrences in fish hosts from worldwide revealed more species descriptions in different hosts and geographical areas. Thus far, a total of 20 species have been reported belong to the genus *Chloromyxum* which is usually coelozoic in mainly gall bladder of freshwater and marine fish and in a small number of amphibians. Their spores are bivalved, and the valves are either smooth or ridged, and two pairs of polar capsules. Species identification based mainly on spore morphology and morphometry. Here, in the present study, we aimed to provide identification of a myxozoan parasites species in *Raja clavata* in the Turkish coastal areas of the Black Sea for the first time.

**Materials and Methods:** Samples of thornback ray *Raja clavata* were collected by commercial fishermen in Sinop coasts of the Black Sea in Turkey and transferred to parasitology laboratory during March and December 2017. A total of 11 fish specimens were examined for myxozoan parasites using conventional methods. All external and internal organs including gills, fins, skin, urinary bladder, kidney, gall bladder, intestine and gonads were examined using a phase contrast Olympus microscope (BX53) and morphometric characteristics of parasite spores were measured and photos were taken with a digital camera (DP50) and DIC attachment. The prevalence (%) was calculated as the percentage of the total number of infected fish while the intensity of infection was semi quantitatively evaluated following a scale from (1+) 1 - 9; (2+) 10 – 19; (3+) 20 – 29; (4+) 30 – 39; (5+) 40 – 49; (6+) >50.

**Result and Discussion:** Throughout investigation processes, only one myxozoan species with characteristics four polar capsules were found in the gall bladder of *Raja clavata*. Morphology and morphometric characteristics of 30 individuals of our *Chloromyxum* species corresponded well to those reported previously and therefore we named it to be *Chloromyxum partistriatus* Kovaljova, Donec & Kolesnikova, 1989 belonging to the myxozoan genus *Chloromyxum*. Infection prevalence (%) and intensity values for *C. partistriatus* were determined to be 9.1% and 6+, respectively. This species has previously been reported from the same host off Ukraine in the Black Sea, however, this study is the record of a parasitic myxozoan *Chloromyxum partistriatus* Chloromyxum in Turkish coastal areas of the Black Sea as well as the first report of a member of the genus *Chloromyxum* in Turkish parasite fauna of fish.

**Keywords:** Myxozoa, *Raja clavata*, *Chloromyxum*, Black Sea
Effects of Different Photoperiod Applications on Kisspeptin in Zebrafish (*Danio rerio*)

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Introduction: Kisspeptin hormone has important roles in reproduction. Kisspeptin is synthesised mostly in the brain, although it is also found in various peripheral tissues. There are studies shown that kisspeptin is an important role on reproductive and energy balance. However, it is possible that the kisspeptin signaling has additional roles beyond reproduction control. This study aims to determine how changed kisspeptin levels of zebrafishes left in different photoperiods.

Material and Methods: Fish samples were subjected to 18 hours light, 6 hours light, 12 hours dark, 12 hours light and 6 hours dark, 18 hours light photoperiod. Tissue sample was weighed and homogenized by adding PBS (pH 7.4) at a certain amount. Then it was centrifuged (3000 rpm) for approximately 20 minutes. Supernatant was used in study. Kisspeptin-1 was analyzed using ELİSA. (fish kit YLBiont Cat. No. YLA0074FI).

Result: The kisspeptin levels were measured in the of zebrafishes, which were left in the bright for 6 hours and dark for 18 hours (91.51±8.3 pg/ml), dark for 12 hours) and bright for 12 hours (88.70±5.8 pg/ml, bright for 18 hours and dark for 6 hours (69.65±7.9 pg/ml). It was determined that the kisspeptin levels of these zebrafishes left in different photoperiods were not statistically significant difference.

Discussion: The findings suggest that Kisspeptin-1 levels does not depend upon different photoperiods.

Acknowledgments

This work was supported by Science Research Foundation of Bingol University of Turkey (project number: BAP-FEF.2017.00.007)

Keywords: *Danio rerio*, Kisspeptin 1(KISS-1), photoperiod
Detected Exotic and Invasive Species in Susuz and Aygir Lakes (Kars), Cildir and Aktas Lakes (Ardahan)

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Introduction: Aygır, Çıldır and Aktaş are lakes with volcanic character (1,2,3,4). About 20 years before, a fishery cooperative has been established for these lakes, which were used to market a large number of natural and indigenous fish species to the domestic market, especially the Çıldır lake (5,6,7,8). Population of these highly precious, natural and indigenous species have rapidly decreased in recent years due to breeding of exotic and invasive species, which is the main subject of this report. Nowadays these native fish are found very deep in the lake, few in number and small in size. These species are identified in this important wetland area within Kars and Ardahan city boundaries. They are exotic and invasive species and it is unknown that breeding was made by whom, when, how and why. This invasive species in reported lakes, have led to significant decrease on natural fish populations.

Materials and Methods: In 2013-2014, The local fisherman of Aygır, Çıldır and Aktaş lakes were told to collect fish samples every three months to determine the fish fauna of the lake. Collected fish samples were identified according to the literature.

Results: This study was made on Susuz and Aygir Lakes (Kars), Cildir and Aktas Lakes (Ardahan) under the projects of Ministry of Forest and Water Works. In this investigation, which was made in Aygır and Cali Lake, we detected the presence of Prussian Carp (Carassius Gibelio) and Turkish Crayfish (Astacus Leptodactylus) only in Aygır Lake of summer 2013 and it was also detected from another investigation in both Cildir and Aktaş Lakes of summer 2014.

Discussion: In order to determine the biodiversity of the lake and its surroundings; the field work was performed in Aygır, Çıldır and Aktaş lakes, the Israeli Carp and Turkish Crayfish were caught more than other native and natural fish species. According to the statements of the literature and local people, native fish species have decreased rapidly but the populations of Israeli Carp and Turkish Crayfish have increased rapidly (5,6,7). Israeli Carp adults causing natural populations to decrease by eating eggs and larvae of other fish species. Also Turkish Crayfish has been found to cause a decrease in the density of natural populations as they consume underwater plants and fish eggs in the lake ecosystem. After working in this important wetland habitats, it can be concluded that these exotic and invasive species (Carassius gibelio and Astacus leptodactylus) are destroying species and should be removed from the lakes.

Keywords: Kars, Ardahan, Aygır Lake, Çıldır Lake, Aktaş Lake, Biodiversity, Exotic Species, Invasive Species , Ministry of Forest and Water Works.
Introduction: Bacterial exopolysaccharides (EPS) could be used as bioflocculants, bioabsorbents, encapsulating materials, heavy metal removing agents, drug delivery agents, ionexchange resins, a natural immunomodulator, and antioxidant and antibiofilm agents. To evaluate antibiofilm potential of EPS from ZZ40 Enterobacter sp. and ZZ47 Rhodococcus pyridinovorans strains newly isolated from waste-water treatment system. Cancer is one of the most important diseases of today. In this study, it was also aimed to investigate the potential cytotoxic effects of EPS ZZ40 and ZZ47 on different cancer cell lines.

Material and Methods: A biofilm formation assay with varying concentration of EPS (0.025, 0.05 and 0.1 mg/ml) was performed in order to study the antibiofilm potential of the EPS against two gram-positive and two gram-negative bacterial strains. The cytotoxic effects of EPS ZZ40 and ZZ47 were investigated by MTT assay on human lung (A549), breast (MCF-7) and cervical (HeLa) cancer cell lines for 72 h. All cells were seeded into 96-well plates at a concentration of 4x10^3 cells/well. After 24 h incubation, the cells exposed to EPS at different serial concentrations from 2^-0.0625 mg/ml for 72h. Untreated cells was served as control.

Results: Biofilm formation in test bacteria decreased significantly (P<0.05) with increasing concentrations of both EPS. EPS ZZ 40 and ZZ47 exhibited the best antibiofilm activity at 0.1 mg/ml against Staphylococcus aureus ATCC 6538/P (45%) and Bacillus cereus CCM 99 (75%), respectively. The cytotoxic effect was not observed until almost 50% against any cells. The both EPS showed less than 20% effect on A549 cell viability. The cytotoxic effect of both EPS on the HeLa cells at 2, 1 and 0.5 mg/ml were similar; 48%, 40% and 39% for ZZ40 and 45%, 38% and 33% for ZZ47, respectively. In addition, the both EPS at lower concentrations (0.25-0.0625 mg/ml) exhibited cytotoxicity less than 28% on HeLa cells. At 2 mg/ml, ZZ47 (36%) caused more cytotoxic effect on MCF cells than ZZ40 (28%). However, the lower concentrations of ZZ47 (less than 0.5 mg/ml) were ineffective on MCF cells. The both EPS displayed the highest cytotoxic effect on HeLa, especially at 2 mg/ml after 72 h treatment.

Discussion Taken together, these data identify the antibiofilm activity of EPS ZZ40 and ZZ47, which may make it potential in the design of new therapeutic strategies for bacterial biofilm-associated infections and limiting biofilm formation on medical indwelling devices. In addition, determined cytotoxic activities of both EPS against A549, MCF-7 and HeLa cells suggesting them for the development of therapeutic and preventive strategies against cancer disease as well.

Keywords: Bacterial exopolysaccharides (EPS), Antibiofilm activity, Cytotoxicity, Cancer cell lines (A549, MCF-7 and HeLa).
Effect of castor bean [Ricinus communis Linn (Euphorbiaceae)] and dieffenbachia [Dieffenbachia maculata (Araceae)] of root-knot nematode (Meloidogyne incognita) on greenhouse tomatoes

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Introduction: Tomato is the vegetable that is grown the most in the world and in our country (Turkey). It becomes necessary to control many pests in tomatoes that are generally grown in fields or greenhouse cultivation. Plant-parasitic nematodes (PPNs), particularly Meloidogyne spp. root-knot nematodes (RKNs), are widely distributed and cause significant yield losses in a wide range of crops. The most destructive species is Meloidogyne incognita (Kofoid & White) Chitwood, which causes serious problems to a number of economically important agriculture and greenhouse crops. Nematode control is largely based on synthetic nematicides, which besides being costly present potential risk to non-target organisms. In the search for more benign acceptable alternatives to chemicals, the possibilities are being investigated of exploiting nematode-antagonistic plants for the management of plant parasitic nematodes. In this study, the efficacy of pieces of leaves of castor bean [Ricinus communis Linn (Euphorbiaceae)] and dieffenbachia [Dieffenbachia maculata Schott (Araceae)] were evaluated at two different applications (10 and 15 g) against Meloidogyne incognita on tomatoes.

Material and Methods: Experiments were carried out in pots under greenhouse conditions using tomatoes cv. Seyran F1 as assay plants that are commonly cultivated in Turkey. Each experimental unit consisted of the plastic pot containing sterilized loamy sand/pot and a seedling tomato (cv. Seyran F1). The galled roots of tomato plants of Rio Grande variety infected with M. incognita were cut into 1-2 cm pieces and placed near the roots of the seedling in each pot. Pieces of D. maculata and R. communis plants were also placed in the pots with the galled roots in two different treatments of 10 and 15 gr. The negative control pots received only with galled root pieces infected with M. incognita and the positive control pots received only water. The chemical control group was treated with nematicide after being infected with M. incognita. Each experiment was arranged in a randomized block design (RBD) with 7 factors and 5 replications. Trials were conducted between November 2016 and January 2017.

Results: As a result of this experiment, R. communis and D. maculata were found to be effective against RKN, M. incognita. Of these plants especially R. communis demonstrated to have a quite high effect

Discussion: Experiments showed that the plant parts used had nematicidal activity to differing degrees. R. communis plant parts are observed to be more effective than D. maculata. Data obtained have shown that plant parts used are effective in suppressing RKN. In addition to these findings it is concluded that similar experiments could be made in coastal regions of Turkey in areas where protected cultivation is widespread and based on the results obtained R. communis could be used in organic farming and in integrated control against RKN. As a result of these experiments, it has been found that R. communis exhibits nematicidal activity against RKN, M. incognita and that it is crucial to evaluate data that will be obtained from experiments on other RKNs.

Keywords: Root-knot nematode, Meloidogyne incognita, Ricinus communis, Dieffenbachia maculata, parted leaves, tomato.
Species Composition of Culicoides Latreille 1809 (Diptera: Ceratopogonidae) in Northeastern Anatolian Region of Turkey

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Introduction: Culicoides biting midges (Diptera: Ceratopogonidae) are vectors of a wide array of pathogens, including arboviruses of international importance in the worldwide production and trade of livestock. Globally, the most important of these, at present, are bluetongue virus (BTV), Epizootic Haemorrhagic Disease (EHDV), Ephemeral Fever (EFV), Akabane (AKAV) and African horse sickness (AHS). These diseases, which affect domestic and wild ruminants, cause considerable health and economic losses due to deaths, abortion and decreased productivity. There are limited studies on Culicoides fauna in Turkey and also there have been no studies on Culicoides in Northeastern Anatolian Region specified as the study area. In this study we collected Culicoides species from different localities in Northeastern Anatolian Region and identified them.

Material and Methods: This study was carried out in order to detect Culicoides species in Northeastern Anatolian Region of Turkey in August 2017. In this study Culicoides samples were collected by using Onderstepoort type light traps from Kars, Ardahan, Iğdır, Erzurum and Artvin. A total of 3988 Culicoides specimens composed of 3976 female and 12 males were collected and 13 specimens were identified as: Obsoletus group 361 (9.05%), Culicoides pulicaris 53 (1.32%), C. punctatus 3016 (75.62%), Nubeculosus complex 22 (0.55%), C. newsteadi 176 (4.41%), C. furcillatus 1 (0.02%), C. longipennis 32 (0.80%), C. fascipennis 118 (2.95%), C. odibilis 2 (0.05%), C. cataneii 1 (0.02%), C.dzhafarovi 12 (0.30%), C. riouxi 39 (0.97%), C. impunctatus 7 (0.17%), C.lupicaris 1 (0.02%), C.subfascipennis 8 (0.20%), C. shaklawensis 3 (0.07%), C. picturatus 134 (3.36%) and C.kurensis 2 (0.05%).

Discussion: The prevention or reduction of transmission of Culicoides-borne diseases is completely dependent on the control of these species and limiting vector–animal/human contact. Vector surveillance is a key component of any local integrated vector management control. The goal of vector-based surveillance is to quantify animal/human risk by determining local vector presence and abundance. Our findings indicate that some species are important risk factors for the region since they can serve as vectors in transmitting and spreading important Culicoides-borne diseases. And also these findings showed the necessity of more studies such as seasonal population dynamics and distribution and vectorial capacity of these species in the area.

Keywords: Culicoides, Northeastern Anatolian Region, Vector-Borne Diseases
**ORAL PRESENTATION**

**Biological Struggle Elaeagnus angustifolia with Phragmites australis at Van Yüzüncü Yıl University Campus**

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**Introduction:** Damage and product losses caused by invasive crops attract attention. These invasive plants are often struggling with chemical substances. However, the chemicals applied to agriculture are a problem in terms of ecosystem. For this reason, natural herbicides may be preferred because of the fact that the plants reduce the damage to the environment to a minimum. In this study, the biological struggle with the use of the elaeagnus (*Elaeagnus angustifolia* L.) plant, which spreads in wide areas on the campus of Van Yüzüncü Yıl University as an invasive plant, and spreads in the natural field to control the populations of the reedmace (*Pragmites australis* L.) have been discussed.

**Material and Methods:** From the Van Yüzüncü Yıl University Campus, in November of 2017, collected leaves were dried in an area that does not see the sun. Extracts were obtained from the dried leaves by homogenization and centrifugation method. The extracts were diluted with distilled water and prepared at 4 different concentrations. The extracts at different concentrations and the pure water forming the control group, which constitute the experimental group, were applied to ripe rhizome of reedmace collected from the campus and planted in pots.

**Results:** While the germination rate in the control group was 100%, the germination rate in the undiluted extract-applied rhizomes decreased to 40%. The germination rates of 1:8 and 1:4 extracts were found to be 70%. In 1:2 extract, it is 60%. The mean body length of the control group was 2.26 cm, but the mean value of the undiluted extract was reduced to 0.29 in reeds. 0.55 cm for a 1:2 extract, 0.61 cm for a 1:4 extract, and 1.29 for a 1:8 extract. In the dry weight increments, the weight measured in the control group is 0.06, 0.04 in the extract of 1:8, 0.02 in the extract of 1:4 and 0.02 in the extract of 1:2, and 0.01 gram of the undiluted extract.

**Discussion:** Extracts taken from elaeagnus leaves have an inhibitory effect on growth of reedmace rhizomes. This effect increased as the concentration of the leaf extracts increased. Statistical methods applied to the results of the study revealed significant relationships. It is necessary to investigate the potential of herbicide extracts from herbaceous leaves and their potential in future studies. It would be possible to get rid of foreign and harmful grasses without threatening the ecological balance.

**Acknowledgment:** We would like to thank TUBITAK-2209/A for supporting this work.

**Keywords:** Allelpathy, Biological Fighting, Elaeagnus, Reedmace
Comparative Anatomy and Ecology of *Potamogeton praelongus* (Potamogetonaceae), a Recently Rediscovered Species from Turkey

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**Introduction:** *Potamogeton* L. is one of the largest aquatic plant genus having species with solely floating or submerged leaves, and species having both submerged and floating leaves. In Turkey, the genus *Potamogeton* is represented by 14 species and 3 hybrids. *Potamogeton praelongus* (whitestem pondweed) is a perennial stoloniferous and submerged aquatic plant. *P. praelongus* has a nordic, weakly suboceanic, and circumpolar distribution. In Europe its distribution extends from North Scandinavien to South of France in the Alps and in Pyrenees. The species is also distributed in similar latitudes of Asia and North America. Although it has a wide distribution area, it is a rare species. It was only recorded from Turkey in the Flora of Caucasus in 1928 from Kars province (North Eastern Turkey). Since then it could not be collected again.

**Material and Methods:** During a revision of Potamogetonaceae in Turkey, numerous plant materials were collected between the years 2015 and 2017. The stele types, shape of endodermal cells, pseudohyodermis, presence vascular bundles in the cortex were determined and photographs were taken. Temperature (°C), barometric pressure (mmHg), pH, dissolved oxygen (%DO and mg/L), specific conductivity (us/cm), conductivity (us/cm), total dissolved solids (g/L), salinity (ppt) and ammonium (mg/L) were measured by using a YSI Professional Plus Meter. Geographical data (elevation and coordinates) were recorded by using Magellan eXplorist 610.

**Results:** The species was collected from a different locality in Southern Turkey from a Mediterranean mountain region (Cilician Taurus) and the existence of the species in the flora of Turkey is confirmed. Comparative anatomy of *P. praelongus* along with the closely allied species *P. perfoliatus* is discussed.

**Discussion:** Our anatomical findings indicate that *P. praelongus* specimens have eight (triotype) vascular bundles on contrary to major previous publications. *P. praelongus* is critically endangered in Turkey with a single population where it grows in an oligotrophic, calcareous, snow-melting lake with alkaline water.

**Acknowledgement:** This study was funded by Abant Izzet Baysal University Scientific Research Projects Coordination Unit (Project no: 2015.03.01.895). Ali Nihat Gökyiğit Foundation provided a three-year grant for the first author to make a revision of the Turkish Potamogetonaceae family for the Illustrated Turkish Flora Project and supported herbarium visits.

**Keywords:** Potamogetonaceae, Aquatic, Macrophyte, Turkey.
Local Ecological Conditions of Oriental Beech (*Fagus orientalis* Lipsky) Ecosystems in Artvin Province

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**Introduction:** The determination and presentation of the local ecological conditions in the natural distribution areas of the forest trees are significant for forestry applications. Indeed, it would be helpful to know about the requirements of any tree species for the silvicultural interferences on the stands relating to this species and the right selection of the tree species that could be brought to these areas for silvicultural treatments. In this study, the development and local ecological characteristics of the eastern beech from native tree species have been examined in sites with / without sea effect. Oriental Beech (*Fagus orientalis* Lipsky) is the most important species of broad-leaved trees that spread in our country. Oriental Beech, in addition to providing an important contribution to Turkey's economy is among the most important raw material for the forest products industry.

**Material and Methods:** The research areas were selected from two sub-regions of site within the Artvin province borders, which were land affected by the sea (Borçka forest sub-district directorate) and not affected by the sea (Artvin forest sub-district directorate). 6 and 12 sample pilots were selected from the sub-regions of site by selecting-sampling method, respectively. The sample pilots were taken from Karşıköy of Borçka, and Genya Mountain and Saçinka of Artvin. The sizes of the sample pilots were selected as: 400 m² and 600 m². For the determination of site index, age and height measurements were made on 100 trees in the hectare tree representing the top height. Some spatial (slope, aspect, altitude and relief) factors were determined and soil samplings were made according genetic soil horizons from excavated soil profiles, and some soil properties (absolute and physiological soil depths, soil type) were detected. The particle sizes, actual and potential acidity, organic carbon, exchangeable bases were determined in soil samples. The amount of fine soil was calculated as gr/lit on the volume samples. The available water capacities of the soils were calculated in mm according to fine soil amounts in relation to the horizon thicknesses.

**Results:** Average site indexes in Karşıköy, Genya Mountain and Saçinka were 31.95 ± 2.67 m, 27.08 ± 2.94 m and 25.08 ± 2.11 m, respectively. Site index amounts of research areas are different statistically. Particle size ratios, fine soil and skeleton, stoniness amount, available water capacity, and actual acidity are different statistically (p<0.01). The difference in local ecological conditions has affected site index.

**Discussion:** Sampling pilots were selected from three different geological formations in volcanic rocks. Soil properties varied according to local ecological conditions (spatial, climate) of site and geological formations. Physical soil properties were affected on available water capacity, the soil organic matter, the nutrient content of the soil, and the nutrient uptake of trees. Altitude and aspect were important factors affected productivity of eastern beech. The highest value of site index was in northern aspects of low altitudes (average 1200 m) in Karşıköy and the lowest value of site index was southern aspects of medium altitudes (average 1360) in Saçinka. Sample pilots in Genya Mountain were at 2nd productivity class (average 1700 m and north aspect)

**Keywords:** Oriental beech, local ecological conditions, site index, Artvin
ORAL PRESENTATION

Research of Annual Movements of Crane (Grus grus) Breeding in Sivas, Erzincan, Erzurum and Ardahan

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Introduction: Global population of crane (Grus grus) is estimated to be around 491,000-503,000 individuals. Breeding range of ssp grus is northern Eurasia (Western & Northern Europe, European Russia, Western and Central Siberia) and Turkey & Caucasus for spp. archibaldi. Crane is listed as Least Concern (LC) according to latest IUCN criteria. Two subspecies of crane breeds in Turkey (ssp. grus, ssp. archibaldi). Although breeding records in literature states around a breeding population 136-167 pairs, the quality of data was very low, and recent studies also support this finding. Our findings reveal that total population is around ~80-100 pairs, and summering population is around 150 individuals. Wintering population is more than 10,000 individuals. Turkey is both breeding, wintering and migration grounds of Turkey, however annual movements of cranes breeding in Turkey is not known. This study reveals the migration, wintering grounds, feeding and resting areas of breeding crane population in Turkey.

Material and Methods: During the “National Crane Action Plan” field studies in 2012, the breeding sites, number of pairs and provinces hosting largest populations are defined. Before the field studies in 2016, the areas where the ringing and satellite tagging activity will be carried out. The ringed individuals are caught by running after flightless individuals (young or moulting adults). Colour rings are placed on cranes according to colour ringing coding in Europe Crane Ringing Council. The satellite transmitters data are uploaded to www.movebank.org, and downloaded from there in different formats.

Results and Discussion: 16 cranes were ringed, 7 of these were tagged with satellite transmitters. Most of the individuals stayed in Turkey whole year, stating a short distance migration compared to cranes breeding in European countries. Wintering grounds is mainly in Çukurova Delta, only one individual migrated to Iraq for wintering, with short distance movements over time, and came back to Turkey after two days. The only adult tagged with satellite transmitter during moulting stage, turned back to the same breeding site the next breeding season. Site fidelity is high, as stated by literature findings. 1 of the satellite tags stopped sending signals, 2 cranes were found dead, reason unknown, satellite tags were recovered to be used in the next breeding season. 4 satellite tags are still active. Satellite transmitters data revealed some of important areas that cranes are using. With the help of these data, it will be possible to actively protect these sites.

Acknowledgement: “National Crane Action Plan” is supported by UNDP/GEF-SGP, some of the satellite tags and costs of field studies are funded by during the project “Let’s Protect Our Cranes Together” supported by Civil Society Dialogue Programme.

Keywords: satellite transmitter, ringing, bird, migration, breeding
ORAL PRESENTATION

Land Cover-Use Change Analysis for Bursa Karacabey Karadağı-Ovakorusu Wildlife Development Area with Using Pixel-Based Classification Method

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Introduction: Nowadays, global climate change is one of the most important issues faced by every country in the world. Many researchers have been pointed out that land cover changes due to harmful human activities is one of the main causes of climate change. Moreover, changes in vegetation effects wildlife habitats greatly. For this reason, the determination of the change in land cover is of great importance for future regulations. Geographic information systems (GIS) and remote sensing (RS) techniques are frequently used because they save both time and labor for these kind of studies. In this study, the positive and negative land cover changes of the Bursa Karacabey Karadağı-Ovakorusu Wildlife Development Area, which is protected by law to enhance wildlife, was investigated from 2003 to 2017 with using Landsat satellite imagery.

Material and Methods: In this study, Pixel-Based (PB) classification system and Support Vector Machine (SVM) algorithm are used for land cover classification. In addition, Landsat satellite imagery was selected from the months of June, July and August when the vegetation was intense and the images with less cloud and snow effect.

Results: Accuracy analysis of the technique used in the study was made and according to this, an average accuracy of 87% was obtained with Kappa coefficient of 0.827. According to the results of this study, while there is no change in the 22975 hectare area, but a positive change in terms of vegetation can be observed. The greatest difference was with the change of 3307 hectares from medium level vegetation to dense vegetation.

Discussion: According to the results of this work, there is a positive increase with regards to vegetation in the study area. The main reason for this is the removal of protected areas from harmful human activities. If we think that the global climate change is affecting our lives more and more every day, it can be seen that preserving our important natural areas by laws for the future has great importance.

Keywords: Land cover, Land use, Climate Change, GIS, Remote Sensing
Distribution and Abundance of Eggs and Larvae of *Sardina pilchardus* (Walbaum, 1792) in the Sığacık Bay (Aegean Sea)

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Introduction: Small pelagic fish species such as anchovies and sardines, are particularly important and contribute to the economic of the countries. Because of that, to examine the early life stages, spawning times and areas, nursery areas, recruitment of these species and environmental factors are so important. These could be achieved by ichthyoplankton surveys. The present study is of great importance since no studies on ichthyoplankton has been found in Sığacık Bay until now. The aim of this study is to observe distribution and abundance of eggs and larvae of *Sardina pilchardus* in the Sığacık Bay.

Material and Methods: This study was carried out between November 2016 and March 2018 monthly to represent one year at 13 stations in Sığacık Bay. The depth range of there stations are between 20 and 155 m. Ichthyoplankton samples were collected using a 0.57 m mouth diameter, 350 µm mesh size vertically and 500 µm mesh size horizontally by WP2 type plankton net. The samples were fixed and kept in final concentration of 4% buffered formaldehyde solution. All individuals in the samples were counted using a stereo microscope to calculate the abundance (ind/m³ in the vertical water column, ind/100m³ in horizontal water column). Hydrographic parameters were measured at all the stations (surface and bottom) using a multiparameter equipment.

Result and Discussion: During the study, the total abundance of sardine eggs and larvae were found 73 individuals/100 m³ in the horizontal distribution (rate of eggs were 99.4% and rate of larvae were 0.6%), 86 individuals/ m² in the vertical distribiton (rate of eggs were 59.1% and rate of larvae were 40.9%). Frequency of occurrence (FO%) of the sardine eggs and larvae in the total ichthyoplankton was calculated as 1.7% in horizontal distribution. The standard length of sardine prelarvae were found between 2.35 and 5.30 mm, while postlarvae lengths were found between 6.20 and 21.00 mm. Sardine eggs and larva were observed at all the station in horizontal distribution and at 10 stations in vertical distribution. The most of the eggs and larvae were obtained from D2 station. The depth of this station is 55 meters. Sardine eggs and larve were found between October-March, and February was the most observed month. When the mean hydrological values of the water were examined; the temperature was measured between 15.2-18.8 °C, the salinity 39.4-39.7 ppt and the dissolved oxygen 7.5-7.8 mg/l during the spawning period (October- March). In February, when maximum spawning occurred, the temperature, salinity, dissolved oxygen values were observed as 15.3 °C, 39.6 ppt and 7.8 mg/l respectively. As a result, the distribution and abundance of sardine eggs and larvae in Sığacık Bay have been determined and it is thought that the sığacık bay is less preferred by sardines as spawning area.

Keywords: Sardine, Fish egg and larvae, Ichthyoplankton, Sığacık Bay, Aegean Sea

Aknowledgement: This study was supported by Ege University Scientific Research Project under Project code: 16-SUF-001. We thank Hüseyin UYGUN, Serkan TEZ and Burcu TAYLAN for their contributions to the maritime study.
Introduction: Küre Mountains National Park (Bartin Section) comprises most of the important samples of endangered “Black sea humid carstic forest ecosystems” which make it valuable for nature conservation purposes. The aims of the research are to determine forest vegetation types of the research area and to reveal prevailing environmental conditions underlying forest communities using numerical methods.

Material and Methods: The vegetation was collected and classified according to Braun-Blanquet method. Vegetation-environment relation was analyzed with various statistical techniques. For this purpose, a total of 121 relevés and 245 plant taxa from forest vegetation of the region were stored into TURBOVEG and further analysis were carried out in JUICE and CANOCO 5 softwares. Vegetation data was analysed using measured environmental variables (slope, aspect, soil characteristics) and species derived variables (ecological indicator values of plants and their chorology).

Results: The forest vegetation is presented by 3 classes : Querco-Fagetea Br. Bl. et Vlieger ex Vlieger, 1937, Quercetea pubescentis (Ober, 1948) Doing Kraft., 1955, Quercetea ilicis Br. Bl. 1947 ex A. & O. Bolos Y Vayreda, 1950 which contain 5 orders, 7 alliances and 8 associations. Results of Detrended Correspondence Analysis (DCA) showed that forest vegetation data was heterogeneous (gradient length is 4.9 SD). The relevés of each classified forest communities were clearly separated from each other in the ordination graph. When the ordination graph was examined, it was seen that altitude and moisture gradients had a quite significant role in the separation of communities. Moreover, aspect and slope were also found to be efficient factors. For instance, While Ilici colchicae-Fagetum orientalis and Rubo hirtus-Abietum bornmuelleriana prefer humid northern slopes, Carpino-Quercetum petraeae and Buxo sempervirens-Carpinetum betuli occur on the steeper slopes. This situation affects both soil depth and accordingly the amount of soil nutrient. Thus, the average soil nutrient and moisture indicator values of these coomunities were found to be low.

Discussion: The relevés that represent the forest communities were evaluated together with the other studies conducted in Northwest Anatolia. Measured environmental variables such as altitude, slope, aspect and soil characteristics explained most of the variation in species composition and differentiated forest communities. Also, average indicator values of relevés derived from species data supported ecological differentiation among communities. These diversified ecological factors were also reflected in high plant species diversity in the study area.

Acknowledgements: This study is supported by TÜBİTAK, Project number: 114O660

Keywords: Diversity, Forest Community, Küre Mountains, Turkey, Vegetation
Introduction: Forest ecosystems are the most important carbon pools around the world. On a global scale, it is estimated that 0.9 billion tons of carbon per year are stored in the atmosphere by forests. In forests, carbon is not stored only by living vegetable mass. With litter and dead wood, forest soils are also important carbon pools. In accordance with the Kyoto Protocol and Paris Agreement, the countries listed in the Annex 1 List of the Kyoto Protocol should regularly submit national inventories of greenhouse gases to the Secretariat of the United Nations Framework Convention on Climate Change every year. Guidelines prepared by the IPCC are used in the preparation of national inventories of greenhouse gases. According to the country-specific data of these guides regarding forestry, stocks in the carbon pools in the forests and the changes in these stocks can be calculated in different ways. However, it is also explained that this guidance can be calculated through various models if more detailed data of the countries (such as the litterfall and decomposition rates of tree components) are available. The common feature of these models, which are called process-based, is the increase in vegetative mass and the estimation of the component of the trees that fall into the soil due to tree growth.

Material and Methods: In this work, the main models that can be used in the studies for estimating the organic carbon content of national forests are investigated with their inputs, purpose and scopes, time intervals and up-to-datedness, the types of forest ecosystems that they can be applied, and their abilities to represent these ecosystems were studied and summarized by the help of their manuals and literature studies in view of their scale and detailed technical information.

Results: 3 main models that can be used in the forests of Turkey was determined as (i) Carbon Budget Model of the Canadian Forest Sector (CBM-CFS3) which was developed with the aim to determine the contribution of Canada’s forests to the global carbon cycle, (ii) the Finish originated model called Yasso07 which is used for the purpose of predicting the data on carbon dynamics of forest ecosystems in many countries, particularly in Finland and (iii) ‘Forest Biomass and Dead Organic Matter Carbon Model’ (FBDC) of the Republic of Korea. As their familiarity to forestry practices, the variety of tree component inputs, and suitability for modification in the intended use direction, the CBM-CFS3 model has been observed to be more consistent than the other 2 models.

Discussion: In order to use process-based models in forest ecosystems, there is a need for data such as yield tables specific to tree species, growth equations, litterfall and decomposition rates of tree components. Although there are peculiar equations and yield tables for tree species in our country, there is a lack of data about litterfall and decomposition rates. Increasing the research to produce these data will enable process-based models to be used in our country.

Acknowledgement: We would like to express our appreciation to the Istanbul University Scientific Research Project Commission, which supported this study (FDK-2017-24394).

Keywords: CBM-CFS3, Yasso07, FBDC, Decomposition, Litterfall
Introduction: Ecological design requires solutions which adopts the nature as a model in designing the area, which are also compliant with the natural processes and the structural and ecological features of the area. Intensive use of areas in order to make the highest benefit from the area gives damages to the natural structure. Permaculture, considered as an ecological approach in urban areas, is defined as conscious design and maintenance of the agriculturally fruitful ecosystems which have the variety, stability and flexibility of the natural ecosystems. These are harmonized integrations which satisfy the needs of people living on them with sustainable food, energy, shelter and other tangible and intangible needs.

Material and Methods: Permaculture is an integrated design science which allows us to build sustainable human settlements. Ethical principles are: Care for the Earth, Care for the People, Setting Limits to Population and Consumption.

The purpose of this paper is to stress out the importance of the permaculture design as an ecological approach and to discuss the practices in Turkey. Upon evaluations, the current status of Turkey has been evaluated and relevant suggestions have been made for sustainable healthy cities for the future.

Results: The main objective of sustainable landscape design is to develop a self-sufficient and sustainable system which can be a part of the urban ecosystem. In this regard, approaches taking the nature as a model and bringing systematic solutions to the structural and ecological features of the area should be adopted. One of these approaches is permaculture design within the ecological design. Appropriate areas inside the city should be converted to application areas called permaculture based on the functioning of the ecosystem.

Discussion: The contributions of the ecological design in urban green areas to the environmental, economic and social sustainability targets in an urban structure are clear. Urbans are the places where the area usage and the people’s effect are utmost. Continuously decreasing green areas in urbans disrupt the relationships between humans and the environment and this accordingly causes growing ecological problem in urban areas. These issues signify in today’s cities that the urban development is left to an uncontrolled development and change and is deprived of an ecological basis.

Keywords: Ecological design, Permaculture, Turkey
Assessing the Water Quality of Brook Soğanlı (Karabük)

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Introduction: It was aimed to seasonally monitor the water quality of Brook Soğanlı, which is used for irrigating the agricultural land around Karabük Province, for a year, to record the seasonal changes by using the water quality data, and to establish a database to be used in further studies to be carried out on Brook Soğanlı, on which no study has been carried out before.

Material and Method: This study, which was started in July 2017, was carried out by taking water samples in all 4 seasons. The water samples to be used in analyzing the water quality parameters were collected on monthly basis. 1 day before the field works, the equipment, devices, and sampling bottles were disinfected. The water samples were collected by sinking the 3L bottles into 15cm depth from the surface and in the direction opposite to the water flow. The parameters examined are dissolved oxygen (DO), salinity, pH, temperature, and electrical conductivity (EC), which were analyzed on-site, and the suspended solid matters (SSM), chemical oxygen demand (COD), biological oxygen demand (BOD), nitrite, nitrate, phosphate, sulfide, sulfate, chloride, sodium, potassium, ferrous, lead, copper, nickel, zinc, cobalt, and cadmium, which were taken to Central Research Laboratory of Kastamonu University within 4 hours and analyzed in the same day.

Results and Discussion: In the present study, which was carried out on the Brook Soğanlı that constitutes an important water source for Karabük city center and nearby villages, the chemical and physical analyses of water samples were performed and the seasonal changes were recorded. The water quality classes were determined according to the actual Surface Water Quality Management Regulation’s Intra-Continental Water Classes, and the upper and lower limit values were compared. In conclusion, it was determined that the studies on improving the actual water quality of Brook Soğanlı, in which many fishes and aquatic organisms are known to live, should be immediately started, and that the importance of this brook should be taken into consideration for the sustainability of ecological balance and the irrigation of nearby agricultural lands. Moreover, it is necessary to repeat the water quality studies on a regular basis for determining the contribution to water quality of brook, to prevent the release of insufficiently filtered water into brook, to prevent the leakage of domestic and animal wastes through precipitation water or underground water, and to take measures and precautions in order to improve the actual water quality of Brook Soğanlı.

Keywords: Water Quality, Water Pollution, Karabük, Brook Soğanlı
Introduction: Coastal dunes has a fluctuating structure, so they are dynamic environments. Several biotic and abiotic factors affect these ecosystems. This environment is challenging several conditions such as salt spray, drought, nutrient deficiency, high temperature, high wind and substrate mobility. In the present study, it was aimed to determine plant diversity and community structure, and the relationships between soil parameters and diversity in Aksaz-Karagöl dune.

Material and Methods: Field study was carried out between 2015-2017 years. The permanent plot samples were selected and percentage cover of each plant species was recorded monthly during two vegetation periods. Plant richness and diversity was determined. Soil sampling was made at 50-60 cm in depth. Soil moisture, organic matter, total N, NH$_4$-N, NO$_3$-N, P, pH, Na, K, Cl, Ca, Mg, electrical conductivity (EC), cation Exchange capacity were determined. Community shape was evaluate by Bray-Curtis similarity. Relationships between plant diversity and soil parameters were analyzed by Spearman correlation.

Results: 34 plant species were determined. Shannon (H'), Evennes (J'), Margaleff (d) and Simpson (1-$\lambda$) indexes were 1.63, 0.41, 4.92, 0.45, respectively. Bray-Curtis similarity index was 59.25%. There was positive correlation between Mg and H', while negative ones between NH$_4$, EC and salinity and species number, H' and J'. There was also negative correlation between salinity and H', J' and 1-$\lambda$.

Discussion: In the present study, it was determined that the community structure is heterogeneous in Aksaz-Karagöl dune. This situation could because of anthropogenic effects in this area. On the other hand, especially NH$_4$, Mg, EC and salinity have effects on community structure.

Acknowledgement: This study was supported by TUBITAK (The Scientific and Technological Research Council of Turkey, project no: 114O796).

Keywords: Dune, Plant diversity, Soil, Aksaz-Karagöl Wetland, Sinop
Evaluation of Landscape Designs of İrem Rehabilitation Center in Kocaeli

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Introduction: Hospitals are health institutions proving care services for people. The people who go to a hospital for getting a medical treatment usually feel anxious, tense, and stressful. Hospital garden should help to calm and relax the patients, and provide a positive contribution to the treatment, as well. When designing the hospital gardens, aesthetic considerations should be kept in the background, and requests and needs of users should be given priority in the design approach. Hospital gardens must be exactly the opposite of hospital environment.

Material and Methods: In this study, İrem Rehabilitation Center in Kocaeli is investigated in detail with the help of experimental qualities (sensory stimulation, movement, control). The problems of Rehabilitation Center Garden have been put forward with the help of scoring table.

Results: Common problems of this center garden have been identified, and solutions to these problems and suggestions have been put forward regarding more effective design of İrem Rehabilitation Center Garden for increase visual quality.

Conclusion and Discussion: The present situation of İrem Rehabilitation Center Garden was determined in terms of therapy. The solutions were offered for the present problems of this Center Garden in this context, a new open space therapy unit has been offered.

Keywords: Hospital garden, Healing garden, Rehabilitation center, Therapeutic areas
Two Gonad-Infecting *Philometra* Species (Nematoda: Philometridae) in Marine Fishes in the Sinop Coasts of the Black Sea

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**Introduction:** Gonad-infecting species of *Philometra* are widely distributed in marine fishes of the Atlantic, Indian and Pacific Oceans, sometimes also occurring in brackish–water environments. These parasites may cause serious damage to the fish ovaries and may thus affect fish reproduction. Since they frequently occur in commercionally important wild or cultured fish hosts, the correct identification of these parasites is very important. Despite the fact that some species may be agents of serious diseases of fishes with economic importance or may significantly affect their reproductive success, the fauna of philometrid nematodes (Philometridae) parasitizing marine fishes remains poorly known. In this study, *Philometra* species in some marine fishes from the Sinop Coasts of the Black Sea will be examined and information about morphology and infection values of these nematodes will be obtained.

**Material and Methods:** Fish samples were collected from commercial fishing vessels off Sinop coast in the Black Sea (Turkey) from June 2016 to May 2017. Collected fish were transferred to parasitology laboratory at the Faculty of Fisheries and Aquatic Sciences in Sinop and examined for metazoan parasites under a dissecting microscope. Totally, 34 fish species belonging to 26 families were investigated. The nematodes obtained from fish gonads were washed in physiological saline and then they were fixed and preserved in 70% ethanol. Morphological diagnostic features of philometrid nematodes were studied in detail using light microscope and photomicrographs of each parts of these parasites are presented.

**Results and Discussion:** The current is the first report on gonad-infecting *Philometra* species in marine fishes from Turkish Black Sea coasts. Two philometrid parasites; *Philometra globiceps* and *P. saltatrix* were identified and found be infecting 3 fish species belonging to 3 families. The infection prevalence (%) and mean intensity values of two parasite are detected. Because of a considerable morphological uniformity of philometrids that especially of the gonad-infecting species, their species identification based on morphological features remains rather difficult. A detailed examination of males is very important for the taxonomy of philometrids. Unfortunately, most philometrid species were described solely from large-sized females, whereas extremely small conspecific males remain unknown. The morphology of both male and female individuals of the Philometrid parasites defined in this study is described in detail. Consequently, the present study is contain very important information for identification of philometrid nematodes.

**Keywords:** *Philometra*, Nematode, Gonad, Black Sea,
**Introduction:** The Bryophytes are represented almost 19,000-24,000 taxa in the world and approximately 1,100 species in Turkey. Although many researches have been carried out on bryoflora in Turkey, many areas have not been studied in detail. Study area is located in Karadağ-Ovakorusu Wildlife Development Area and is situated in the A2 grid - square according to the Henderson’s grid system in Turkey. Floodplain forest (Fraxinus angustifolia, Alnus glutinosa, etc.), lake, dune fields, deciduous forests (Castanea sativa, Tilia tomentosa, Carpinus betulus, Quercus spp., etc.) pine forest (Pinus nigra subsp. pallasiana), pseudomaquis, are main vegetation types seen in the study area. The main aim of this study, to determine the bryophyte flora of the area.

**Material and Methods:** This study presents the Bryophyte Flora of Kocaçay Delta, Karacabey Floodplain Forest and their environs in Marmara Region of Turkey. The material of this study is the bryophyte samples collected from the study area. Within this study, two field trips were organized to the research area during April 2017- June 2017. All bryophyte specimens were deposited in the private herbarium of Keçeli & Ursavaş in Çankırı Karatekin University.

**Results:** In this study, with an examination of 320 moss, 2 hornwort and 40 liverwort specimens collected from 49 stations, together with 1 From Anthocerotophyta, 15 from Marchantiophyta, 115 from Bryophyta of the area. Belonging to 35 families, 74 genera, and 131 taxa of bryophyte, 11 families, 13 genera, and 15 taxa of liverwort have been identified. Of these taxa Brachythecium capillaceum (F.Weber & D.Mohr) Giacom., Pseudotaxiphyllum elegans (Brid.) Z.Iwats have been recorded for the second time in Turkey. Moreover, two taxa have been regarded as the new records for square A2 according to the Henderson (1961) Grid System.

**Discussion:** As a result of this work, it is seen that Kocaçay River Delta, Karacabey Floodplain Forest, and their environs have rich bryophyte diversity compared to the many other areas in Turkey. It can be shown as a reason for this is that the area has different ecosystem types, various altitudes and habitats.

**Acknowledgement:** This work was supported by the Scientific and Technological Research Council of Turkey (TÜBİTAK), Project No: KBAG-115Z364.

**Keywords:** Bryophyte, Flora, Kocaçay River Delta, Karacabey Floodplain Forest, Bursa, Turkey
A New Record of Phantom Flies (Diptera: Ptychopteridae) from Turkey

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Introduction: Phantom flies from the family Ptychopteridae are similar to crane flies from the family Tipuloidea. The two species share the same delicate body type, bright body color, the light color labels on the thorax and abdomen, and have spots on their wings. Currently, Ptychopteridae is represented by only a few species including 14 species from Europe and three species from Turkey. However, the phylogenetic age and relics of these species are of great interest to researchers.

Material and Methods: Adult samples of Ptychopteridae were collected from August to September using a sweep net (40 cm diameter) from the many field studies of Afyonkarahisar, Aksaray, Aydın, Bursa, Çanakkale, Eskişehir, Isparta and Kırklareli during 2003 and 2015. They were preserved either in 75% alcohol solution or by pinning and drying. All specimens were deposited in the Zoological Laboratory of Muğla Sıtkı Koçman University, Muğla, Turkey. The taxa identification was completed after genital preparations of samples using a stereo microscope. Some samples were pinned after identification while others were stored in insect envelopes and labeled as standard museum material types.

Results: The present study resulted in the collection of 44 specimens including 34 male specimens from the designated research area. The results were evaluated in terms of zoogeography.

Discussion: Among the collected samples, four species were classified in the subgenera Paraptychoptera and Ptychoptera of Ptychoptera genus. One of these is determined to be a new record for our country.

Acknowledgment: The authors would like to thank TÜBİTAK for financial support (Project number: 102T177; 107T678; 113T039; 110T522; 114Z501)

Keywords: Diptera, Ptychopteridae, Fauna, Türkiye, New record
Arsenic Removal by Electrocoagulation Process Using Iron Plate Electrodes from Groundwater’s of the Western Anatolia, Turkey

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Introduction: Numerous cases related to arsenic (As) pollution in natural water resources in various parts of the world at recently have been reported. Turkey is one of the countries under the threat of arsenic pollution, and it’s determined of high As concentration ranging from 10 to 10,700 μg/L in groundwater and surface waters near mines regions (boron, silver, and copper), geothermal and active tectonism fields in the west regions of Anatolia. Due to from effects of highly toxic and carcinogenic, United States Environmental Protection Agency (US-EPA) and several countries of the world including Turkey has revised the guideline for As maximum contaminant level (MCL) in drinking water from 50 to 10 μg/L. The US-EPA suggested modified coagulation/filtration, adsorption, ion exchange, activated alumina, reverse osmosis, and modified lime softening as best available technologies for arsenic removal. Recently, electrocoagulation (EC) process can be used as an alternative method to remove (<10 μg/L) arsenic from water because of advantages such as simple in operation, compact treatment facility, cost-effective, reduced amount of sludge and no need to handle chemicals. However, there is a limited study in literature about arsenic removal from real natural water sources by EC process. The purpose of this study is removal in real groundwater samples containing As by an EC reactor using iron (Fe) plate electrodes. The operating cost according to energy and electrode consumptions at optimum operating conditions of the As removal EC process were also calculated.

Material and Methods: Groundwater samples were taken from the Dulkadir Village near silver mine operating (GW-1) and the Yukarıyoncağa Village (GW-2) near boron mine operating in the Kütahya Province. EC study was performed in an batch mode EC reactor at room temperature. Electrodes were connected to the dc power supply. Current was held constant at desired values and the experiment was started. The samples at taken from the EC reactor were filtered using a membrane filter and metal concentrations were determined by the PerkinElmer ICP-OES Optima 7000 DV.

Results: The As removal efficiencies from groundwater samples of GW-1 = 538.8 and GW-2 = 1132.1 μg As/L were achieved >98.5-99.9% at applied current of 0.025-0.30 A and operating time of 0-80 min. Operating cost, energy and electrode consumptions were calculated as 0.012-0.20 $/m³, 0.0011-0.020 kWh/m³ and 0.0015-0.0040 kg/m³ at operating conditions.

Discussion: The applied current and EC time are the two most important parameters for controlling the coagulant dosage rate within the EC process. Thus, increasing the applied current from 0.025 to 0.30 A showed significant improvement in the As removal efficiency. In this case, the EC time required to meet the MCL of As was lowered with increase in the applied current. As removal efficiency increased with the increase in the amount of coagulant dosage from electrochemically generated Fe²⁺ and Fe³⁺ from Fe anodes in the EC process.

Acknowledgement: This research was carried out as part of the Masters of Science thesis (MSc Thesis) study entitled “Arsenic Removal by Electrocoagulation Method from Some Groundwater’s in Turkey”.

Keywords: Groundwater, Arsenic Pollution, Electrocoagulation Process.
Age and Growth of false scad, *Caranx rhonchus* (Geoffroy Saint-Hilaire, 1817) (Pisces, Carangidae) from İzmir Bay (Central Aegean Sea)

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**Introduction:** The false scad, *Caranx rhonchus* (Geoffroy Saint-Hilaire, 1817), is a Carangid species, which has economical value and its population is mostly expanding in a 30 to 50 m depth range throughout the Mediterranean. It would be crucial to know its biological characteristics to understand how environmental parameters could affect its growth. It is also important to continue the earlier efforts of management and control. There is a lack of information about the biology of this species in Turkish seas. The aim of this study was to obtain knowledge about age and growth characteristics of *Caranx rhonchus* from İzmir Bay.

**Material and Methods:** A total of 261 *Caranx rhonchus* were collected seasonally by commercial purse seiners between September 2017 and March 2018 from İzmir Bay. The length–weight relations were determined according to the allometric equation: \( W = aL^b \). Age was determined by otolith reading. The Student’s t-test was used to verify the existence of significant differences between sexes and to test the allometry in growth. Growth parameters were estimated using the von Bertalanffy growth equation.

**Results:** The sex ratio was calculated as 1:0.96 (female:male). The total length (weight) of females ranged from 13.3 cm to 32.2 cm (23.87 g to 349.62 g) and of males from 16.5 cm to 30.6 cm (46.09 g to 289.49 g). Age estimates ranged between 0+ and 4+ years and the II and III age groups included the highest number in all samples. The length–weight relations were calculated as: \( W = 0.0083* L^{3.065} \) (R=0.976), \( W = 0.0089* L^{3.044} \) (R=0.981) and \( W = 0.0083* L^{3.074} \) (R=0.983) for females, males and sex combined, respectively.

**Discussion:** Results reported in this study will contribute to the knowledge on age and growth parameters of *Caranx rhonchus* in İzmir Bay. These parameters can be useful for managers in the management and conservation of the stock, and also for detailed studies on the species in the future.

**Acknowledgement:** This study was supported by the Ege University Scientific Research Fund (Project No: 18-SÜF-010).

**Keywords:** *Caranx rhonchus*, Age, Length-Weight, İzmir Bay, Central Aegean Sea.
Introduction: In 1902, the first lessepsian fish species was reported in the Mediterranean and until now different researchers reported numerous new records and the number of lessepsian fish species in the Mediterranean exceeded 100 nowadays. Many of them have successfully established populations in the eastern Mediterranean coasts and in competition with native species. In Turkish waters the first lessepsian fish was reported in 1943 and until now total number reached to 67. Because of the rapid changes in the coastal marine ecosystem in the region, we tried to reveal the current situation of the lessepsian fish species composition.

Material and Methods: Fish samples were collected by trawling operations carried out between December 2014 and September 2015 in Taşucu-Mersin region seasonally. The trawl locations were selected in different depths and habitats and 8 hauls (day and night) were carried out for each season. Fishes were separated identified to species and weight and numbers of the species were recorded on the board.

Results: Totally 110 fish species were determined, 34 of them were lessepsian belong to 22 families and 76 of native species (9 of them cartilaginous fish) belong to 41 families. Pomadasys stridens have been the most abundant among the lessepsian fishes (27.1%) and followed by Saurida lessepsianus (%24), Nemipterus randalli (%16.4), Upeneus pori (%8.8) Equulites kluzingeri (%6) in total biomass. In addition, two lessepsian fish species (Cheilodipterus novemstriatus and Equulites elongatus) were firstly recorded on the coast of Turkey in the study.

Discussion: In previous studies, E. kluzingeri, S.lessepsianus, Upeneus mollucensis, N. randalli, U.pori were the most abundant species among the lessepsian fishes, which caught from bottom, trawl. In this updated study, both biomass and abundance of P.stridens have the highest value. Although this fish was first reported in 2009 in Turkey coast has reached this level in the last few years. Although there are more native species in terms of species diversity, the total biomass of lessepsian fishes higher than that of native fishes. Which means that trophic relations have turned in favour of the lessepsian.

Acknowledgement: We would like to express our appreciation to the İzmir Kâtip Çelebi University Scientific Research Project Commission, which supported this study (IKC-BAP-2014-1-SÜÜ-08).

Keywords: Lessepsian bioinvasion, trawl composition, eastern Mediterranean, lessepsian fish
ORAL PRESENTATION

Removal of Congo Red From Aqueous Solutions by Adsorption With the Use of Illite Mineral

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Introduction: Textile industry is considered as one of the major consumers of synthetic dyes to impart color and shape for their final product. The process is carried out using dye solutions in which generally water is used as solvent. During the operation, most of the dyes in the solution are binded to the surface of the material. Therefore, a huge amount of water is utilized and disposal of this effluent to the environment is significant since various types of toxic chemicals are included. This problem can be solved by the use of an appropriate treatment method prior to the disposal. Adsorption is one of the most preferred methods for the purpose. Use of an effective adsorbent in the process is significant. In this study Congo red is removed from aqueous solutions by the adsorption method with the use of a mineral, illite, as the adsorbent.

Material and Methods: Illite mineral forms naturally in the rocks. In this study; illite obtained from the city of Ordu of Turkey was utilized. Congo red dye is obtained from Merck Co. Aqueous dye solutions with different initial concentrations (25-500 ppm) were prepared using ultra high pure water. Each solution was shaken with known amounts of illite (0.01-0.05 g) in a 50 mL conical flask at 150 rpm speed.

Results: Adsorption procedure is performed in a batch system in order to optimize several different parameters such as the contact time, amount of clay, initial dye concentration, and pH. The results showed that the process was strongly affected from the parameters. Adsorption equilibrium was reached in 120 minutes. Especially, initial pH of the aqueous phase had a significant effect in the process. Highest removal efficiency was obtained at the initial pH of 5.3. From the kinetic studies, it was seen that the adsorption obeyed to the pseudo-second order kinetic model (R²=0.995). In the ranges of the parameters studied, the highest adsorption efficiency was obtained as 90% when the initial dye concentration and adsorbent dose were 25 ppm and 0.05 g, respectively. It was seen that the adsorption process best described by Langmuir isotherm model (R²=0.999).

Discussion: The results showed that illite has an appropriate surface for the removal of an anionic dye, Congo red, from aqueous solutions.

Acknowledgement: The authors would like to express their appreciation to Selçuk University Scientific Research Projects Coordination Unit for the financial support of the study (SUBAP-17201137).

Keywords: Congo red, adsorption, illite.
The Endemic and Rare Plants of Keltepe
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Introduction: Karabük Province has a structure that contains the plant taxa belonging to different phytogeographical regions in its position. In the province that has special locations in terms of biodiversity one of these privileged special regions that come to the fore with the difference of altitude is Keltepe region. Keltepe, which is located on Karabük province, it is the highest point of the province with an altitude of about 2000 m and also it is one of the richest point with plant biodiversity.

Material and Methods: The plant samples collected from the Keltepe (Karabük) region in 2015-2016 by considering the vegetation period constitute the material of the research. In this study, endemic and non-endemic rare species were identified from naturally distributed plant species in Keltepe region and protection statues according to IUCN and CITES and BERN were revealed.

Results: The rate of endemism in the study area was approximately 15% and 37 endemic and 3 non-endemic taxa naturally distributed were determined. Of these, 2 taxa NT, 7 taxa VU, 2 taxa CD and 18 taxa LC in category were evaluated. 11 taxa do not have IUCN risk categories.

Acknowledgement: We would like to express our appreciation to the Kastamonu University Scientific Research Project Commission, which supported this study (KUBAP-01/2015-25).

Keywords: Karabük, Keltepe, Biodiversity, Endemic Plant.
Medicinal and Aromatic Plants in Organic Agriculture in Turkey

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**Introduction:** In recent years, industrial use of medicinal and aromatic plants has been increasing rapidly in the world and our country. These plants are used not only in herbal medicine industry but also in industrial sectors such as food, perfumery, cosmetics, spices, herbal tea, essence and dye etc. They are considered as an additive to animal feeds and dietary products, as well as to use as insecticides and bioherbicides. They also find use in garden and landscape areas and erosion control. With the increasing use of these group plants, a growing market has emerged in the trade of herbal medicinal and aromatic products. Turkey geographical location, climate and plant diversity, agricultural potential, thanks to the large surface area of medicinal and aromatic plants is one of the leading countries in trade. In our country, these plants are provided by collecting from the nature and cultivation in part. The interest and demand for organic plants and drog are increasing day by day.

**Material and Methods:** The use of medicinal and aromatic plants in many industrial fields, being able to be produced organically, contribution to sustainable agriculture, the possibilities of growing some plants in rural areas and the economic income to be provided to the local area and preservation of nature with conscious collecting education are features that will provide the advantages of organic cultivation. A qualitative review has been carried out on this subject and preliminary reviews have been used to collect the necessary information.

**Results and Discussion:** In our country, many medicinal and aromatic plants are produced organically for the domestic and foreign market. The advantages of obtaining organic products in areas where they are naturally present or are grown are also very well appreciated. Most of the laurel, carob and blueberry plants are collected from nature and organic produce is also made. Rosehip, sage, thyme, sumac, myrtle, mint, lemon balm, rosemary and lavender are both produced and collected from nature. Poppy, fennel, rose, anise, cumin, caper, lemon beebrush, tarragon, basil and heath etc. are produced organically. These plants are produced organically on forty on the country. Medical and aromatic plants are not only grown in organic farming system but also protecting plant health due to their various properties. In today's highly developed organic farming applications, the conversion of herbal extracts into commercial products as organic insecticides has gained great importance. Secondary metabolites found in plants have been found to be effective against harmful substances due to their properties such as repellent or deterrent besides their use as main drug raw materials. In addition to using plant extracts, it is possible to use medicinal and aromatic plants as a preliminary plant for conservation purposes to control harmful plants, as mixed planting and border plant. The allelopathic effects of medicinal and aromatic plants are utilized in weed control. As a result, medicinal and aromatic plants should be included in organic production and these advantages should be evaluated well. These plants may play a potentially important role in protecting ecological balance.

**Keywords:** Organic Agriculture, Medicinal and Aromatic Plants, Turkey
Evaluation of the Magnitude of the Environmental Pollution Caused by the Former Soviet Uranium Facility Located at the Kaci Say Village I the Isik-Ton Region in Kyrgyzstan Using *Perovskia abrotanoides* Kar. as Biomonitor Organism

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**Introduction:** Excessive radioactive exposure due to radioactive contamination causes extreme adverse effects on all living organisms in the environment. Kyrgyzstan still suffers from the past practices and exploitations of radioactive industry used by the Soviet Union that caused significant impact on the fragile ecosystems of this region, especially related with storage of uranium in inadequate conditions, and problems arising from this situation. In the past, uranium used in Soviet nuclear power plants was supplied by Kyrgyzstan, and because of this, there are at least 50 abandoned regions used as mine tailings in the country. Kaji-Sai is one of them and located in the Ton region, 270 km from Bishkek on the southern shore of Issyk-Kul Lake. At present, the structure of mine tailing is gradually disappearing under the pressure of natural and anthropogenic reasons. Therefore, our main goal by this research is to make evaluation for the rate of radioactive contamination for understanding of risk for organisms living around.

**Materials and Methods:** In this study, *Perovskia abrotanoides* Kar. as a biomonitor organism was chosen as study material for determination of existent alterations on mineral element uptake in the plant caused by leakages from uranium mine tailing by employing ICP-MS in terms of investigating of the mineral element status and the levels of uranium of the plant. In experimental procedures, the leaf, stem and root parts of this plant and their co-located soils collected from 5 different localities were used. Also, radioactivity readings were recorded using Geiger counter.

**Results:** The data proved that uptake and accumulation of mineral elements were altered extensively in *P. abrotanoides* grown in the uranium mine tailing having strong radioactive leakage causing reductions on the uptake pattern of certain mineral elements and increments on that of others.

**Discussions:** The biological responses of organisms living in the area contaminated by radioactive leakage were clearly seen. The environmental impacts should be taken into consideration and necessary precautions should be carried out by the relevant institutions.

**Keywords:** *Perovskia abrotanoides* Kar., Biomonitoring, Radioactive contamination, Mine tailing, Kaji-Sai, Kyrgyzstan
The Evaluation of Perennial Herbaceous Plants used in Planting Designs Grows in Coastal Areas in Eastern Black Sea

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Introduction: The coastal areas of the Eastern Black Sea which contains landscaping areas in Turkey are attractive in terms having unique beauty, a narrow shoreline embraced nature and sea, rich vegetation. The Eastern Black Sea Region, which is predominantly located in the vicinity of the settlement and urbanization, has a unique vegetation formed by the influence of land structure and climate characteristics. In the coastal area, the forest cover was destroyed by dense settlements over time, and the pseudomaki plant cover was dominant.

Material and Methods: Perennial herbaceous plants which are member of natural plants are recently used at urban parks and gardens because they are effective throughout year, not needed to plant repeatedly and have different colour options. In this study, perennial herbaceous plants grown in the Eastern Black Sea Coastal Areas were determined by field study, photography, laboratory studies and their usage strategies were evaluated.

Results: As a result, it has been found out that there are significant perennial herbaceous plant species in Turkey and especially in Eastern Black Sea Region. The use of plants in planting projects that grow naturally and which can be appreciated from aesthetic point of view will benefit the ecology and economy of the region considerably.

Discussion: The proper evaluation of plants in designs is of great importance in terms of sustainability of the design. Since the easy-to-produce commercial plants are preferred in planting design projects in Turkey, our natural species are not given much space. However, the results of world-wide studies have shown that natural species used in planting designs are more effective in practice. In the world, especially at the urban environments in the developed countries, qualified planting examples formed with perennial herbaceous plants can be seen.

Keywords: Planting design, perennial herbaceous plants, Eastern Black Sea Coastal Areas
Examination of the legal status for protection of Truffles: Case of Thrace

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Introduction: The history of scientific studies about truffles (Tuber spp.) in our country is based on the 1990s. Scientific and technical studies continues rapidly on protection of natural areas, afforestation, production of grafted seedlings, cultivation, determination of habitats and their potential, detection of places about truffles in Turkey. The truffles unrecognized and not very consumed in Turkey has begun to attract attention of investors, forest villagers and public because of high economic returns. Natural truffle areas of our country has also attracted the attention of foreigners because of reduction of truffle potentials and natural areas in their countries. Due to this condition, it is predicted that it will increase the pressure on natural truffles in the near future. There is a need for urgent legislative regulations for sustainable production and preservation of natural truffle areas.

Material and Method: Examination of legislation about forest, environment and custom in terms of truffles. Scanning and making inferences of scientific and technical studies performed by General Directorate of Forestry, universities and research institutions. In this study, practices in Thrace based on about truffles.

Discussion: Each official institutions is practicing in the framework of own legislation in their responsible areas. There is a need to create the compatible with each other legislation to prevent biological smuggling, contribute to the conservation and sustainable production of natural truffle areas, increase cooperation between institutions. General Directorate of Forestry which is authorized institution in the forest areas should continue own role for creation internal legislation as well as the establishment of inter-institutional legislation and should accelerate the technical and legal regulations.

Results: General legislation about fungus is not enough for mushrooms underground. Sustainable production of truffles requires special knowledge and technique due to special characteristics. Institution employee, collectors capable of diagnostics and inspector knowing the properties of truffles is very few. Habitats of this truffles is being destroyed collecting unconsciously. Truffles traded, consumed and known by European Union countries are collected and taken abroad illegally. Legal regulations aren’t enough about using of grafted seedlings from abroad for truffles plantations. There is big risk in affecting natural truffle fields and transmission of disease through these seedlings.

Acknowledgement: We would like to express our appreciation to the İstanbul Regional Forest District Directorate, Vize Forest District Directorate.

Keywords: Truffles, biological smuggling, legal regulation
Determination of Necrophagous (Diptera: Sarcophagidae) Species in Yozgat, Turkey

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Introduction: Arthropods and mainly carrion feeding insects represent the most conspicuous element in decomposition process of organic matters. The role of necrophagous flies in this ecological procedure is quite important given their predominance to other microbial decomposition community are very complex and highly competitive. Sarcophagids are the one of the most important insect groups, which are fed with carcasses in fresh decaying stages, especially in the larval period as obligate or facultative. So, the name of “flesh flies” refer to that breeding habit. Some species have a great importance not only for forensic entomology, but also for human and animal health like as myiasis which is defined as the infestations and feeding of some fly larvae with live or dead tissues and body fluids in living organisms. The aim of this study is to determine the necrophagous Sarcophagidae (Diptera) species and their seasonal distributions in Yozgat province of Turkey.

Material and Methods: This study was conducted during the spring and summer of 2017 in in Yozgat province of Turkey. The experiments were conducted simultaneously, both shady and sunny locations in six funnel traps. For this purpose, 75 gr of chicken livers were used as bait for attracting the adult flies. The traps were controlled three times a day and the specimens were collected by measuring the temperature and humidity. The specimens were collected by daily and diagnosed.

Results: Totally 20 flesh fly species and their seasonal distributions were determined. All of the species were identified for the first time in Yozgat province of Turkey.

Discussion: At the end of the study, while Sarcophaga (Sarcophaga) Iehmanni Müller, 1922, Sarcophaga (Bercaea) afirca (Wiedemann, 1819), Sarcophaga (Liopygia) crassipalpis Macquart, 1839, Sarcophaga (Liopygia) argyrostoma (Robineau-Desvoidy, 1830) and Sarcophaga (Helicophagella) melanura Meigen, 1826 determined as the most abundant species, Blaesoxipha (Blaesoxipha) batilligera Séguy, 1941, Taxigramma heteroneura (Meigen, 1830) and Sarcophaga (Liosarcophaga) tuberosa Pandellé, 1896 were rarely encountered in the traps.

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Keywords: necrophagous, Diptera, Sarcophagidae, trap, Yozgat
Micropropagation of *Salvia siirtica* by Temporary Immersion System

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Introduction: Most of the plants in the Lamiaceae family have been mentioned for their nutritional, pharmaceutical, therapeutical abilities and decorative purposes since ancient times. Literature survey on Salvia species shows that there are annual or perennial herbaceous or bushy perennial forms. Salvia siirtica is restricted to Çatılı region in the northern part of Siirt province, where it grows at elevations between 1450-1500 m and in the literature study, there is no information on the trend of the populations in the field, area distribution, spread and habitat size, national or international protection status and protection, breeding and reproduction. This study was carried out as a part of large scale propagation and ex situ conservation methods for this Turkish endemic species using a temporary immersion bioreactor system (RITA).

Material and Methods: Seeds of *Salvia siirtica* were collected from Tillo town of Siirt Province between June -July of 2016. Collected seeds were preserved in a refrigerator at +4°C until they were used for in vitro culture. Surface sterilization was achieved by shaking seeds for 5 min in 5% (v/v) commercial bleach solution sodium hypochlorite solution (Commercial Axion). The axenic seeds were rinsed three times (5 min each) in sterile distilled water. Then, they were cultured on MS medium containing 3% sucrose and 0.6.4% agar. After 40 d, axenically developed seedlings were used as explants for the development of micropropagation protocol.

Results and Discussion: Among the tested immersion conditions, immersion for 1 min every 8 h reduced vitrification and callus production, and improved proliferation in the pistachio. Interactions were evident in immersion time and frequency in nodal segments. Shoot tips were better than nodal buds as the highest shoot multiple rate (96.8%) was recorded in MS medium containing 1 mg/l BA in immersion for 1 min every 8 h in RITA. In vitro rooting of *S. siirtica* L., despite in the proliferation medium was also achieved up to 41% in RITA. However, rooting was better on semi-solid medium and a 100% rooting was obtained from all the parameters tested including the control group. The results of this study showed that RITA could be used for the mass propagation of Salvia siirtica.

Keywords: Micropropagation, RITA, *Salvia siirtica*, Siirt
New Data for the Genus *Limnephilus* Leach, 1815 (Trichoptera: Limnephilidae) from Macedonia

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**Introduction:** The family Limnephilidae is a large Integripalpian family of caddisflies (Trichoptera) with more than 1000 species worldwide. Species of this family are found in marshes, lakes, rivers and streams from low altitudes up to the alpine area. Many species of this family in the Balkan Peninsula are endemics of certain mountains, rare or threatened by anthropogenic activities.

**Material and Methods:** Adult caddisfly specimens were collected with entomological net, sweeping net, handpicking and ultraviolet light trap in Brodec village in Macedonia. The sampling was carried out between October 2016 and October 2017. Collected samples were preserved in 80% ethanol.

**Results:** During this investigation we found 26 species and 13 genera belonging to 8 families. The distribution of species within families is as following: Limnephilidae (14), Rhyacophilidae (4), Philopotamidae (2), Polycentropodidae (2), Glossosomatidae (1), Uenoidae (1), Sericostomatidae (1) and Beraeidae (1). Three species are recorded for the first time from Macedonia: *Limnephilus auricula* Curtis, 1834, *Limnephilus flavicornis* (Fabricius, 1787) and *Limnephilus griseus* (Linnaeus, 1758).

**Discussion:** Finding of three first records during this investigation in the Karadak Mountains shows that despite recent intensified investigations on caddisfly fauna in Macedonia there are still areas which are still insufficiently sampled. *Limnephilus auricula* and *Limnephilus flavicornis* are widely distributed in Europe and Balkan Peninsula, while *Limnephilus griseus* has been currently known only from few localities in Balkans. All three species are associated with pristine undisturbed freshwater habitats in upstream segments of streams and rivers and are thus under continuous threat from anthropogenic activities such as forest degradation, alternation of freshwater ecosystems and disturbances in water flow regime.

This investigation contributes to the better knowledge of faunistics and ecology of caddisflies in Macedonia.

**Keywords:** Trichoptera, Macedonia, *Limnephilus auricula*, *Limnephilus flavicornis*, *Limnephilus griseus*. 
Introduction: In today’s World, Pleurotus ostreatus and Agaricus bisporus species which are grown both wild and cultured are very popular for humans diet because of these species have been used traditional medicine, economically and pharmacology. Two species of edible mushrooms Pleurotus ostreatus and Agaricus bisporus were selected from natural and cultured ones to determine vitamins and mineral contents levels. In this study, total protein levels, vitamin A-E and C levels and some mineral levels such as Fe, Cu, Zn, K, Na and Ni were investigated in both natural and cultured species.

Materials and Methods: These species were collected from Tokat’s different localities and cultured. Total protein levels were studied with Dumas methods, vitamins were detected by reverse phase HPLC methods and the minerals were examined in AAS after burning in the acid by microwave.

Results: According to the results, while total protein and vitamin C levels were seen very high at natural samples at both species, vitamin A levels were found higher in cultured specimens. Besides these vitamin E was detected very measure in Agaricus bisporus cultured samples (1630.08 μg/g) also natural Pleurotus ostreatus samples high level aganist to the cultured samples (1143.22 μg/g). In addition to mineral contents of each samples to both species had different measure range. Fe minerals level were high at natural samples to both specimens but Cu, Zn, K and Ni leves were detected very high natural Agaricus bisporus and Pleurotus ostreatus cultured samples.

Discussion: Consequences of this study we can say both species with every samples are very rich protein, vitamin and mineral contents are very healty to human race.

Keywords: Pleurotus ostreatus, Agaricus bisporus, minerals, total proteins, AAS.
Protected Areas in Gümüşhane District: Case Study of Spider Forest Nature Conservation Area

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Introduction: Spider Forest Nature Conservation Area that must be protected in an absolute and strict manner in protection area status remains one of the most important mixed forests characteristics through its biodiversity and the natural resources. In the direction of the main goal and inventory form which can produce practical and easily understandable data has been tried to be form.

Material and Methods: Spider Forest Nature Conservation Area located in the Kürtün district of Gümüşhane province was used as material in the study. Spatial and topographical information of 23 registered natural resources were obtained. Particularly, in order to equip 8 monumental trees with necessary services and facilities, location information was obtained by using ED50 UTM system which is suitable to the country coordinates. However, measurements of the height, breast height diameter, crown projection area and crown diameter of the monumental trees have been carried out. The inventory form used by the relevant institutions in our country was re-standardized and 3 complementary forms were created and used in the inventory studies.

Results: Spatial information deficiencies of the natural resources in the Nature Conservation Area were eliminated in terms of protection-use balance and support was established to the future workings which will be held to equip natural resources with necessary services and facilities. However, it has been found out that there are 12 old-growth forests in the study area which are considered as natural resources. But, in Turkey, there are not enough studies have been done about revealing the structures of old-growth forests. In this study, the qualities of old-growth forests were also studied on standard forms to increase their awareness.

Discussion: It has been determined that the statutory status of many natural resource components were determined in our country, but each institution has registered these natural resources according to their own standards. With the study, it is possible to remove the disadvantages that are occurring and to remove the complications by gathering the right information into a single point.

Keywords: Spider Forest Nature Conservation Area, Protection of Natural Resources, Inventory Form
Effects of Urban Development on the Gastropod Diversity in Kastamonu City
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Introduction: Rapid population growth in the city of Kastamonu is accompanied in the recent years by a high pace of urbanization in the recent years particularly due to inflation, i.e. migration from surrounding lesser developed areas. The urbanization process involves replacement of multistorey apartment houses with traditional houses and recently older apartments usually having gardens. As slow dispersalists in general, terrestrial gastropods (snails and slugs) are among most affected organism groups from such rapid changes and therefore among the candidate groups to investigate the effects of urbanization on the biota.

Material and Methods: 51 stations of Kastamonu city were surveyed between 2002 and 2017. Collected live samples were preserved in 70 % ethanol.

Results: Totally 52 species and subspecies from 21 families have been determined from 51 stations in Kastamonu city. Among these 9 (17%) were endemics, 4 of which could not be found during recent surveys, together with 11 of the rest, and 13 stations were observed to be either destroyed or in the process of destruction in the meantime.

Discussion: This study represents an update to a previous work after 10 years interval. Although during the previous decade development was predominantly focused on expansions in the edges of the city, in the last decade continuing transformation of city margins, shifting of governmental institutions and further extensions mainly to the north have been observed. Unfortunately, despite regulations, traditional fabric with green landscape is being lost due to lack of relevant inventories and planning. Immediate effects can be observed in a wide spectrum from avian biodiversity to invertebrates, among which situation of gastropods are presented here as an example.

Keywords: Endemic, Extinction, Kastamonu, Malacofauna, Urbanization
An Evaluation of Artvin's Monumental Trees

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Introduction: In order to maintain the vital activities in the World, the conservation and sustainability of natural resources must be ensured. Turkey has many cultural and scientifically valuable natural resources that has been protected or should be protected. Main goals of the study are (1) to standardize the information about the registered monumental trees in Artvin region located in an important position in terms of biodiversity, (2) to simplify taking of natural resources into conservation status, (3) to increase their recognition, (4) to create a base for other researches to be done in our country.

Material and Methods: In the study, 3 chestnut, 1 Scots pine, 1 spruce monumental tree and 1 spruce and 1 beech natural monument in Artvin region were visited, the necessary measurements and examinations were made and the spatial and characteristic information of the trees were re-standardized and marked on the inventory forms. The coordinates of the monumental trees were determined. Breast height diameters and tree heights were measured by digital instruments in centimetre accuracy. Age of the monumental trees were determined by increment cores. Crown diameter was calculated by measuring the radii in the east, west, south and north directions within the projection of the top crown.

Results: When the size of the study area and the ecosystem's naturalness were taken into consideration, the number of registered monumental trees and stands were found to be very less. Therefore, it is revealed that the existing monumental trees in the region must be protected with precision. The accumulation of the positional and characteristic information of 7 monumental trees in the forests of Artvin in a single form has increased the awareness of these areas in terms of ecotourism by getting simultaneous information about the transportation and quality of the natural resource.

Discussion: Each country tries to protect their monumental trees according to their conservation laws. However, in our country, the inventory of monumental trees is missing, the whole of monumental trees are not registered, the developments of the registrants are not well monitored, and monumental trees are not well maintained and effectively protected. These disadvantages will be achieved in a single point by gathering accurate information in one spot. Inventory forms in which the definitions and property information of the monumental trees are collected in one place will form a base for further work in Turkey.

Keywords: Monumental Tree, Nature Monument, Biodiversity, Ecotourism, Protection-Use Balance
Impacts of Climate Change on the Upper Tree Line in the Eastern Blacksea Region, in Turkey

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Introduction: Tree line ecotones are climatically limited and they are hotspots for monitoring global climate change. Plenty of studies have shown that climate change is the main reason for the recent upward shifts of the upper tree lines in many mountainous regions. However, there is no published study focusing forest line dynamics in relation to climate change both in the eastern Blacksea region and in Turkey. Therefore, growth patterns and temporal dynamics of the upper line of the Kaçkar’s subalpine forests were analyzed in this study.

Material and Methods: The study area consisted of 40 sampling plots located in Alabalık, Büyükyayla, Tuzlutepe, Olgunlar, Öğdem, Elevit, Palakcur, Aşağı Kavrun and Pertkaya. Historical white and black aerial photos, 1/25000-scaled topographic maps, Landsat satellite images and meteorological data were used along with in-situ measurements. Thus, spatiotemporal changes in the upper tree line were analyzed using ArcGIS software in the period between 1969 and 2017.

Results: There was 2.1 °C increase in mean annual temperature in the region from 1960’s to 2017 especially in the summer seasons. The most important change was observed in Tuzlutepe. The results showed that the upper tree line shifted up to 180 linear meters in this region. It was almost up around +100 m in elevation. Naturally regenerated saplings (Picea orientalis) moved up to the alpine zone in five sampling plots. The mean age of the spruce saplings was 13 years with a standard deviation of 3.4. Aside from Tuzlutepe, there were slight changes within the upper tree lines in the other regions. No downward shift was observed in any sampling plot.

Discussion: The resulting upward shifts in the Kaçkar Mountains may be attributed to both climate change and land abandonment. Because rural people have begun to abandon their lands and immigrate to city centers in Turkey from 1980’s onwards. As a result, human impact and grazing pressure on forests has reduced resulting in the expansion of forestland especially in the marginal areas. On the other hand, climate-induced processes such as heat stress force forest ecosystems to migrate their former sites gradually. Therefore, further studies are needed for determining the main driver of tree line shifts in the subalpine zone. Whatever the cause is, adaptive forest management should be adopted along with the efforts for mitigating climate change to sustain these critical natural resources in the future.

Keywords: Climate change, tree line shifts, subalpine forests, remote sensing, change detection, Artvin
Levels of PM$_{2.5}$ Bound Metals at two Different Stations in Ankara (Turkey)

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Introduction: One of the most significant environmental problems that human being faced today particularly in the urban areas is air pollution. It has been well documented in the literature that there is a strong correlation of deteriorated air quality with the health issues observed in humans. World Health Organization (WHO) has been globally estimated that approximately 3 million people die each year due to exposure to ambient air pollution implying that air pollution is one of the world’s leading environmental problem (WHO, 2014). Among the various air pollutants, particulate matter (PM) with varying size and chemical composition is of major concern both in developed and developing countries due to its ubiquitous nature. It is well documented in the literature that PM with aerodynamic size less than 2.5 µm (PM$_{2.5}$) has resulted in numerous diseases in humans upon exposure. Though severity of the problem, PM$_{2.5}$ has not been monitored in Ankara until recently. The primary purpose of this study is to determine the levels of PM$_{2.5}$ at two different stations in Ankara in addition to its metallic content.

Material and Methods: In this study, two monitoring stations were established in Ankara. One of the station was placed in the Turkish Public Health Organization in Sihhiye and second station was placed in the Beytepe Campus of Hacettepe University. Daily PM$_{2.5}$ samples were collected by means of Tecora Skypost PM$_{2.5}$ sampler on quartz filters between June-August 2016 and December 2016-January 2017. The PM mass of collected samples was determined by using 0.01 mg sensitivity microbalance. Collected samples were then digested in acidic medium using microwave oven. The metal content of the digested samples were determined by using Agilent 7700 model ICPMS.

Results: The obtained results showed that PM$_{2.5}$ mass concentration in Sihhiye and HU Beytepe Campus are 53.75±20.62 and 46.35±15.44 µg/m$^3$, respectively. It is found that metal concentrations are ranging from 0.0004±0.0002 ng/m$^3$ (Cd) to 1741±852 ng/m$^3$ (Cu) for campus station while they are ranging from 0.0005±0.0014 ng/m$^3$ (Cd) and 4106±20152 (Mn) ng/m$^3$ for Sihhiye station. When the obtained metal concentrations were compared with the values reported in other studies performed in Turkey, it is revealed that concentrations corresponding to Mn, Cu, Hg and Ba are particular lay higher in this study.

Discussion: The observed PM$_{2.5}$ levels in this study was almost two times higher than daily acceptable value (25 µg/m$^3$) set by WHO, which further implies that regulatory agencies should monitor this pollutant and take the necessary precaution to reduce its level in Ankara. Arsenic content of PM$_{2.5}$ (10.53 ng/m$^3$) exceeded the permissible concentration (6 ng/m$^3$) set by European Union Air Quality Standard in Sihhiye station in winter. The elevated level of As in PM$_{2.5}$ during winter was atributed to increase use of coal for domestic heating within the urban part of the city.

Acknowledgement: We would like to express our appreciation to the Hacettepe University Scientific Research Project Commission, which supported this study (FHD-2016-12903).

Keywords: Ankara, PM$_{2.5}$, Metals
Introduction: Caryophyllaceae family is composed in approximately 86 genera and ca. 2200 species, mainly distributed in the northern hemisphere, mediterranean and Irano-Turanian region. Saponaria L. has about 40 species in the world. Saponaria L. is represented by 25 taxa in the family, 12 of which are endemic in Turkey. This study aims to give as a first detailed account of the morphological, anatomical, palynological and micromorphological characteristics of local endemic Saponaria karapinarensis.

Material and Methods: Plant materials were collected from Konya, Karapınar Village in 2017. According to standard herbarium techniques were dried and deposited at the KNYA herbaria. The herbarium samples were examined using Flora of Turkey under the a stereo-binocular microscope. The taxonomical description of the species was made following Hedge. For anatomical studies, living material was kept in 70 % ethanol. The paraffin method was used for cross sections of root, stems and leaves. The specimens were embedded in paraffin wax and then sectioned between 5 and15 μm thickness with a Leica RM2125RT rotary microtome. All sections were stained with safranin-fast green and then mounted with Entellan. Measurements and photos were taken using a Leica DM1000 binocular light microscope with a Leica DFC280 camera. In pollen investigations, pollen material were obtained from herbarium specimens, The pollen slides were prepared according to Wodehouse’s technique. P/E ratios were calculated. To determine exine sculpturing of the pollen were used SEM microscope.

Results: In the anatomical investigations, it has been observed that root showed secondary thickening, pericycle characterised by a sclerenchymatous ring on the stem, epidermis has eglandular and glandular hairs on the upper part of the stem, mesophyll consists of 4-layered palisade parenchyma cells and root, stem and leaves have druse crystals. Pollen grains are spheroidae. According to SEM, the exine sculpture is granulatae microechinatae-microperforatae. I investigated seed morphology and micromorphology features of it for the first time. Seeds has reniform type with black colour. Testa cell margin and cell shape are rounded polygonal and smooth, respectively. Seed surface pattern is colliculate and there are numerous tubercules on the colliculates.

Discussion: The present study provides useful, morphological, anatomical and palynological information of the examined Saponaria karapinarensis. The anatomical and palynological properties given in this work provides the first detailed description of S. karapinarensis.

Acknowledgement: I would like to thank Prof. Dr. Osman Tugay who allowed me to examine his Saponaria specimens.

Keywords: Anatomy, Caryophyllaceae, Morphology, Saponaria karapinarensis, Palynology.
Antifungal Activity of *Arbutus unedo* L. (Strawberry tree) and *Laurus nobilis* L. (Laurel) Leaf Extracts against Some Plant Pathogens

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**Introduction:** Synthetically produced pesticides are used to control plant diseases. Consequently, using pesticides negative effect on nature and environment and directly affects people. For these reasons, several researchers were conducted to determine alternative methods against plant diseases. One of the effective methods is to use plant extracts which incorporating natural antifungal substance. In this study, antifungal activities of ethanol extracts obtained from the leaves of plants *Arbutus unedo* L. and *Laurus nobilis* L. against *Alternaria solani*, *Fusarium oxysproum radicis-lycopersici* (FORL), *Monilia fructigena* and *Verticillium dahliae* plant pathogens in tomato and apple disease were investigated.

**Material and Methods:** Agar petri method was used determining antifungal activities. Mycelium growth, mycelium growth inhibition and lethal dose (LD₅₀) values were determined according to the obtained activity results. Doses of 0.1, 0.5, 1 and 2 mg/ml of the plant extract were applied against the tested pathogens.

**Results and Discussion:** Activity was observed in all of the doses and the activity values increased as the dose amount increased. The most effective leaf extract against plant pathogens is *A. unedo*. Mycelial growth inhibition rates were found to be 60% (highest) at 2 mg/ml of *A. unedo* against *A. solani* and, 4% (lowest) against *M. fructigena* at 0.5 mg/ml dose. The rates were 49% (highest) against *V. dahliae* at the dose of 2 mg/ml for the *L. nobilis* leaf extracts and, 12% (lowest) against *A. solani* at the dose of 0.5 mg/ml. Lethal dose values (LD₅₀) were calculated as 1.49 and 2.89 mg/ml for *A. solani*, 3.05 and 3.24 mg/ml for FORL and 3.16 and 1.42 mg/ml for *V. dahliae* in *A. unedo* and *L. nobilis* leaf extracts, respectively. According to the results obtained, the extracts used against the tested organisms have moderate and high antifungal activity.

**Keywords:** Plant extracts, Plant pathogens, Lethal dose, *Arbutus unedo, Laurus nobilis*
The Effects of Invasive Tree Species on Forest Ecosystems in Turkey

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Introduction: The distribution of species and their interactions with each other in forest ecosystems are under the influence of environmental factors. The hereditary and silvicultural characteristics of species play an active role in their adaptation to their habitat. It is also a proof that they have functionally maintained their ecological niches. Due to its geographical location, different climate types and topographic patterns, which are a result of its position as a transition point between climatic zones, Turkey offers a potential living space for many species outside their natural distribution areas. The fact that alien species that are acting as invaders in an area compete with local tree species and establish dominance in a brief time leads to the deterioration of natural habitats.

Material and Method: In this study, it was focused on particularly on exotic species. The fast growing species have 35-40 year-old scientific background in Turkey. In this process, about 80 different exotic species have been tested. This study reveals the typical characteristics of major tree species known as invasive tree species among these exotic species. These species include “Ailanthus altissima (Mill.) Swingle. (tree of heaven), Acer negunda L. (boxelder maple), Albizia julibrissin Durazz. (silk tree), Robinia pseudoacacia L. (black locust), Acer platanoides L. (crimson king maple), Pinus pinaster Aiton (maritime pine), Eucalyptus spp. (gum tree)”.

Results: Considering forestry in Turkey, invasive tree species may form hybrids with native and local tree species, which may lead to the alienation of their gene structure and pollution of gene pool of the native species. The resulting genetic pollution causes a loss in production by negatively affecting tolerance to environmental factors. In addition to the ecological and economic interventions of invasive species in the habitat of native species, their pollen poses a threat to human health. This issue, regarded by various organizations in the world as being important, has been approached considering Turkey's forestry principles.

Discussion: The long-term effects of invasive tree species in the ecosystem must be identified. In addition, the control of species under appropriate goals and appropriate conditions is critical to the sustainability of natural forest ecosystems. Suggestions have been made to determine the current characteristics of invasive species and to take the necessary precautions for forestry applications.

Keywords: Invasive tree species, Forest ecosystems, Genetic pollution, Ecological niche.
Exploring the Little Known Spider (Arachnida: Araneae) Community of the Olive Grove Ecosystem from Southern Foothills of Kaz Mountains, Çanakkale & Balıkesir, Turkey

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Introduction: Aegean islands and the Greek coast of the European mainland represent one of the most studied and best known places in the world in terms of spiders. This creates an opportunity for arachnologists to unite forces with other fields in biology such as ecology and biogeography, due to ease of species identifications favored by the availability of immense taxonomic literature and superb online identification tools, as well as faunistic literature for comparative approaches. Anatolian coast of the Aegean Sea, on the other hand, remains almost untouched by arachnologists, with only a handful of published literature reports in existence. Keeping these in mind, we conducted a study aiming to identify the impact of olive agriculture on spider communities. Here we focus on documenting the regional spider species pool.

Material and Methods: Sampling was performed in 26 different parcels of minimum 6 hectares (selected olive groves or other types of woodlands) from Ayvacık and Edremit districts in late spring, replicated at three consecutive years between 2015 – 2017. Pitfall traps and vacuum samplers were used to sample soil and vegetation dwellers respectively. Samples were preserved in 70 % ethanol; identified and counted under stereomicroscopes in laboratory. Identifications were based on genital morphology for adults. Habitus characteristics were used for sub-adults when taxonomic identification was not possible (parataxonomy), resulting in creation of “morphotypes”. Chao’s richness estimator was used to assess actual species richness. Rarefaction was used for sample size standardization to achieve comparable results.

Results: 27,443 specimens were collected, all identified at the highest taxonomic resolution possible, resulting in 14,252 specimens (adults) identified as 288 distinct species. 35 species among adults could not be identified up to species level. In addition to these, 297 morphotypes were identified among sub-adults (excluded from following stats due to their unreliability). An estimated richness of 334 species was calculated when data from both microhabitats combined (soil and vegetation); whereas 266 (325) and 96 (114) species were recorded from soil and veg. microhabitats respectively - estimates of actual richness given in parentheses. When rarified to equal sample sizes, observed species richness were 152 and 96 in soil and veg. respectively. Rare species (singletons + doubletons) represented 30% of the total species pool with similar representation in both microhabitats.

Discussion: With this study, we revealed a Mediterranean spider community, with richness levels comparable to the tropics. According to richness estimators, we have succeeded to achieve high representativeness (86% completeness). Nevertheless, huge number of subadult morphotypes indicates presence of still undiscovered species, which should be solved by further sampling for collection of adults at different seasons. Similarly, rare species were abundant, but this appears to be a common finding in invertebrate community surveys. Soil microhabitat showed higher richness than vegetation, even at comparable sample sizes. Presence of unidentified adult specimens is a strong indicator of new taxa; but we need more taxonomic analyses.

Acknowledgement: This study was partly funded by YÖK and TÜBİTAK TOVAG213O147.

Keywords: Arachnology, Diversity, Fauna
Rapid Mapping of River Inundation Areas with Sentinel-1 Data: A Case Study of the 2015 Flood in Edirne, Turkey

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Introduction: Satellite-derived inundation maps are widely used to capture the maximum extent of floods. They are especially invaluable in immediate response, short- and long-term recovery, and future mitigation activities. Thanks to the growing availability of multi-temporal satellite data, a variety of passive and active sensors in the visible and microwave range are currently in operation and allow to estimate inundation area and to delineate flood boundaries. Synthetic aperture radar (SAR) data has become one of the most important data sources for flood detection since SAR has the advantage of operating at wavelengths not impeded by cloud cover, or a lack of illumination, and can acquire data over a site during day or night under almost all weather conditions. In the present study, a rapid mapping of river inundation, which took place in Edirne, was carried out by using Sentinel 1 C band SAR data was used. The event occurred in 2nd February 2015 without live lost. Since Edirne suffers river inundation events, they can result in significant financial and non-financial damages.

Material and Methods: In the present study, two Sentinel-1A ground range detected (GRD) level-1 data representing pre- and post- flood event were freely downloaded from the Copernicus Open Access Hub, previously known as Sentinels Scientific Data Hub. All data was processed by using SNAP Desktop software which consist of a collection of processing tools product readers and writers and a display and analysis application to support the large archive of data from ESA (European Space Agency) SAR missions. Obtained data was first clipped as covering the area of interest. Then, radiometric calibration, speckle filtering, multi-looking, and geometrical correction were applied respectively. Following the RGB composition of sigma0 bands of data was created from stacked bands of pre and post-event data (bands of sigma0), and converted to tiff for supervised classification applied to delineate inundated areas. Supervised classification was applied in ERDAS Imagine software. Classification success was evaluated based on overlapping the map created on optical satellite imagery of the area.

Results and Discussion: In the present study, a rapid mapping of river inundation areas due to the 2015 flood in Edirne was carried out via Sentinel 1A C-band SAR data. The approach applied in the study is a change detection that is quite simple, successful, and feasible. The analysis showed that SAR data successfully detects inundation areas. According to classified map, inundation areas cover 2% of the analysed area. However, water bodies cover 2.3% of the total area. Supervised classification application provided correct discrimination of pixels for all three classes, according to visual evaluation from optical imagery of the area.

Conclusions: Satellite based high resolution SAR data is an important data source for rapidly creating inundation maps. Especially C-band Sentinel-1 data, which is a new generation of high resolution remotes sensing data from ESA, could be used for the rapid mapping of river inundation areas. This is because Sentinel-1 is good at identifying and mapping flooded areas that are visible to the SAR. One of the important advantages of Sentinel-1 is free of charge accessibility for data provided by ESA. Also, two satellite constellations offer a 6-day exact repeat cycle—which could allow to monitor river inundation.

Keywords: Flood, Inundation, Mapping, SAR, Sentinel
ORAL PRESENTATION

Evaluation of Abies nordmanniana subsp. bornmülleriana Mattf. on Adsorption of Crystal Violet from Aqueous Solution

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Introduction: Some industries such as textiles, leather, papers, and printing use significant amounts of dye to colour their products. Dyes lead to a lot of problems in aquatic life and human health. One of the dye species, crystal violet (CV) has been widely used as a biological stain and textile colorant and it is toxic and mutagenic for humans and animals. Therefore, removal of CV is required before releasing into the environment. The adsorption is one of the most useful processes to remove of wastewater containing dyes because of initial cost, operating conditions and simplicity of design. It is important that the adsorbent used in the adsorption process is economical, easy to obtainable and environmentally friendly. The objective of this work was to investigate the efficiency of Abies nordmanniana subsp. bornmülleriana Mattf. as adsorbent in the removal of CV dye crystal violet from aqueous solutions. The influence of adsorbent dosage (1-15 g/L) and contact time (5-420 min.) was evaluated using batch experiments.

Material and Methods: Abies nordmanniana subsp. bornmülleriana Mattf. was used as biosorbent and obtained from a local source in Bartın, Turkey. 50 mg/L CV concentration (100 mL) was taken in 250 mL erlenmeyer flasks and 10 g/L biosorbent was added. Orbital shaker was used to homogenize aqueous solutions at 150 rpm for 240 min. at 25 °C. Samples were taken at certain time intervals and centrifuged. CV concentration was determined using an UV-VIS spectrophotometer at the wavelength of 586 nm.

Results: The effect of adsorbent dosage (1-15 g/L) and contact time (5-360 min.) on the removal of CV dyes from aqueous solution using Abies nordmanniana subsp. bornmülleriana Mattf. was investigated. According to the result it was observed that when the adsorbent dosage increased, the adsorption efficiency of CV also increased. Optimum dye removal was observed at 10.0 g/L (% 99.12) biosorbent dosage. Moreover, it was observed that biosorption equilibrium was reached within 180 min. and after this time, the adsorption efficiency did not significantly change with time.

Discussion: The aim of this work was to investigate the application potential of Abies nordmanniana subsp. bornmülleriana Mattf. as biosorbent for the removal of CV from aqueous solutions by batch adsorption experiments. Adsorption capacity was increase with increase in adsorbent dosage and that biosorption equilibrium occurred within 180 min. According to the result, efficient and environmentally friendly Abies nordmanniana subsp. bornmülleriana Mattf. can be used to remove CV from aqueous solutions.

Keywords: Adsorption, Abies nordmanniana subsp. bornmülleriana Mattf., Crystal violet, Adsorbent dosage, Contact time
The Evaluation of Lenght-Weight Relationship of Mosquitofish (*Gambusia holbrooki*) in Freshwaters of Turkey

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Introduction: The genus of *Gambusia* distribute wide range in all over the world. Most known species of *Gambusia* are *G. affinis* and *G. holbrooki*. They are commonly called as mosquitofishes and are used in biological control frequently for 100 years. Both of the species are also known that in Turkey’s inland waters. There is no species that belonging to this genus except for two aforementioned fish in Turkey. To date, *G. affinis* has stated in literature mostly from Turkey.

Material and Methods: The aim of this study was to determine the occurrence of *Gambusia* species in freshwaters of Turkey and their length-weight relationships. For this aim, 111 stations which are belong to 6 geographical areas were investigated in 2016 and 2017. The samples were collected by seine net and hand net. The fishes were euthanized with phenoxyethanol (1 ml/L) and after fixed with 4% formaldehyde. In the laboratory, the samples were diagnosed at the species level. Species identification was done based on the types of males’ gonopodium notch.

Results: Results show that 63 stations included (37 lotic habitats and 26 lentic habitats) only one species as *Gambusia holbrooki* (n=3054) from the genus. Females varied in size from 1.67 to 57.2 mm, whilst males varied from 1.64 to 33.7 mm. The body weight values ranged between 0.03-2.88 gr. The relationships between length and weight was calculated using the Ricker length-weight relation model; \( W=aL^b \) equation. Length-weight relationship values were found between \( a=0.008-0.060; b=2.554-3.726; r=0.684-0.997 \) for females; \( a=0.006-0.025; b=2.115-3.665; r= 0.767-0.992 \).

Discussion: In conclusion, the present study demonstrated that *G. holbrooki* species is mainly widespread in Turkey, whereas previous studies mostly reported *G. affinis* as a common species. Size distribution values of the present study were found wider the previous studies. Regarding the length-weight relationships of *G. holbrooki*, our findings were similar with different geographical areas (Ergüden 2012; Eagerai and Radkhah, 2015; Sedaghat and Hoseini, 2015).

Acknowledgement: We would like to express our appreciation to the Ege University Scientific Research Project Commission, which supported this study (BAP-2015/SÜF/016). This study is a part of doctorate thesis.

Keywords: Invasive, distribution, *Gambusia holbrooki*, mosquitofish, length-weight relationships, Turkey
The Legal Regulations About Urban Green Spaces and Accessibility

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Introduction: Urban green spaces are expressed in terms of the amount of space per capita and/or the distance to the green space in the legal framework. No universally accepted measurement standard exists. However, countries at different levels of management set their own green space standards. Green space standards, which are analyzed independently of user movements in legally, represent the circular coverage area determined as a distance (duration or length). However, the concept of accessibility is a multifaceted concept that should be interpreted by the physical and social infrastructure of the city. Therefore, the aim of this study is to evaluate the location of the urban green spaces in terms of accessibility, and to reveal and discuss the uncertainty in the current regime.

Material and Methods: The material of the study constitutes legal regulations concerning with the urban green spaces on the basis of authenticated zoning laws in Turkey and other developed countries as well as the international standards of green spaces established by international institutions and organizations.

Results: The amount of green space in urban areas expressed as per capita at urban scale is mainly important ecologically, but in terms of accessibility it is necessary to examine at different functional levels. In Turkey, at regulation no. 23804, distribution of green areas of different qualities in different levels are stated based on the population. No distance is specified for the spatial location of this standard, which is determined as 10m²/person in total. Therefore, the direct effect of urban texture on green space accessibility within the context of settlements, roads and green spaces has been left to the initiative of the planners.

Discussion: When the green space standards discussed in terms of accessibility the specified number of utilization of facilities are seen to include a lot less. It is inevitable that the distributions should be integrated into the urban morphology and physical plans in quantitative methods so that urban residents can make maximum use of the urban green spaces. However, the challenges of running and the number of facilities in green spaces included in accessibility analyzes are the inputs that need to be clarified legally without being based on interpretation. As a result, the realization of a number of regulations related to the subject in need of legal administrative framework is inevitable.

Keywords: Urban green spaces, accessibility, legal framework.
Turkey at the Crossroads of Bird Migration Between Asia, Africa and Europe

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Introduction: Turkey’s unique location at the junction of three continents has created one of the most important crossroads with millions of birds crossing twice a year during the spring and autumn migrations between their breeding and wintering grounds. Larger species tend to avoid crossing large water bodies and form concentrations at bottlenecks during diurnal migrations, while most waterbirds and passerines perform broad-front nocturnal migrations. The aim of the study was to define the main migration bottlenecks and corridors of birds within Turkey and to identify high-risk areas for power line and wind turbine collisions.

Material and Methods: Ring recovery data from Cernek Ringing Station between 2002-2018, the tracking data of 6 GPS tagged White Storks and 20 satellite tagged ducks in Kızılırmak delta have been used to analyse movements. Besides, all available literature (articles, reports, Ebird, Kusbank bird databank) was searched for migration data. All data was combined and according the concentrations of birds at particular sites, the migration corridor maps of species has been prepared. The major and minor pathways have been shown separately in accordance with the concentration of birds. A sensitivity map was produced using migration concentrations. ArcGIS 9.3 was used to produce the migration maps.

Results: A total of 37 maps for soaring species, and 10 maps for passerines and non-passerines with broad front migration has been produced. Lake Ladik, Sultan Marshes, Seyhan Delta were the main stopover sites for White Storks. Significant concentrations at the Bosphorus, the Dardanelles, East Black Sea coasts and Hatay were detected, while there were again some main corridors identified for most of the species while passing across Anatolia. Nocturnal migratory birds do not need to funnel to specific bottlenecks, but we have determined that they also follow some paths according the topography. Two of the tracked White Storks were electrocuted, and many tracked raptors also reported electrocuted in Thrace, Central Anatolia and south Turkey.

Discussion: There are very few studies performed in Turkey to understand the movements of the migratory species across the country. Some bottleneck counts at Bosphorus and Belen pass provide good data, whereas data from other parts of the country are missing. Systematic counts, covering all seasons are needed in some of the concentration sites to understand the passage in detail. While counting birds we also need to identify important stopover sites for the migratory species for protection of those areas. Tracking devices are quite expensive, but they are necessary to determine the local movements and to identify the important passage and stopover sites. Further migration monitoring should be established in different parts of the country, which will provide important information to better advice on the wind farm development and power line locations.

Acknowledgements: We would like to thank to the Ministry of Forestry and Water Affairs which has funded the “Preparing Turkey’s Bird Movement Maps” project, to the Samsun Greater Municipality for funding the White Stork tags, and to the Ondokuz Mayıs University for funding bird ringing in Kızılırmak delta (PYO.ORN.1901.15.001).

Keywords: migration, soaring, birds, tracking, ringing
Introduction: Migration phenology varies depending on species, population, age, sex, climatic, geographical and ecological conditions. This study aims to contribute to the understanding of the migration behavior of *Lanius collurio*. For this purpose, migratory phenology has been evaluated according to different age and sex groups.

Material and Methods: Bird ringing studies are performed every year from 15 March to 30 May in spring and from 15 August to 30 October in autumn at Cernek Bird Ringing Station. In the study, data belonging to *Lanius collurio* caught in Kızılırmak Delta between 2002 and 2015 were used. The "5-day running average" formula has been applied to smooth the graphs while the migration phenologies were calculated.

Results: A total of 1686 individuals from the 14-years data set were included in this study. In spring, 130 adult females, 36 adult males, 37 birds with unidentified age and sex were ringed. In autumn, 1252 juveniles, 115 adult females and 116 adult males were ringed. Spring migration starts from the last decade of April and continues until late May, and lasts an average of 40 days. It is most intensive in mid-May. Autumn migration starts from mid-August and continues until late October. It is most intensive from mid-August to 10th of September. Both males and females show similar migration phenologies. Autumn migration of adults is completed ~25 days earlier than juveniles.

Discussion: It was considered that the number of catches in autumn was seven times more than the catches in spring, may result of the location of Kızılırmak Delta or the need to urge to reach the breeding sites earlier. It is also known that spring migration occurs in a narrower range due to breeding stress and competition. Although it is acknowledged that adult males migrate earlier than adult females in some species, hence there were no difference between sexes in this study. In autumn migration, adults have a much shorter passage period than juveniles, suggesting that experienced adults may more effectively refuel and stay for a shorter period. Furthermore since autumn migration is post-nuptial, the presence of high density of birds would cause to competition, and refuelling period of juveniles could take longer than adults, as juveniles could be forced to suboptimal feeding areas. Detailed analysis are needed to understand the catching number differences between spring and autumn.

Acknowledgements: The bird ringing project was supported by Ondokuz Mayis University (Project number F-478, PYO.ORN.1901.13.001 and PYO.ORN.1901.15.001). We would like to thank all the ringers and volunteers involved in the bird ringing study.
Biochemical Composition of Smooth Scallop (*Flexopecten glaber* Linnaeus 1758) from Çardak Lagoon in Çanakkale, Turkey

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**Introduction:** The smooth scallop (*Flexopecten glaber* Linnaeus 1758) which belongs to the Mollusca phylum, Bivalvia classis, Chlamys family is an economically important bivalve species. It is a quality food that has rich content in terms of nutritiveness for human consumption. It is distributed along the whole coasts of Turkey. The amounts for aquaculture and fisheries of scallop species are 2 million 63 thousand tons and 572 thousand tons for 2015 in the world, respectively. In Turkey, scallops are produced mainly by fisheries instead of aquaculture. In this study, it was aimed to investigate monthly changes in biochemical composition of smooth scallop.

**Material and Methods:** This study was carried out in Çardak Lagoon in the Çanakkale Strait. Smooth scallops were collected to analyse biochemical compositions of the specimens per month. The values of temperature, salinity, particle inorganic matter and particle organic matter of surface water from sampling location were also measured and calculated. The condition index, meat yield, protein, lipid, moisture and ash amounts of smooth scallop were analysed monthly.

**Results and Discussion:** A total of 6-month data between July and December 2017 belongs to an ongoing study were analysed. As a result, a statistically significant relationship was found between the meat yield and moisture (p<0.01). Moreover, a statistically significant relationship was also found between the amounts of particle inorganic matter and particle organic matter in the environmental parameters (p<0.01). In conclusion, it is estimated that scallops used their energies for reproductive functions instead of the growth during the sampling period because the reproductive activities of bivalve species generally occur between late spring and autumn.

**Acknowledgement:** This study is a part of PhD thesis of Pervin VURAL from Department of Aquaculture, Graduate School of Natural and Applied Sciences at Çanakkale Onsekiz Mart University. Also, it was supported by Çanakkale Onsekiz Mart University Scientific Research Projects Coordination Unit (Project Number: FDK-1349).

**Keywords:** *Flexopecten glaber*, scallop, condition index, biochemical composition, Çanakkale Strait
The Problem of Man and Environment in the Context of Ontanticity of Existence

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Introduction: Martin Heidegger is a German philosopher who lived between 1889 and 1976. His most important and most famous work, which is talked about is Being and Time (Sein und Zeit). In this work, Heidegger makes an analysis of existence (Daseinanalitik) based on human experience with the phenomenological method which investigates not the object, but its consciousness. The fundamental theme of philosophy has been the question of “being”, since its beginning. According to Heidegger, philosophy had been a metaphysics to ask “what is being?” the question isn’t needed to ask “what is being”, but “what is the meaning of being. The meaning of the being can only be enlightened in human being. As soon as we are aware of being, it get out of darkness and enter the house of being.

Material and Methods: The basic problem of this work is how the concept of "environment" (Umwelt) passes and what kind of place it is in the authentic structure of existence in Daseinanalitik by will be gathered data from works of Heidegger, especially Being and Time and others.

Results: Human beings go through an "environment" from beginning to end. The problem is what the environment expresses in terms of human existence and how it gains meaning with the consciousness. The problem is what the environment expresses in terms of human existence and how it gains meaning with the consciousness. How should human beings develop a relationship with the environment so that the value of authenticity of existence does not deteriorate? What does the environment get in the case of autonomy? The answer to these questions can be given as follows: The environment is a part of the world of human sense. The relationship of man to the environment is not related to a deaf and dumb existence, but to his own soul. If the environment deteriorates, there is no value for the person who is responsible for himself. The way of avoiding this is not only with the person alone and with the people he lived with, but also with the environment which is a domain of meaning, at the same time he can pass on the theme without looting it as an authenticity value, without exploiting it, becoming an object of ambition and passions. If human beings interact with this environment in this frame, they behave in accordance with the authentic nature of existence.

Discussion: Heidegger's analysis of existence treats the meaning of contact with being within the framework of the consciousness of existence. He confronts many beings during his encounter with the beings. First he finds himself in a world and into this world. The journey that begins with this throwing is a "coming with the beings" from beginning to end. This person comes face to face with human, society and social institutions. He comes faces objects and goods. In the end, he comes faces to face with death. Dasein's principal existential task is to be in touch with and be able to maintain this relationship without disturbing the authentic structure of existence. At this point, it becomes problematic in relation to man himself, his social and physical environment, and the objects he produces (technology).

Keywords: Heidegger, Being and Time, Meaning of Being, Dasein, Environment.
In the present study, the aerobic bacterial flora of Acipenser gueldenstaedtii, Acipenser stellatus and Acipenser baerii juveniles were investigated on an indoor aquaculture system. The water parameters were measured and the bacteria were isolated from various organs and water samples. Aeromonas hydrophila, Pseudomonas aeruginosa and Vibrio fluvialis were isolated from stellate sturgeon (Acipenser stellatus). Aeromonas hydrophila and Pseudomonas aeruginosa were isolated from Siberian sturgeon (Acipenser baerii). Pseudomonas fluorescens and Burkholderia cepacia were isolated from Russian sturgeon (Acipenser gueldenstaedtii). Aeromonas hydrophila and Pseudomonas aeruginosa were isolated from production water. Isolated bacterial flora is very important to monitoring and controlling fish farms and fish diseases. In this research, aerobic bacterial flora of Acipenser gueldenstaedtii, Acipenser stellatus and Acipenser baerii are first time compared on indoor aquaculture system. They must take monitoring and analysis bacterial flora for prevention and control of infections by bacteria, and also use good quality microbiological water filters to against the environmental contamination on indoor aquaculture systems.
**Introduction** The increasing spread of antibiotic resistance genes (ARG) in the environment is a global challenge to public healthcare. There is a large number of works devoted to the spread of ARG in natural waters and wastewaters. The influence of the inflow of ARG from anthropogenic sources and contamination of biotopes with heavy metals on resistome was tackled. Also a small number of works investigating the resistome of soils should be pointed out, and few of them are devoted to the impact of organic pollutants like polycyclic aromatic hydrocarbons) on distribution and accumulation of ARG in contaminated soils. The aim of this work was to study the diversity of clinically significant ARG in anthropogenically contaminated soils. The investigated soils were taken in the municipal landfills of different ages, outskirts of the two villages and sites that have been accumulating liquid waste from chemical production plant for 30 years.

**Material and Methods** We evaluated the presence of 10 clinically important ARG in the 20 soil samples taken in the municipal landfills (6 samples), industrially polluted site (12 samples) and on the outskirts of rural settlements (2 samples). The PCR method was used to detect the presence of carbapenemase genes - *VIM*, *NDM* and *OXA*-48, genes of resistance to cephalosporins - *CTX-M* and *MecA*, to glycopeptides - *VanA* and *VanB*, to erythromycin – *ErmB* and to tetracycline - *TetM/TetO*, and also genes of hydrocarbons biotransformation - cytochrome P450 (*CYP153*), naphthalene dioxygenase (*nahAc*), alkane monooxygenase (*alkB*) and biphenyl dioxygenase (*bphA*)

**Results** Genes *OXA*-48, *MecA* and *ErmB* were not detected. Maximum variety of ARG (*VIM*, *NDM*, *CTX-M*, *VanA*, *VanB*, and *TetM/TetO*) was found in industrially contaminated soils. In landfill soil samples *VanA*, *VanB* and *TetM/TetO* were detected. In these samples there are no genes of *VIM* and *NDM* carbapenemases, as well as no *CTX-M* genes of resistance to cephalosporins, common in soils. The composition of ARG found in the soils of polygons resembled the spectrum of ARG present in wastewaters. The smallest variety of ARG was found in soil samples, selected in rural settlements (*NDM* and *CTX-M*).

**Discussion and Conclusion** Maximum diversity of genetic resistance determinants was found in the samples of industrially contaminated soil. Only 3 different ARG with the spectrum typical for municipal wastewaters were found in soil samples collected at the solid waste landfills. The solid waste landfills are also hot spots of ARG accumulation and require careful attention. The soils on the outskirts of rural settlements are the least toxic naturally, but under the influence of anthropogenic load, plant residues combustion and grazing, they are also not free from clinically important antibiotic resistance genes.

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**Keywords:** antibiotic resistance genes, landfills, soil pollution, polycyclic aromatic hydrocarbons (PAH)
Ecological Characteristics of *Cladonia foliacea* Group Lichenes Distribution in Turkey

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Introduction: Lichens belong to the genus *Cladonia* are occurs very moist and forested areas. Lichens in the *Cladonia foliacea* groups within the genus *Cladonia* in Turkey: *C. foliacea* (Huds.) Willd., *C. firma* (Nyl.) Nyl., *C. caespiticia* (Pers.) Flörke, *Cladonia cervicornis* (Ach.) Flot. *C. parasitica* (Hoffm.) Hoffm., *C. symphycarpia* (Flörke) Fr., *C. cariosa* (Ach.) Spreng.

Material and Methods: The seven species within *C. foliace* group were collected from various regions of Turkey between the years 2013 to 2015.

Results: The seven species within *C. foliace* group were examined morphologically, anatomically and ecologically. In addition, these species have also been examined phylogenetically after DNA isolation and PCR.

Discussion: The seven species have different ecological characteristics. *C. foliacea* is common in acidic habitats. *C. firma* is mainly distributed on the siliceous rocks in coastal areas. *C. caespiticia* spreads in forested areas and on mosses. *C. cervicornis* is common on soil and dunes. *C. parasitica* is usually distributed on pine and oak logs. *C. symphycarpia* is common on calcareous soils. *C. cariosa* is distributed in natural habitats with calcareous rock and soil. When examined also phylogenetically, the seven species are phylogenetically distinct from each other.

Keywords: *Cladonia foliacea*, Lichen, Ecology, Phylogeny.
ORAL PRESENTATION

A Review of Climate Type Variability from Bartın Region

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Introduction: The consequences of climate change can vary on global, regional and local scale as flood, drought, scarcity, precipitation and temperature extremes. In 1998, 1999 and 2009, large-scale flood events occurred in Bartın region. Undoubtedly, there are many influential factors in flood events such as basin, topography and drainage conditions. Climate is one of these factors. From this point of view, local climate change in Bartın-Turkey was studied based on the last fifty years of data in this study.

Material and Method: Climate analysis was performed in 5-year periods for Bartın using temperature and precipitation data recorded by the Bartın Directorate of Meteorology between 1965 and 2014, using Thornthwaite method.

Results: Values of moisture, thermal efficiency, aridity index and seasonality factor were determined. The moisture index values ranged from 29,54 to 73,98. It was the lowest the period between 1975 and 1979 and it was the highest the period between 1995 and 1999. Thermal efficiency was the lowest the period between 1995 and 1999 with the value 653,33 and it was the highest the period between 1965 and 1969 with the value 710,83. The aridity index value was the lowest at 1,41 and it was the highest at 31,84 during the periods 1995-1999 and 2005-2009, respectively. The seasonality factor values ranged from 49,46 to 52,77 throughout the study period. It was the lowest the period between 1980 and 1984, and it was the highest the period between 1995 and 1999.

Discussion: According to moisture index, Bartın is in moist climate class and there has been no change throughout the study period. The period between 1965 and 2014 shows a mesothermal climate type in a fairly stable state by evaluation of thermal efficiency index based on annual evaporation. In the classification of the aridity index, water scarcity is generally observed in the summer period. In particular, the years between 2005 and 2009 was the period with the highest level of water scarcity for the last 50 years. Seasonality factor was in category b, which means that the region had the conditions close to the oceanic climate effect throughout the study period.

Keywords: Climate type change, Bartın, Thornthwaite method, fifty years period
A Research on the Effect of Organic Fertilizer Applications on Yield and Yield Components in the Production of Organic Cotton (Gossypium hirsutum L.) under Harran Plain Ecolojical Conditions

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Introduction: In organic agriculture, soil, the biological structure of the soil and the protection of its vitality and the sustainability of soil fertility are essential conditions. For this purpose, organic fertilizers and some soil conditioners have to be used. Thus, plant nutrients needed for planting will also be brought to the soil. Southeastern Anatolia region has an important position in cotton production in our country.

Material and Methods: This study was carried out in the organic agriculture conditions under Harran Plain Conditions that place in the Semi-Arid Climate Zone at 2014 and 2015 growing seasons. In the study "Stonoville 468" (ST 468), "BA 119" and "Candia" cotton varieties used as plant material. In the trial; organic farm manure (2000 kg / ha), pigeon manure (1000 kg / ha) and microbial fertilizer (1000 cc / 1000 lt water) were creat organic fertilizer material. The experiments were carried out with two factors and four replications according to the split parcel trial design in randomized blocks design.

Results: According to the combined analysis results of two years; the seed cotton yield of the varieties changed from 3870.66 kg / ha (ST 468) to 3990.80 kg / ha (BA 119) and the highest seed cotton yield was obtained from the “BA 119” variety. As a result of organic and microbial fertilizer applications seed cotton yield was changed from 2750.70 kg/ha (control) to 4370.82 kg / ha (pigeon manure+ microbial fertilizer combination) and the highest seed cotton yield was obtained from pigeon manure + microbial fertilizer application. Plant heights, According to varieties, between 74.31cm (Candia) and 86.42 cm (BA 119) and in accordance with the organic fertilization were found from 79.48 cm (Control) to 83.53 cm (Pigeon manure).

Discussion: According to the results obtained from our work; the highest organic seed cotton yield was obtained from the "BA 119" cotton variety in both years, by applying Biofarm fertilizer (4687.8 kg / ha) and Pigeon manure + Microbial Fertilizer (5827.3 kg /ha).

Acknowledgement: We would like to express our appreciation to the Harran University Scientific Research Project Commission, which supported this study (HÜBAK-2014). This study was produced from a doctorate thesis entitled "The Effect of Organic and Microbial Fertilizer Practices on Agricultural and Fiber Quality of Cotton Varieties (Gossypium Hirsutum L.) in Harran Plain Organic Condition”.

Keywords: Organic Agriculture, Cotton , Gap ragion.
The Spider Fauna of Eastern Part of Küre Mountains National Park (Arachnida: Araneae)

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Introduction: The spiders are the most crowded group of arachnids. They have been adapting to many of the Earth's ecosystems, thus becoming a group that lives in many different ecosystems. Spiders can be found in various habitats from the Everest mountain to the deep pits of canyons, rivers or lakes. Spider species is over 47,500 taxa belonging to 116 families in the World and total of 1022 species in 53 families are known in Turkey. The aim of this study was to determine the spider fauna of Eastern Part of Küre Mountains National Park, which will contribute to knowledge of the spider fauna of Turkey.

Material and Methods: The adult spider specimens were collected from Eastern Part of Küre Mountains National Park in August and September of 2014-2015. The specimens were collected under stones, bushes and leaf litter by means of shifter and hand aspirator during the daytime. Specimens were preserved in 70 % ethanol. The identifications were made with a Leica S8APO microscope and pictures were taken by means of the Leica DC 160 camera. Principally well known identification keys were used for identification (Heimer & Nentwig 1991, Roberts 1987 and Tyschchenko 1971). All measurements are given in millimeters. Collected and examined specimens are deposited in the Zoological Museum of Kastamonu University (KUZM).

Results: A total of 1605 samples were collected at 10 sampling stations from Eastern Part of Küre Mountains National Park. The examination of the collected samples revealed that 104 species which belongs to 24 families.

Discussion: The findings introduced 4 new species to the spider fauna of Turkey, total species has increased to 1026 from 1022 with this study. The morphometric measurements and other characteristic features of the Turkish species are not different from the European specimens.

Acknowledgement: This study was supported within the scope of project number KÜ-BAP-01/2013-34 by Scientific Research Projects Coordination Department of Kastamonu University.

Keywords: Fauna, New record, Spider, Turkey, Araneae
Introduction: According to Bronfenbrenner's Ecological Systems Theory, human existence is largely determined by the systems it is in and the way these systems interact with one another. This theory explains the mental health problems by forgetting that the human being is part of the natural cycle which he really belongs and throwing himself from out of the ecological system to modern life. In this study, it was aimed to examine the mental health of people who live in harmony with the natural environment.

Material and Methods: For this purpose, 30-item interview form using the items of "Brief Symptom Inventory" and a 20-item observation form using the items of "Healthy Life Style Behaviors Scale" were used to measure psychological health. The data was obtained by using these two tools from 18 people, living in the district of Avsallar-Incekum bound to the Alanya.

Results: This study revealed that people living in harmony with the natural environment are far from the fast, isolated, competitive-based, selfish, and individualistic lifestyles of city life. These people see neighborhood relations and the social environment as an insurance system. Another important finding in this study is that people do not have high expectations, such as increasing consumption and speeding up production. Findings showed that this lifestyle has great advantages over mental health, compared to people who isolate themselves from the natural surroundings.

Discussion: According to the findings obtained in the study, the ecological environment on people's mental health is seen as effective. Also, the findings signed that the environment should be kept natural and the regulatory projects should be developed towards this suggestion in order for the people live in calm and peaceful life.

Keywords: Ecological environment; Mental health
Seed Germination Studies on Critically Endangered Endemic *Campanula aktascii* and *Campanula yaltirikii*

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**Introduction:** The loss of biodiversity has been a global problem in recent years. Therefore, in-situ and ex-situ conservation strategies have gained importance. Seed germination is an important developmental stage in the life cycle of plants. Because of that, ex situ conservation strategies including propagation of native species are of great importance for the conservation and management of the biodiversity. This study aims to reveal germination properties of critically endangered (CR) endemic species *Campanula aktascii* Aytaç & H. Duman and *C. yaltirikii*, H. Duman for ex-situ cultivation and strengthening of natural populations.

**Material and Methods:** In order to prepare the basis for the ex-situ protection strategies, distribution areas were recorded. Mature seeds were collected in 2016 from the distribution areas of the species. Germination characteristics of these species were determined by using growth chamber in sterile conditions. Besides that, effects of different concentrations of GA3 (100 ppm, 250 ppm and 500 ppm) were investigated. Each trial was done in three replicates. The germination tests were carried out at 15°C, 12 h light, 12 h dark period, taking into consideration the climatic conditions in which the seeds germinate in the nature. The experiment lasted 60 days. The appearance of cotyledons was accepted as germination criterion.

**Results:** It was determined that both *C. aktascii* and *C. yaltirikii* were chasmophyte species and they had a fragmented distribution, because of their special habitat preferences. As a result of germination experiments, no germination was observed in the control group of *C. yaltirikii* seeds and the highest germination rate was 21.57% in 500 ppm GA3 in the species. The lowest germination rate in the seeds of *C. aktascii* was 73.31% in the control group, whereas the highest germination rate was 87.73% in 250 ppm GA3 application. According to the results of Analysis of Variance, while GA3 applications at different concentrations were statistically significant for *C. yaltirikii* in terms of mean germination percentage (p<0.05), they were statistically insignificant for *C. aktascii* (p>0.05).

**Discussion:** Although, it was investigated that seed dormancy was observed in *C. yaltirikii* seeds, GA3 applications in high concentrations were able to break the seed dormancy for the species. To conclude GA3 applications may be useful for breaking dormancy and increasing seed germination rates for the ex-situ cultivation and strengthening of natural populations.

**Acknowledgement:** We would like to express our appreciation to the Akdeniz University Scientific Research Project Commission, which supported this study (FDK-2017-2318).

**Keywords:** Conservation strategies, ex-situ, in-situ
Macrobenthic composition in Tatlıca Waterfall (Sinop)

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Introduction: Aquatic ecosystems are threatened by not only agricultural and industrial usage but also touristic activities. The main influence upon Tatlıca Waterfalls ecosystem is tourism. Therefore, aim of this study was to detect the ecological situation and biological diversity in Tatlıca Waterfall which is open to visitor year-long.

Material and Methods: Benthic macroinvertebrates have been used as a bioindicator group. Field studies were performed seasonally between 2013 February and 2014 January. Macroinvertebrate samples were taken with kick sampling method, dissolved oxygen, temperature, pH measurements were made in situ, nitrite, nitrate, orto-phosphate and chlorophyll a concentration were analyzed in laboratory and sediment values were also investigated.

Results: Sediment structure of Tatlıca Waterfall was found to be composed of very coarse pebbles and medium cavity structures according to Moss-Quervain chart. Trophic structure was found to be oligotrophic having a I. class water quality according to the water analysis results. Eighty-two species were identified in total that belongs to five phyla (Platyhelminthes, Nematoda, Annelida, Mollusca, and Arthropoda) and thirty-three families during the field study.

Discussion: Tatlıca Waterfalls are clean and have healthy macrobenthic fauna according to multivariate and BMWP - ASPT analyses. Dominant taxa are; Gammarus komareki (252 ind/m²), G. uludagi (145 ind/m²), Planaria spp. (50 ind/m²), Bezzia sp. (13 ind/m²), Simulium sp. (13 ind/m²), G. balcanicus (18 ind/m²), G. pulex pulex (17 ind/m²), Henlea ventriculosa (11 ind/m²), Beatis sp. (10 ind/m²), respectively. When we compared to taxon numbers, Malacostraca was found as most abundant taxa while Ostracoda was the rarest family.

Acknowledgement: This project has been supported by Sinop University Research Fund (Project No: SUF1901-12-12). We would kindly like to thank Ethem Ertaş and Ferhat Büyükdeveci for their technical support.

Keywords: Macroinvertebrate, Freshwater, Tatlıca Waterfall, Sinop
Comparative Pollen Morphology of *Centaurium serpentinicola* Carlström and *C. maritimum* (L.) Fritsch (Gentianaceae) in Turkey

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**Introduction:** The genus *Centaurium* Hill (1756: 62; subtribe Chironiinae, tribe Chironieae, Gentianaceae), includes about 20 species distributed mainly in the Mediterranean Basin. These plants commonly known as “centaury”, are annual or biennial herbs with opposite and sessile leaves, cymose inflorescences, and salverform and pink to pinkish-reddish or purplish, rarely yellow or white corollas. Its anthers are spirally twisted after dehiscence. *Centaurium serpentinicola* Carlström and *C. maritimum* (L.) Fritsch are well known species in the Flora of Turkey. *C. serpentinicola* is endemic to Turkey. *C. maritimum* is distributed in Europe. In Turkey, *Centaurium* is represented by 8 species, two of which are recorded as doubtful or imperfectly known.

**Material and Methods:** The pollen slides were prepared according to Woodhouse method. Pollen measurements were made by BAB TCA-5.0C image analyzing system. The surface ornamentations of pollen grains were examined using ZEISS Supra 40VP model electron microscope (SEM) in Pamukkale University Advanced Technology Application and Research Center (PAÜ-İLTAM). And also, detailed measurements of pollens were carried out in SEM. In morphological descriptions of pollens, Ertman’s terminology was followed.

**Results:** The ornamentation of pollen grain of both species is striate-reticulate. Their aperture types are tricolporate. Pollen shape of *Centaurium serpentinicola* was determined mostly spheroidal and rarely as suboblate, according to P/E ratio (0.99±0.06 μm). Pollen shape of *C. maritimum* were found as oblate-spheroidal (P/E = 0.96±0.02 μm). Pollen sizes are 26.58±1.91 μm × 26.81±1.58 μm in *C. serpentinicola*, while 23.48±0.97 μm × 24.32±1.03 μm in *C. maritimum*.

**Discussion:** In addition to being morphologically distant from each other, *C. serpentinicola* and *C. maritimum* are found to be different from each other in the shape and size of their pollen.

**Acknowledgement:** We thank Pamukkale University Scientific Research Projects Coordination Unit for financial support (PAUBAP project no: 2017FEBE024).

**Keywords:** Pollen morphology, taxonomy, Gentianaceae, *Centaurium serpentinicola* Carlström and *Centaurium maritimum* (L.) Fritsch
Introduction: The 56th article of the 1982 Constitution guarantees that the right to life is secured and that the right to live in a balanced and healthy environment is guaranteed. Sustainable development and clean environment are kept the most important thing to form environmental law by accepting the relevant article in constitution as the basis. Since 1970, our country is more concerned about environmental problems, and some measures have been taken and regulations have been made in order to solve environmental problems. When existing regulations are examined, it has seen that the ecological rights are regulated around the human factor. In this study, we have discussed and made suggestions about the ecological place of all the ecosystem organisms, the rights they have in the ecosystem and the necessity of ecological law as a new arrangement in this frame.

Material and Methods: The first phase of the study formed by the emergence of the environmental right that forms the basis of the work and also searching for common stakeholders around the world to solve environmental problems. Then the history and scheduled changes in the regulation of environmental rights in Turkey were examined. It has been tried to determine the reasons for innovations and changes in regulations. In second phase of the study, the ecological rights in terms of law have been tried to be revealed in the light of related provisions and regulations. After that, the extent to which all living creatures that constitute the ecological system are secured in the legal regime in order to ensure their preservation and continuity in the legal system has been examined. Finally, it has been discussed what is the concept of ecological law and what extent it can contribute to the preservation of living beings and the maintenance of their sustainability. In this study local and foreign researches are examined as well as exemplary judicial decisions by the Council of State and the Supreme Court of Appeals have been evaluated.

Results: Nature is there with all living creatures. The ecological system is based on a balance and is not static. Changes in ecological order over time should be taken into consideration in order not to disturb the natural equilibrium. Changes in ecology should be taken into account when determining policies that directly or indirectly affect nature, such as the environment, energy, and tourism. Continuing increase in human population, urbanization, industrialization, as well as the fact that the human beings constantly in demand from the nature, faces the danger of disappearing the green and the clean environment. Therefore, it must be recognized that the destruction of this equilibrium, which is important in establishing and maintaining the ecological balance of all living things in the ecosystem, will cause great destruction and protection measures should be organized in such a way as to protecting while using, rather than to use first and then protect them.

Keywords: Environmental rights, Plants and animals, Ecological law, Legislation
The Use of Some Plant Wastes as Pelleting Treatments in Onion (*Allium cepa L.*) Seeds

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Introduction: Depending on population growth, crop production and consumption are also increasing. Researches on re-use of agricultural wastes such as plant materials in reproduction for sustainable agriculture have been carried out. The aim of this study is to investigate the use of some agricultural plant wastes as seed pelleting material.

Material and Methods: Some plant wastes such as artichoke leaf, pod of pinto bean, corn cob and pea pod have been used as pelleting material to investigate their effect on the quality of onion seed (*Allium cepa L.*). After the pelleting, some physical and physiological quality parameters of the seeds were examined.

Results: After the pelleting, seed size and surface area increased about 1.5 times and seed weight increased about 2.5 times than unpelleted control seed. The water activity values of seeds were 0.30 aw in the control group and 0.32 aw in the pelleted seeds. The germination percentage was 97% in control seeds and 83% in pelleted seeds.

Discussion: The germination percentage of pelleted seeds was lower than controlled seeds, but the germination percentage was still higher than standard in certification. The water activity values in pelleted seeds were close to control group and low level, indicating proper storage potential. Therefore, it can be stated these materials could be used as seed pelleting material and further researches need to determine the proper mixing rate of plant wastes for seed pelleting.

Acknowledgement: This project is a multidisciplinary project and funded by Scientific Research Project division of Ege University.

Keywords: Plant Waste, onion, *Allium cepa L.*, Seed Pelleting.
Introduction: In irrigated lands, drainage water salinity changes strictly depending on the irrigation practices. From this point of view, irrigation water quality and its amount are the most important factors. Since salts in the profile can only be leached with the water that is added and passed through the profile, i.e. irrigation water with the leaching fraction, the quantity taken inside by the water is strictly related to the salt content and the amount of the leaching water.

Materials and Methods: In this experiment, we studied the different irrigation water quality and leaching fractions on drainage water salinity using 115 cm depth PVC soil columns with 40 cm diameter. There were 5 irrigation water salinity treatment and 2 different leaching fraction ratios.

Results and Discussion: The results were evaluated with EC and some ion concentrations of drainage water that accumulated into the plastic cups which were situated at the bottom of the columns. Results showed that drainage water salinity and ion concentration of drainage water varied in relation to the irrigation water quality and leaching fractions.

Acknowledgement: This study was supported by TUBITAK/TOVAG (109O165)

Keywords: Salinity, Drainage water quality, Irrigation water quality, Leaching fraction
Introduction: Under normal conditions, amphibians do not drink. How do amphibians regulate their water balance? The purpose of the present study was to evaluate histomorphological and histochemical characteristics of skin and kidney of some amphibians (Hyla orientalis, Pelophylax bedriagae, Lyciasalamandra billae, Lyciasalamandra luschani) and the determination of hyaluronic acid (HA) in skin and kidney to explain how amphibian could maintain hydric balance.

Material and Methods: Specimens were anesthetized with ether and then euthanized by decapitation. Skin and kidney tissue samples were fixed in 4% paraformaldehyde or Bouin’s fluid. Then tissue samples were processed by using standard histological methods. Sections were stained with Hematoxylin-eosin, Alcian blue (AB) and Periodic acid-Schiff (PAS). Biotinylated hyaluronic acid binding protein (B-HABP) was used to assess HA- immunoreactivity. Additionally, the percentage of cutaneous glands was determined in both ventral and dorsal sides of the animals.

Results: The dorsal and ventral skin of samples consisted of epidermis and dermis. Two types of dermal glands, granular and mucous glands, were identified. The position of hyaluronic acid (HA) was determined in the dermis, mainly in the upper region of dermis. When it comes to kidney, nephron functional unit of the kidney of specimens was composed of glomerulus that was enclosed by Bowman’s capsule, the proximal and distal tubules, and collecting duct. Proximal tubule was formed by cubic epithelial cells with apical brush border. The distal tubules was lined by a simple epithelium of cubic cells without brush border. The collecting ducts consisted of columnar or cubic cells and they were larger than proximal and distal tubules. Many melanomacrophage centres were also observed in the kidney parenchyma. Additionally, the localization of HA was determined in the interstitium surrounding the collecting ducts of the kidney.

Discussion: Amphibian skin is characterized by having numerous dermal glands unlike other vertebrates. Two distinct types of gland, granular and mucous, were observed. Mucous glands secrete mucus which is composed of water and mucins. Mucins are hydrophilic molecules which absorb water for the homeostasis of wet-surfaced epithelia. Additionally, the percentage of mucous glands was higher than the percentage of granular glands in both ventral and dorsal sides. Corroborating to our study, it was reported that water was absorbed via skin instead of drinking water through their mouth in many adult amphibians. The HA immunoreactivity was observed in the dermis, especially in the upper region of dermis. The HA has an ability to bind large volumes of water, and this feature makes it perfect lubricator and water absorber. When it comes to kidney, the localization of HA was determined in the interstitium surrounding the collecting ducts. The presence of HA in the interstitium surrounding the collecting ducts provides the passive diffusion of water out of the tubules into the interstitium. Therefore HA probably acts an important role in renal water handling. Based on literature data; due to HA’s ability to retain water, it probably acts a significant role in the body’s fluid balance.

Keywords: Amphibian, skin, kidney, mucous gland, collecting duct, hyaluronic acid
Physiological Determination of Reactions Formed by Different Boric Acid Applications in Some Safflower (Carthamus tinctorius L.) Types

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Introduction: The changes that occur in biotic and abiotic factors cause some changes which are expressed as stress and which are effective on the physiological and metabolic events in plants. These changes may negatively affect growth and development and cause to the death of the plant. In plants, boron stress increases the activities of antioxidative enzymes and causes some physiological changes. In this study safflower (Carthamus tinctorius L.) plant were used as experimental material both as it is an industrial plant that can be used in many fields such as food, forage and dyeing industry and both it shows more resistance to most plants.

Material and Methods: In this study, Remzibey, Balca and Dincjer types of safflower (Carthamus tinctorius L.) plant were used as experimental material. Seeds of each varieties were germinated in seed beds which contains 100 seeds in vials. Distilled water used as control group and 5, 10, 15, 20 mM boric acid (H₃BO₃) solutions were applied. The condition was 16 hours light/8 hours dark photoperiod and 25±1°C in growth chamber. Changes in APX, CAT, GR and SOD enzyme activities were determined at the physiological level by using leaves of safflower plant which were germinated by applying boric acid in different concentrations.

Results: In our study, the values obtained for antioxidative enzyme activity also decreased on high concentration of boric acid. Antioxidant enzyme activities were found to be effective on boron tolerance. It was determined that increase in boric acid concentration increases enzyme activity in all varieties. APX, CAT, GR and SOD activities decreased at 5 and 10 mM and 15 and 20 mM boric acid application was observed relative to other concentrations.

Discussion: One of the most important stress factors affecting plants is boron toxicity. Though the element boron is one of the micro elements absolutely necessary for the growing of the plants, too much boron found in the soil is a stress factor which limits the plant growth and productivity. As a result, it is understood from the results of the antioxidative enzymes activities that safflower types can cope with the low boronic acid concentration. However, high boronic acid concentrations (15 and 20 mM) caused to stress and it was determined that increased enzyme activities in plant samples.

Keywords: Carthamus tinctorius L., Boric acid, APX, GR, CAT, SOD
Environmental Reflections from Ideas of Stakeholders in Terms of Mediterranean Model Forest Network: Case of Yalova Model Forest

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Introduction: Model Forests are organisations targeting sustainable management of natural resources. These organisations are established by stakeholders in their locations. The concept “Model Forest” was created in the early 90s, when the government of Canada thought an alternative to the conflicts between forest loggers and communities living in forested areas. International Model Forest Network (IMFN) was established by the government of Canada after that the United Nations Conference on Environment and Development held in 1992, Rio. After that, six regional network were created in this context all over the world. One of these is Mediterranean Model Forest Network (MMFN) in which Turkey is included. In this context, Yalova Model Forest (YMF) as an association was established in 2010. Countries like Spain, France, Italy, Croatia, Greece, Algeria, Morocco, Tunisia and other initiatives are represented as regional in this network. The aim of this study is to contribute to the sustainable management of forests creating environmental awareness through model forests established with participatory approach.

Material and Methods: The main material are strategic plans and various publication in terms of MMFN. For this aim, 5 strategic plans were examined environmental aspect. Additionally, questionnaires about environment performed with stakeholders of YMF in terms of scientific research project were used and were interpreted statistically using SPSS.

Discussion: There are a various actions about environment in the strategic plans at the MMFN. Actions about environment in strategic plans and questionnaires are similar. There are similar concerns about environment in the strategic plans. So, it is given importance to the concept of sustainable forest management in all strategic plans.

Results: The last strategic plan (2014-2017) of YMF includes 8 actions about environment and climate change directly. These actions are based on regulations of utilization and protection of environment in terms of sustainable forest management. These results are compatible with questionnaires about environment. The amount of actions about environment in strategic plans of model forests in Mediterranean basin are changeable. But, environmental actions are the main element in all model forests. There are a focus group about environment in YMF.

Acknowledgement: We would like to express our appreciation to the General Directorate of Forestry, which supported this study (OGM 10. 8402 / 2013-2015).

Keywords: Environmental reflections, ideas of stakeholders, Yalova Model Forest
The Endemic Species of the Genus Bellevalia Lapeyr. (Asparagaceae) in Turkey

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Introduction: In terms of species numbers, Bellevalia (Asteraceae) is represented with species with approximately 70 species according to studies published around the World. According to Cowley, the richness in the diversity of the species lies in its distinctive characteristics regarding leaf width and pubescence, raceme shape and density, pedicel length in relation to perianth length, perianth length, the tube: lobe ratio, perianth color, and anther color. To inform about distributions of the endemic species and to collect the species of the genus Bellevalia in different area in Turkey.

Material and Methods: The endemic species in the genus Bellevalia were collected from different area of Turkey during the Project ‘Systematic Revision of the Genus Bellevalia Lapeyr. (Asparagaceae) in Turkey’ and were dried according to common herbarium technics. The dried specimens were identified with the help of Flora of Turkey and East Aegean Islands and related literature.


Discussion: About distributions of the 19 endemic species in the genus Bellevalia collected from different localities in Turkey were informed.

Acknowledgement: We thank to the Curators of AEF, AIBU, ANK, DUOF, GAZI, HUB, EGE, INU, ISTE, ISTF, ISTO, KATO, and VANF, who allowed us to study their other Bellevalia specimens. We also thank to “TÜBİTAK: KBAG-215Z156” for financial support.

Keywords: Bellevalia, Endemic, Turkey.
Introduction: The vast majority of living things need molecular oxygen to sustain their lives. Oxygen radicals are the consequence of the reduction of molecular oxygen by a single electron. The most important feature of these free radicals is that they react with other molecules in the environment and cause oxidative damage. In live systems, there are many protection systems to prevent this damage. The most important of which is the enzymatic protection system. In addition, vitamins have the same effect. In this study, the effects of aspartam and vitamin E on the activities of superoxide dismutase, catalase and glutathione peroxidase of antioxidant enzymes were researched comparatively.

Material and Method: After the mice were injected aspartam and vitamin E intraperitoneally, they were killed by servical dislocation 2, 4, 8, 12 and 24 hours after and their livers were removed. After, total enzyme fractions were obtained by applying the livers homogenisation, sonification and centrifugation. Those fractions were made use of to find out changes in the superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPx) activities.

Results: As a result, it was determined that the GPx activity was inhibited under effect of vitamin E, but the CAT and SOD activities were activated in the 8th and 24th hours. And it was observed that, under the effect of aspartam in the 8th and 24th the CAT and SOD activities and in the 12th and 24th hours the GPx activity were activated. On the other hand, it was determined that when vitamin E and aspartam were injected together, the GPx activity was inhibited, the SOD activity was a little activated only in the 8th hour and the CAT activity was inhibited in the 2nd, 8th and 12th hours.

Discussion: Vitamin E effect can prevent free radical formation. As a result, the activity of the enzymes may be low due to the non-stimulation of the radical scavenger SOD, CAT, GPx enzymes. This may be the cause of inhibition.

Keywords: Vitamin E, aspartam, superoxide dismutase, catalase, glutathione peroxidase, liver, mouse
The Important of the Biological Invasions in Turkey Forests

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Introduction: Although invasive species have found on the quarantine list of many countries, the range of they are increasing and cause economical harmful in invasion of area. There is a great increase in the number of invasive species detected in agriculture, forests, parks, gardens and settlements in many parts of the world. Some species can adapt in a new area and their population increases rapidly due to their ecological tolerance and biological characteristic. In Turkey, which has many protected area and significant plant area, determination of biological outbreaks and of their distribution by monitoring, and taking precaution play the important role. In this study, the distribution of some important invasive species in Turkey and their damages are discussed.

Material and Methods: Alien invasive species in recent years in Turkey were evaluated according to the EPPO list and literature.

Results: Some important pests are Leptoglossus occidentalis, Dryocosmus kuriphilus, Anoplophora chinensis, Corythucta arcuata and C. ciliata which have been identified so far in Turkey forests and also these species are in the EPPO list. L. occidentalis was identified firstly in 2009 in İstanbul and then it was distributed on Pinus species in many areas. It leads to important damage especially on Pinus pinea in İzmir. Biology and natural enemies of this species have not determined. D. kuriphilus feed on only Castanea sativa and it was recorded in Yalova and Bursa. However, it is considered to be the most important pest of C. sativa because of this kind of parthenogenetic breeding and lack of the present natural enemy in the areas where it is detected. A. chinensis has one generation in a year and the most number of the host plant. It have been identified on Acer and Salix spp. in İstanbul, Trabzon, Antalya and Bartın so far. C. arcuata, which is harmful to Quercus spp., was first detected in Bolu in 2003 and determined in Western Black Sea and west of Central Anatolia. C. ciliata was also found on Platanus sp. in Bolu and Kastamonu, respectively 2009 and 2016.

Discussion: Turkish biodiversity is quite high compared with the biodiversity of other countries in the temperate zone. For this reason, the potential distribution areas of species can be determined by obtained information about the distribution of species and found whether they are present on different hosts and can be taken precaution.

Keywords: Biological invasion, Forest tree, Insect, Turkey
Introduction: Forest management necessitates accurate and current spatial inventory information about the structural characteristics of the forest. This inventory information is usually obtained through terrestrial measurements. However, since terrestrial measurement is very time consuming and costly, researchers concentrate on this information from remote sensing data. One of the important parameters obtained in terrestrial measurement is the tree height. Aerial photograph interpretation and photogrammetry are widely used for this reason in forestry. Since the first introduction of aerial photographs into the practice of forestry, tree heights have been tried to be estimated with various methods like using shadow length. Technological improvements especially in digital photogrammetry, tree heights can be measured more effectively. In this study, firstly a point cloud is created by using automatic matching of stereo images and then a Canopy Height Model (CHM) is created from this point cloud. And it was tried to estimate mean stand heights through aerial photographs using CHM.

Material and Methods: This study covers Pinus brutia and Pinus nigra plantation forest areas in Adıyaman, Çelikhan and Gölbaşi Forest District. A total of 112 sample plots were measured, including tree heights in each sample plot. As a remote sensing data Ultracam X digital aerial photographs which has 30 cm spatial resolution were used to determine tree heights. The statistical relationships between the tree height obtained by terrestrial measurements and the tree height obtained from aerial photographs are revealed by regression analysis.

Results and Discussion: Mean stand heights were determined using tree heights which are selected considering Weise quadratic mean diameter. The point cloud was obtained with the aid of the stereo model created from the raw images. Using the point cloud Digital Elevation Model(DEM) and Digital Terrain Model(DTM) were generated. Stand top heights were determined using average value of tallest 3 trees which were measured using CHM created by taking the difference of DTM and DEM. The estimation model was developed by using regression analysis between the stand top heights obtained by CHM and mean stand heights obtained from the terrestrial measurements. The mean stand height estimation model based on Ultracam-X data have accuracy statistics with the $R_{adj}^2=0.88$ and RMSE=0.68 m. Mean stand height is an important indicator in determining the stand characteristics in the field of forest management. This study shows that mean stand height estimation is possible and very quick method through point clouds generated using image matching technique in plantation forests.

Acknowledgement: We would like to thank to General Command of Mapping and General Directorate of Forestry for the supply of Ultracam-X aerial photographs and forest inventory data.

Keywords: Adıyaman, Stand Height, Stereo Image, Point Cloud
Faunistic Composition, Ecological Properties and Zoogeographical Evaluation of the Cerambycidae (Coleoptera) of the Eastern Black Sea Region of Turkey

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Introduction: The beetle family Cerambycidae is one of the largest groups of insects with more than 35,000 species worldwide. The longhorn beetle fauna of Turkey has been studied intensively over the past several decades. According to Löbl and Smetana (2010) approximately 650 species and subspecies were given from Turkey. Longhorned beetles vary greatly in body size, morphology, coloration, and natural history. Adult cerambycid species are phytophagous or xylophagous. Larvae of the most longhorn beetle species are xylophagous, while the rest of the species, larvae feed in stems or roots of some herbaceous plants. Some species are important pests, damaging and even killing trees in managed and natural landscapes. In this study, it was mainly intended to present the faunistic composition of determined species (their distribution as per subfamilies and genus), their ecological features (assessment of number of individuals, presenting the collecting months and altitudes) and their relations with zoogeographical regions.

Material and Methods: Longhorn beetles (Cerambycidae) were collected from Eastern Black Sea Region between 2013 and 2015. The samples were collected by using insect net and mouth aspirators and killed using ethyl acetate. Informations such as collecting dates, GPS coordinates, altitudes etc. were recorded. Collected samples were preserved in 70 % ethanol.

Results: As a result of the conducted study, it was observed that big majority of Cerambycidae fauna in the research area is occupied by species belonging to the Lamiinae (30 species from 7 tribe) and Ceramycinae (19 species from 9 tribe) subfamilies. These subfamilies were followed by the Lepturinae (13 species from 2 tribe). The phenology of the fauna, number of individuals of species sampled and the altitudes of samples collected during the field studies were considered.

Discussion: The faunistic composition, ecological properties and zoogeographical composition of Cerambycidae of the Eastern Black Sea Region in Turkey were examined. Sixty two species belonging to 18 tribes were identified. The Eastern Black Sea region’s cerambycid fauna is relatively similar to that of Turkey and shares many species with the European part of the Western Palearctic.

Acknowledgement: We would like to thank Osman Sert, Mahmut Kabalak and Yavuz Turan for valuable help during field studies.

Keywords: Cerambycidae, Eastern Black Sea Region, Fauna.
Net Primary Productivity of Ilgaz Reservation Area Forests as Affected by Climate Anomalies Between 2000 and 2010

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Introduction: Frequency of climate anomalies has increased considerably in recent years. Studies have shown that climate extremes such as extreme aridity, heat waves, and long-lasting droughts are becoming more frequent in Europe, Africa, America, Australia, and most of Asia. The frequency of climate anomalies has increased in Turkey in recent years, with hot spots of heat waves occurring along the coastline of the Eastern Black Sea, in western, southeastern, and central Turkey, and along the Western Balkans. Net primary productivity (NPP) is an important indicator of vegetation health; therefore, it may be used to evaluate response of forests to climate anomalies. The objective of this study was to evaluate response of forest in Ilgaz reservation area to climate anomalies between 2000 and 2010.

Material and Methods: This study was conducted in Ilgaz Reservation Park. We obtained annual values of NPP from 24 pixels in MODIS (MOD17A3: Annual MODIS GPP/NPP data sets) between 2000 and 2010 (11 years), making 264 NPP values in total. This provided a 24-km² continuous observation area (each pixel in MOD17A3 represents a 1-km² area). The NPP data were downloaded from https://lpdaac.usgs.gov/data_access/data_pool at a 1-km resolution and were converted to the ArcView data format using the MODIS Reprojection Tool (MRT). The impacts of the climate anomalies on the NPP of the forests in the study area were evaluated using quality control charts (QCCs).

Results: All the studied forests, except one pixel (1 pixel = 1 km²), were hit by 2007 heat wave and majority of the forest were hit by 2010 anomaly. The impact of heat waves was not uniform across vegetation types and topographic characteristics. Stands of Göknar and göknar-sarçam mixture were hit more seriously than those of other species.

Discussion: Our data showed that the studied forests experienced a serious reduction in NPP in 2007 and 2010 heat waves, which were consistent with results from Erşahin et al. (2016). Although extreme events usually only last a few months and the ecosystem may survive these conditions, the legacy of these events may last for several years. However, our results suggested that the impact of anomalies were recovered shortly after (i.e., in next year) the event.

Acknowledgments: We thank Turkish State Meteorological Service for providing climate data and NASA for making MODIS NPP (MOD17A2 and MOD17A3) data sets available at free of charge.

Keywords: NPP, Heat waves, Ilgaz Mountain, Quality control charts, MODIS
Faunistic, Ecologic and Zoogeographical Evaluations on Staphylininae (Coleoptera: Staphylinidae) Fauna of Northeastern Anatolia

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Introduction: Staphylinidae is amongst the most widespread and diverse families of Coleoptera. In parallel to this the subfamily Staphylininae also has a great diversity and number of species. Black Sea Region of Turkey has a temperate and moist climate, which is best represented in the eastern part of the region where it’s the most preferable conditions for Staphylininds to live in. Thus, the focus of this study is to make contributions to Staphylininae (Coleoptera: Staphylinidae) fauna of Turkey with additional material from Northeastern Anatolia. Additionally, some ecological properties zoogeographical status of all species were also discussed.

Material and Methods: Study material is composed of specimens collected from Eastern Black Sea Region between 2013 to 2015. Field studies were carried out between months March-November and mostly done by using aspirator, insect net and sifting debris. Some of the specimens were collected from fungi and mammalian nests. Collected samples were preserved in 70% ethanol and 10% acetic acid solution upon examination.

Results: Totally, 72 taxa of 19 genera belonging to 3 tribes of Staphylininae were recorded. The majority of Staphylininae fauna of Eastern Black Sea Region is composed of species belonging to tribe Staphylinini (61 species, 84.7%), followed by tribes Othiini (6 species, 8.3%) and Xantholinini (5 species, 6.9%) respectively.

Discussion: According to results, three species are first records for Turkey and first detailed localities were given for two species. In addition, 26 species were reported from Black Sea Region for the first time with this study. Generally, Staphylininae species could be found throughout the year, however June-July is their most actively found periods in the region. Specimens were collected from 0-2750 m; mostly collected between 1000-1500 m. As expected, species composition reflects the zoogeographical situation of Turkey and mostly shared with European and Middle Eastern faunas. Since it’s a transition region from Caucasia to Europe through Anatolian peninsula, approximately 40% percent of the species were shared with other regions of Turkey, except Southeastern Anatolian Region

Acknowledgement: I would like to thank Osman Sert, Mahmut Kabalak and Yavuz Turan for their contributions in field studies.

Keywords: Coleoptera, Staphylinidae, Staphylininae, Eastern Black Sea Region, Fauna
Eco-physiological Responses of Drought Tolerant Woody Species to Desert Conditions in Karapınar/Konya

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Introduction: Desertification, which has been affected by many factors (physical, chemical and biological) in arid and semi-arid areas, gradually increasing its negative effects in the world. In terms of geographical location, soil conditions and climate, Turkey is under the risk of desertification. Central Anatolian and Southeastern Anatolian regions are areas where land degradation, weak vegetation cover, human oppression is observed, are prone to the increased ratios of desertification. Konya-Karapınar basin selected for its desert characteristics. Also, the climate data for the study area showed that the drought conditions in this area were increased each year and continues to increase.

The eco-physiological performances of some woody species that have spread in the study area and their adaptation capabilities to this arid region have been examined. In Central Anatolia Region, where the study area is located, it is important to determine the characteristics of woody species that survive in arid conditions, for existing and further afforestation and restoration studies in the region.

Material and Methods: The eco-physiological properties of Robinia pseudoacacia and Elaeagnus angustifolia on the field during the study were measured through the vegetation period (June-September) of 2014. Measurements conducted with six individual plants from each species.

Results: Physiological properties of Robinia pseudoacacia and Elaeagnus angustifolia species in Konya-Karapınar region were measured. As a result of these measurements, it has been found that both plants have adequate photosynthesis, transpiration and water use efficiency values to survive in this arid region, which has high temperature and low precipitation conditions.

Discussion: Both plants examined in this study are known to be drought tolerant, which showed sufficient adaptability and survival capacity under this arid and barren desert environment. Thus, this species should be considered for restoration and afforestation studies.

Keywords: Robinia pseudoacacia, Elaeagnus angustifolia, Eco-physiology, Drought stress, Karapınar/Konya
Chromosomal Identification in *Rattus rattus* (Linnaeus, 1758) (Rodentia: Muridae) from Western Anatolia using Banding Techniques

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Introduction: The genus *Rattus* (Fischer, 1803) has been defined as a widely distributed in the Palaearctic region. The two species of this genus are recognized as *Rattus rattus* (*R. rattus*) and *Rattus norvegicus* (*R. norvegicus*) in Turkey. To date, karyological studies have recorded diploid chromosome numbers (2n) ranging from 38 to 42 for *R. rattus*. From five different chromosomal groups of this species (Oceanic or European (2n=38), Ceylonese (Sri Lanka) (2n= 40), Asian (2n=42), Japanese (2n= 42), Mauritus (2n=42 Mau)) the Oceanic type of *R. rattus* is present in Turkey. The karyotypic polymorphism is due to pericentric inversions, centric fusions, centric fissions, C-band polymorphisms and supernumerary chromosomes. The aim of this study is to identify the chromosomal polymorphism, heterochromatin and nucleolus organizer regions (NOR) of *R. rattus* in Western Anatolia.

Material and Methods: Eight *R. rattus* specimens, from Bilecik and Sakarya in the Western Anatolia, were karyologically studied. Chromosome samples were prepared from bone marrow (Ford and Hamerton 1956). The C-banding was achieved according to the technique of Gosden (1994) and NOR staining according to the method of Howell and Black (1980). At least 20 well-spread and banded metaphase plates were photographed and arranged to determine the diploid chromosome number (2n), the autosomal fundamental number (NFa) and the fundamental number (NF). Chromosomes were classified according to Levan et al. (1964). Heterochromatin and NOR distributions were examined in the arranged chromosome plates.

Results: The karyotype consisted of *R. rattus* revealed a diploid number of 38 comprising 9 metacentric/submetacentric pairs, 2 subtelocentric pairs, 7 acrocentric chromosomes. The X is a medium sized acrocentric and the Y chromosome is a small acrocentric. C-banding results showed that centromeric heterochromatin is present in all pairs of chromosomes. However, only 3 acrocentric pairs and one pairs metacentric chromosomes are observed with low C-banding. Nucleolar organizer regions (NORs) are located in 5 metacentric/submetacentric chromosomes.

Discussion: In the present study, we aim to reveal karyotypic characteristics by C-banding and AgNOR staining in *R. rattus* from Western Anatolia (Bilecik, Sakarya) populations. Recent karyological results have recorded 2n= 38 chromosomes from Central Anatolia similar to Asiatic and European Turkey. In this study, we found 2n= 38 from Western Anatolian populations with distinct heterochromatin and NORs characteristics.

Keywords: *Rattus rattus*, Chromosomal polymorphism, Bilecik, Sakarya
Evaluation of UNESCO Candidate Wetland Ecosystems: Kızılırmak Delta as a Case Study

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Introduction: Wetlands are the unique ecosystems for countless species of plants and animals, providing several ecosystem services. However, these ecosystems face with severe anthropogenic impacts such as overexploitation, habitat fragmentation, conversion land for agriculture. In the present study, we evaluate the current ecological status of Kızılırmak Delta which is the first UNESCO world natural heritage candidate in Turkey.

Material and Methods: We used both field and literature data for biotic and abiotic parameters during the study period (from October to April). To reveal the biodiversity, we performed field survey twice during study period. To investigate the interactions between the environmental parameters such as water quality in ground and surface waters, current water usage, climatic variables, fisheries, animal husbandry as well as economic activities and biodiversity in the Delta. We obtained meteorological, land use, water management, agricultural and environmental data from related public institutions and local NGOs.

Results: We found 554 plant species, 35 fish species, 12 amphibian, 13 reptile and 356 bird species. 5 major ecosystems with 19 different habitat types including sand dunes, forests, inland surface waters, salt marsh and temporary habitats were determined. We observed high water quality deteriorations in groundwater and drainage channels. In groundwater, salinity was observed high, where groundwater used intensively for irrigation salt content of soil also increased in dry seasons. The land use capability has been changed since 1987 from natural to artificial agricultural lands according to the Landsat satellite images. Shoreline changes have occurred in Black Sea coast, 750m shoreline lost since 1980.

Discussion: Kızılırmak Delta hosts different habitat types hence this create outstanding universal value so it should be included UNESCO world heritage list. There is a high anthropogenic impact on the Delta particularly excess water and fertilizer usages, salinization, and eutrophication thus lower the availability of habitats. This have also triggered the economic losses in the area such as unproductive soils. The most important problem in the Kızılırmak Delta is improper implementation of water bodies. For the survival of wetlands water is vital so there should be efficient water management plan prepared and applied considering the ecosystem demands.

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Keywords: Kızılırmak Delta, wetlands, biodiversity, anthropogenic impacts, UNESCO
Parasitoids of the Most Important Pests in Turkey Forests and Opportunity to Use Biological Control

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Introduction: The increase of distribution areas of pest species limits to possibilities of control methods in forests. The application in biological control of natural enemies, which is dominant on the pest species, is needed to determine in order to protection of ecological balance in forest ecosystem. Using chemical agents in forest ecosystem especially cause by decreasing biodiversity and destroying natural sources. For this reason, in many studies, the most common and effective natural enemies on economically important plant pests have evaluated in biological control studies. Especially the use of parasitoid species, which is to suitable in biology of pest and having high reproductive capacity and low host preference, are important in success of biological control. In this study, in Turkey forests, preferences of host plant of the most harmful 10 pest species (Thaumetopoea wilkinsoni-T. pityocampa, Lymantria dispar, Rhyacionia buoliana, Diprion pini, Neodiprion sertifer, Tortrix viridana, Dioryctria sylvestrella, Euproctis chrysorrhoea and Hyphantria cunea), distributions, parasitoids species, host preferences of these, most common parasitoids with use opportunities in terms of biological control have been covered.

Material and Methods: Pests and their parasitoids species in Turkey forests were evaluated according to the literature.

Results: In Turkey forests, pest species which have the widest distribution are T. wilkinsoni-T. pityocampa, E. chrysorrhoea and L. dispar. In addition, L. dispar and E. chrysorrhoea damage to agricultural plants together with forest trees, so they are polifag species. H. cunea has the majority of parasitoids which totally 17 species whereas D. sylvestrella has the minority of parasitoids which is 5 species. Compsilura concinna is remarkable as the parasitoid species with the most host diversity. The most effective and common parasitoid species were determined to Ooecyrtus pityocampae and Baryscapus servadeii as egg parasitoids of pine processorynomoths.

Discussion: In biological control application, distribution of pest and parasitoid species, host preferences, habitat preferences and adaptation of biological periods are important. Further studies are needed to identify parasitoid species in areas where pests are due to the fact that Turkey is substantial country in terms of topography, climate characteristics and biodiversity. However, in the richest biodiversity, the parasitoid under normal condition could not be effective because of competition or environmental factors. Furthermore, when the herbaceous and woody floras protect in order to protect existing biodiversity in forest areas and especially providing to feed parasitoid species in adult periods, biological control efforts can increase to success.

Keywords: Parasitoid, biological control, forest, Turkey.
Using the Organelles of Acer Pseudoplatanus as a Bioindicator for Heavy Metal Pollution

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Introduction: Heavy metals are pollutants that are usually released to the air from industrial or traffic sources. In addition to being carcinogenic in terms of a majority of human health, some of them are toxic to human health even at low concentrations and tend to bioaccumulate. Therefore, monitoring of heavy metal pollution is extremely important. The use of plants as biomonitors has been one of the most effective methods for a long while to determine heavy metal pollution. However, the capacity of plants to accumulate heavy metals can vary according to many factors, especially heavy metal species, plant organism and heavy metal concentrations in the air. Therefore, the species and organelle that are most effective in monitoring of each heavy metal species needs to be identified separately. In this study, the concentrations of Ni, Cd, Zn, Fe, K, Mg and Mn elements in leaves and branches of Acer pseodoplatanus were determined depending on traffic density.

Materials and methods: The samples, which were taken from Acer pseudoplatanus leaves and branches, were kept at room temperature for 15 days, after they were dried at 50 °C for 1 week. 2 g of the dried samples were weighed and placed in 10 ml of concentrated HNO₃ at room temperature for 1 day and then boiled for 1 hour at 180 °C. Then, 20 ml of distilled water was added to the solution, after that the solution was filtered through 45 μm filter paper. In the solutions obtained from the filtrate; Ni, Cd, Zn, Fe, K, Mg and Mn analyzes were performed on GBC Integra XL-SDS-270 ICP-OES.

Results and discussion: As a result of the study, it was determined that the variation of Ni, Zn and Mn in the organelle of the tree and K and Mg depending on the traffic intensity did not differ statistically as significant at 95% confidence level. The highest concentrations of Cd and Zn were found in the leaves, K in the seeds and Mg in the branches, respectively, which were statistically significant at the 95% confidence level. As a result, Ni, Cd, Zn and Fe increased depending on the traffic intensity and K, Mg and Mn relative to the change of the traffic is not found at significant level.

Keywords: Acer pseudoplatanus, Heavy Metal, Bioindicator, Air Pollution
Investigation of Crude Oil Yield and Fatty Acid Composition of Buckwheat (Fagopyrum esculentum Moench) Cultivated in Turkey

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Introduction: This study investigated crude oil yields and fatty acid components of seeds of buckwheat (Fagopyrum esculentum Moench) grown at different sowing times and fertilizer doses of newly imported foreign origin in our country.

Material and Methods: The fatty acid analysis was carried out with Agilent 7890 GC-MS system. The relative percentages of the separated compounds were calculated from total ion chromatograms. The identification of the oil components was based on the Wiley and NIST mass spectral library.

Results: Crude oil yields of buckwheat seeds grown at Konya ecological conditions at five different sowing times and different fertilizer doses (0, 10 and 20 kg/da DAP-18-46) ranged from 2.11-2.97%. The amount of oleic acid in the major unsaturated fatty acids of buckwheat ranged from 38.09% to 45.82%, while the amount of linoleic acid ranged from 9.69% to 35.56%.

Discussion: In this study, it was determined that seeds of buckwheat (Fagopyrum esculentum Moench) grown at different sowing times showed significant differences between raw oil yield and fatty acid components.

Keywords: Buckwheat seed, Fagopyrum esculentum Moench, planting time, fertilizer, fatty acid components
First Chromosome Studies on the Genera *Calchas* Birula, 1899 and *Neocalchas* Yağmur, Soleglad, Fet & Kovařík, 2013 (Scorpiones, Iuridae, Calchinae)

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Introduction: Scorpions (Scorpiones) are the fifth most numerous order of arachnids. Iuridae family consists of 4 genera and 14 species. The species are limited to Asia (Turkey, Iraq) and Europe (Greece). The family Iuridae is a small family comprising only four genera composed of 14 species: *Calchas* (4 species), *Neocalchas* (one species), *Iurus* (3 species) and *Protoiurus* (6 species) of which 12 species are local endemics.

The order Scorpiones possesses 2385 described species taxonomically, but only 128 scorpion species have been karyotyped so far. Iurid cytogenetics is not known. That is why we decided to focus on karyotypes of iurid species. In order to obtain karyological information, we have studied representatives from each of two genera: *Calchas* and *Neocalchas*. Cytogenetic features, karyogram, mitotic metaphase chromosomes and meiosis of *Neocalchas gruberi* (Fet, Soleglad, Kovařík, 2009) and *Calchas nordmanni* Birula, 1899 were prepared based on Giemsa-stained testicular chromosomes for the first time.

Material and Methods: Both species are distributed in Turkey and collected from Antalya and Artvin provinces respectively. Chromosome preparations from testis tissue and meiotic cells were obtained by the standard air dry technique by Traut (1976) as follows; gonads were hypotonised in 0.075 M KCl for 20 mins. and then fixation was carried out in methanol: glacial acetic acid (3:1) for 20 mins. After this time the tissue was dissociated in a drop of 60% acetic acid on a microscope slide and then, moved to a warm histological plate for evaporation (45°C). The chromosomes were stained by 5% Giemsa solution in Sörensen phosphate buffer (pH = 6.8) for 20 mins. The chromosome preparations were observed with Olympus BX41 and photographed with attached camera.

Results and Discussion: It has been observed that both species have holocentric chromosome and achiazmatic meiosis chromosome. Karyotypes of two analyzed taxa differ with their diploid numbers. Analysis of spermatogonial metaphase cells revealed the diploid number 2n = 40 in *Neocalchas gruberi* and 2n = 82 in *Calchas nordmanni* which are the first record for the family Iuridae. Bivalent chromosomes were detected during the first meiosis in both species. Our study reported the first results of the chromosome numbers for the genera *Calchas* and *Neocalchas*. These data will be useful for future studies in cytotaxonomy of family Iuridae.

Acknowledgments: This study was supported by Manisa Celal Bayar University Scientific Research Projects Coordination Unit (BAP project no. 2015-177).

Keywords: Scorpion, Scorpiones, Karyotype, Chromosome, Iuridae, *Neocalchas*, *Calchas*
Determination of Vertical Distribution of Ant Fauna (Hymenoptera: Formicidae) of South Aegean Region of Turkey Using Pitfall Traps

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Introduction: The ant fauna of Turkey is increasing with being added new records and has remarkable in recent years. On the other hand, it is unlikely to say that the ant fauna of Turkey has been knew completely. This study was carried out to determine the phenology and vertical distribution of ant species in order to contribute to Turkey's southern Aegean ant fauna.

Material and Methods: Study was carried out at Afyonkarahisar, Aydın, Denizli, Muğla and Usak in the South Aegean Region of Turkey between September 2013 and August 2014. Study was performed by using Dung baited pitfall traps, the lowest 9m to the highest 2150m in 22 localities and 11 habitats at different heights with 2 month periods. At the end of our periodical field studies, samples were placed in glass jars containing 96% alcohol and brought to the Entomology Laboratory of Biology Department of the Faculty of Art and science of Dumlupınar University. The samples that are diagnosed are preserved in the Biology Department of the Faculty of Science of Trakya University.

Results: As a result of the study, 83 species were obtained. The most species was determined in Denizli-Aydöğdu Village with 26 species. The least species was determined in Afyon-Sandıklı-Çamoğlu Village with 4 species. According to the Simpson diversity index, the station with the highest species diversity was Uşak-Banaz-Büyükoturan Village with 0.883. It was determined that the habitat containing the most species is pine forest (43 species) and meadow habitat (42 species), while the least species is alpin zone and saline soil with 12 species. It has been determined that Cataglyphis nodus (Brullé) were present in 19 out of 22 stations and in all 11 habitats. The most species was obtained between 750-1000 meters (57 species), whereas only 12 species were obtained over 2000 meter.

Discussion: Altitude plays an important role in the distribution of ants besides habitat. There are species that prefer a certain height, as well as species that do not exceed a certain height. The data obtained by this study gave the habitat and elevation preferences of the ants in the region where the study was conducted.

Keywords: Ant, Formicidae, phenology, vertical distribution, fauna, Turkey
Introduction: Marketing of organic products through local organic bazaars is one of the key elements of developing organic agriculture in a country. Providing consumers with organic products will improve public health and food safety. It will also make contributions to all stakeholders involved in every stage of agricultural activities such as pre-production, production, harvesting, post-harvest, and marketing. There are several methods of distribution organic products to consumers. The most frequently used method is mainstream retailers who were very effective in developed countries, particularly in Europe and North America. Local organic bazaars are also very effective, particularly enabling small producers to reach the market and providing cultural exchange between rural and urban people.

Material and Methods: This study mostly used qualitative methods reviewing previous work, secondary data, governmental reports, and points of views and opinions of subject matter experts. Main subjects covered in this study include the developments of local organic bazaars in Turkey, types of organic products supplied in these bazaars, basic marketing strategies applied, and possibilities and opportunities of developing and increasing these bazaars in a sustainable way.

Results: Results of this study showed that there are 18 organic bazaars in Turkey and there is a remarkable potential to increase this number. Organic bazaars were initiated with the initiative of NGOs and municipalities. Producers and consumers are highly satisfied with organic production and consumption, respectively. However, the number of bazaars and variety of products aren't at a satisfactory level. There is a misunderstanding among some consumers that organic products are only for higher income consumers.

Discussion: Establishment of local organic bazaars is one of the preferred marketing methods of organic products. To open more organic bazaars, provincial and district directorates of the Ministry of Food Agriculture and Livestock must bring together all the stakeholders including producers, consumers, processors, municipalities, and civil society organizations. Results of this study will provide useful information for scientists, policy makers, suppliers, consumer organizations, and extension practitioners in Turkey.

Keywords: Organic bazaars, Ecological products, Marketing of organic products
Effects of Environmental Pollution on Honey Production in Turkey

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Introduction: Environmental pollution, climate change and the natural balance resulting from overuse of resources are deteriorating. This threatens the lives of people and other living things. In recent years, bees are at the forefront of living things that are most affected by industrial pollution, drug use in agriculture, and fuel consumption. It is stated that changes in the climate cause irregularities in colony development and the formation of weak colonies, widespread disease, the return to the hive of field bees and their deaths. The destruction of natural resources and honey bees with environmental pollutants poses a significant threat to the world. Turkey ranks second after China in the world honey production. Turkey is a decrease in the yield of honey per hive in question in recent years.

Material and Methods: Turkey's 1990-2014 years honey production with environmental pollution indicators methane (CH4), carbon dioxide (CO2), nitrous oxide (N2O) emissions in industrial production index Granger causality analysis was performed.

Results: This study evaluated Turkey apiculture in general, the effect of the honey production of environmental pollution and industrial production index was investigated. As a result of the analysis made, a one-way causality relation from the industrial production index to total honey production was determined. In the same way, a one-way causality relationship from CH4, CO2 and N2O emissions, which are indicators of environmental pollution, towards honey production has been established.

Discussion: Beekeeping is one of the sectors most affected by environmental pollution and climate change. Besides the importance of honey and other bee products, global food production is impossible without dusters such as honey bees. In recent years, honey bee populations in the world have been alarmed by the increasing deaths. Environmental pollution, pesticides and industrial pollution are shrinking habitat of honey bees in Turkey. Beekeeping should be considered important, supported and all concerned should be conscious for the continuation of the country's agriculture and natural life. Action plans at local, regional and national level should be established.

Keywords: Honey Production, Environmental Pollution, Turkey
Local Seed Usage and Producer Awareness in the Protection of Agricultural Biodiversity (Kastamonu Taşköprü Garlic)

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Introduction: Garlic, which is used as medicine and food, is produced in many countries and has an important place in the foreign trade of the producing countries. Taşköprü garlic constitutes 25% of Turkey's garlic production. Taşköprü Garlic is a very hard and sharp smelling, high quality and storage resistant type and is preferred in indoor and outdoor markets. In this study, Taşköprü garlic was mentioned. Taşköprü garlic is an important part of Turkey's biological diversity, the country's agriculture and safe food.

Material and Methods: The main material of the study is the data obtained from questionnaires made with 92 producers of garlic in Taşköprü district of Kastamonu province. In the study, especially the local seed use of producers and their knowledge, awareness and behavior were examined. A 5-point likert scale was used to measure knowledge, awareness and behavior of producers. In addition, socio-demographic and economic variables and Khi Square analyzes were conducted that affect the determination of the cultivation area of the garlic cultivation area by the producers.

Results: According to the results obtained; 45% of the producers think that the stone bridges are in danger of extinction. Approximately 80% of growers stated that local seeds are based on our food future, that small farmers are economically viable, that food safety is high, each region is proud of their traditional products and expresses their cultural identity, and their awareness is high. In the study, The average garlic cultivation area was 14 da. Some of the important factors affecting farmers' decisions to change their cultivation areas were income levels, ownership of property, and the length of time they spent farming.

Discussion: It is important gene center of the world because of its geographic structure of Turkey and ecological conditions. Local varieties are being replaced by hybrid varieties in search of yield increasing in agricultural production. This situation leads to the reduction or disappearance of local varieties with large preliminaries for plant genetic resources. In order to avoid similar problems in stone bridges garlic example, informative studies should be done.

Keywords: Taşköprü garlic, producer awareness, local seed.
The Trichoptera (Insecta) Fauna of Beyler Reservoir (Devrekâni, Kastamonu, Turkey)

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Introduction: In Turkey, there are approximately 200 natural lakes and 120 reservoirs, each with different structural and ecological features. A highland reservoir in the Western Black Sea region of Turkey, Beyler reservoir classified as inland reservoir in the region and it carries ecological importance. The change in water level is a physical feature that differentiates reservoirs from lakes. The macro-invertebrate density and biomass in reservoirs may be equal to or higher than those of natural lakes due to regular water release regimes. In order to determine the taxonomic composition, biodiversity and abundance of the Trichoptera fauna of the Beyler reservoir, 5 stations determined and sampled between June-September of 2016 and 2017.

Material and Methods: Adult caddisfly specimens were collected with entomological net and light trap (6 W BLB floresan bulb). The caddisfly larvae at the reservoir were sampled at limnetic zone of 5 stations using a standart aquatic net (30x25 size with 500µ mesh). Samples were fixed in 80% ethanol immediately after collection, and they were taken to the laboratory. For the identification of samples, Leica APO S8 binocular stereomicroscope was used. The collection is deposited at the Laboratory of Zoology of the Faculty of Sciences and Arts, University of Kastamonu, Turkey.

Results and Discussion: In this study, 24 adults, 673 larvae and 11 pupae were collected. A total of 15 taxa, belonging to 9 genus of 5 families (Glossosomatidae, Psychomyiidae, Hydropsychidae, Limnephilidae, Leptoceridae) were identified. While the highest diversity and abundance of caddisflies were found at the 1st station, the lowest diversity and abundance were found at the 5th station. In addition, the abundance and diversity of Trichoptera taxa were determined to be highest in June and lowest in September. Agapetus nimbulus McLachlan, 1879 (Glossosomatidae) and Anabolia nervosa Curtis, 1834 (Limnephilidae) were new record for the Trichoptera fauna of Turkey. In addition to these, 5 caddisflies species are new record for Kastamonu Trichoptera fauna. With this study, the number of Trichoptera taxa in Turkey reached to 484 and in Kastamonu reached 76. As a result, this and similar studies will contribute to the Turkish Trichoptera fauna, and will also shed light on other systematic and ecological studies.

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Keywords: Caddisfly, water reservoir, new record, caddisfly biodiversity, Turkey
Determination of DNA Damage Caused by Different Salt Concentrations in Safflower Types with ISSR-PCR

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Introduction: Salinity is a major abiotic stress factor affecting plant growth. Safflower is one of the plants with high resistance to stress factors. This taxon is cultivated in Eskişehir, Burdur and Isparta. Parts of safflower are used the treatment of various diseases, and the flowers of the crop are used in the food, cosmetics, paint and pharmaceutical industries. Especially high tolerance against cold and hot temperature makes safflower an alternative plant for dry agricultural areas. In this study, DNA damage was detected in three different types of Safflower grown in different concentrations of KCl by ISSR-PCR

Material and Methods: In this study, seeds of three varieties of safflower, Balcı, Dincer and Remzi Bey were used as experimental materials. The seeds of each variety were germinated in seed beds which contains 100 seeds in vials. Distilled water used as control group and 50, 100, 150 mM KCl solutions were applied. The condition was 16 hours light/8 hours dark photoperiod and 25±1°C in growth chamber. DNA isolation was carried out by the method developed by Dellaporta et al. (1983). Also, the obtained DNAs were screened by ISSR-PCR technique using 6 different universal primers. According to the results of the screening, the DNA damage that occurred between the concentrations and cultivars was compared.

Results: According to the ISSR-PCR results obtained in the study, it was determined that changes occurred in each type of Safflower. It has been determined that the salt (KCl) at different concentrations causes different band profiles on the varieties. It has been determined that the applied 100 and 150 mM KCl solution is highly effective in Balcı varieties. Furthermore, When the aspir types were compared, it was determined that there are differences in the ISSR profile depending on the concentration applied.

Discussion: Salt stress causes changes in osmotic stress and ion balance in plants. In addition, it damages DNA, protein, chlorophyll and membrane function, thus exhibiting secondary effects with photosynthesis inhibition and metabolic toxicity. This study has shown that high concentrations of KCl salt cause damage to the DNA of Safflower varieties. While Remzibey variety is resistant to high salt concentration, Balci is sensitive. Remzibey variety is parallel to the literature. In addition, as salt concentration increased, there was a difference in ISSR-PCR profiles. These profile differences were also observed with different primers.

Keywords: Carthamus tinctorius, salt, ISSR-PCR
An Evaluation on Views of Local People about Tourism Activities in Rural Area Interaction with Agriculture: The Sample of Sapanca - Taraklı

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Introduction: Tourism is thought as an important alternative source of income for rural areas where is disadvantage in point of level of income. It is possible that tourism activities go hand in hand with agricultural activities in rural areas. At the same time, cultural structure inherent in region is protected while tourism activities are developing. Moreover, tourism activities can be built on rural values. On the other hand, it is also possible that tourism activities may develop against agricultural activities. It is known that tourism activities are built on Sapanca Lake and natural beauties around in Sapanca district of Sakarya province. It can not be said that tourism activities in the Sapanca county are too much integrated with agricultural activities. On the other hand, it is observed that tourism activities in Taraklı district are developed together with agricultural production and local culture. The tourism activities, which are mentioned in the Taraklı district, increase the market potential for agricultural products and other local products produced in the region. In this research, the interaction between agriculture and tourism has been tried to be evaluated from the perspective of people living in these two different processes related to tourism and agriculture activities.

Material and Methods: The main material of research consist of data obtained the survey study in the villages which are related to the districts where is determined. 25% of the total number of villages in each district are included in the scope of the survey. It has been decided to work with 50% of the number of farms in these villages. Thus, a survey was conducted by face to face interviews with a total of 117 farmers, 39 of whom were from Sapanca district and 78 Taraklı district. The obtained data were evaluated with descriptive statistics and percentage distribution tables.

Research Findings: According to the results of the research, 81.8% of the participants in Taraklı and 66.7% of those in Sapanca think that the development of rural tourism activities integrated with agriculture in the region is appropriate. Those who think that the development of tourism activities in the region will affect agriculture positively constitutes more than half of both districts (%56.4 ve %53.3) and the proportions of the two districts are close to each other. According to the results of the research, the general tendency of the participants in both districts is that tourism and agricultural activities continue.

Results: The development of tourism activities in areas where agricultural production continues is considered by local society. Besides, it is possible that the tourism activities are capable of enabling the sustainability of the agricultural activities and people, who live in district, prefer this alternative.

Keywords: Rural Tourism, agriculture and tourism, Sapanca, Taraklı
Building Panel Production from Waste Ashes: A Constructional Solution for Environmental Pollution

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Introduction: Fly ash (FA) and bottom ash (BA) that are industrial solid wastes are released during coal-burned industrial processes and cause important environmental problems. Some environmental problems caused by these waste ashes (WAs) include damage to textiles, rain and wind erosion. In the world, there are natural and artificial radiation sources that are inevitable for many uses such as energy production, medicine, industry, research, agriculture etc. But sometimes natural or artificial radiation can be dangerous and we need to protect us from such radiation. Radiation effects can be reduced by using various building materials which can be capable of radiation absorption. In terms of environmental technology, the conversion of waste into another product is referred to as "reuse" in the waste management hierarchy pyramid. The reuse solutions on industrial type of solid wastes need to be developed for WAs (FA and BA). The construction industry is the main sector where these wastes are used. In this study, it is aimed to evaluate the usability of industrial WAs in the production of economical and useful building panels and to determine their physical-mechanical properties including status of radiation absorption.

Material and Methods: WAs supplied from Afşin Elbistan Thermal Power Plant (AETPP) as FA and Bor Sugar Factory as BA, Portland cement supplied from ÇİMSA Cement Industry and Trade Inc., lime and moulding plaster in commercial types are the materials of this study. Sieve analysis was carried out in the WAs. The physical and mechanical tests (flexural and compressive strengths, bulk density, water absorption, porosity and radiation absorption) were planned. These experimental studies were carried out according to TS EN standards (TS EN 12859, TS EN 13279-1, TS EN 13279-2, TS EN 520+A1, TS EN 13950 and TS EN 14190). WAs ratios were specified in the range of 10-90%. The building panels were produced in combinations of WA+cement, WA+lime and WA+moulding plaster. In order to determine the radiation absorption status of the panels, a lattice system was designed consisting of nested lead plates in order to avoid uncontrolled radiation. Ordinary building panel and building panel produced from waste ashes will be compared in order to measure the radiation absorption of building panel.

Results: Preliminary results of the experiments show that compressive strengths of the AETPP FA in the combination of 80% WA+20% cement and 10% WA+90% cement were found to be 10 and 62.5 MPa, respectively. Preliminary results show that building panels has 10% or even more radiation absorption potential. Experiments will be continued for different physical and mechanical tests and new matrices will be created.

Discussion: According to 7-day compressive strength test results, it was determined that the WAs suitable raw material for the production of cementitious building panel. After all experiments are completed and physical and mechanical tests are carried out, the results will be discussed in comparison with the standards and literature studies.

Keywords: Building panel, Environment, Radiation absorption, Reuse, Waste ash
Determination of Pollens Content in The Atmosphere of Kars Province in 2016

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Introduction: The main task of pollen is to ensure the plant fertilization and it uses natural factors successfully to guarantee the fertilization. Wind-pollinated plants produce more pollen than the other pollination types. Pollens in a specific density in the atmosphere causes of allergic rhinitis, allergic conjunctivitis and allergic disorders such as allergic asthma in humans. Plant pollination has shown variation between plants depending on the season and plant pollination continue all year. This causes longer duration of allergic reactions in people with pollen sensitivity.

Material and Methods: Weekly pollen samples of Kars atmosphere were obtained by volumetric pollen trap (Lanzoni VPPS 2000). Weekly pollen samples were converted to daily preparation in the laboratory. Preparations were analyzed in Olympus CX21 light microscope. The obtained pollen data were converted to daily and monthly tables and pollen calendar was prepared.

Results: A total number of 49 taxa were identified. 24 of these taxa are woody (4643 pollen - %25.14), 25 of these taxa are herbaceous (13784 pollen - %74.64). The 0.22% of the total pollen (40 pollen) cannot be diagnosed. The pollen density which is greater than 1.00% plants are these followings: Poaceae (%39.52 – 7298 pollen/m³), Urtica spp. (%10.23 – 1890 pollen/m³), Cupressaceae/Taxaceae (%7.91 – 1461 pollen/m³), Artemisia spp. (%6.44 – 1189 pollen/m³), Chenopodiaceae/ Amaranthaceae (%3.91 – 722 pollen/m³), Betula spp. (%3.80 – 701 pollen/m³), Boraginaceae (%3.08 – 569 pollen/m³), Rumex spp. (%3.04 – 562 pollen/m³), Pinus spp. (%2.63 – 486 pollen/m³), Plantago spp. (%2.33 – 430 pollen/m³), Fraxinus spp. (%1.62 – 299 pollen/m³), Quercus spp. (%1.39 – 257 pollen/m³), Cedrus spp. (%1.18 – 217 pollen/m³), Salix spp. (%1.14 – 211 pollen/m³), Asteraceae (%1.10 – 204 pollen/m³) and Populus spp. (%1.07 – 211 pollen/m³).

Discussion: The woody plant pollens reached its highest level in April while the herbaceous plant pollens in June. The woody plant pollens reached its lowest level in October while the herbaceous plant pollens in December.

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Keywords: Kars, Pollen, Pollen calendar
Atmospheric Pollen Diversity of Ardahan Province in 2016

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Introduction: So far many investigation has been carried out for determining of atmospheric pollens content in many regions of Turkey however some provinces located in East or North-East Anatolia regions haven’t been completed yet. That is why, Pollen contents of Ardahan, province were aimed to determine in this study.

Material and Method: In this study, Lanzoni pollen traps (Lanzoni VPPS 2000) were used for the pollen sampling in the atmosphere of Ardahan province in 2016. Pollen samples were converted to daily pollen slides in the laboratory and examined under a light microscope and pollen calendar were prepared from pollen data of the these provinces.

Results: In this study, total 38521 pollen were determined during the study period. It was found that the nonaroreal plant pollens were 76.07% and arboreal plant pollens were 23.85%. The 0.08% of the total pollen (32 pollen) cannot be diagnosed. Nonarboreal plants pollen in the atmosphere of Ardahan were listed as follows: *Urtica* spp. (%38.76 – 14929 pollen/m³), *Poaceae* (%21.73 – 8370 pollen/m³), *Artemisia* spp. (%4.20– 1619 pollen/m³), *Boraginaceae* (%3.81 – 1467 pollen/m³), *Rumex* spp. (%2.29 – 881 pollen/m³) and *Apiaceae* (%1.70 – 655 pollen/m³) ve odunsu bitkilerden. Arboreal plants pollen were also listed as follows: *Pinus* spp. (%6.22 – 2395 pollen/m³), *Cupressaceae/Taxaceae* (%4.52 – 1740 pollen/m³), *Populus* spp. (%3.08 – 1185 pollen/m³), *Cedrus* spp. (%3.00 – 1157 pollen/m³), *Betula* spp. (%1.75 – 674 pollen/m³) and *Fraxinus* spp. (%1.15 – 443 pollen/m³).

Discussion and Conclusion: The season of allerjen pollen and it’s concentration in the atmosphers of Ardahan province were determined in this study. This data will helpfull for both doctors and patient suffering from allergic disease. It will also helpful for exact diagnosis and the treathment of allergic disease by pollen calendars showing polliation periods of plants. Maximum pollen concentration (55.42%) of Ardahan atmosphere was recorded in June and this inerace was found to result form *Poaceae* and *Urtica* pollen concentration (15.57%, 22.53%).

Keywords: Ardahan, Pollen, Pollen calendar

Acknowledgements: I would like to thank TUBITAK for its financial support (Project number KBAG–113Z649).
Introduction: In flowering plants, reproductive cells which carry male gametes are called as pollen and they provide fertilization. Anemogam plants produce a large number of pollen to guarantee the fertilization and these pollen grains are transported in the atmosphere for a long time. When wind loses its effect, some pollen grains fall on land and water, some of them go on flower's stigma to provide fertilization and the others go to the respiratory system of human body and cause allergic reactions. These reactions are allergic rhinitis, allergic conjunctivitis and allergic asthma. The fallen pollens can be moved back into the atmosphere by wind and that causes longer duration of the allergic reactions.

Material and Methods: In this study, the atmospheric pollen of Ardahan atmosphere was investigated by using VPSS 2010 (Lanzoni) device which is volumetric method between 1st January 2015 - 31st December 2015. Weekly pollen samples were converted to the daily preparations and they are painted by woodhouse method. Preparations were analyzed and counted in light microscopy.

Results: As a result of atmospheric pollen sampling 23149 (pollen/m³) pollen grains of 42 taxa were detected. While 22 of total taxa were determined as woody plants (25.01% - 5790 pollen), 20 were of these taxa were found as other herbaceous plants (44.58% - 10319 pollen). Poaceae was found as 30.20% in the study period. Unidentified pollen concentration was seen 0.21%. In the studied region, taxa are identified as intense are Poaceae (%30.20 – 6992 pollen/m³), Urtica spp. (%23.16 – 5362 pollen/m³), Pinus spp. (%8.26 – 1913 pollen/m³), Boraginaceae (%7.00 – 1621 pollen/m³), Artemisia spp. (%6.22 – 1439 pollen/m³), Cedrus spp. (%5.78 – 1338 pollen/m³), Betula spp. (%3.37 – 779 pollen/m³), Rumex spp. (%3.04 – 703 pollen/m³), Populus spp. (%2.62 – 607 pollen/m³), Salix spp. (%1.25 – 290 pollen/m³) and Apiaceae (%1.53 – 355 pollen/m³).

Discussion: Maximum pollen concentration (55.11%) of Ardahan atmosphere was recorded in June and this increase was found to result from Poaceae, Pinus and Urtica pollen concentration (19.05%, 7.94%, 12.13%).

Acknowledgement: We would like to thank TUBITAK for its financial support (Project number KBAG-113Z649).

Keywords: Airborne pollen grains, Ardahan, Ardahan Pollen Calendar
Introduction: Mid-winter waterfowl count is one of the most basic methods used to monitor long-term changes in waterfowl populations and wetland ecosystems. In this study, it was aimed to determine the bird species wintering in the Obruk Dam reservoir and population sizes, which have not been previously studied.

Material and Methods: Point transects and line transects count methods were used during field works. Point transect counts were made at 8 different predetermined spots and line transect counts were made on the lake by Hitit University boat named "Hitit Güneşi". Field studies were done by using 100/400 telephoto objective, DSLR camera, two 10x42 binoculars, two 20-60x50 telescopes and one mechanical counter on November-December 2017 and January-February 2018.

Results: We recorded 48 bird species; 2 Podicipediformes, 1 Suliformes, 3 Pelecaniformes, 4 Anseriformes, 7 Accipitriformes, 2 Falconiformes, 1 Gruiformes, 2 Charadriiformes, 2 Columbiformes, 1 Coraciiformes, 1 Piciformes and 22 Passeriformes. 14 of these species were waterbirds and according to IUCN redlist, *Aegypius monachus* and *Turdus iliacus* are listed as NT and rest of all the species is listed as LC. In winter season of 2017-2018 *Fulica atra*, *Anas platyrhynchos* and *Tadorna tadorna* were the most observed species with 23,772, 1151, 761 individuals, respectively. Total number of recorded water birds was 26,975.

Discussion: This study is important because of being the first research on birds wintering in Obruk Dam reservoir and will be used as a basis in future studies in Obruk Dam reservoir. When compared with mid-winter waterfowl counts of 2017 done by DKMP around Turkey, Obruk Dam reservoir was the 17th wetland in 65 wetlands in terms of individual number. In Beyler and Karaçomak dam lakes in Kastamonu province which are neighboring Çorum; 22 and 17 water bird species were determined respectively with previous studies. Obruk Dam reservoir started to keep water in 2007, 13 and 34 years after Beyler Dam and Karaçomak Dam reservoirs. Obruk Dam reservoir has 50 km² surface areas which is bigger than Beyler and Karaçomak Dam reservoirs. According to these data we can state that Obruk Dam reservoir will be a big and an important habitat for water birds in the future and water bird numbers use the dam will be increased. Obruk Dam formed a new habitat for water birds in Çorum and biodiversity of Obruk Dam reservoir should be observed in the future in order to determine new habitats inside the dam for wintering birds.

Keywords: Wintering Birds, Obruk Dam, KOSKS, Biodiversity
**Introduction:** The 'slow city' movement that considered in the context of sustainable local development, has emerged as the continuation of the 'Slow food' movement in Italy that occurred in response to the global food chains destroying local delicacies in the 1990s. The concept of a slow city which emerges as an alternative to modern urbanization, offers to local people the opportunity to live in a city which is far from environmental problems and where the natural and cultural resources unique to it are protected. In addition, it is emerged as a concept of a self-contained city in which traditional products are produced and the natural and cultural values of the city are protected and developed with controlled and sustainable tourism concept. At this point, the perspectives, perceptions and expectations of the local authority and the local people living these cities to the concept of 'slow city' are very important. The perception of the local authority and the local people will be measured with a questionnaire study was carried out on local population. Also, the relevant evaluations will be done by determining the expectations from this city model.

**Material and Methods:** The material of the study is the Perşembe county of the Ordu Province on the Black Sea coast of Turkey, which was declared a slow city on 21 October 2012. One to One Questionnaire will be applied to urban residents selected randomly from Ordu-Perşembe residents. The sample size was determined as 379 people. Within the scope of the study, the local authority’s views, evaluations and targets for the Perşembe county and their perception of the slow city movement will be learned from interviews with the local authority. We aim to learn the perceptions of urban residents about the slow city application and its advantages. Also their expectations, satisfaction and requests will be determine about slow city application with this survey. Statistical analyzes will be applied to the survey and the results will be shared with the local administrations. Non-parametric statistical evaluation methods will be used for the evaluation of the survey results.

**Results and Discussion:** The survey study is now in progress. The relevant analysis will conduct after the survey work has been completed.

**Keywords:** Slow city, Perception, Local authority, Local people, Perşembe-Ordu
The Effect of Low Temperature Degrees on Pedunculate Oak (Quercus robur L.) Seeds

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Introduction: Low temperature stress, which is one of the factors affecting growth, productivity and distribution of plants, interrupts biochemical activities of during seedling and tree stage. Low temperatures effect the distribution of plants reducing metabolic activities, growth and vitality of plants depending on the duration and intensity.

Pedunculate Oak generally distributes in Marmara, West Blacksea, Central Anatolia and Lakes Regions of Turkey. Especially, drought and frost stresses affect negatively nursery and afforestation activities. Also, Pedunculate Oak acorns mature in october and are sown in nurseries during december. Accordingly, acorns are exposed to low temperatures in nurseries during winter. For this reason, determination of tolerances to low temperature degrees of acorns and seedlings is very important in decreasing frost damages during seedling production.

Material and Methods: In this study, the effects of low temperatures on acorns collected from 4 Pedunculate Oak trees occur in Çankırı city center and Korgun district were investigated. In this context, acorns were exposed to -10, -15, -20 °C temperature levels. In addition, one group was separated as control samples. Acorns were stored in closed pots at +2 °C with 70-80% moisture level in a fridge until the test time. Frost tests were carried out between 15th-20th February in 2018. Test was started at 0 °C and decreased to predetermined temperature degrees with a 5 °C/h¹ gradual decrease. Acorns have been kept for 5 hours at this temperature degree and then increased to 0 °C with the same changing speed. Frost damages on the acorns exposed to low temperature levels were determined using germination and tetrazolium tests following ISTA (1996) rules.

Results: According to low temperature levels, while germination rate was found 83% for control group, it was 25%, 1% and 0% for -10 °C, -15 °C and -20 °C respectively. Tetrazolium test showed 93% vitality rate for control group and 30% for -10 °C, whereas whereas it was 0% for lower temperature levels.

Discussion: Results showed that frost damage on acorns of Pedunculate Oak started at -10 °C and a sudden fall in germination and vitality rates were occurred at lower temperature levels. For this reason, further studies must be carried out using short temperature intervals between 0°C and -10°C in order to reveal the exact cold hardiness levels.

Acknowledgement: We would like to express our appreciation to the Çankırı Karatekin University Scientific Research Project Commission, which supported this study (ÇAKÜBAP - OF200217B40).

Keywords: Pedunculate Oak, Seed, Acorn, Cold hardness, Plant stress physiology, Germination test, Tetrazolium test.
Introduction: There are several abiotic and biotic factors responsible for damage to oak acorns. While stress factors such as water stress and cold hardiness are among the important abiotic factors, insect and fungi represent the principal biotic factors to influence the vitality of seeds either during germination or under storage conditions. Additionally, abiotic factors can act as predisposing (weakening) or contributing factors in increased susceptibility of plant tissues to fungal attacks. Even though oaks are among the essential forest trees in Turkey, the impact of neither the abiotic nor the biotic factors on oak seeds have been studied in Turkey. This study aims to assess the fungal colonization and associated fungal communities of oak acorns damaged by low temperatures.

Material and Methods: Pedunculate Oak (Quercus robur L.) acorns were exposed to controlled freezing temperatures (-10, -15, -20 °C) and the frost damages on the acorns were determined using germination tests following ISTA (1996) rules. Fungal colonization of these seeds as well as those of control groups were monitored for 40 days during the germination tests. Seeds with any visual signs of fungal growth on the pericarp were counted at each observation day and were separated for fungal isolations. Fungi were isolated from the pericarp, seed coat and cotyledons of infected seeds. Identification of obtained isolates were conducted via sequencing their rDNA’s internal transcribed spacer region (ITS) region.

Results: The occurrence of fungal infections were significantly higher on seeds exposed to low temperatures compared to controls. No seeds exposed to -200°C were germinated. Besides, almost all were colonized by fungi (96 %). A similar high fungal infection percentage was recorded for seeds exposed to -15 0°C (94 %). However, the percentage of seeds colonized by fungi were lower on seeds exposed to -10 0°C (62 %) in comparison to those exposed to lower temperatures. Fungal colonization, even though significantly low, was also observed on controls (8%).

Discussion: The fungi associated with oak acorns were studied for the first time in Turkey, and many fungi including well know pathogenic acorn fungi with the potential to inhibit or completely prevent vitality of seeds during storage or further development of germinant were detected. Fungal colonization of seeds damaged by low temperatures possibly results from the increased susceptibility of dead or severely damaged tissues to saprophytic fungi.

Acknowledgment: This study was partly supported by Çankırı Karatekin University Scientific Research Project Commission (ÇAKÜBAP- OF200217B40).

Keywords: Pedunculate Oak, Seed, Acorn, Cold hardiness, Plant stress physiology, seed pathology, fungal colonization, seed fungi
Mapping Seagrass in Gökova Bay Using Optical Satellite Images

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Introduction: The ecological environment where marine animals, plants and other organisms live in is named as Benthic Habitat. Seagrass is an essential endemic marine species and an important part of Benthic Habitat which prevents coastal erosion and regulates carbon dioxide absorption in both undersea and atmosphere. Seagrasses affects biological, biogeochemical and physical processes in coastal areas, so its sustainability needs to be maintained. In this research is to determine the suitability of Worldview-2 (WV-2) high resolution multispectral data in classifying and mapping benthic habitats, specifically seagrass meadows. Worldview-2 provides an increased number of spectral bands for high-resolution image, from the traditional 4 bands to 8 bands. In this study, it is aimed to define the ratio of presence and to map seagrass meadows which has been put under protection against extinction in Turkey.

Material and Methods: The study area was a part of Gökova Bay which is a marine protected area. The acquisition date of WorldView-2 satellite image data used on this study is July 20, 2010 In this study radiometric and atmospheric correction were performed using Fast Line-of-sight Atmospheric Analysis of Hypercubes (FLAASH) model and MODerate resolution atmospheric TRANsmission. Seagrass coverage maps are produced by applying minimum distance supervised classification technique on pre-processed image.

Results: A total area of 20.12 kilometre square has been classified. Seagrass seems to be present at the %13.98 of study area. Rest of the area mostly consists of sand.

Discussion: The mapping approach and the map products presented in this paper will be an useful and efficient information source for seagrass beds monitoring and management in Turkey.

Acknowledgement: This work was supported by Research Fund of the Yıldız Technical University. Project Number: 2015-05-03-YL05

Keywords: Seagrass, Worldview-2, Image Classification, Optical Remote Sensing
The Possible Link between Cytosine Methylation and Z-Form DNA in Heavy Metal-Acclimated Freshwater Bacterial Isolate

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Introduction: Heavy metals, though not among the most commonly found elements in biological systems, are of special interest in the field of ecology. The study of heavy metal acclimation mechanisms in bacteria is important as these organisms may be used for the bioremediation of heavy metal polluted areas.

Material and Methods: *Gordonia* sp. isolate was quantified using Colony-Forming Unit (CFU) assay. The bacterium was grown at their minimum inhibitory concentrations (MIC) and gradually acclimated to cadmium (Cd), lead (Pb) and silver (Ag) until the end-point acclimation MIC’s were reached. Afterwards, chromosomal DNA was purified and analyzed with Attenuated Total Reflectance (ATR)- Fourier Transform Infrared (FTIR) Spectroscopy coupled with Chemical Pattern Recognition Techniques, namely Principal Component Analysis (PCA) and Hierarchical Cluster Analysis (HCA). Furthermore, global DNA methylation were quantified by measuring 5-methylcytosine levels in an ELISA assay.

Results and Discussion: We measured extensive changes in the backbone and sugar conformations in DNA of acclimated bacteria. There were significant increases in the quantity of Z-form DNA, indicating that heavy metal acclimation significantly favours the formation of Z-DNA. For all heavy metal-acclimated bacteria groups, the significant decreases and increases were observed for N-type (C₃'-endo puckering) and S-type (C₂'-endo puckering) sugars, respectively. This could correlate to the change in quantity of Z-form DNA, which adopts a C₂'-endo puckering. The PCA and HCA demonstrated clear-cut differentiation between DNA’s of control and heavy metal-acclimated bacteria. The obtained methylation profile of Cd-acclimated bacterial DNA was completely different from control, Pb and Ag-acclimated bacterial DNA. We found 49% hypermethylation in Cd-acclimated DNA compared to control DNA. However, we measured hypomethylation in DNAs of Pb and Ag-acclimated bacteria. The DNA of Pb-acclimated *Gordonia* sp. demonstrated 52% hypomethylation with respect to control DNA. In case of Ag acclimation, the hypomethylation was found as 42% in comparison with control DNA. In this study, we revealed the changes in the conformational and methylation state of the DNA of freshwater bacteria acclimated to live and grow at high concentrations of heavy metals. The presented data shows that the changes in DNA conformation and methylation state may allow the bacteria to survive in otherwise inhibitory heavy metal concentrations. These mechanisms may play just as important a role as genetic changes in acclimation to toxic environments.

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Keywords: Freshwater bacteria, DNA methylation, DNA conformation
Introduction: The fundamental inputs used by tourism, which became the most important industry in the world, as an economic development and employment generating sector are natural and cultural values. Cultural values play an important role in the formation of tourism at local, national and international levels. The concept of “cultural tourism” developed in this context points to the need to pay sufficient attention to sustainable goals of cultural heritage during its transformation to an object of tourism. Because, while contributing to the recognition of cultural heritage, tourism also leads to its devastation at the same time.

Malatya has not been able to express itself sufficiently in terms of natural or cultural tourism. Tourism statistics show that the province is far behind in this sense. Malatya, which is trying to develop by particularly being backed by the apricot production, needs to publicize its cultural potential and offer it to the tourism sector at this point. Within the scope of this study, cultural route planning is tried on Malatya province and its immediate surroundings.

Integrity in cultural landscaping can contribute to the continuity of the intersection of the interface between ecology and culture. The cultural routes provide a dynamic approach that takes into account the integrity of all cultural practices, including traditional ecology, structure and morphology, as well as the continuity of the mentioned interface.

In the Province Tourism Master Plans that are made in our country, the individual authentic items are put in the foreground and the integrity of these individuals is not considered.

Material and Methods: Cultural route planning has been tested on the province of Malatya and its immediate surroundings.

Results: In the region, many thematic routes, harboring very different types of tourism and tourism activities, have been identified. Within the scope of the main focus of cultural tourism, thematic routes are determined on the basis of region, province, district and village.

Discussion: In Turkey, because of unrecognized cultural heritage values, especially in recent years the need for responsible tourism has increased. Because tourism planning takes place in accordance with short-term investments. It is necessary to ensure the integrity of culture-oriented values with nature. In the tourism master plans of the provinces, the individual authentic items are put in the foreground and the integrity of these individuals is not considered.

The cultural routes offer a new perspective to protect cultural heritage and to evaluate natural and cultural values in an integrated approach.

Keywords: Cultural Routes, Cultural Landscape Heritage, Tourism, Malatya
Introduction: Next to vertebrate, insects are the only invertebrate that uses acoustics for their communication. Acoustic communication requires signaler and conspecific or hetero-specific receiver. Orthopterans are one of the dominant insects that uses acoustic signals mainly for conspecific mate attraction. On the other hand, ears and ultrasound producing structure in moths (Order: Lepidoptera) are known to have evolved primarily to detect and defend against their predators i.e. bats. Studies on bat-moth arms race have enriched our understanding on the basic mechanism behind ultrasound production and role of moths tymbal organ in defending against bats. As most of the studies have been performed from a behavioral perspective, our knowledge, however on the structural diversity of tymbal (ultrasound producing) organ’s in different moth species have failed to grow proportionately. The present study therefore, has been undertaken to document the structural variation in tymbal organ of Indian moths belonging to family Erebiidae.

Material and Methods: Specimens were collected from different localities in India using light trap sampling method. Killing jar containing ethyl acetate was used to capture and sacrifice individual moths for lab study. Dry preserved moth specimens were observed under Leica S8 APO stereo zoom microscope to descale the meta-episternum region. Exposed tymbal organ thereafter was gold plated and imaging was carried out using scanning electron microscope at 1-2kV resolution using JEOL JSM-6010 PLUS/LV at Sophisticated Instrument Centre, Punjabi University, Patiala.

Results: Detailed images of tymbal organ of 10 moth species belonging to subfamily Arctinii and Lithosinii has been recorded. All studied species show interspecific variation in the size and shape of their tymbal organ. In addition, variation in structure and pattern of ridges has also been observed across species.

Discussion: The present study is first of its kind to be performed to understand structural diversity of tymbal organs in a comparative framework. Based on our preliminary results, species-specific uniqueness, in size, shape and structural arrangement of cuticular ridges have been observed. Such structural specificity may serve as a useful and reliable morphological feature in the field of moth taxonomy to ascertain species identity.

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Keywords: Moths, Bioacoustics, Tymbal, Ultrasound, Erebiidae, Systematics
Biobarrier Formation on Natural Zeolite For Sustainable Bioremediation

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Introduction: Biobarriers are a new technology designed to control or prevent flow from a specific site to groundwater as an alternative to conventional impermeable barriers. Nonpoint source pollution in the biobarrier is accomplished by degradation the pollutant carried through the pores of the bio-barrier with the help of microorganisms on the barrier. The structure, which is defined as filling material in barriers, is not only used as a carrier, but also has an effect on the performance of the treatment. In this study, there is reason to be that the microorganism development surface is zeolite in the upstream column reactor used to form the bio-barrier. In the literature, studies have been carried out to treat various pollutants by forming biofilm on the surface of natural zeolite. Natural zeolite is a good support material for biofilm. In addition, the use of natural zeolite is economical in its use as an inexpensive treatment.

Material and Methods: In this study, a system has been developed to study the elimination of pesticide using biobarrier. In the studies using column reactor, three types of microorganism strains and zeolite were used as the filling material and the flow was uniaxial. On the natural zeolite surface, an electron-beam x-ray spectrophotometer chemical characterization was performed to determine whether biofilm developed. In order to compare with the zeolite sample which develops biofilm, the electron zeolite x-ray spectrophotometer chemical characterization has been performed in zeolite obtained after natural zeolite sample and zeolite 550°C with biofilm removed from the column and burned.

Results: The chemical characterization is made for the elements of Al³⁺, Si²⁺, Fe²⁺, K⁺, Ca²⁺, Na⁺, Mg²⁺ which are natural zeolite. In addition, N, P and S in the microorganism structure were analyzed. Phosphorus nitrogen, iron and sulfur ions are looked at to determine biofilm formation. When elemental analysis is performed after natural zeolite and biofilm-coated natural zeolite are burned at 550°C, we can see that these ions can not be determined. This result confirms the formation of bio-barrier on the zeolite surface.

Discussion: This work demonstrated the formation of biofilm on zeolite surface. Natural zeolite is found to be an important material for pollution removal by forming bio-barrier.

Keywords: Biobarrier, Bioremediation, Natural Zeolite
Introduction: In recent times increasing energy demand has led to environmental problems and deterioration of ecological balance. In order to be minimally affected by these emerging problems, humankind has developed climatic designs. Bioclimatic comfort of human has taken into account in the developed climatic designs. The temperature range in which the person feels physically and psychologically most comfortable, represents the bioclimatic comfort zone.

Material and Methods: In this study, the data of climate in Iğdır city center for 1 year is obtained by the State Meteorology Station, and bioclimatic comfort parameters are produced and future scenarios are created for design and planning. These data have been analyzed in the Rayman Pro 1.2 program by adapting to usage of urban open and closed space.

Results and Discussion: According to the results of the analysis, it is determined that the places where the construction is intense in the summer months are more comfortable between 17:00 and 00:00, and the open spaces are more comfortable between 00:00 and 17:00. Based on these comfort analyzes, it is thought that a resource will be created in the urban planning for the future by obtaining comfort-sensitive maps of Iğdır city center.

Keywords: Iğdır, Bio-Climatic Comfort, Climate
Spatial and Temporal Variation of Soil Pollution across Mega-city İstanbul (Turkey)

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Introduction: Due to rapid growing of industrialization and urbanization, soil pollution has become one of the major environmental problems worldwide. Metals are known to be one of the most important parameters leading to soil pollution. Metals in soil become airborne by the action of wind and transported to human and animal bodies by inhalation. In addition, metals become soluble in surface and groundwater and thus adversely affecting the living organisms present in the aquatic ecosystems. For these reasons, metals bound to soil particles do not only influence the soil but also the other environmental compartments (such as air and water) and hence threat the health of human being. İstanbul, which is a mega-city, is considered to be one of the most significant cities of Turkey in terms of industry, economy and urbanization. In parallel to increased industrialization and urbanization, intensified soil pollution particularly in terms of metals in addition to other environmental problems is currently taking great attention. The main objective of this study is to find the spatial and temporal variation of soil pollution in terms of metals across the İstanbul.

Material and Methods: In this study, soil samples were collected at 22 different points in İstanbul between September and December 2014. The pH content of the soil samples were determined by following the 9045D method developed by USEPA. Electrical Conductivity (EC) was also measured with the same pH meter. The metal content of the samples were determined by PANANLYTICAL AXIOS Advance model WDXRF instrument. The elements measured in this study were U, Br, Sc, Th, Ga, Nb, As, Co, Sn, Y, Nd, La, Ni, Pb, Cu, Ce, Rb, V, Zr, Cr, Sr, Zn, Ba, Mn, S, P, Ti, Mg, K, Fe, Ca, Al and Si. The accuracy of the measurements was checked by analyzing different standard reference materials. In addition, labile fractions of the metals were also determined in this study by ICPMS followed by microwave assisted digestion.

Results: pH measurements revealed that mean pH of the soil samples was 7.09±0.39 while the corresponding values were ranged from 6.1 to 7.9. The obtained EC values changed from 120 to 2700 µS/cm while average EC was found as 763±537 µS/cm. The levels of total metals were ranged from 1.94±0.56 ppm for U to 26.5±3.57 % for Si. The mean concentration for Cr for the whole study period was determined as 176±196 ppm, which exceeded the allowable Cr concentration threshold value (100 mg/kg for pH > 6.0) in Turkish Soil Pollution Control Regulation. On the other hand, the exceedances of other metals regulated by this regulation were observed at individual sampling sites during the study.

Discussion: The levels, temporal and spatial variation of metals found in İstanbul soil composition were assessed in this study. Only Cu and Cr levels showed statistical difference between the months during the study. Beşiktaş, İkitelli and GOP were the sites that we observed exceedances during the study.

Acknowledgement: We thank to Turkish Scientific and Technological Research Council (TÜBİTAK), which supported this study with grant number 117Y204.

Keywords: İstanbul, Soil, WDXRF, ICPMS, Metals
Impact of Traffic Emissions on PM$_{2.5}$ Chemical Composition in Mega-city İstanbul (Turkey)

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Introduction: It has been reported that about 90% of the World population exposed to PM$_{2.5}$, particulate matter with aerodynamic diameter is less than 2.5 µm, levels exceeding the threshold value set by WHO in 2014. Many researchers have also shown strong link between the PM$_{2.5}$ levels and respiratory diseases. Unfortunately, few cities including İstanbul are able to keep the levels of this pollutant below the threshold values of WHO. It is also noteworthy to mention here that PM$_{2.5}$ is one of the air pollutants that is currently not regulated by Turkish Air Quality Control Regulation. The objective of this study is to find the diurnal variation of metals bound to PM$_{2.5}$, which will provide information about the impact of traffic emissions on the PM$_{2.5}$ chemical composition.

Material and Methods: Six hour long PM$_{2.5}$ samples were collected on 47 mm diameter PTFE filters with Thermo Scientific Sequential sampler between 14/11/2014 and 28/01/2015 at a traffic site (Beşiktaş), İstanbul. After PM mass concentration determined, samples were digested in strong acidic medium using microwave oven and analyzed by means of ICPMS. Around 56 parameters from Li to U, was determined in this study. The accuracy of the measurements was checked by analyzing standard reference materials, which were digested and analyzed under the same conditions with the PM$_{2.5}$ samples. In addition to PM$_{2.5}$ sampling, real-time measurements were also taken from a meteorological sensor, one NO$_x$ and O$_3$ monitor during the study.

Results: Average 6-hour long PM$_{2.5}$ mass concentration was found as 30.2±14.3 µg/m$^3$ during study period while minimum concentration was observed in October (22.6±8.8 µg/m$^3$) and maximum level was determined in January as 40.8±30.1 µg/m$^3$. Once the diurnal profile of the PM$_{2.5}$ levels were compared, it has been found that there is a statistically significant difference ($p<0.05$) in the each quarter of day and relatively higher concentrations during 18:00-24:00 and 24:00-6:00, which implied that both the traffic emissions and mixing height affecting the measured PM$_{2.5}$ concentrations at the sampling site. The metals, which did not show any statistically significant ($p>0.05$) variation during day were Hg, Se, As, Se, V, Rb, Ba, Ge and Bi while Pb, Sb, K and Cd were the elements that we observed statistically significant difference during the 6-hr long time measurements.

Discussion: The diurnal variation of PM$_{2.5}$ and metals associated with this pollutants was investigated in this study.. The results revealed that both PM$_{2.5}$ mass and metals bound to it are under the influence of traffic emissions and boundary layer height at the sampling site.

Acknowledgement: We thank both to TÜBİTAK (Project No: 113Y025) and Abant Izzet Baysal University Scientific Research Project Commission (Project No: BAP –2015.09.02.825) for supporting this study.

Keywords: İstanbul, PM$_{2.5}$, ICPMS, Metals
Effects of an Insect Growth Regulator, Fenoxycarb, on 7th instar larvae of Greater Wax moth, Galleria mellonella

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Introduction: Greater wax moth, Galleria mellonella (Linnaeus, 1758), is an economically harmful species that causes loss of beekeeping industry because they feed with larvae honeycombs. Culture can be carried out easily and cheaply in laboratory conditions. Fenoxycarb is an “III. Generation pesticide”, called insect growth regulators. Insect growth regulators have been produced with the aim of developing more specific chemicals whose targets are insects to reduce the adverse effects of pesticides on nature and life. They have reduced toxicity on the environment and target the endocrine system by creating hormone effects in insects. They disrupt normal hormonal balance and prevent growth, development and reproduction of insects. The majority of insect growth regulators currently available are juvenile hormone analogues (JHA) that mimic the action mechanism of juvenile hormone.

Material and Methods: The insect culture was carried out in the dark with synthetic food at 60 ± 5% humidity at 30 ± 0.5 °C in the incubator. Stock solution was prepared at 25 g / 2.5 l concentration with fenoxycarb dissolved in acetone. Eight different doses between 250 ng and 10 g were prepared by diluting and applied topically to the 0th day of last larval instar. The weight changes of the larvae were recorded and head capsule measurements were made. The results were evaluated statistically.

Results: At doses between 250 ng to 750 ng; it has been observed that 1) 27-47% of last larval instar larvae prolongated the stage 1 to 2 days and were normal pupation 2) 10% of larvae did not undergo metamorphosis and they were dauer larvae 3) 5% of larvae had growth retardation and finally died 4) 3% of larvae were darkened and quickly died 5) 35-65% of them had extra larval molting between 3-7 days. The rate of pupation in the larvae passing the extra larval stage was found to be 98%. At doses between 1 g and 2 g, the rate of 8th instar molting was 95%. At dose applications of 5 g and 10 g, almost all larvae passed 8th instar with a deviation of 3%. The pupation rate at the end of the 8th instar was determined as 99%. Rarely, more than one extra molting has been recorded.

Discussion: Application of 750 ng and over doses had extra larval stages in larvae. Application of JHA generally accelerated the start of larval molting. This effect is thought to be due both to the direct inhibition of the prothoracic glands and to the modification of the release of PTTH brain activity. Studies in Lepidoptera indicate that it is not always possible to obtain healthy larvae that can survive as a result of JHA applications. Healthy pupation by extra larval molting, despite the chemical application that the larvae were exposed to is remarkable as a strong strategy for survival among Lepidoptera.

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Keywords: Galleria mellonella, Fenoxycarb, insect growth regulator, extra larval molting
Phytase: A New Aspect For Environmental Phosphorus Pollution

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Introduction: Animal agriculture has caused increasing environmental pollution. Especially, the high load of phosphorus excretion by the monogastric animals has led to phosphorus pollution in water. One of the reasons for phosphorus pollution is plant-derived feeding that includes phytate. Phytase (myo-inositol hexakisphosphate phosphohydrolase; EC 3.1.3.8 and EC 3.1.3.26) hydrolyzes the phosphate moieties of phytic acid. Addition of phytase in poultry supplements helps reducing the phytate phosphorus excretion and enhances the feed quality. Besides, phytase-additive feed could balance phosphorus ratio in environment. Therefore, phytase is considered a potential candidate for use to decrease environmental problems by eutrophication and constant chelating of nutrient factors from the soil. In this study, we aimed to obtain microbial phytase and phytase-producing microorganisms where isolated different places in poultry house.

Material and Methods: All soil samples were taken from barn and poultry house. Each sample was diluted with sterile saline solution. After serial dilution, 50 µl volume sample was taken from each dilution and inoculated on Phytase Screening Medium (PSM) agar plate. All plates were incubated at 30-37 °C for 24-48h. Clear halo zone were considered as a phytase producing bacteria. The biggest zone diameter was selected potential producer isolate. PSM broth medium was used to produce phytase enzyme. Enzyme activity was measured by spectrophotometer.

Results: Obtained isolate for phytase producing was determined its halo zone diameter. Then enzyme activity was assayed Trichloroacetic acid method. Phytase enzyme was partial purified with salting out method. All results were evaluated by statistically.

Discussion: Phosphorus is one of pollutants for soil and water. It can be caused eutrophication with another contaminant. Agricultural pollution is one of the reasons that lead to rise phosphorus pollution. There are many other studies to make different way decreasing phosphorus pollution. Phytase enzyme would be another option to cut down phosphorus input to environment.

Keywords: Phytase, Phosphorus pollution
Suitable Site Conditions for the Distribution of Black Pine in Gölhisar District, Turkey

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Introduction: Black pine is the most widely distributed tree species used extensively in the forestry in Turkey and covers an area of approximately 26.6 per cent of the total forest area. It is one of the most importance of ecologically, socially and economically. This study was aimed at determining suitable areas for the potential distribution of black pine in the Gölhisar district located in the western Mediterranean region in Turkey.

Material and Methods: Presence – absence data of black pine was collected from 400 sample plots, which are size of 20 x 20 m. Explanatory data which are elevation, slope, radiation index, topographic position index, parent materials and landforms were used to potential distribution model and map of black pine. Potential distribution model and map of the black pine was composed by Generalized Addictive Model (GAM). To control the validation of model were calculated by means of Receiver Operating Characteristics (ROC) curve.

Results: Obtained model of black pine by means of GAM was configured explanatory variables, which are elevation, parent material and landform. GAM showed that places where sandstone and serpentine were determined as primary parent materials, lower slopes, U shaped valleys and summits where average elevation was from approximately 1350 – 1850 m were found most suitable areas for potential distribution of black pine. According to ROC curve result, validation value and cross validation value were obtained to be 0.849 and 0.809, respectively. Finally, mapping of potential distribution model of black pine was visualized by using of Geographic Information Systems software.

Discussion: According to the findings from this study, it is not possible to state a general judgment on the distribution of the black pine. On the other hand, the results obtained from this study is especially important local scale in Gölhisar district. So, it can be suggested that the results can be used for forest operations such as restoration, protection of forest, afforestation in the district.

Acknowledgement: We would like to express our appreciation to the Mehmet Akif Ersoy University Scientific Research Project Commission, which supported this study (0295 – NAP – 16).

Keywords: Generalized Addictive Model, Mediterranean region, Pinus nigra, Predictive distribution model
Investigation of *In Vitro* Microbial Growth Possibilities of Lavender Plant Grown in Diyarbakir Province

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**Introduction:** Lavender flowers are from the family Ballibagiller (Labiatae) and grow in North west and South west Anatolia between June and August, blue or purple flowers open, 20-60 cm in length, aromatic smelling, perennial, herbaceous or playful plants. More widespread in western regions where marine climate is present. There are two species that grow in Turkey. These are *Lavandula x intermedia* and *Lavandula angustifolia*. Lavender has been traditionally cultured for 40 years in order to produce the essential oil in Isparta province of Turkey.

**Material and Methods:** In the study, pre-seedling stems were prepared from 'Raya', 'Silver' and 'Vera' lavender varieties of *Lavandula angustifolia* species as field material and 'Giant, Hid, cote', 'Dutch' and 'SuperA' lavandin varieties of *Lavandula x intermedia* species and selected the 'Super A' lavandin variety of *Lavandula x intermedia* that could be adapted in Diyarbakir conditions. Production and reproduction of lavender plant as in other aromatic plants are carried out in two main ways, generative and vegetative. However, because of the in fertility of the 'Super A' lavandin variety of *Lavandula x intermedia* crowd and the lack of seeds, vegetative propagation and shoots were used. In the research, 'Super A' lavandin cultivars belong *Lavandula x intermedia* species in field and greenhouse experiments, 5 different IBA doses (kontrol, 1 mg/l, 2 mg/l, 3 mg/l ve 4 mg/l) as rooting of cuttings hormone, and shoot tip explants from ‘Super A’ lavandin cultivars and two shoots (0.25 mg/l BA+0.50 mg/L IBA and 0.25 mg/l BA+1 mg/l IBA) media and three rooting (0.25 mg/l, 0.50 mg/l and 1 mg/l NAA) media in *in vitro* conditions were used as materials.

**Discussions:** The number of root, root length and rooting ratio varied according to IBA doses and taken cutting period from rootstock plant, and the highest rooting values was determined in 4 mg/l IBA dose of the December period, the lowest rooting values from in non applied IBA (control) of the January period at all lavender and lavandin cultivars. The highest rooting ratio was obtained 55.00 % in 4 mg/l IBA dose of the December period, the lowest rooting ratio from *Lavandula x intermedia* Super A cultivar 10.50 % in control parcel of the January period.

**Result:** The number of shoot, shoot length, seedling weight, rooting ratio and survival ratio in *in vitro* conditions varied according to cultivars, shoot and rooting media, and the highest rooting ratio was obtained from 0.5 mg/l BA shoot media and 0.5 mg/l NAA rooting media combinations.

**Acknowledgement:** We would like to express our appreciation to the Kastamonu University Scientific Research Project Commission, which supported this study (DUBAP/TARIM-MYO. 17.001).

**Keywords:** Lavender, cutting propagation, *in vitro*, micropropagation
Effects of Different Organic Fertilizers on TTS and Vitamin C Parameters of Cherry Tomato Cultivars

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**Introduction:** The tomato (\textit{Lycopersicum esculantum}) is possibly the most popular vegetable in the world and plays a significant role in human’s diet worldwide. Tomatoes derive their nutritional value from several compounds such as vitamin A, E and C. They also include antioxidants, which protect the cells from oxidative chemicals.

**Material and Methods:** This research was carried out in the organically managed and certified field of Agricultural Research Center at Erciyes University, Kayseri, Turkey. The objective of this study was to investigate the effects of four types of applications (compost, microbial, mixture (2 ton/da manure + 2 ton/da compost+300 g/100 L microbial fertilizer), manure) on some pomological parameters of three hybrid cherry tomato cultivars (İnci F1, Yeniçeri F1 and Pekbal F1) as plant materials which were obtained from two Turkish seed companies. This experiment was laid in split-plot designed.

**Results:** Three hybrid cherry tomato cultivars and four different organic amendments (compost, manure, microbial and mixture) were used in this study to estimate the effects of fertilizers, cultivars and/or combinations on some selected plant parameters like fruit quality (TSS and vitamin C). There was no interaction between the cultivars and fertilizers for TSS. TSS values, an important parameter for fruit quality, differed among the cultivars ($P < 0.001$), but not among the fertilizers ($P = 0.165$). İnci F1 had the highest TSS (8.82%) followed by Yeniçeri (7.64%) and Pekbal (6.90%). Another important parameter, vitamin C, was the highest (32.18 mg.100 gr\textsuperscript{-1}) in İnci F1 followed by Yeniçeri (30.44 mg.100 gr\textsuperscript{-1}) and Pekbal (30.20 mg.100 gr\textsuperscript{-1}).

**Discussion:** This study indicated Pekbal and İnci cultivars were the most productive under the application used in this study in Central Anatolia conditions elevating 1100 m from the sea level. Among the fertilizers, the compost application was the most productive application with all three cherry tomato cultivars. Overall, presence of interaction between cultivars and fertilizers suggest importance of performance comparisons prior to program.

**Acknowledgement:** Scientific Research Projects Coordination Unit (BAP) of the Erciyes University for financially supporting (ERU-BAP under Project code of FYL-2017-7283)

**Keywords:** Organic agriculture, organic fertilizers, cherry tomato.
Validity of WEPS Model for Mass Transport from Two Adjacent Dunes

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Introduction: Wind erosion constitutes a serious problem in arid and semi-arid central sections of Turkey. Actual wind erosion measurements and accurate estimations play significant roles human and environmental health and food safety. WEPS (Wind Erosion Prediction System) is the most common model used in erosion estimations. In present study, case-based geostatistical parameters were calculated for sediment flux measured with BEST traps from two dunes with different vegetation cover ratios, success of WEPS model in simulation of total mass transport was assessed and effects of vegetation cover ratios on mass transport from two adjacent plots were investigated.

Material and Methods: The present research site is located within the boundaries of Karapınar town (37°42′53″N, 33°33′03″E) of Konya province. Annual average precipitation of the region is 275 mm. The wind erosion measurement set up, located in test plots embodies a winged-pole with 5 sediment traps. As a sediment trap, the BEST (Başaran Erpul Sediment Trap) was used which has low-cost plastic body, durable under field conditions and quite efficient in capturing saltating and suspended particles.

Results: The WEPS-simulated total mass transported was 353 kg m⁻¹ on plot A and 555 kg m⁻¹ on plot B. Correlations between actual mass transport and WEPS-simulated mass transport was R²=0.612 and it can be said that WEPS was successful in estimating mass transport.

Discussion: Regardless of the fact that the plot A was set up only 30 meter away from the plot B, it had smoother topography and heavier vegetation. Therefore, the difference between the measured and the predicted mass transport reveals the effects of topography on mass transport. Inexistence of a slope factor was considered as the greatest drawback of WEPS model.

Acknowledgement: This work was supported by the Scientific and Technological Research Council of Turkey (TÜBİTAK), Project No: TOVAG 110O296, 2012: 1-13.

Keywords: BEST sediment trap, Wind erosion, WEPS model
ORAL PRESENTATION

Spleenworts Family (Aspleniaceae) in Turkey

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Introduction: Aspleniaceae is one of the largest fern families, including about 500 species under two genera in the world. The family mainly contains a large cosmopolitan genus, Asplenium L. (Spleenworts). In Illustrated Flora of Turkey Vol II (2018), 16 natural species of spleenworts occur in Turkey. Besides, there are 4 natural or artificial hybrids and a cultivated specimen (Asplenium nidus L. - bird's-nest fern) in the genus.

Material and Methods: The study material consists of specimens collected in field studies between 2000 and 2017, and dried specimens in various herbaria (AEF, ANK, B, CBB, DUOF, E, EGE, GAZI, HUB, ISTE, ISTF, K, NGBB, P). Ecological data related to habitats of species have been taken in field studies. Spore samples taken from the herbarium specimens were germinated in laboratory of Çanakkale Botanic Garden Herbarium (CBB) and prothallus formed. According to the data, bedrock types and habitat types of species were determined, and distribution maps were prepared.

Results: The spleenworts are mostly distributed in rocky places in Turkey. Asplenium trichomanes L. subsp. trichomanes on siliceous, subsp. quadrivalens D.E.Mey. are found on calcareous rock fissures. A. obovatum Viv. varieties are found in calcareous rock fissures near the sea climate in Aegean-Marmara Sea. A. scolopendrium L. and A. sagittatum (DC.) Bange are found in waterlogged limestone rocks or on wet forest floor. A. tadei Fraser-Jenk. & Schneller and A. × reuteri Milde are found endemic in high mountain limestone rocks. A. woronowii Christ, A. cuneifolium Viv., A. viride Huds. and A. septentrionale (L.) Hoffm. prefer in acidic rock fissures in high mountains. Other species are found in calcareous rocky habitats. A. ceterach L. is found in all types of rocks and in habitats and is more common in sunny rock crevices.

Discussion: While most taxa prefer to grow in basic rocky areas, those in high mountains prefer acidic rocks. Different pH values have been shown to affect the distribution of species and form changes. Living specimens and spore growing are needed to analyse the systematics of genus Asplenium.

Acknowledgement: I would like to express my appreciation to ANG Foundation and Nezahat Gökşyigit Botanic Garden (NGBB), which supported this study (Illustrated Flora of Turkey, Vol 2).

Keywords: Aspleniaceae, Asplenium, Biodiversity, Spleenworts, Turkey.
Introduction: The main aim of environmental education is to educate environmental literate individuals who are aware of the environmental problems that the world faces and try to solve these problems (Yıldırım, Bacanak, Özsoy, 2012). According to Qu et al. (2015), environmental awareness refers to how individuals perceive the relationship between individuals and the ecosystem and the effects of this relationship. Therefore, it can be said that environmental awareness is a very important factor in educating the environmental literate individual in order to realize the purpose of environmental education. It’s known that the most vital and global environmental problem is the climate change which has been struggled by the all countries of the world till Kyoto conference and protocol. That’s why the subject of climate change was chosen as a cover of research in this study.

Material and Methods: In the research, general survey model was used. The research group of the study constituted 250 teacher candidates who were studying at different departments of the Faculty of Education at Niğde Omer Halisdemir University. In order to collect data, ‘awareness scale towards to climate change’ developed by researchers and applied to teacher candidates.

Results: As a result of the study, teacher candidates had moderate level awareness towards to climate change and there was a significant difference in different categories of them.

Discussion: Climate change is seen more as a country-level problem than as a pressing personal problem. But, we should change the public opinion of the people to change the country. This study creates a general overview to the teacher candidates’ awareness towards to climate change.

Keywords: Awareness, climate change, environmental education
An Experimental Tourism Approach to Eco-Tourism: The Example of Malatya Apricot Orchards

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Introduction: Tourism sector has become an important source of income for countries in the 21st century. Individuals are constantly changing in accordance with the changing conditions of tourist product perceptions and desires. As the qualities of tourists’ travel, expectations, enjoyment and income level are different, the tourism service offered to them is also different. Thus, the concept of ecotourism has come to the fore. Ecotourism is a type of travel tourism that is environmentally conscious, and is receptive to natural areas. The eco-tourism activities that frequently come to our country in the first place are primarily in the form of highland tourism. However, these activities may be utilized as different potentials in other regions. With different regions in Turkey in terms of agricultural diversity and the presence, Malatya province apricot orchards will constitute an appropriate alternative for eco-tourism region. Malatya has a share of 11% for fresh apricot production and 70% for dried apricot production in the world. Due to its historic importance and its dominance in the world market, Malatya and apricot have become two identical words. Activities in the apricot orchards, starting in the spring and ending in the autumn, can be considered as an experimental tourism opportunity for sustainable tourism, agriculture and economy within nature.

Material and Methods: This study aimed at an experimental tourism approach based on agriculture in ecotourism, was conducted in Malatya Province. By using ecotourism and cultural route approach along with geographic information system technique, experimental practices of ecotourism have been developed through the apricot route.

Results: In the world, ecotourism is being developed through experimental practices in relation to animal or plant species within the scope of the cultural heritage or cultural route approach. An apricot route connecting the city, city perimeter and rural area has been identified for apricot orchards and experimental practices based on apricot have been developed on this route.

Discussion: Tourist arrival in Malatya is quite low compared to the rest of the country. It is experiencing the disadvantages of being located in the inner parts far away from border and port areas of our country. This disadvantage has to be transformed into an advantage by having a rich potential in terms of agricultural diversity. Turkey’s chance and its location in ecotourism along with its rich geography and natural potential is a great opportunity in terms of types of nature tourism. Malatya is also one of these fortunate regions. Academic researches show that there is also an increase in income levels of the countries where there is an increase in the number of tourists with ecotourism activities. If the activities of ecotourism are carefully planned and managed in accordance with the experimental practices based on agriculture in Malatya and nearby provinces, it will be possible to preserve cultural heritage values and achieve economic sustainability.

Keywords: Eco-tourism, Apricot Orchards, Experimental Tourism, Malatya
**Effects of Sublethal Lambda Cyhalothrin Concentrations on the Glutathione and TBARS Biomarkers in *Astacus leptodactylus* (Eschscholtz, 1823)**

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**Introduction:** Freshwater crayfish (*Astacus leptodactylus* Eschscholtz, 1823) species are produced by aquaculture besides the fisheries in the world. One of freshwater crayfish producing method is the rice-crayfish rotational cultivation system. The restriction of rice-crayfish rotational cultivation system is the widely usage of pesticide and herbicide in the paddy fields. In this study, it is aimed to determine the toxicity level of lambda cyhalothrin, one of commonly used active ingredient for agricultural pesticide, on *Astacus leptodactylus* individuals, and therefore, to contribute to the knowledge on the appropriateness of the utilization as pesticide in paddy fields for rice-crayfish polyculture. To achieve this purpose, the effects of sublethal lambda cyhalothrin concentrations on the organism are evaluated by using glutathione and TBARS biomarkers.

**Material and Methods:** Freshwater crayfish species were collected from Atikhisar Dam Lake (Çanakkale, Turkey) by fyke nets and they have been adapted to the laboratory conditions for 10 days. These adapted healthy individuals were placed into aquariums that have 20 litres as ten specimens per aquariums. The experiments were conducted with three repetitions including one control group and five different concentrations. *Astacus leptodactylus* individuals were exposed to different lambda cyhalothrin concentrations (0.01, 0.05, 0.10 µg L⁻¹) for 14 days. Physico-chemical parameters of filtered water sampled from the study area were measured. The temperature, salinity and dissolved oxygen were measured as 22.4°C, 0.2 ppt, and 6.9 mg L⁻¹, respectively. Three samplings were carried out in the experiment at zeroth day (without exposing to any chemical), fourth day, and fourteenth day. On these sampling periods, GSH and TBARS analyses were performed after hepatopancreas tissue was removed from dissected individuals and frozen liquid nitrogen.

**Results:** Deaths of freshwater crayfish individuals were seen on the lambda cyhalothrin exposed groups depending on the increase in concentrations and time while there was no death on the control groups. There were partially stampede and abnormal movements particularly in medium- and high-concentrated aquariums after pesticides were used. TBARS and GSH parameters obtained from hepatopancreas were assessed to evaluate the oxidative stress. TBARS is the indication of lipid peroxidation and presented a statistically significant increase for all lambda concentrations compared to the control group. Moreover, TBARS levels are increased in parallel to the increase in lambda concentrations. GSH is increased on the fourth day in all lambda concentrations compared to the control group while it is statistically decreased on the fourteenth day in high concentrated group compared to the control group.

**Discussion:** The results revealed that low level concentration of lambda cyhalothrin has even a potential to be a reason for oxidative stress on freshwater crayfish species. Therefore, this active ingredient is found not to be appropriate for rice-crayfish rotational cultivation systems. Consequently, an alternative active ingredient at lower toxicity level than lambda cyhalothrin should be preferred for these aquaculture systems.

**Acknowledgement:** This study is a part of MSc thesis of Ebru Şasi from Graduate School of Natural and Applied Sciences, Department of Basic Sciences at Çanakkale Onsekiz Mart University.

**Keywords:** *Astacus leptodactylus*, Crayfish, Biochemical Parameters, Lambda Cyhalothrin, Glutathione and TBARS
Introduction: The city as a core of politics, health, fashion, culture, education and art, has always been in the center position after a certain period of history of humanity. Besides, cities are centers where there are problems such as housing, traffic, employment, population increase, air and noise pollution. It is a fact that the services offered by the cities for humanity are at a price paid to the nature. Today, industrialization and urbanization are leading to adverse effects such as air pollution, population density and the formation of urban heat islands and climate change. The increasing average temperature of our earth in recent years, unsteady precipitation, which is the result of causes of landslides while in some regions it increases the risk of desertification and drought. Such disasters have shown that traditional drainage systems (rapid removal of water from the system) in urban areas have been inadequate in recent years. The right management of rainwater in green infrastructure systems contributes to water security and the prevention of natural disasters. Reducing air pollution and noise via green areas, especially in urban areas, is known that by moderating the construction, decreasing the construction density, increasing the quality of the local environment and affecting human health positively. The urban areas are divided into different functions and have various sizes and their ecological, social, economic and physical characteristics contribute positively to the quality of life of urban residents. Open and green space systems contribute to healthy urbanisation by creating more livable environments with the green corridor and green belts created.

The place we live directly affects our physical and mental health. There are a variety of ways to provide options for mobility of people in the city and promoting physical activity. The development of healthy cities is possible with a transport system that provides environmentally sustainable transport and controlled development that can prevent scattered urban development. Sustainable transportation is socially and economically a sustainable transportation system that reduces fuel use, improves energy efficiency, ensures infrastructure access and utilization is effective, efficient and affordable.

Material and Methods: In this study, the components of urban ecology to create livable cities have been examined with exemplifying cases from the world with a perspective of landscape architecture focusing green infrastructure.

Results: Resilient and healthy cities are achieved by the systematic planning of urban green areas such as the integration of bicycles and different transport types for sustainable transportation where the green infrastructure approaches in which thermal comfort and rainwater are managed as well as all these urban developments.

Discussion: The study approaches the climate change / urban life relation in the context of landscape architecture applications in the world and presents its proposals for economics-ecology dimension.

Keywords: Green Infrastructure, Urban Ecology, Healthy Cities, Sustainable Transportation, Rainwater Management
Algal Flora and Water Quality of Birecik Dam Reservoir
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Introduction: One of the most important groups in aquatic ecosystems having rich biodiversity is algae. Total number of species living in aquatic habitat are defined as 151407. They contain chlorophyll and other photosynthetic pigments and also the source of about 60-80% oxygen production being the source of life for other creatures. Besides, they are primary producer and are the first ring in the food web in the ecosystem. In addition to, algae species belonging to different taxa can be used as raw materials in various industries such as human food, fertilizer, animal feed, cosmetics and pharmaceuticals ext. via intensive production. In this sense, benthic and phytoplanktonic algae have global importance on all living things with influence function. Some important global contracts were signed by member states to United Nations Environment Programme (UNEP) at the Rio in 1992. Various national and international strategies were prepared by them. At this conference, it was emphasized that algae represent the most important group of members having rich biodiversity in aquatic ecosystems. That is why, necessity for protection them and keep records are were pointed out. For this purpose, this study was carried out to determine the algal flora and water quality of Birecik Dam Reservoir. The study was carried out between April 2016 and February 2017 and it was analyzed as 4 seasons by sampling 6 different stations.

Material and Methods: Planctonic samples were taken vertically and horizontally with plankton nets with 20 μm and 55 μm mesh sizes. Epiphytic and epilithic samples were collected from plants and stones an by scraping the upper surface of the plant and stones with a toothbrush. Formaldehyde was added to both the planktonic and benthic specimens to a concentration of 3%. The measurement of some physical and chemical parameters was measured by the YSI 556 brand multiparameter device.

Results: In this study, a total of 178 algae taxa were identified, 114 of them Bacillariophyta, 25 of Charophyta, 19 of Chlorophyta, 12 of Cyanobacteria, 5 of Miozoa, 2 of Ochrophyta and 1 of Euglenophyta. Of these, one of Cyanobacteria, 2 Chlorophyta, 3 Charophyt, 3 with Miozo and 17 including the Bacillariophyta, 26 units taxa has been identified as a new record for Turkey algal flora.

At the stations; Temperature (°C) -1,16 - 23,90 (average: 14.56); pH 8,12 - 8,89 (average: 8.52); Electrical Conductivity (μS cm⁻¹) 436 – 466 (average: 444); Dissolved Oxygen (mg / l) 5.37 - 14.02 (average: 9.36); Suspended Solid (g / l) 0.150 - 0.433 (average: 0.29); Klo-a (mg/l) 0.15-0.65 (average: 0.41) was found between. The water quality of Birecik Dam Reservoir has been determined as Class I.

Discussion: The first study on algal flora in this region was performed by Erkaya et al., in 2001-2003, they sampled from five localities and published 10 taxa in their work entitled "Abundant and Common Species in the Algae of the Wetlands of the Lower Euphrates Basin" published in 2011. In this study, a total of 178 algae taxa were identified, 114 of them Bacillariophyta, 25 of Charophyta, 19 of Chlorophyta, 12 of Cyanobacteria, 5 of Miozoa, 2 of Ochrophyta and 1 of Euglenophyta. Of these, one of Cyanobacteria, 2 Chlorophyta, 3 Charophyt, 3 with Miozo and 17 including the Bacillariophyta, 26 units taxa has been identified as a new record for Turkey algal flora.

Acknowledgement: This research was supported by HÜBAK (Scientific Research Projects Executive Council of University of Harran) with the project No: 16202.

Keywords: Algal flora, Water quality, Benthic algae, Birecik Dam Reservoir
Introduction: Industrial sludge is an inescapable by-product of industrial wastewater treatment processing. With the industrialization, the amount of industrial wastewater has increased significantly and enormous amounts of industrial sludge have been produced from the industrial wastewater treatment plants. The characteristics of industrial sludges depend on wastewater characteristics and treatment processes. However, industrial sludge generally contains pathogenic microorganisms, organic pollutants, and toxic contaminants. Heavy metal is one of the most important contaminants in sludge. The presence of heavy metals, which may be accumulated by organisms and transferred to higher trophic levels, is the main limitation of the process. The organic amendments are able to absorb heavy metals, and hence can be used for the process of bioremediation. Most of the study on the effects of the heavy metals have been done in aquatic environments, but data on the removing heavy metals from industrial sludge is little.

Material and Methods: This research work was conducted to investigate the effects of expanded vermiculite on the removal of heavy metals from industrial sludge composting. The composting process was carried out for 100 days in pilot in-vessel systems, which were filled with the mixture of expanded vermiculite and sludge. Mixtures of compost additives and sludge were prepared at 10%, 25% and 40%. The variations of pH, electrical conductivity, moisture content, ammonia nitrogen, nitrate nitrogen and total nitrogen were analyzed during the process. At the end of the process, the results compared with compost quality criteria.

Results: The experimental results indicated that the concentration of Zn (II) ions in composted sludge was decreased when mineral was added during the process. For compost with industrial sludge, the highest content of large pores was observed, this was achieved with expanded vermiculite. The water retention properties of the sludge were improved with the addition of expanded vermiculite. The lowest value of water content was obtained for industrial sludge with the ratio of 40% expanded vermiculite.

Discussion: In the present work, a cheap, readily available and effective material has identified expanded vermiculite as a potentially amendment for the removal of zinc from industrial sludge. Compared to untreated industrial sludge, the physical and chemical properties of compost were significantly improved with the addition of expanded vermiculite.

Keywords: Industrial sludge, composting, heavy metal, zinc, expanded vermiculite.
An Evaluation of the Cinereous Vulture (Aegypius monachus L.) Population in Turkey

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Introduction: Cinereous vulture (Aegypius monachus L.), the one of the largest bird of prey, is a vulture species which is breeding in Turkey. The species is in the "Near Threatened" category according to the IUCN criteria. Turkey has the second largest Cinereous vulture population in Western Palearctic region. However, there is no clear assessment on the population in Turkey, due to the lack of detailed studies on the species. The aim of this study, is to evaluation of the population of Cinereous vulture in Turkey.

Material ve Methods: Studies were conducted in Northwestern of Central Anatolia Region between 2010-2016. Field surveys were performed in the breeding season of Cinereous vulture to determined occupied nests. Also former literatures on the breeding areas in Turkey of species were reviewed.

Results and Discussion: According to detailed and current studies in Eskişehir (Türkmenbaba and Sündiken Mountain), Ankara and Bolu, it is found that at least 100 pairs breed in Turkey. An important part of the colony is found in Sündiken Mountain with 46 breeding pairs. Also, Eskişehir has the largest colony of Cinereous vulture in Anatolia with 74% of pairs. In spite of the fact that, Turkey has the second largest Cinereous vulture colony in Western Palearctic region, it should be produced urgently conservation strategies for the species because of the low breeding pair numbers. To prevent anthropogenic activities such as forestry in breeding area, poisoning and shooting, are very important to protection of the species in the region.

Keywords: Accipitridae, Anatolia, Threatened vulture
Introduction: Ecological footprint is directly related to the increasing quality of life and consumption of humanity from the past to the present. It is represented as “global hectare” (kha) of biologically productive land and water area required for sustainability of consumed resources and storage of waste produced. For sustainable development, the resource amounts that can be produced by nature should be greater than the consumption levels of renewable natural resources and there are different markers used to determine this. For individuals to become aware of how their consumption habits affect nature and to reduce pressure on natural resources, the ecological footprint is important in terms of forming a scientific background for effective and applicable solutions. However, this concept is not known by many people. Within the scope of this study, the aim was to reveal the awareness of undergraduate students who deal with nature in the Landscape Architecture and Environmental Engineering Departments of the Engineering and Architecture Faculty about ecological footprint. To be able to determine the awareness levels of undergraduate students attending these two environmentally-friendly departments, a survey study was performed. The survey inquired about what ecological footprint was, how it is calculated, what criteria are important for ecological footprint measurement, how correct consumption habits and lifestyle are and awareness of traces left on the environment. The survey was applied to a total of 95 people, 60 Landscape Architecture Department students and 35 Environmental Engineering Department students. Finally, it was determined whether department was effective on the survey responses and the awareness of ecological footprint among students from these two departments integrated with nature was determined.

Material and Methods: Within the scope of the study 95 voluntary participants attending undergraduate education in Kastamonu University (KU) Engineering and Architecture Faculty Landscape Architecture and Environmental Engineering fields completed a survey study about awareness of ecological footprint. The results are given as frequency distributions and analyzed in the SPSS program with the chi-square test.

Results: It was revealed that students did not know the ecological footprint concept or how it was measured and were unaware of the mean ecological footprints for the world and Turkey. Very few students were aware that grasslands, wetlands and seas were productive areas in terms of ecology. At the same time, choice to use natural or imported products, food consumption choices, travel choices, use of insulation material and use of technological products were encountered as less well-known criteria for measurements of ecological footprint by many students.

Discussion: Knowledge levels about ecological footprint of students in the landscape architecture and environmental engineering departments were not different as both departments are involved with natural science; however, the students had mistaken or incomplete knowledge about this concept. As the class level of students increased, their knowledge of the topic increased. However, in spite of being natural science students, even final class students were determined to have insufficient knowledge levels.

Keywords: Ecological footprint, Environmental awareness, Sustainability
We Know About The Level Of Microplastic Pollution, The Methods Of Treatment And Impacts

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Introduction: Plastics are produced from organic and inorganic raw materials like carbon, silicon, hydrogen, oxygen and chloride. Generally, they comprise petrol-derived long polymeric molecule chains. Currently, widely used synthetic plastics represent 90% of global production. Frequently used in all areas due to being cheap, resistant and light, they include low- and high-density polyethylene (PE), polypropylene (PP), polyvinyl chloride (PVC), polystyrene (PS) and polyethylene terephthalates (PET), respectively. It is widely accepted that the majority of material polluting coastal and marine environments comprise these plastics. Microplastics are new anthropogenic pollutants identified in different aqueous environments like lakes, rivers, estuaries, oceans and wastewater in recent years. These pollutants are defined as particles with dimensions smaller than 5 mm, with disintegration of larger plastics by mechanical and photo-oxidative routes forming a secondary source. Plastics pellets used as raw material and microbeads in cleaning materials, detergent, cosmetic products, used as abrasives in the plastics industry and in personal hygiene products are classified as primary source. Microplastic pollution from primary and secondary sources spread throughout all oceans and seas around the world forming pollution in unknown waters. Microplastic pollution is taken into cells by a variety of aquatic organisms from zooplankton to mammals entering the ecosystem food chain with this situation causing environmental concerns. Plastic pollution formed by mixing of microplastic particles with wastewater discharge and aqueous ecosystems is a source of global risk. The aim of this study is to investigate the amounts of microplastics, with increasing awareness in recent times and only beginning to be studied in Turkey, in aqueous environments, their effects on organisms and treatment methods used.

Material and Methods: In this study, the amounts of microplastics in aqueous environments, effects on organisms and treatment methods used were screened from the literature to create a review.

Results: Research in the study attempted to select representatives from different points on the earth. The results of the studies indicate that microplastic pollution has begun to form a serious threat to aquatic ecosystems. Studies in the future should focus on prevention of sources forming microplastics, awareness and reduction methods. It is considered there is a need to increase treatment and measurement methods for microplastics.

Discussion: The results of the literature screening identified microplastic (MP) pollution in seas, surface waters and at wastewater treatment plant outputs. Many methods are used with the aim of determining MP pollution, with the analytical methods of visualization (microscope, SEM) and FTIR mainly chosen. Plastic fragments and fibers from personal hygiene products, detergents, plastic bottles, textiles and fishing rod parts were determined to be the dominant types forming microplastic pollution. Studies of inputs and outputs of wastewater treatment plants observed the primary, secondary and tertiary treatment output removal efficiency for MP varied from 98-99%. The effect of plastic on marine organisms appears in failure, blockage and circulation. The majority of studies were completed on fish; however, in recent times the effects on microalgae, daphnia magna and zebrafish have been researched.

Keywords: Microplastic, Wastewater, Pollution, Marine
Introduction: Plant-parasitic nematodes (PPNs), particularly *Meloidogyne* spp. root-knot nematodes (RKNs), are widely distributed and cause significant yield losses in a wide range of crops. Major root-knot nematode species: *M. arenaria*, *M. exigua*, *M. graminicola*, *M. hapla*, *M. incognita*, *M. javanica*, *M. mayaguensis*. PPNs, host association and distribution in different localities of Turkey have been surveyed. A total number of 240 nematode species of PPNs belonging to 56 genera of Tylenchida detected in Turkey. These nematode species found associated with 66 plants from 48 different localities of the country. In Turkey, the species *M. incognita*, *M. arenaria*, *M. javanica* and *M. hapla* are the most commonly found, with *M. incognita* and *M. javanica* which causes serious problems to a number of economically important agriculture and greenhouse crops.

Material and Methods: During a survey of PPNs, moderate to severe root-knot infection was observed on the roots of broad bean (*Vicia faba* L.) growing in the vegetable and legumes production in Niksar district, Yolkonak village (Tokat, Turkey). After examination of the root galls, mature females were found attached in abundance on the roots. On the basis of perennial pattern of mature females of *Meloidogyne javanica* (Treub) were identified.

Results and Discussion: Broad bean (*Vicia faba* L.) (Fabaceae) appeared to be a new hosts of the RKNs in Turkey not previously reported. In Turkey, *Meloidogyne javanica* was found for the first time in Iğdır on unknown host and is presently widespread in various Turkish regions, where it causes severe damages. It is extremely polyphagous, attacks severely plants but is very damaging also to *Vitis vinifera*, vegetables, Cucurbitaceae, ornamental plant, *Musa* sp., *Arachis hypogaea*, *Lycopersicum esculentum* and *Capsicum annuum*

Keywords: Plant-parasitic nematodes, Root-knot nematodes, *Meloidogyne javanica*, Broad bean, *Vicia faba*, new host, Turkey
Bioavailability, Microbiologic and Bioactive Properties of Tarhana Produced with Alternative Cereals and Legumes

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Introduction: Tarhana is a traditional fermented product frequently consumed in Turkey and many Mediterranean countries. In general, it is obtained by fermentation of the mixture of yogurt, wheat flour, various vegetables and different spices. It can also be consumed as soup or dry chips. The aim of the study was to investigate the production possibilities with the alternative cereal and legume flours of tarhana which was traditionally produced and to obtain a product which was increased nutritional content and bioavailability and to which can be consumed by both celiac patients and healthy consumers. Moreover, the microbiologic and bioactive attributes of the products were determined. On the other hand, an alternative usage area and a new product in terms of different cereals and legumes were proposed to today's consumer.

Material and Methods: For this purpose, the use of gluten-free chickpea flour, bean flour, buckwheat flour, whole wheat rice flour, lentil flour and corn flour were investigated in the production of tarhana. The traditional tarhana formulation formed with preliminary experiments were tested with these flours. The counts of lactic acid bacteria and yeast which were responsible fermentation were determined microbiologically. Furthermore, the antioxidant activity and bioavailability (mineral and protein bioavailability) of six types of tarhanas were determined. In addition, the decline in phytic acid levels, which were important mineral and protein binders of the products, will be analyzed. The relationship between the number of microbiota and other properties were examined, and the relationship between other properties were evaluated statistically.

Result and Discussion: The number of lactic acid bacteria and yeast changed according to the samples which was produced with different flours. While the phytic acid content as a antinutritional factor of samples were decreased, the antioxidant activities were increased. Furthermore, their bioavailability changed according to flour type, the improvement was obtained on the bioavailability. The use of different flours instead of wheat flour will be provided an important advantage for celiac patients and other healthy persons. At the same time, the production of the tarhana which had high nutritional content and bioavailability will be another advantage for this consumer group whose have got a damaged intestinal digestive system in the future. On the other hand, consumer preferences of today's consumers are changing towards of natural, additive-free and traditional food products. The six types of tarhana produced in this study were been products which nutritional contents scientifically presented, natural, fermented and have alternative taste and flavours in terms of today's consumers. Moreover, the cereals and legumes supply an important part of the human diet in developed and in developing countries. Also, they rich in minerals, protein and especially vitamin B. Whereas the research and development of their alternative products and usage areas will be contributed to nutritional quality of human daily diet, and to their agricultural sustainability.

Keywords: Tarhana, Cereals, Legumes
Introduction: Sea cucumbers are important resources for coastal livelihoods and ecosystems. At least 60 species are fished from more than 40 countries and most of the harvests are processed then exported to Asian markets. There are 37 sea cucumber species from Holothuroidea class lives in the Mediterranean Sea. Sea cucumbers are important ecologically as suspension feeders, detrivores and prey. Despite its ecological importance, due to its high income, many individual sea cucumber fisheries have shown severe depletion or even collapse. In this review, we tried to show their ecological importance and current status of sea cucumber fisheries in the world and Turkey.

Material and Methods: Web of Science and National ULAKBİM were searched using key words of “sea cucumber” and “sea cucumber fisheries”. Furthermore, fisheries data were used in Turkish Statistical Institute and General Directorate of Fisheries and Aquaculture. BECHE-DE-MER Information Bulletin published by South Pacific Commission was also searched.

Results: The juvenile sea cucumbers are important prey in food webs and adults are important in ecosystem function. For example, some species regularly bury, thereby oxygenating sediments through bio-turbation. Most of the commercial sea cucumbers are deposit feeders that consume detritus, bacteria and diatoms mixed with sediments on the seabed. Sea cucumbers are often small-scale fisheries in the way the animals are harvested, mainly comprising fishers that collect sea cucumbers by wading or skin diving in shallow waters. Hookah diving system is common for sea cucumber harvesting in Turkey. Fishing pressure has impacted most commercial stocks, and at worst are leaving insufficient stock in the water to support commercial harvests or stock recovery.

Discussion: In general, global catch and production (including aquaculture) of sea cucumber fisheries has increased 13- and 16-fold over the past two to three decades. However, many individual sea cucumber fisheries followed a typical trajectory with a rapid increase, short peak, and in most cases a substantial downward trend, thereby suggesting a boom-and-bust pattern. There is a high demand for sea cucumber products on the international markets. This has caused the over-exploitation of certain fisheries. Inadequate or non-existent appropriate management plans at both national and regional levels have allowed such exploitation to take place. In the light of the lack of strong local governance, international regulations that control trade may be one of the best hopes for the conservation of highly valued sea cucumber populations.

Acknowledgement: This study was supported by TÜBİTAK No:217O207 project.

Keywords: Sea cucumber, ecological services, fisheries, Aegean Sea
**Introduction:** Graphene, consisting of carbon atoms bonded in a hexagonal structure, has thermal, mechanical and electrical properties. Graphene oxide (GO) have rich functional groups (carboxylic, carbonyl and hydroxyl), and this groups play an important role in the growth of various nanostructures. In this way, formation of single step nanoparticles connected to GO layers is ensured. In this study, we compared of antimicrobial activities biosynthesized silver nanoparticle (Ag NP) and Ag@GO hybrit nanocomposite.

**Material and Methods:** NaCl-I (0.09 M) and NaCl-II (0.29 M) solutions were used to capture Ag NPs by GO. Briefly, NaCl-I solution was added dropwise to the mixture of 0.1 mg / mL GO, 5 mM Ag NP and 2 mL plant extract and stirring was continued. After about 10 seconds the NaCl-II solution was added and stirred for 30 minutes. Then the mixture was centrifuged at 3000 rpm for 5 min. The solid Ag@GO particles were dispersed in 5 mL of deionized water, centrifuged and the was dried for characterization studies. *Staphylococcus aureus* and *Escherichia coli* were used to detected antimicrobial activities of Ag NP and Ag@GO. The minimum inhibitor concentration (MIC) were determined by broth microdilution technique.

**Result and Discussions:** The pH of the rose extract and Ag NP was measured as 4.92 and 4.40, respectively. The absorbance peaks of rose extract, Ag NP and Ag@GO were recorded at 255 and 362; 205, 259 and 322 nm; 207, 256 and 361 nm, respectively. DLS results show that effective diameters of Ag NP 209 nm, and Zeta potential of GO was -16.7 mV, Ag@GO was -27.4 mV. We claim that Ag NPs were successfully deposited on the surface of GO and Ag NPs made Ag@GO nanocomposite highly negatively charged. In terms of antimicrobial properties, Ag@GO nanocomposites exhibited much higher antimicrobial activities compared to bare Ag NP and plant extrates. The reason for that when Ag@GO nanocomposite with interact with microorganism cells, it may wrap the entire surface of target cells as a swaddle and induce effective cell death.

**Conclusion:** We developed synthesis of Ag@GO nanocomposite by benefiting from green nanobiotechnology. We first fabricated plant extract directed Ag NPs and attached them on the surface of GO in the presence of salt solution. Ag@GO nanocomposite showed quite promising antimicrobial activity against several pathogens compared to Ag NPs, plant extract and GO.

**Keywords:** Green Synthesis, Silver Nanoparticles, Silver@Graphene Oxide Nanocomposites, Antimicrobial Activity.
Evaluation Of Internal Bacterial Microbiota of *Neodiprion sertifer* (Geoffr) (Hymenoptera: Diprionidea) for Possible Biotechnological Applications

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**Introduction:** The European pine sawfly is a primary pest species that cause significant damage to the pine forest. The pest make damage in scots pine, red pine and larch. It shows distribution in all pine plantation area in Artvin. In this study, the bacterial microbiota of *N. sertifer* were investigated primarily to obtain new biological control agents against the pest and to use in other biotechnological applications.

**Material and Methods:** Larvae of *N. sertifer* were collected from the pine forests in Artvin, Turkey, in April and May 2016 and taken to the laboratory. Collected larvae were surface sterilized with 70% ethanol and were homogenized in a Nutrient broth by using a glass tissue grinder. Then, samples were ten-fold diluted. 100 μl of the suspensions were plated on a Nutrient agar. Plates were incubated at 30°C for 24 or 48 h. Bacteria were selected based on their colours and colony morphologies. Then, pure cultures were prepared and these cultures were identified using various assays.

**Results:** The bacterial microbiota of *N. sertifer* were identified as *Pseudomonas* sp. (Ns1), *Staphylococcus* sp. (Ns2), *Bacillus megaterium* (Ns3), *Klebsiella oxytoca* (Ns4), *Klebsiella oxytoca* (Ns5), *Staphylococcus pasteuri* (Ns6), *Klebsiella oxytoca* (Ns7), *Raoultella planticola* (Ns8), *Pantoee agglomerans* (Ns9), *Staphylococcus pasteuri* (Ns10), *Pantoee agglomerans* (Ns11), *Acinetobacter lwoffi* (Ns12) and *Pantoee agglomerans* (Ns13) based on their morphological, biochemical, and molecular characteristics.

**Discussion:** In previous studies has been reported that bacterial strains have different potential for many biotechnological applications such as purification of waste water, cleaning of oil spills, caffeine degradation, biodegradation, antimicrobial peptides-bacteriocin production, antifungal activity, enthomopathogenic activity... In the present study, the potential of these isolates possible biotechnological applications of importance were discussed under the light of literature. This is the first study on the bacterial microbiota of *N. sertifer*.

**Acknowledgement:** This research has been supported by Artvin Coruh University Scientific Research Projects Coordination Department (Project Number: ACU-BAP 2016.M80.02.07). We would like to thank Yaşar Aksu for collection of the insect samples.

**Keywords:** *Neodiprion sertifer*, pine, pest, biotechnologically important bacteria
Niche Modelling Study on *Synaptus filiformis* (Fabricius, 1781) (Coleoptera: Elateridae) in Turkey

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**Introduction:** *Synaptus filiformis* is one of the most distributed and known species of the family Elateridae. It was recorded seven geographical region of Turkey and also distributes European part of western Palaearctic, Middle Asia and Middle East in Palaearctic region. Until publication of Jarzabek-Müller et al. (2017) the genus *Synaptus* Eschscholtz, 1829 was a monotypic genus with *S. filiformis* (Fabricius, 1781). According to literature (Kabalak, 2010; Kabalak and Sert, 2011, 2013; Sert and Kabalak, 2011) *S. filiformis* lives herbaceous plants near streams. Because of that this species could be considered as one of the species related with potamic habitats and their herbaceous plant biota.

**Material and Methods:** Ecological Niche Modelling (ENM) is used to estimate the current and possible future distributions of *S. filiformis*. Future estimations are applied by using IPCC 5 climate scenarios. Data of previously collected specimens from different parts of Turkey is used as presence data for the models.

**Results:** Possible future distributions of *S. filiformis* for 2050 and 2070 are estimated using ENM.

**Discussion:** ENM results of current time for the species is consistent with the known distributions of the species. The results obtained are important in understanding how *S. filiformis* in Anatolia will react to climate change. The fact that the *Synaptus filiformis* is a widespread species, it could be accepted as dependent species to potamophilous herbaceous plant habitats. This result increases the importance of conservation of these kind of habitats. Conservation strategies should be considered for future situations of river habitats facing anthropogenic threats and adverse effects of climate change.

**Keywords:** *Synaptus filiformis*, Ecological Niche Modelling, Turkey.
Environmental, Socio-Cultural and Economic Value of Olive Growing

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Introduction: The olive tree (*Olea europaea*) is a species of the family (*Oleaceae*) that is eaten fruit and is unique to the Mediterranean climate. Mediterranean countries that are significant breeders of olive tree include Italy, Greece, Spain, Turkey and Tunisia. However, breeding spread to other world areas - North and South America Oceania countries. There are 900 million planted olive trees in the world, about 9 million hectares. In Turkey, 20% of vineyards and orchards and 2.2% of agricultural land is covered with olive trees. Olive is a special plant. that can be used in many regions by taking advantage of economic and social benefits in its efforts to combat desertification and erosion.

Material and Methods: This study has benefited from related national and international sources (publications, reports, articles, research, etc.). In addition, relevant statistics were obtained from organizations such as FAO, IOC and TURKSTAT. Percentage ratios and arithmetic mean calculations were used in the evaluation of the statistics.

Results: Olive growing contributes to the protection of ecological balance. Because 75% of the olive production areas are located in rural and rural soils and 80% of the olive production areas are still in dry agriculture. Because of this position of olive production areas, the olive tree keeps natural balance by preventing erosion first of all. Olive trees can be grown in extreme climatic conditions, where few other woody crops survive. 70% of the world’s olive orchards are rain fed, without water from irrigation and using rainwater only. The olive tree forest has existed for thousands of years. In some regions of the Mediterranean, olive trees are grown with barely 200 mm of rain and constitute an essential source of livelihood for many sectors of the population. Their fruit and the oil it produces are good for your health but olive trees are also good for the environment. In this study, information focusing on olive; including, ecologic, socio-cultural and economic dimensions were presented as a whole.

Discussion: Olive trees are an alternative to the evaluation of mountainous dry land. It is also a high adaptability, durable and long lasting plant. Another feature of olive trees is that they are resistant to forest fires and can easily rejuvenate. They are successful under extreme weather conditions and require very little attention. Olive trees, by contrast, are beneficial to the environment by reducing the level of CO₂ in the atmosphere. Another important feature in terms of ecology is that it provides shelter for wildlife. Olive, which has been living for many years is important in the struggle against desertification and erosion. as well as from economic and social benefits.

Acknowledgement: This paper is a compilation study.

Keywords: Olive trees, Environment, Ecosystem, Economy.
Cationic Dye Decolorization through a Visible Active Photocatalyst Promoted by Aluminum Oxide

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Introduction: A visible light sensitive MgFe$_2$O$_4$-Al$_2$O$_3$/Ag$_3$VO$_4$ photocatalyst was prepared to increase the activity of Ag$_3$VO$_4$ by utilizing Al$_2$O$_3$ nanopowders. Photocatalytic activity of MgFe$_2$O$_4$-Al$_2$O$_3$/Ag$_3$VO$_4$ was measured by methylene blue (MB) decolorization under visible light. Results suggested that first order kinetic model is valid having rate constant k, 0.03252 min$^{-1}$. The half-life of decolorization was found as 21.3 min. The activity of the pure Ag$_3$VO$_4$ was also compared with the MgFe$_2$O$_4$-Al$_2$O$_3$/Ag$_3$VO$_4$. It was shown that rate constant obtained with Ag$_3$VO$_4$ was 0.01577 min$^{-1}$ and its half-life 43.9 min suggesting a twofold increase by Al$_2$O$_3$ adsorbent. At the end of the reaction, catalyst powders were removed easily from the solution by a magnet.

Material and Methods: FeCl$_2$·4H$_2$O, FeCl$_3$·6H$_2$O, Mg(OAc)$_2$·4H$_2$O, NH$_3$ 25 % solution and NaOH were taken from Merck. Al$_2$O$_3$, AgNO$_3$ and V$_2$O$_5$ were purchased from Aldrich. 0.5 g Ag$_3$VO$_4$ was blended with 0.5 % MgFe$_2$O$_4$-Al$_2$O$_3$ in an agate pestle for 30 min and calcined at 300 °C for 2 hours. Activity was measured by MB decolorization under visible light.

Results: Rate constant k for decolorization was found to be 0.03252 min$^{-1}$ and its half-life was 21.3 min. A methylene blue witness sample at the same concentration was placed near the main sample to indicate whether the experimental conditions have effect through heat or photolysis. It has been shown that experimental conditions has no effect on decolorization showing that decolorization stem from only photocatalytic activity. From the half-lives which are 21.3 min for MgFe$_2$O$_4$-Al$_2$O$_3$/Ag$_3$VO$_4$ and 43.9 min for Ag$_3$VO$_4$, it is clear that adding Al$_2$O$_3$ particles to the Ag$_3$VO$_4$ proved positively to enhance the photocatalytic activity due to the adsorption of dye molecules by Al$_2$O$_3$.

Discussion: Photocatalyst technology is a promising alternative for removing the industrial pollution waiting for efficient photocatalysts developed for benefiting the endless energy of sun. This study showed that Al$_2$O$_3$ doping strategy produced successful result in increasing the activity of solar light sensitive Ag$_3$VO$_4$ almost twofold in the visible region. The catalyst can be removed easily from the aqueous solution by a magnet bar due to the magnetic particles of MgFe$_2$O$_4$ eliminating the difficult conventional separation techniques.

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Keywords: Photocatalyst, Methylene blue, Decolorization
The Relationship between Trichoptera Species and Water Quality

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Introduction: Trichoptera are a well-studied group of aquatic insects that are recognized by both entomologists and limnologists, for their especially peculiar habit of building nets and cases. Caddisfly (Trichoptera) larvae have been frequently used in monitoring programmes as bio indicators of organic pollution. Also, they play important roles in food webs and ecological processes such as leaf breakdown. Caddisflies are commonly used as bio indicators because of their close relationship to environmental conditions and because they are good dispersers at local scales, which might minimise distance effects and spatial patterns. Caddisflies (Trichoptera) are a diverse and vital biotic component of freshwater ecosystems, having been able to adapt and succeed in nearly every type of aquatic habitat.

Material and Methods: Trichoptera samples were collected using a combination of several sampling methods (with a kick net of 250 μm mesh size, colonization substrates (bricks), and picking up the larvae from the stone surfaces). Different methods were used in order to effectively gather representative number of larvae. The collected material was fixed and kept in 80% ethyl alcohol and sorted in the laboratory. Trichoptera samples were identified at the maximal possible level using a stereomicroscope (genus or species). At each sampling station, water samples were taken monthly and analysed within 24 hours after collection. NH₄⁺-N, NO₂⁻-N, NO₃⁻-N, PO₄³⁻-P, Cl⁻ and BOD₅ were measured in the laboratory by following the standard methods (APHA, 1998). Water temperature (°C), pH, dissolved oxygen (DO), and electrical conductivity (EC) were measured during sampling in situ.

Results: In a general assessment for variety values, the highest values are determined in station 1 and the lowest values are determined in station 5. In 6th station, no Trichoptera taxa was determined. The sediment structure of the stream is negatively impressed by this area and its base constriction is covered with 1-2 cm sediment. Therefore, in this area it’s thought that the habitats which lives Trichoptera taxa is decrease and diminish the diversity. In station 6 there is pollution load due to waste water inflow. The sediment structure of this station, like station 5, shows an adverse change and it has a muddy base constriction. When the environmental variables analyzed which is measured in area, it’s clearly seen that the 6th station is carrying excessive pollution load and quite low water quality.

Discussion: The distribution of the macroinvertebrate communities depends on multiple environmental variables affecting at different spatial-temporal scales. The stream size and environmental factors of the study area in shaping macroinvertebrate communities. Also, other environmental predictors (water current, discharge, pH, temperature, stream depth and width, and percentage of substrate type) are very important in defining Trichoptera species richness.

Keywords: Trichoptera Species, Water Quality, Turkey
Preparation of Folic Acid-Copper(II) Containing Hybrid Nanostructures and Investigation of Its Catalytic and Antimicrobial Activity

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Introduction: In recent years, researchers have put much effort into developing the new strategies for synthesis of functional bio-materials having enhanced properties. For instance, in 2012, Zare and co-workers discovered an encouraging breakthrough in fabrication of immobilized enzymes with greatly enhanced activity and stability. They reported the formation of flower like organic-inorganic hybrid nanostructures using protein and enzymes (laccase, carbonic anhydrase, lipase and BSA) as organic component and Cu^{2+} ion as inorganic component. Due to this inspirational work, several researchers have used various biomolecules (protein, enzyme and amino acids) and metal-phosphate nanocrystals for underlying principles of organic-inorganic hybrid nanostructures formation and enhancement in catalytic activity and stability. In this work, we prepared a novel vitamin-inorganic hybrid nanoflowers (HNFs) using folic acid as an organic component and copper (II) ion as an inorganic component in phosphate buffer saline (PBS) solution.

Material and Methods: The synthesized hybrid nanoflowers was characterised by FTIR and SEM. The activity of folic acid–copper phosphate HNFs was evaluated using guaiacol as a substrate in the presence of hydrogen peroxide (H_{2}O_{2}).

Results: The most regular and uniform flower-shaped morphology was observed were formed at pH 4. The folic acid–copper phosphate HNFs had higher catalytic activity than free folic acid and copper phosphate. The synthesised HNFs did not have antioxidant activity and antimicrobial activity against investigated pathogens (bacterial and fungicidal).

Discussion: The flower like organic-inorganic hybrid nanostructures are generally prepared using protein and enzymes as organic component and Cu^{2+} ion as inorganic component. However, this work indicated that a vitamin (folic acid) could be used as organic component in the formation of the flower like hybrid nanostructures. The catalytic and antimicrobial activities of the hybrid nanostructures might depend on characteristic properties of the organic components used in the synthesis of hybrid nanostructures.

Acknowledgement: We would like to express our appreciation to the Erciyes University Scientific Research Project Commission, which supported this study (FBA-2016-6899).

Keywords: Nanoflowers, folic acid, antimicrobial activity, catalytic activity, morphology.
Analyses of Sea Surface Temperature by Wavelet Methodology

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Introduction: The change in sea surface temperature (SST) is a parameter used in the analysis of climate change and ecological changes. The main purpose of this study is definition of small, meso and large-scale factors and their role on SST in near vicinity of Sinop, Kastamonu and Zonguldak.

Material and Methods: SST has a triggering role on cloud formation and cyclones mainly over sea surface. Beyond of surface measurements, remote sensing data (MODIS-aqua band) have been analysed in daily and monthly basin.

Results: Wavelet methodology presents an opportunity to define the importance of different scales fluctuations on SST variations. Based on statistical analyses, %1.73-2.35 (min.-max.) increasing was observed on monthly SST between 2015 and 2016 1D wavelet analyses explains some details at three different frequencies. At high frequency, monthly variation does not show an important fluctuation in mid-summer, between June and August. There are five important extremes on SST variation mainly associated with small and large-scale influences. Meso scale fluctuations on SST variations play an important role at the end of study period (end of September). Large-scale influences have a crucial role on SST variations in winter, at late spring, beginning of summer and early autumn. Extreme values of SST are associated with meso and large-scale factors influence.

Discussion: It is expected that the results of this paper would be useful on prediction of fish fecund ability and the fields of climatology, environmental, marine and atmospheric sciences.

Acknowledgement: We would like to express our appreciation to the International Centre for Theoretical Physics (ICTP).

Keywords: SST, Modis data, Wavelet, Kastamonu
Molecular Characterization and Phylogenetic Analyses of Culicoides pulicaris Complex Species

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Introduction: Biting midges of the Culicoides pulicaris species complex (Diptera: Ceratopogonidae) are known as one of the vectors of bluetongue virus in Palearctic regions. Vector competence of Culicoides is expressed only in adult females, however morphological identification of constituent species is only readily applicable to adult males and some species distinguishing traits have overlapping character states. Furthermore, adult males are typically rare in field collections, making characterization of Culicoides communities impossible. Therefore molecular characterization of corresponding Culicoides species is a key future for revealing epidemiology of culicoides-borne diseases in a region. This study was conducted to provide DNA barcodes by molecular characterization and establish phylogenetic constructions of the species and/or haplotypes belong to C. pulicaris complex that were collected from West Blacksea Region and Konya vicinity.

Material and Methods: Genomic DNA isolations were individually performed on the female specimens which were grouped by means of species according to the morphological identification data and the barcode mt-COI gene region of the obtained isolates were amplified. In the next step characterization of amplification products were provided by utilizing cloning, plasmid purification and sequence analyzes. Phylogenetic relationship of the isolates along with the homologous isolates from the World in available in the GenBank were revealed.

Results: One hundred fifty-one polymorphic sites were distributed among the COI sequences of the obtained isolates from Pulicaris complex leading to the detection of 22 different haplotypes and C. fagineus, C. flavipulicaris, C. lupicaris, C. newsteadi, C. pulicaris, C. punctatus species were molecularly identified and characterized. The presence of C. lupicaris has firstly been identified based on molecular level in Turkey. Furthermore a possible new species under Culicoides subgenus along with morphological data was characterized and its characteristics was determined.

Discussion: In this study, the first molecular data were obtained for the C. pulicaris complex prevalent in Turkey. The species complex from Turkey and other European countries formed reciprocally monophyletic clades in COI phylogeny. Overall, this study demonstrates the congruence between the morphological identification and COI molecular characterization for member species of C. pulicaris species complex, and usefulness of DNA barcoding based on COI in the identification of Culicoides species complexes and other genera of arbovirus vector.

Acknowledgement: This study was supported by Erciyes University Research fund with the Project code TSA-2015-5762.

Keywords: Culicoides pulicaris complex, PCR, molecular characterization, phylogenetic construction
Eco-Friendly Practices in Operating Room

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Introduction: Environmentally friendly practices refer to decreased energy consumption, using resources in a carefully and sustainable way and decreased environmental pollution. An environmentally friendly hospital is defined as a hospital where energy is saved, carbon emission is decreased and productivity and quality are increased. In hospitals with eco-friendly practices, to create alternatives to resource utilization, to encourage the use of energy and water and materials more effectively and efficiently, to prevent waste, and to design environmentally sensitive buildings. The aim of this review is to draw attention to eco-friendly practices that can be applied in the operating room. Although the operating rooms have a small physical area, 20-33% of all hospital wastes are from the operating room. In one operation, more waste is produced from waste produced by a family of four in a week. Disposable or reusable surgical materials have potential damage for environmental. Using disposable materials are easy. However, wastes from disposable items cause waste deposits that release atmospheric toxins. Reuse of disposable materials reduce waste generation and disposal costs. Surgical handwashing before surgery is the most common source of water waste. In a study conducted in the UK, it was found that an average of 18.5 liters of water was used for each handwash before surgery. Rubbing an alcohol-based hand instead of hand-washing has the potential to save millions of liters of water each year.

Air emissions are a term used to describe gases released into the air and emitted from various sources. One of the most important causes of air emissions in the operating room is the release of carbon dioxide. Leak checks should be made regularly on instruments and connections. The amount of anesthetic gases in the operating room should be measured to avoid excessive emissions.

Material ve Method: Observations and evaluations made at Kastamonu State Hospital were used.

Result: Health care is one of the largest industries in the modern world. The damage done to the environment is conflict with the «premium non nocere» principle which is the golden rule of health. With eco friendly practices adverse effects on the environment can be reduced without changing quality of patient care. Therefore nurses, physicians and all health personnel working in the operating room should be aware of eco friendly practices and take part in protecting the environment.

Discussion: The operating room consumes a very high amount of energy. The health sector in the United States; is the second largest energy user after the food industry. When all the illuminators are used in the operating room, 1.8 megawatts of energy are used for 24 hours, and 12.7 megawatts of energy is used for a week. It is 12 times more than the average household uses. In the operating room, energy consumption areas should be defined, programs should be developed to save energy for these areas, energy saving equipment should be purchased, energy consumption related procedures should be established and audits should be conducted.

Anahtar Kelimeler: Eco-Friendly Practices, Nursing, Operating room
A Review on Ecological Design in The Hospitality Sector in Asia

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Introduction: The three industries which effect global climate change are can be listed as construction, transportation and tourism. Buildings and constructions which are built for tourism sector is responsible of using clean water resources, forest products and energy resources. Considering these facts, especially in the last decade, hotel design and managements started to consider more sustainable, green and eco-design principles. There are some certification programs in order to control the sustainable building designs such as LEED, BREEAM and DGNB. Also, some other certification systems are developed for controlling sustainable hotel designs and management like Green Globe, Green Key, Eu Eco Label. In this paper, it is aimed to analyse the ecological design methods in hotels and discuss their benefits for sustainable tourism concept. In total five green hotel designs from five different East and Southeast Asian countries are chosen as case studies because of their popularities in recent years as tourism destinations. The hotel designs will be analysed and discussed with their design, construction and hotel operation strategies. This study aims to give a new perspective to designers and tourism establishments by giving examples of the East and Southeast Asian countries as their fast growing economic power and design understanding.

Material and Methods: Firstly, ecological design, sustainable design and green design terms were explained any analysed within architectural concept. The hotels which are analysed were chosen because of their different design and management qualities. Ecotone Hotel from Japan, Six Senses Chengdu from China, Hotel Icon from Hong Kong, Sekeping Serendah from Malaysia and Park Royal Pickering from Singapore the hotels which are chosen. Use of building materials, indoor and outdoor plantation, efficient use of sunlight, being able to blend in natural environment, green business management methods are discussed.

Results: Ecotone Hotel was built near to Biwa Lake, Moriyama city. The site is in between natural landscape and urban texture and by the time, because of urban development the site lost its originality. The hotel design itself aims to help regain the ecological values of the existing site. The Designers created two inner lakes for attracting new animal species to the site. Six Senses Hotel Chengdu was built inside the Unesco World Heritage and the design itself respect the Giant Panda habitat site. The materials that were used in construction are mostly natural. Hotel Icon from Hong Kong is located in dense urban area but an immense indoor vertical garden made of 8000 different plant species brings greenery. Sekeping Serendah Hotel is blending with rainforest and respecting the ecological values of the site. Park Royal Pickering hotel concentrate on rooftop and terrace gardens which are self sustainable and add 15,000 square metre greenery to the city.

Discussion: According to the results, it can be said that sustainable design techniques and methods can vary according to the scale of the hotel, level of the luxury, existing conditions on site and climate of the country that they were built. However, general sense of sustaining the environment, bringing new eco-design ideas and adding values to the existing site is a common language that can be read from all examples.

Keywords: Ecological design, Sustainable Hotel Design, Sustainable Tourism
The Impact of Tourism on the Natural Environment Case Study on Ajloun Forests

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Introduction: From the point of view of the international community to man, the reason for this. The Ajloun Forests are a destination for tourists who are calm and natural, a mountainous area planted with forested trees and natural water. But tourism is both. Through the wrong test of tourism in the environment

Materials and methods: The researcher in the study was based on the field survey and the follow-up of the forum news on the examination of exams.

Results: The study reached the following results:

1. The formation of random tourism causes natural wealth in Ajloun.
2. The need to make awareness programs about the dangers of indiscriminate hiking, and the allocation of safe places and society
3. Provide the mechanism to give waste recycling in the area, to preserve the beauty of the area.
4. Re-planting trees in areas of fire and cutting, to preserve the sustainability of natural forests.

Discussion: Hiking operations that limit the local population pose a threat to the natural environment so that hiking and population allocation must be organized to compensate for maximum tree alliances and eliminate both the natural environment and tourism.

Acknowledgments: We would like to thank the University of Irbid for its support for this study and also thank Ajloun Municipality, Ajloun Tourism Office and the Directorate.

Keywords: ecotourism, forests, sustainable tourism, natural environment.
Change of The Biotic Cycle of Substances and their Influence on The Health of Animals

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Introduction: Due to the changes in the environment, new, previously unknown animal diseases, called biogeocenotic pathologies, have appeared in Kyrgyzstan. Biogeocenotic pathology is a mass disease in plants, animals and humans that occurs as a result of unfavorable changes in biogeocenosis. Nowadays more than three dozen biogeocenotic pathologies of animals are known, among them special attention of scientists and practitioners attract such diseases that arise as a result of disruption in the cycle of substances. Therefore, a comprehensive study of the biogeocenotic trophic chain: soil-water-plants (feed)-animals by their content, macro and microelements and heavy metals is a very urgent task.

Materials and Methods: The scientific and experimental research was carried out in the "Chabretz" and "Sokuluk" farms, in Sokuluk district of the Chui region, on the content of macro and microelements and heavy metals in soil, water, plants (feed) and blood of animals by atomic absorption spectrophotometry.

Results: Soil, water, feed as components of a certain biogeocenosis are of great importance, especially when studying biogeocenotic pathology in cattle. It has been established that the main cause of causing biogeocenotic pathology in cattle is the imbalance of a certain biogeocenosis of macro- and microelements and heavy metals in the soil, water, feeds (plants). Comparative results of the content of macro- and microelements and heavy metals in soil, water, feed and blood of animals in experimental farms show that the number of individual macro- and microelements in soil, water and feed of ecologically unfavorable biogeocenosis significantly differs from the main indicator, for example, manganese content, copper, cobalt, iron, selenium and iodine is much lower, and the amount of calcium, phosphorus and magnesium is, on the contrary, greater than the threshold concentration. This difference in the content of macro- and microelements in soil, water, and plants (feed) affects, in turn, the number of these elements in the blood of animals. From the analysis of blood results on the content of macro- and microelements, it can be noted that almost all indicators were extremely low compared to the control indicators. This is to say that in experimental animals, metabolism, especially mineral metabolism, is disrupted. Also within the experimental research, we studied the contents of toxic elements (Pb, Hg, Cd, Ni, As) in soil, water, plants (feeds) and animals bloods (cows and calves). The arsenic concentration exceeds 8.0 times, or up from 0.05 mg/l to 0.40 mg/l in experimental animals. The results of experimental studies have shown that there is a serious imbalance in the content of macro and microelements and heavy metals in soil, water, feed, and also in blood in experimental animals.

Discussion: The results of experimental studies have shown that in soil, water, feed, and also in the blood of experimental animals, there is a serious imbalance in the content of macro and microelements and heavy metals.

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Keywords. Ecology, monitoring, soil, water, feed, animal, macro and microelements, heavy metals, blood, system, pathology, cattle.
A New Record of the Lacewing Fauna of Turkey (Neuroptera: Hemerobiidae), with some Notes on Morphology, Ecological and Distributional Notes

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Introduction: The family Hemerobiidae is one of the most common in the Neuroptera and one of its importance in the control of small phytophagous pests. Most species are arboreal and few are associated with low vegetation. The family comprises 575 extant species belonging to 43 valid genera. Six species of Drepanepteryx Leach in Brewster, 1815 are known from Europe, Asia, and Canary Islands, but not found in Turkey. Studies on the brown lacewing fauna of Turkey was followed by several neuropterologists. In this study, new material must be collected and studied to achieve a satisfactory level of knowledge on the geographical distribution and ecology of many poorly known species.

Material and Methods: In 2006 Drepanepteryx specimens were collected from West Black Sea Region of Turkey using light trap and sweeping and beating the vegetation by a net. Specimens were killed in jars that were filled with ethyl acetate, prepared and labeled according to the standard procedures for museum material.

Results: This is the first report for the genus and species (Drepanepteryx phalaenoides) for the Turkish lacewing fauna, southwest part of Palaearctic region. D. phalaenoides inhabits coniferous woodlands and has a strong preference for Pinus (Aspöck et al., 1980). Very few specimens from Leningrad (Russia) were captured in deciduous trees (especially Ulmus sp., Tilia europaea) in from May to August (Dorokhova, 1973). Besides, It is found only rarely and always singly on shrubs, deciduous and coniferous trees (Zelený, 1962,1963), on the contrary, its prefers orchards (Aspöck et al., 1980). In this study, this species have been collected in a humid valley on Fagus orientalis to 1357 m. from one of the 550 localities, and indicates that the rare species found only one locality and one specimen.

Acknowledgement: The author is thankful to the Scientific and Technological Research Council of Turkey (TÜBİTAK) for partial support of this work under grant TBAG-105T320.

Keywords: Neuroptera, Hemerobiidae, new records, Turkey.
POSTER PRESENTATIONS
Use of Molecular Markers to Assess the Environmental Risk to Three Plant Species Exposed to the Pollutants of Bazian Cement Factory in Bazian\Sulaimani\Iraq

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Introduction: Aim of study is to determine genotoxic effects of various environmental pollutants in Bazian cement factory in bazian district. It was studied three plant species which include (Platycladus orientalis, Eucalyptus spp. and Melia azedarach). Development of several PCR-based techniques, provides many advantages in analysis of genetic toxicology. Random amplified polymorphic DNA (RAPD) method; a PCR-based technique which is fast and capable of detecting DNA alteration. Purpose of genotoxicity testing is to determine if a substrate will influence genetic material. Cement industry produced cement dust which contains metals such as Cd, Cr, Cu, Ni and Pb. Air pollution cause serious threat to human health, plant and environment. Biomonitoring helps us to understand possible impacts of such contamination by providing information on environmental pollution and improving process of risk assessment through measurement of physiological responses of organisms. Furthermore heavy metals have been shown to be genotoxic to living organisms. Exposure of plants to toxic levels of heavy metals triggers alterations. However, as different heavy metals have different sites of action within plant, the overall visual toxic response differs between heavy metals.

Materials and methods: Three plants were collected from three sites in and near factory (1km). Control sample collected from garden in city center was not exposed to any kind of contamination. Plants samples were collected for heavy metals according to a regular schedule per season during september 2015 to August 2016. Also fresh leaves had collected for DNA extraction for molecular work. Concentration of some heavy metals to evaluate pollution status using AAS had done (Pb, Cd, Cr, Ni, Fe, Cu and Zn). Main observation or changes in RAPD patterns included an appearance of new bands and/or disappearance of normal bands compared with controls. Genomic template stability (GTS %) was calculated as: GTS = (1 – a/n) x 100% where, a indicates RAPD polymorphic profiles in each sample exposed to environmental pollution in cement factory of Bazian, and n is the number of total bands in control.

Results: Mean concentrations of heavy metals in this study for all plant species are generally below 100mgKg⁻¹ and like control samples results. GTS% ratios were (68.36%,69.38%,89.79%), (79.2%,83.16%,89.1%) and (79.12%,87.91%,99.94%) in (CCR, Gate3 and Out) respectively.

Discussion: Statistical results for heavy metals in plants leaves revealed significant differences only among sites for most metals. As samples from CCR revealed lowest level of GTS ratios followed by Gate3 and Out and that agree with distances from main stack respectively and might led to a high level of genotoxic effect in three plants species.

Twenty-five different primers were tested and 20 yielded clear and reproducible bands.

Conclusions: This study shows suitability of plants samples for genotoxicity detection, and also suitability of RAPD for genotoxicity assessment. Also use of indicator plants as a biomarker in early detection of genotoxic agents showed reliable sensitivity in terms of assessment impact caused by air pollution.

Acknowledgement: We would like to express our appreciation to the Kastamonu University Scientific Research Project Commission, which supported this study.

Keywords: Plant, genotoxicity, risk assessment, RAPD; GTS.
Metal Concentrations in Water and Sediment of Sığırcı Lake (Edirne, Turkey)

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Introduction: Heavy metals are naturally occurring elements that have a high atomic weight. Industrial, domestic, agricultural, medical and technological applications of heavy metals have led to their wide distribution in the environment. Therefore, the heavy metal pollution threatens both for the aquatic life and the human health. Sığırcı Lake is located in Edirne Province of Turkey and as many aquatic ecosystems, it is known to be exposed to an intensive pollution by means of especially agricultural pressure on the system. The aim of this study was to determine the toxic element accumulations in water and sediment of Sığırcı Lake.

Material and Methods: Water and sediment samples were collected from 5 stations selected on the Sığırcı Lake in spring season of 2017 by using polyethylene bottles and Ekman Grab. Total of 9 inorganic pollution parameters including Cd, Pb, As, B, Cu, Zn, Cr, Ni and Se contents were investigated in water and sediment samples by using Inductively Coupled Plasma – Mass Spectrometer (ICP – MS). Also Geographic Information System (GIS) were used in order to make the distribution maps for present the detected element levels recorded in water and sediment of Sığırcı Lake.

Results and Discussion: As a result of this study it was determined that although toxic element levels detected in sediment of Sığırcı Lake were not exceeded the lowest effect level (LEL) and threshold effect level (TEL) according to the sediment quality criteria, water of Sığırcı Lake has II. Class quality in terms of cadmium, lead and arsenic concentrations and has IV. Class quality in terms of nickel concentrations in general according to the Water Pollution Control Regulation in Turkey.

Acknowledgement: We would like to express our appreciation to the Trakya University Scientific Research Project Commission, which supported this study (TÜBAP 2016/247).

Keywords: Sğırcı Lake, Toxic Metals, Water – Sediment Quality, GIS
Biomonitoring of Air Pollution by Using Antioxidant Parameters in Plants Collected from Different Regions in Diyarbakir Province

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Introduction: Air pollution is one of the most significant environmental concerns in both developed and developing cities. The urban air quality is continuously affected by emissions from both stationary and mobile combustion sources. Mobile sources contribute to the emission of major urban air pollutants including: carbon monoxide (CO), nitrogen oxides (NOx), sulphur oxides (SOx), particulate matter (PM), lead (Pb), photochemical oxidants such as ozone (O₃) and ozone precursors like hydrocarbons and volatile organic compounds. Various physical, chemical and dynamic processes may generate air pollutants including particulates and gaseous contaminants that may cause adverse health effects in human or animals, affect plant life and impact the global environment by changing the atmosphere of the earth. While plants can improve the air quality in some extent, air pollution may adversely influence the plant life. Air pollutants such as ozone may inter into plant tissues via stomata and elevate the level of reactive oxygen species (ROS) causing serious damage to the DNA, proteins and lipids. In this study, it is aimed to investigate the effect of pollutant gases generated as a result of air pollution on the antioxidative defense mechanism in plants.

Material and methods: For this purpose, in the summer months of 2017, in the sample areas in various districts located in the central province of Diyarbakir province (Eğil, Koşuyolu and organized industry region), pinus sp. Leaf samples of the species were taken. Enzymatic antioxidants (SOD, CAT, GSH-PX) were determined in collected plant leaf samples. Biochemical biomarkers are measured in the microplate reader using the ELISA method.

Results: SOD and CAT enzyme activities were decreased in the Koşuyolu and Organized Industrial regions when compared to Eğil (control zone). GPx enzyme activities were increased when compared to Eğil.

Discussion: Different results of the plant may provide an indication of the possible metabolic processes responsible for the adverse effects of air pollution in plants. The overall plant injury symptoms found in this study may reveal, in some extent, the environmental consequences of inadequately controlled urban air pollution in Diyarbakır. The overall plant injury symptoms found in this study demonstrated that Pinus sp., have a potential to be considered as effective bioindicator to reflect the environmental air quality in polluted areas.

Acknowledgment: We would like to express our appreciation to the Munzur University Scientific Research Project Commission, which supported this study (YLMUB017-06).

Keywords: Air pollution, Antioxidant enzymes, Pinus sp., Diyarbakır
Changes in Some Antioxidant Enzymes Activities in *Gammarus pulex* Exposed to Methyl Orange Textile Dye

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Introduction: Textile dyes are largely used in the World today and textile industry plays an important role in nation’s economy. Dye pollutants from the dyestuff manufacturing, dyeing, printing and textile industries are major sources of environmental pollution. The effluents of these industries are usually strongly colored, and the direct release of the wastewater into receiving water body will provoke damage to aquatic life. Several textile dyes have carcinogenic, mutagenic, and teratogenic effects. They are also toxic to human, aquatic species, and microorganisms. The present study was undertaken to determine the toxicity of the methyl orange textile dye by using the changes of some antioxidant enzymes activities in *Gammarus pulex*.

Material and method: A static test was used to determine the LC50 value. LC value of methyl Orange (MO) was determined as 1737.3 ppm and then three subletal dose of MO (1/4; 1/8 and 1/16 of LC value) were exposed to *G. Pulex* for 24 and 96 hours. Superoxide dismutase (SOD), Catalase (CAT), Glutathione peroxidase (GPX) activities were determined by using ELISA kit.

Results: The CAT activity was decreased in all the groups exposed to different doses of MO. The GPX activities were changed in all the groups, but the differences among the groups were not statistically insignificant. MO affected SOD activity in different levels and in different concentrations. In our study, it has been found that exposure duration didn’t significantly affect the biochemical biomarkers.

Discussion: In conclusion, the alterations in activity of antioxidant enzymes demonstrate that stresses from dye metabolism were changeable and the toxicity of metabolites can be illustrated by the action mode of the antioxidant defense system. Activity can be induced as a compensatory response to slight oxidative stress; however, severe oxidative stress resulting from highly toxic material suppresses activity of these enzymes and then causes oxidative damage. Changes in antioxidant enzymes (CAT and SOD) may potentially be used as sensitive biomarkers for risk assessment of dyes in the environment and may contribute to the establishment of discharge regulations.

Acknowledgement: We would like to express our appreciation to the Munzur University Scientific Research Project Commission, which supported this study (YLMUB017-05).

Keywords: Antioxidant enzyme, *G. pulex*, Methyl Orange
Adverse Effects of Environmental Pollution on Lung Tissue of Euraisan Marsh Frog (Pelophylax ridibundus)

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Introduction: The artificial fertilizers, insecticides, municipal sewage, industrial and factory wastes are polluted the Karasu Basin. The pollution in the basin also threatens the Euphrates Basin. During the last few years, many amphibian populations have been decreasing dramatically by environmental pollution. The Eurasian marsh frog Pelophylax ridibundus (formerly known as Rana ridibunda) is a medium-size amphibian species. In Turkey, this species is known in all suitable habitats. The frogs are also distributed in Karasu Basin. One of the main reasons for the decrease in frogs in natural habitats is chemical pollution. The aim of the work was to show the effect of environmental pollution on the lung tissue of Pelophylax ridibundus from Karasu Basin.

Material and Methods: The histopathological effects of the environmental pollution were investigated on P. ridibundus frogs collected from Karasu Basin. Frogs were caught at three agricultural areas in the Karasu Basin (Dereboğazı I, II and Söğütlü Village), Erzurum. The histological changes in lung of the frog were detected microscopically and evaluated with semiquantitative analyses. The presence of lung histological alterations was assessed by degree of tissue change (DTC).

Results: Various histopathological abnormalities were determined in lung tissues of the frogs. Hyperplasia of the epithelium, thickened alveolar septa, dilated blood capillaries, congested blood vessel and deposits of melanomacrophage were observed in lung tissue. For all sites frog lungs’ DTC values ranged from 4.57 to 42.43 with a mean value 21.65, indicating moderate changes in the organ.

Discussion: The histopathologic abnormalities did not show significant increasing in frog species caught from Dereboğazı site, statistically. But, pathology increased in Söğütlü site and this increase was found to be statistically significant. The DTC values were varied from slight to moderate of lung and kidney tissue in the Söğütlü site. The DTC values of Dereboğazı site demonstrated their good environmental quality. The results suggest that there is a close relationship between amounts of pathologic abnormalities and environmental pollution.

Acknowledgement: We would like to express our appreciation to the Atatürk University Scientific Research Project Commission, which supported this study (BAP-2014/68). The animal ethics committee permission for the study was received from Atatürk University Local Animal Ethics Committee (Number: 36643897-132).

Keywords: Agricultural Pollution, Karasu Basin, Histopathology, Lung, Kidney, Pelophylax ridibundus.
Comparison of Some Nutrient Contents of Garlic Grown In Greenhouse and Open Field in Taşköprü of Kastamonu Province

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Introduction: Garlic (Allium sativum L.) belong to Amaryllidaceae family is one of the major vegetables and medical plants in the world. When it is fresh, it is a type of vegetable that consumes the teeth that make up the head when it is dry. Garlic is widely used as a flavoring in cooking, and it has been used as a medicine throughout ancient and modern history to prevent and treat a wide range of conditions and diseases by humans for thousands of years. Turkey is one of the leading countries that garlic producing in the world with a share of 4% in garlic production. A big part of the garlic is produced in the Kastamonu province, especially in the district of Taşköprü, Turkey and this is called as Kastamonu or Taşköprü garlic.

Material and Methods: Garlic samples were grown in open field conditions in Taşköprü and in greenhouse in campus of university in Kastamonu. Samples of garlic bulbs were collected in June. After some nutritional values, amounts of compounds with antioxidant characteristics and lipid peroxidation levels of fresh and garlic cloves were analyzed and compared.

Results: The amount of protein in fresh garlic found lower than that in garlic cloves. The total soluble carbohydrates, protein, free amino acid and sucrose content of the fresh garlic grown in open field in Taşköprü found higher than the others. In fresh garlic, the highest proline, MDA and H₂O₂ values were obtained from Taşköprü in both greenhouse and open field conditions. The carotenoids and flavonoid contents of garlic cloves grown in Taşköprü in both greenhouse and open field conditions were higher than that in Kastamonu.

Discussion: Differences were found in some nutrients and compounds with antioxidant characteristics of fresh and bulb cloves grown in greenhouse and open field Taşköprü and Kastamonu. The garlic grown in open field in Taşköprü has good nutritional values than others. It can be said that differences among garlic samples depends on growing conditions effect yield performance and variations in yield and quality of nutritional content.

Acknowledgement: We would like to express our appreciation to the Kastamonu University Scientific Research Project Commission, which supported this study (KÜBAP-01/2014-21).

Keywords: Chemical Compounds, Garlic, Greenhouse, Open Field
Superoxide Dismutase Activity in Blood of Rats Exposed to Non-Ionizing Electromagnetic Radiation

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Introduction: Previously, we and other authors have shown that electromagnetic radiation (EMR) in the microwave range leads to increased lipid peroxidation (LPO) in biological systems. In particular, in experiments on rats, it was shown the accumulation of LPO product malonic dialdehyde in blood of rats exposed to chronic radiation with decimeter radiation. In this regard, the question arises about the response of blood antioxidant system to this physical factor. The aim of our study was to investigate the activity of antioxidant enzyme superoxide dismutase (SOD) in blood of rats that were chronically exposed to EMR of decimeter range. This frequency range is used in the mobile communication system, radiation, which is continuously irradiating people and other living organisms.

Material and Methods: Studies were conducted on Wistar rats divided into experimental and control groups of 10 animals each. Experimental group animals were exposed to 460 MHz EMR (30 µW/cm²) for 7, 14, 21 and 28 days 20 min a day. Superoxide dismutase activity was determined in erythrocytes according to the method based on nitrotetrazolium reduction by superoxide radicals.

Results: Experiments showed that SOD activity in blood reached level of 69.4% for 7 days exposure in experimental rats, while the activity level in control animals was 50.1%. The accuracy of activity increase (~39%) corresponds to a significance level of p<0.05. Further irradiation of the animal up to 28 days leads to a decrease of the enzyme activity. At 28-day exposure, enzyme activity level stabilizes at the level of 18.3% (p<0.01, radiated group vs. control one).

Discussion: SOD activity profile resembles changes in MDA concentration in erythrocytes of rats in similar conditions of irradiation. However, the increase of SOD activity outpaces the rate of LPO products accumulation. This indicates early activation of ROS generation caused by EMR, which is involved in enhancement of free radical oxidation of lipids in erythrocytes. Increased activity of SOD, apparently, is an adaptive response aimed at reducing the rate of ROS formation and, thereby, the intensity of LPO processes. A further decrease in SOD activity during long-term irradiation can occur on the background of activation of other elements of antioxidant defense, particularly glutathione peroxidase, haptoglobin etc. Thus, the obtained data give additional arguments in favor of free radical nature of biological effects of microwave range non-ionizing radiation.

Keywords: rats, electromagnetic radiation, blood, superoxide dismutase
Exploration of Microbiological Contamination in Karasu River of Sinop (Black Sea)

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Introduction: Microorganisms in water resources, which are part of the ecological system, are mixed in various ways. They can come to natural water resources from the atmosphere and soil as well as from industrial and domestic waste sources. These include that certain species of Spirillum, Pseudomonas, Achromobacter, Micrococcus, Vibrio, Chromobacter, and Sarcina, and that rotifer members such as Enterobacteriacea, Bacillus and Streptomyces, and that pathogens such as Escherichia coli, Salmonella and Vibrio comma Streptococcus faecalis, Clostridium perfiringens. Such microorganisms may cause changes in the biochemical structure of water resources as well as cause harmful, dangerous and disease-causing substances.

Material and Methods: The work was made monthly from May 2014 to April 2015, and the results were calculated seasonally. Four different stations were detected to represent the Karasu River. Microbiological analysis values and some physicochemical parameters [pH, conductivity, temperature, biological oxygen demand, ammonium nitrogen, hydrogen sulfide, total dissolved matter] were measured in river water. Microbiological analysis: After samples were taken in sterile containers (100 mL), they was diluted to 10⁻³ level. Analysis was carried out by membrane filtration method.

Results: The microbiological evaluation of the river was determined by investigating the presence of total coliform and fecal coliform bacteria. The minimum and maximum of the total coliform values were determined to be 52-882, 37-779, 50-689 and 27-305 cfu/100 ml at K1, K2, K3 and K4 stations, respectively. Minimum and maximum of Fecal Coliform levels were found as 47-644, 24-568, 21-649 and 19-213 cfu/100 ml in K1, K2, K3 and K4 stations, respectively.

Discussion: Summer season was significantly higher total coliform. This is due to the increase in water temperature and the formation of a suitable breeding environment for microorganisms. In addition, it can be said that the cause is the increase of total coliform concentration. The results show that the pollution load entering the river and temperature are an effect on total coliforms, and they play a major role in the change of river microbial quality. The main source of coliform contamination is sewage wastewater. Such bacteria can cause serious diseases for human health. The fact that the current situation of water resources is monitored periodically, and that the remediation and protection is not to be ignored. Natural water resources are important sources of information in determining ecological changes. Natural water resources are important sources of information in determining ecological changes. This is possible if the characteristics of the waters are determined and known at certain times.

Keywords: Coliform, physico-chemical, water, Creek, stream, Black Sea.
A Revision of the Plant Pathogenic *Phyllosticta* Species on Trees in Azerbaijan

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**Introduction:** The genus *Phyllosticta* is a taxonomically confused group of fungi, comprising an important pathogens and saprobes, causing leaf spots and fruit diseases on numerous plants. The teleomorph of *Phyllosticta* has been defined as the genus *Guignardia*. Morphology, culture characters and host plant associations are important features for species identification. Recently molecular analyses have been conducted for delimitation of some cryptic species. Genus *Phyllosticta* was studied in Azerbaijan between 1950 and 1990, and 167 species were recorded. The purpose of study is to identify and revise diversity of *Phyllosticta* on trees in Azerbaijani, according to the recent nomenclatural novelties.

**Material and Methods:** In total 75 specimens kept in the mycological herbarium of the institute were examined by microscopy. Fungal names were checked according to van der Aa, Vanev [2002].

**Results:** Specimens previously identified as 49 *Phyllosticta* species were revised. According to the new taxonomic changes only one species, *Phyllosticta pruni-spinosae* resides to the genus. Other species were relocated to eight genera, as shown below: *Ph. aceris*, *Ph. apiculata*, *Ph. fagicola*, *Ph. fraxini*, *Ph. fraxinicola*, *Ph. lusitanica*, *Ph. moricola*, *Ph. tumoricula*, *Ph. virentis* to the genus *Phomopsis*; *Ph. alni-glutinosae*, *Ph. alniperda*, *Ph. carpinea*, *Ph. fraxini*, *Ph. fraxinicola*, *Ph. lusitanica*, *Ph. moricola*, *Ph. tumoricula*, *Ph. virentis* to the genus *Phoma*; *Ph. betulina*, *Ph. fagi*, *Ph. fraxini*, *Ph. fraxinicola*, *Ph. macrocarpae*, *Ph. pseudoplantani*, *Ph. pyrina*, *Ph. quercia*, *Ph. sycophila*, *Ph. terebinthi*, *Ph. ulmariae*, *Ph. ulmi*, *Ph. variegata* to *Phoma*; *Ph. bacteriformis*, *Ph. bellunensis*, *Ph. betulina*, *Ph. fagi*, *Ph. fraxini*, *Ph. fraxinicola*, *Ph. macrocarpae*, *Ph. pseudoplantani*, *Ph. pyrina*, *Ph. quercia*, *Ph. tumoricula* to *Astomella*; *Ph. maculans* to *Coleophoma*; *Ph. phaeosporia*, *Ph. quercus-iliensis* to *Coniothyrium*; *Ph. phomiformis* to *Fusicoccum*; *Ph. globulosa*, *Ph. ulmicola* to *Mycospaerella* and *Ph. minima* to *Pleurophoma*.

**Discussion:** Recently the genus *Phyllosticta* was restricted to Coelomycetes with stromatic conidiomata, holoblastic conidiogenesis and one-celled, ovoid to ellipsoidal, cylindrical, seldom pyriform, with greenish guttules, 10-25 μm long conidia, surrounded by a slime layer and apical non-cellular appendage. The number of species previously belonging to the genus was transformed to the corresponding genera. Taxonomic status of two species is remained unclear, *Ph. quercus* placed in both *Phomopsis* and *Phoma*, *Ph. nubecula* to *Phoma* and *Astomella* genera. Preliminary study of *Phyllosticta* species on trees gave insight to concept *Phyllosticta* s.str., nevertheless more work based on molecular biological approach is needed to clarify some dubious species.

**Keywords:** species, genus, plant, fungus, coelomycete
Biological activities and chemical analysis of phenolic and flavonoid components of
*Thymus hirtus* Willd., and *Thymus lanceolatus* Desf. extracts from Algeria

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**Introduction:** The *Thymus* genus belonging to the Lamiaceae family originating from Europe and Southern Asia, is gathered in several species largely distributed in the Mediterranean area, native of the mint family. *Thymus* genus includes about 315 species in the world. Many *Thymus* species are used in various regions of the world in the treatment of bronchial, pulmonary, digestive and urinary infections and possess spasmolytic, antitussive and expectorant properties. Over 11 species of this genus are grown in Algeria, among which *Thymus hirtus* Willd. (El hamriya) and *Thymus lanceolatus* Desf. (thyme of the coat).

**Material and Methods:** The aerial part of this tow spices was collected from Tiaret a province in West of, Algeria after drying, the extraction was done by hydromethanolic solvent and fractionation executed by Chloroform, Ether diethyl, Ethyl acetate and Butanol. The total phenolic and flavonoids contents were determined spectrophotometrically, using the Folin–Ciocalteu assay and AlCl₃.6H₂O method, respectively. Than the hydromethanolic extracts of the tow species were analyzed by HPLC-DAD to identify the phenolic compounds. The antioxidant activities were assessed by DPPH scavenging activity and β-carotene-linoleic acid system. At the last step the antimicrobial was carried out by disc diffusion assay and agar dilution method.

**Results:** The results show that the polyphenol contents of ethyl ether and ethyl acetate extracts of *T. hirtus* are of the highest contents (261.66 ± 3.66 and 272.80 ± 8.88 mgEAG / g.d.e, respectively) while the largest amounts of flavonoids were observed in ethyl ether and chloroform extracts of *T. lanceolatus* (3.39 ± 0.03 and 3.13 ± 0.08 mgEQ /g.d.e, respectively). HPLC analysis of the hydromethanolic extract revealed its richness in phenolic acids. Concerning antioxidant activity, the ethyl ether fraction of *T. hirtus* was found to be more active than other extracts and demonstrated strong free radical scavenging activity (SC₅₀ = 13.12 μg / ml) with very high protective capacity of the β-carotene-linoleic acid system (96.65 ± 0.720%). As for the antimicrobial activity, extracts of the species *T. lanceolatus* were the most active and the strains *Staphylococcus aureus* and *Umpelopsis ramaniana* were the most sensitive with MIC ranging from 0.391 to 0.098 mg / ml.

**Discussion:** The results obtained in this study are in conformity with previous work subjected the genus *Thymus* to the same tests the medium content of phenolic and flavonoids contents, the presence of some phenolic acid and flavonoids compounds, and the interesting antioxidant and antimicrobial activities.

**Acknowledgement:** We would like to express our appreciation to the microbiology laboratory of ENS kouba Algers Algeria, and the chromatography laboratory of Blida University which supported this study.

**Keywords:** *Thymus hirtus; Thymus lanceolatus; antioxydant activity, antimicrobial activity, HPLC analysis.*
Survey of Phytoseiidae mites from garlic crops in Kastamonu/ Turkey

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Introduction: Garlic (Allium sativum L.) (Asparagales: Amaryllidaceae) is one of the most commonly produced vegetable crops in the world. Garlic is used as a spice mash, a canned product, a dried powder, a garlic oil, and as garlic pellets. Garlic has a wide range of uses and positive effects on human health such as asthma, hypertension, bronchitis, cancer, circulatory weaknesses, colds, colitis, and coughing. Although garlic is now grown in almost every region of the world, it prefers under temperate climates on sandy, loamy, and argilliferous soils, especially rich in germanium and selenium. According to the studies that were materialized in our country and the world, it has been reported that mites are caused the important problems for onion, garlic and bulbous ornamental plants. Phytoseiidae family are important predators. Usually they were used as biological control agents for fighting with harmful mites. In this study Turkey Phytoseiidae fauna on garlic and their distributions were determined in first time.

Material and Methods: This study was realized with the weekly sampling were made on garlic cultivation areas in Taşköprü, Hanönü and Central Districts of Kastamonu Province in 2015-2016. The samplings were made from March to July. The samples that were collected were brought to laboratory. After extraction of the samples, their diagnostics were realized.

Results: The weekly sampling were made on garlic cultivation areas for two years and in total 200 sampling were made from 27 points. 7 mite species that belong to Neoseiulus, Anthoseius, Euseius and Amblyseius genus were determined in this study. Totaly 184 mite specimens were determined from Phytoseiidae family.

Discussion: A detailed and comprehensive study targeting marsh biodiversity in direct garlic in the world and in our country is scarce. Phytoseiidae family are important predators. Usually they were used as biological control agents for fighting with harmful mites. Species of this family were fed Tetranychid, Eriophyid mites, small insect eggs, fungi and pollen dust. Species of Phytoseiidae family were usually the predator of Tetranychid mites. It is reported that Phytoseiiids can be able to control some Amblyseius sp., Typhlodromus sp. ve Phytoseius sp. species and tea harmful mite Brevipalpus phoenicis. For these reasons the results of this study have some qualities for the future studies that aims biological features and diversities of predators. In this study, the benefit species increased to the mite biodiversity on head and green parts of garlic. The height of benefit mite species and mite biodiversity on this area supported to the alternatives of biological fighting with phytophagous mites.

Keywords: Allium sativum L., Acari, Garlic, Phytoseiidae, Kastamonu
The Abdomen Meat Yield and Biochemical Composition of Freshwater Crayfish (*Astacus leptodactylus* Eschscholtz, 1823) in Ulugöl, Samsun, Turkey

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**Introduction:** Crayfish are ecological, economically and socially important species. Generally, they are traditionally consumed as a luxury food as well as consumed at special occasions in some countries. On the other hand, they are a source of protein with low calories and rich for vitamin B, sodium, potassium, calcium and magnesium. *Astacus leptodactylus* belonging to Astacidae family naturally exist in Turkey. Crayfish stock in Ulugöl, one of the Bafra Fish Lakes, Turkey, is natural and the commercial fishing is based on renting of lakes by commercial enterprises. Since there is no study done in that area before, it is aimed to determine meat yield and biochemical compositions of crayfish, *Astacus leptodactylus* in this study.

**Material and Methods:** Monthly, *A. leptodactylus* samples were chosen randomly among healthy population, caught with pinter nets by fishermen from July 2010 to July 2011. A total of 378 crayfishes (180 male, 198 female) were used in the study. The samples were brought to a laboratuar in Faculty of Aquaculture, University of Sinop with a humidified styropor container. The abdomen meat yield was sampled according to Harlıoğlu (1999). In order to determine the biochemical composition, abdomens of the crayfish were removed and stored at -80°C. Crude protein analyzed was analyzed according to Kjeldahl method [AOAC, 1980], crude oil was analyzed according to Soksalet method by using Gerhard brand device and moisture, ash and dry matter were found according to AOAC [1990].

**Result:** The average weights of abdomen meat were 3.59±0.13 and 3.49±0.14 g for females and males, respectively. The average abdomen meat yields were 9.43±0.79% in females and 9.57±0.95% in males. Average moisture, crude ash, crude oil and crude protein were 81.27%, 1.47%, 0.81% 16.45%, respectively.

**Discussion:** The difference was not significant in terms of abdomen meat yield between male and female crayfish (p>0.05). The findings obtained in this study chemical compositions showed similarity to the findings obtained from the other studies. It has been concluded that the crayfish species is an important source of nutrition and economic value.

**Keywords:** Crayfish, *Astacus leptodactylus*, meat yield, biochemical composition, Bafra fish lakes
Economic Analysis and Household Behaviours of Agricultural Enterprises Which Are Placed in Garlic Production in Kastamonu Province

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Introduction: The agriculture sector is a private sector that needs to be protected for each country. Countries especially need to be self-sufficient with a large reserve in agriculture. Turkey is a country in terms of rich variety of agricultural products. Due to Turkey's socio-economic conditions, the agricultural sector will continue to be important in the future.

Material and Methods: In this study, the economic analysis of agricultural farming that involves also garlic farming in Kastamonu Province was done. Research within the scope of enterprises are selected by Stratified Random Sampling Method. According to the selected sampling, 74 of agricultural farms have been studied and data were collected through a questionnaire. The completed survey forms, data entry of information, made in a spreadsheet environment. Analysis of primary data is entered into the computer in the process, the program was evaluated using the SPSS package program.

The annual operating results of agricultural establishments are important in terms of knowing the cost-income ratio of establishments. Establishments records are the most important data for determining the annual operating results in the establishments. However, the record-keeping rate in agricultural establishments is very low compared to other sectors.

Results and Discussions: According to Turkish Statistical Institute (TurkStat) database; garlic production in which 65 provinces is the highest production in Kastamonu province. 25,987 tons of fresh garlic and 109,101 tons dry garlic production are produced in Kastamonu province in Turkey. There are 19 counties in Kastamonu province. Taşköprü county is the first garlic producer county has 18,000 tons, second order Merkez county has 1,631 tons and the third order Hanönü has 240 tonnes.

Keywords: Economic analysis, Household behaviours, Kastamonu
Economic Importance of Non-Wood Forest Products in Turkey

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Introduction: The forest of our country is approximately 21,389 million hectares; forest areas constitute 27% of the total area of the country. 50.1% of the country's forests are fertile and 49.9% are inefficient forests. Our forests, which are very rich in terms of biodiversity, consist of coniferous leaves and the other half is broad-leaved species. The richness biological diversity of the forests in Turkey offers plenty, non-wood forest product sources in different parts of the country. The non-wood forest products obtained from these sources are used to meet a wide range of needs both locally and country-by-country, and also significant income is generated through export. A large number of products are exported in our country for this purpose. In 2010, Turkey's non-wood forest products sector in most exporting countries is China. The products sector in Turkey's exports are 15% of total sector exports to China in second place in the US is 9.3% share. These countries were followed by Germany (9.3%), Vietnam (7.9%) and Spain (6%) respectively. In this way, the resulting revenues provide significant revenue to the economy of Turkey. The purpose of this study is to evaluate the contributions of exports of the products to the country's economy.

Material and Methods: In this study, export values of some non-wood forest products will be obtained from the Turkish Statistical Institute (TUIK). The export revenues of our country and its economic benefit will be discussed from the obtained data.

Results and Discussion: Turkey has a rich plant diversity. Because it has a large surface area and different climates, it is very rich in non-wood forest products. Those products have a big market in the world due to its plentiful variety. Especially bay, pine nuts, thyme, chestnut, cumin, anise, sage and linden are some of the important products. The contribution of exports of products to our country's economy is increasing day by day. In order to increase of trade abroad of their and the distribution areas of this product should be determined and protected.

Keywords: Non-wood, forest, economy
The Relationship Between Ecological Conditions and The Samples of Juvenilities in Natural Regeneration Areas of Quercus frainetto Ten. and Quercus petraea (Matt.)

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Introduction: Turkey has quite valuable forest resources in terms of species composition and structural characteristics with the effect of different ecological conditions. At the beginning of primary forest tree species that spread naturally in Turkey comes in oak forests. In this study, neighborhood and competition relations between ecological conditions and natural juvenility in natural rejuvenation areas (RA) carried out in the Hungarian oak (Quercus frainetto Ten.) and Sessile oak (Quercus petraea (Matt.) stands were investigated.

Material and Methods: This research was carried out in three natural RA in the Yumurtatepe Forest Range District in Thrace Region. The total area is to 23.5 ha. The Hungarian and Sessile Oak species were determined in the stand composition. In 2015, natural rejuvenation studies were carried out in three different stands depending on the mast seed years determined. Measurements of juvenility counts, seedling heights (SH) and root collar diameters (RCD) were carried out in the trial areas taken between 2015-2017. Mobile meteorological stations were used to determine climatic conditions in RA. In the research area, physiographic conditions were determined by GPS. Soil analyzes were carried out according to the significant changes in the condition of RA. In addition, according to the K and L function values calculated in the GIS program spatial patterns analysis.

Results: The study areas are in the N, NE and W exposures with the middle and upper slopes. The elevation ranges from 223 to 334 m. The depth of the soil is moderate, deep and very deep soil conditions. The soil structure is in the crumbled and granular environment and the texture is sandy-clayey-slime and sandy-slime formation. The mean temperature in the areas varies between 17.8 and 23.6°C. The vegetation period is 6 months. The mean annual rainfall ranges from 576.2-613.4 mm. On the other hand, it is determined that between the years (2015-2017) the juvenility of the Hungarian oak is 17.2-8.6 seedlings/m² and the juvenility of the sessile oak is 12.6-4.3 seedlings/m². In the same years, the average SH growth was 2.6-11.5 cm for Hungarian oak and 6.4-14.3 cm for sessile oak, while the RCD was 3.6-10.2 mm for Hungarian oak and 4.8-12, 7 mm for sessile oak. Furthermore, it was determined that the Hungarian oak juvenilities are in homogeneous clusters and high competitive power while the sessile oak youths are distributed in the areas of low competition power and heterogeneous clusters in spite of their rapid growth characteristics. On the Hungarian oak, neighbors and solidarity associations are higher than sessile oak. It was observed the Hungarian oak has been developed the pile root system since the first years.

Discussion: To ensure the continuity of oak species, comparative determination of youth dynamism and growth performance should be examined comparatively for longer periods.

Keywords: Hungarian oak, Sessile oak, growth, regeneration, ecology.
A preliminary Study on Determination of Yield and Some Plant Characteristics of Chia 
(Salvia hispanica L.)

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Introduction: Chia (Salvia hispanica L.) belongs to the Lamiaceae family and its center of origin is in mountain areas of Mexico and Guatemala. It was traditionally one of the four basic elements in the diet of Central American civilizations in the pre-Columbian epoch. Today chia is being re-introduced into western diets because of its numerous positive nutritional characteristics. Chia seed has become important for human health and nutrition because its high content of omega-3 fatty acid that promotes beneficial health effects. Chia is a new crop for our country but the economic value of chia in international market and even in Turkey market is quite high. Chia grows naturally in tropical and subtropical environments; it is optimally established from 400 to 2500 m above sea level, but conditions below 200 m elevation are not adequate for its cultivation. The expansion of chia is limited because it is a photoperiod-sensitive plant adapted to areas without cold. The aim of this study is to determine the grain yield and some plant characteristics of chia crop grown under glasshouse conditions.

Material and Methods: A pot trial was conducted as a single crop experiment in 2015-16. In the experiment, seeds of chia were sown into the plastic pod containing mixture of commercial field soil, manure and peat (1:1:1) at the end of October. The mean temperature was 22±1°C and relative humidity was ~70% in the glasshouse. Additional artificial light (purple light, 10000 lux) was applied during 12 h from 6 am to 6 pm. The plants were harvested (17 weeks after sowing) when the crop had reached physiological maturity of seeds (~13% moisture). Plant height (cm), number of brunch and inflorescences per plant, main inflorescence length (cm), biological yield (g/plant), grain yield (g/plant) and thousand-grain weight (g) were determined in the experiment.

Results and Discussion: Minimum and maximum plant heights and biological yields were 30 to 51 cm and 2 to 4 g/plant, respectively. Grain yield ranged between 0.1-0.3 g/plant. One-year results indicated that chia is a new promising crop for human nutrition in Turkey, and easily grown under controlled condition. However, new experiments on chia crop should be conducted at different locations on field conditions with various agronomical treatments (sowing date, row spacing, etc.) to be sure that results are relatively consistent over time.

Keywords: Chia, Salvia hispanica, artificial light, grain yield.
New Occurrence of the Mite Genus *Columbicheyla* (Acari, Cheyletidae) in Turkey

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Introduction: The family Cheyletidae (Acari) is mainly free-living predators, and has a worldwide distribution, comprising about 500 described species in 77 genera. Members of the genus *Columbicheyla* Thewke & Enns belonging to this family are found in tree bark and leaf litter. This genus has not been hitherto recorded from Turkey. Here we present the new record of the *Columbicheyla* and *C. macroflabellata* for the fauna of Turkey.

Material and Methods: The specimens were extracted in Berlese funnels from moss and soil samples collected from Çıkrıkduüzü highland and Zigana gate, Gümüşhane. Mites were mounted on microscope slides in Hoyer’s medium using the standard method. Materials examined are deposited in Acarology Laboratory of Erzincan Binali Yıldırım University, Erzincan, Turkey. Measurements were given in micrometers (μm) by using Leica Application Suite (LAS) Software Version 3.8. Mean values are given first and the range is given parenthetically.

Result and Discussion: The genus *Columbicheyla* Thewke & Enns included the family Cheyletidae is characterized by presence of propodosomal and hysterosomal shields on idiosoma, presence of eyes, dorsolateral and humeral setae fan-like, dorsocentral setae squamate, palp tarsus with two comb-like setae and one sickle-like seta, palp claw edentate, all legs with claws. By now three species have been described in the genus viz. *Columbicheyla bicirci* Lin & Zhang, *C. macroflabellata* Thewke & Enns and *C. nindota* (Corpuz-Raros). *C. nindota* was considered as synonym of *C. macroflabellata* by Fain and Bochkov (2001). The genus *Columbicheyla* Thewke & Enns was not represented in Turkey, and this paper reports the presence of this genus in Turkey with *C. macroflabellata*, based on the specimens collected from moss and soil.

Keywords: *Columbicheyla*, fauna, mite, new record, predator
Cryptognathid Mites (Acari: Cryptognathidae) of Harşit Valley and Örümcek Forests (Turkey)

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Introduction: Mites of the family Cryptognathidae (Acari) can be easily recognized by the presence of a protective hood-like anterior of the propodosoma and an extremely extendable gnathosomal base. It has been suggested that cryptognathid mites are predatory; however, recently they have been considered as microphytophages. Cryptognathid mites have three genera in the world: Cryptognathus Kramer, Favognathus Luxton and Cryptofavognathus Doğan & Dönel. This family comprises 63 species in the world, and they are represented in Turkey with 18 species. In order to contribute to the knowledge of mites in Turkey a faunastic study was carried out on the mites in Harşit Valley and Örümcek Forests (Turkey) from October 2013 to October 2015. In this faunastic study, four species belonging to the family Cryptognathidae have been found.

Material and Methods: Mite specimens were collected from Harşit Valley and Örümcek Forests, during October 2013 – October 2015. Cryptognathid specimens were extracted by using Berlese funnels, cleared in 60% lactic acid and mounted on microscopic slides in Hoyer’s medium under stereo microscope. Measurements were taken in micrometers (µm) with the aid of the Leica Application Suite (LAS) Software Version 3.8. and drawings for some parts of the body were made under a Leica DM 4000B microscope.

Results: In the present work, four species belonging to the family Cryptognathidae were determined: Cryptognathus lagena Kramer, Favognathus cucurbita (Berlese), F. kamili Dönel & Doğan and F. distortus (Kuznetsov). The descriptions and illustrations of these species were presented, and their distributions in the world were also given here.

Discussion: To date, 11 species of the genus Favognathus, five species of the genus Cryptognathus and two species of the genus Cryptofavognathus have been given from Turkey. With the present study, four cryptognathid species were found in the research area; three of them belonging to Favognathus, one belonging to Cryptognathus. These species were already known from different areas of Turkey. Cryptognathus lagena Kramer was recorded from Artvin, Afyonkarahisar, Erzincan, Bingöl, Kelkit Valley and Kütahya; Favognathus cucurbita (Berlese) was recorded from Afyonkarahisar, Artvin, Elazığ, Erzincan, Erzurum, İstanbul, Kırıkkale, Sinop, Kelkit Valley and Kütahya; F. kamili Dönel & Doğan was recorded from the Kelkit Valley, Erzincan and Kütahya; F. distortus (Kuznetsov) was recorded from Kelkit Valley. In this study, these species were found in the new localities, Harşit Valley and Örümcek Forests. With the present work, we contributed to distribution in Turkey of these species.

Acknowledgement: This work was prepared mainly from the mite material collected by a research project (№ 113Z094) supported by the Scientific and Technological Research Council of Turkey (TÜBİTAK).

Keywords: Cryptognathidae, distribution, new locality, Turkey
Effect of copper exposure on sperm motility of brook trout (*Salvelinus fontinalis*)

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**Introduction:** The aquatic life has been negatively influenced by harmful effects of environmental toxic metals. The elevated concentrations of copper (Cu) may be harmful for aquatic animals while low levels are required for metabolic interactions. Toxic effects of copper on non-target local aquatic life may exert both in the water column and the sediment.

**Material and Methods:** Herein, spermatozoa of brook trout (*Salvelinus fontinalis*) were exposed to the levels of 0 mg L⁻¹ (Control), 0.5 mg L⁻¹, 1 mg L⁻¹ and 2 mg L⁻¹ copper and, motility and survival of sperm cells were assessed. Motile sperm percent was assessed as actively moved sperm. Duration of forward motility was time from activation initiation to sperm stop move.

**Results:** Copper had sperm motility-inhibiting effect. We found that Cu exposure with increasing concentrations caused a significant reduction in sperm motility (p<0.05). High concentration (2 mg L⁻¹) of copper significantly decreased motility (61.67±1.28%) and duration (18.00±2.65).

**Discussion:** Based on the present results, copper exposure reduced motility and survival of sperm cells of *S. fontinalis*. The reduction may be explained by the fact stress induced by copper can increase production of reactive oxygen species (ROS), lipid peroxidation and oxidative stress. Overall, we showed that Cu exposure can impair sperm motility of *S. fontinalis*.

**Keywords:** Metal exposure, copper, sperm motility, brook trout, *Salvelinus fontinalis*.
Effect of Cobalt on the sperm quality of *Salmo coruhensis*

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**Introduction:** Cobalt is a constituent of vitamin B12 (cyanocobalamin) and needed for metabolic process. On the other hand, high exposure levels of Cobalt in the aquatic environments have serious effect for fish.

**Material and Methods:** Therefore, experiments were designed to examine in vitro effect of Cobalt on sperm quality of endangered trout (*Salmo coruhensis*). The sperm samples were diluted in an immobilizing solution. Spermatozoa were activated in sperm motility-activation solution. Activation solution was supplemented with different Cobalt concentrations of 1 mg/L; 10 mg/L; 100 mg/L; 1000 mg/L. The percentage and duration of motility were determined in sperm samples.

**Results:** Our results showed that Cobalt concentrations of 1–100 mg/L had a positive effect on the percentage and duration of motility compared to control group (p<0.05). In contrast, Cobalt concentration of 1000 mg/L decreased the percentage and duration of motility (p<0.05).

**Discussion:** The lack of motility, independently of cell rupture may be explained by the fact that Cobalt can lead to mitochondrial disruption that are necessary for sperm motility. In conclusion, both motility and duration of exposed sperm was decreased by Cobalt at concentration of 1000 mg/L. It can be explained with a toxic effect due to high dose of Cobalt ions.

**Keywords:** endangered species, *Salmo coruhensis*, Cobalt, sperm quality.
Determination of Antioxidant Capacity of Scot Pine (*Pinus sylvestris* L.) Seeds Depends on Age

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Introduction: The chemical compositions of seeds may vary with environmental changing, pre-harvest and post-harvest treatments, the methods of the harvesting, health of the trees, storage conditions, and also duration of the storage. Those changing play major role on seed viability, germination rate and seedling characteristics in particularly during the early growth phase. In this study, levels of antioxidant compounds in Scot pine (*Pinus sylvestris* L.) seeds were determined which kept in dark conditions at +4 ºC after storage for three, two and one year period.

Material and Methods: For this purpose, Scot pine seeds were taken from the forest management directorate in Taşköprü district of Kastamonu. Seed samples were classified as the oldest (storage for three years), moderate (storage for two years) and the youngest (storage for one year). In seed samples, the amount of proline, soluble protein, lipid peroxidation level (malondialdehyde-MDA), hydrogen peroxide (H₂O₂) content ad superoxide dismutase (SOD) activity were determined.

Results: Significant difference was detected between seed chemicals with years. Significantly higher amounts of proline was found in the oldest seeds (53.696 µmol/g), but the lowest level of it was determined in the youngest seeds (34.47 µmol/g). Soluble protein decreased with storage duration and it was the highest in the oldest seeds (3311.79 mg). MDA and H₂O₂ concentrations reduced in the oldest seeds (2.62 µmol and 50.44 µmol). SOD activity was the highest in the oldest seeds (9.16 EU).

Discussion: As a result of seed storage duration played an important role on seed chemical compositions. In addition, the oldest seed has the highest protein, SOD levels but the moderate content of MDA, H₂O₂ and proline values.

Keywords: Age effect, Antioxidants, Scots pine
Introduction: Erosion is a natural phenomena occurred by the effects of water and wind. In terms of plant ecology, erosion is a very important factor is affecting the plant diversity. Furthermore, erosion changes to mineral elements taking and environmental conditions by the time. If there is a high destruction level, diversity will decrease because only several species completed their life cycles. If there is a medium destruction level, diversity will be high. Purpose: In this case, medium destruction level will increase plant diversity of grassland and pastures. So, destruction based on erosion will affect to plant diversity.

Material and Methods: We selected 106 grassland and pastures which is representative to each area in Samsun province. We used Lup transect method for determining floristic composition of them. Erosion levels are identified according to field survey and using province inventory reports. All obtained data were used in detrended correspondence analysis (DCA) that explains to species distribution along the environmental gradient. Plant diversity indexes were calculated using Shannon (H’) formula considering erosion levels.

Results: Five erosion levels are found in all studied areas. They are gully (8.49%), surface (52.83%), low (21.7%), medium (13%) and high (3.77%). According to DCA results, study areas belonging medium erosion level are related to maximum species and covered maximum area in ordination graphic (Eigenvalue=0.47).

Discussion: Highest diversity index (H’=1.33±0.03) are found in grassland and pastures with medium erosion level. As a result, we found very significant relationship between erosion and plant diversity. We confirmed that medium level erosion increase plant diversity.

Keywords: Grassland pasture, Erosion, Plant diversity
Comparison of Air Pollution Effect on *Prunus laurocerasus* L. in Kastamonu

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**Introduction:** Tree planting can play an important role in improving the quality of the urban environment. On the other hand, air pollutants by heavy traffic and factories can affect growth and health of trees. In this present study, we studied the impacts of air pollution caused traffic on chemical compositions with *Prunus laurocerasus* L.

**Material and Methods:** For this purpose, the control sample collected from areas away from the traffic, while polluted sample were chosen from areas where the traffic is heavy and less dense in Kastamonu city center. Then in the fresh leaf sampling photosynthetic pigments (chlorophyll a, chlorophyll b and total chlorophyll, peroxidation level (MDA-malondialdehyde), hydrogen peroxide (H₂O₂), enzymatic antioxidants such as Ascorbate peroxidase (APX), Catalase (CAT), Guaiacol peroxidase (GPOX) and superoxide dismutase (SOD) activities, and non-enzymatic antioxidants (carotenoid, flavonoid, proline, total soluble carbohydrate) levels was analyzed.

**Results:** In general, the amount of chlorophyll b and total chlorophyll values, and GPOX activity was found higher in control plant but chlorophyll a, proline, flavons, total soluble carbohydrate and SOD activity increased the most polluted leaf samples. APX and CAT activities were the highest in less polluted leaf but H₂O₂ was the lowest.

**Conclusion:** When the data of this study is taken into account, it was noted that Cherry laurel was more resistant to the traffic pollution and it can be used for management in air pollution. As a result the results provided in this study could be used in the future research directions to improve our understanding of the role of individual tree species in air pollution.

**Keywords:** Air pollution, *Prunus laurocerasus* L., Chemical Composition
Eco-physiological Responses of *Spirulina* sp. to Heavy Metal and Salt Stresses

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**Introduction:** Heavy metals are important environmental pollutants and many of them are toxic even at very low concentrations. Copper is a trace element that is an essential component of the biochemical functions of photosynthetic organisms. However, in excessive concentrations this metal becomes powerfully toxic for phytoplankton communities. Salinity is also one of the major abiotic stresses affecting the growth, development and productivity of organisms. *Spirulina* sp. is a suitable model for toxicity evaluations because of its small size, rapid growth and ease of culture. The main objective of this study was to evaluate the physiological responses of *Spirulina* sp. to copper and sodium chloride.

**Material and Methods:** To examine the effects of copper and salt on *Spirulina* sp., Cu (II) and NaCl were added separately to the growth medium. The effects of Cu (II) and NaCl combinations were also examined. The 7-day-old cultures were used for the experiments. The progressive growth and contents of chlorophyll-α, carotenoid, malondialdehyde, proline and Cu (II) of *Spirulina* sp. were analyzed.

**Results and Discussion:** *Spirulina* sp. showed a reduction in growth caused by Cu (II) and NaCl. The content of chlorophyll-α decreased significantly with increasing concentrations of Cu (II) and NaCl. The carotenoid levels were not significantly affected by Cu (II) or NaCl. The malondialdehyde contents of *Spirulina* sp. increased with increasing concentrations of Cu (II) and NaCl. The proline, a universal protectant from various stressors, increased with increasing Cu (II) and NaCl concentrations. The Cu (II) uptake in *Spirulina* sp. was decreased with increased NaCl concentration. Thus, this investigation present the physiological responses of *Spirulina* sp. to copper and sodium chloride individually and in combination.

**Keywords:** Copper, Heavy metal, NaCl, Physiological effect, *Spirulina* sp.
**Essential Oils Compounds of Some Macrofungi (Lactarius deliciosus and Pleurotus ostreatus) Grown in Kastamonu, Turkey**

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**Introduction:** There are 2422 macrofungi species in Turkey. Most of them grow naturally in Kastamonu forests in the Black Sea Region and are sold commercially. Macrofungi are exported as commercial products, as well as being a favorite food item in our country. Therefore, the aim of the study, investigation of the essential oil compounds of Lactarius deliciosus and Pleurotus ostreatus from Kastamonu, Turkey.

**Material and Methods:** Lactarius deliciosus and Pleurotus ostreatus were purchased from locally commercial company. The essential oil was obtained from fresh macrofungi by hydro-distillation, using a Clevenger system with 150 g dry material and 1500 mL water. The oil was obtained after 3 h of distillation at boiling temperature and stored at 4 ± 1 °C in airtight glass vials covered with aluminum foil. The gas chromatography–mass spectrophotometry (GC–MS) analysis of the obtained essential oil was conducted at the Kastamonu University Center Research Laboratory Application and Research Center by using a Shimadzu GCMS QP 2010 ULTRA.

**Results:** 1-octen-3-ol (22.58%), eicosane (7.45%) docosane (6.32%), methyl stearate (59.46%), metilox (5.71%) and octadecane (5.22%) were found three compound with the greatest amount for Lactarius deliciosus essential oil at the aroma and FAMEs analyses, respectively. Eicosane (13.47%), docosane (10.85%), hexadecane (6.94%), methyl stearate (51.24%), methyl 14-methylpentadecanoate (12.55%) and 4-methylpentadecane (9.56%) were found three compound with the greatest amount for Pleurotus ostreatus essential oil at the aroma and FAMEs analyses, respectively.

**Discussion:** According to the essential oil analyses, Lactarius deliciosus included 12 compounds at the FAMEs and 25 compounds at the aroma results. Similarly, Pleurotus ostreatus included 7 compounds at the FAMEs and 31 compounds at the aroma results. Results shows that, essential oils of these macrofungi have unsaturated fatty acids and/or oil compounds.

**Acknowledgement:** Thank you very much for support to us with collaboration for both Turkish Republic and Libya Government.

**Keywords:** Lactarius deliciosus, Pleurotus ostreatus, Macrofungi, Essential oil
Determination of Relation Between Fish Size and Heavy Metal Content in Muscle of Pike (Esox lucius)

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Introduction: Pollution of aquatic environment is one of the serious problems in the world. Heavy metals enter the aquatic systems from different sources like industrial effluents, agricultural runoffs, transport, burning of fossil fuels, geological structure, mining activities and atmospheric deposition. The aim of this study is to determine heavy metal concentrations in the fish muscle and the relationships between metal levels and fish size.

Material and methods: İşıklı Lake (29° 92´ E, 38° 22´ N), located in the southwest of Turkey and used for irrigation. This study was carried out at October-2012, January-2013, April-2013 and July-2013 at three sampling stations from İşıklı Lake. Fish samples were prepared to analysis according to literature. Statistical analysis of data was carried out using SPSS 18 statistical package programs. Linear regression analyses were applied to the data to compare the relationships between fish size (total length and weight) and heavy metal concentrations.

Results: Except Cr, all metals were determined in muscles in all seasons. Cr was below detection limit in muscle in summer. Cu, Fe, Mn, Se and Zn levels were maximum in autumn, Cr and Mo were in spring, Cd and Pb in summer and Ni was in winter. Cd, Cu, Pb and Zn were minimum levels in spring, Fe, Mn, Ni and Se were in summer, Cr was in autumn and Mo was in winter. Cd, Cr, Fe, Mn, Mo, Ni, Pb and Zn levels were found significant among seasons (<0.05). Linear regression analysis and significant associations between the metal levels in tissues and fish size were also determined. There were significant negative relationships between fish weight and Fe, Mo and Pb, while between fish length and Cd, Pb, Se and Zn. The other relationships were positive.

Discussion: The concentrations of heavy metals in fish muscle were also compared with acceptable limits given by national and international water quality guidelines.

Acknowledgement: This work is supported by Süleyman Demirel University, SDUBAP 3299-YL1-12 project.

Keywords: Heavy metal, Pike, Muscle, Pollution, Turkey
Introduction: The main goal of the study is to determine the ecological features and distribution of *Sorbus* L. taxa in Rize. For this purposes soil and plant samples were collected during the filed surveys.

Materials and methods: The plant samples of the study are collected from Rize with field surveys between the years 2011-2012. The samples were identified with using the identification keys in the Flora of Turkey and The East Aegean Islands (volume 4). The plant materials were deposited in the Herbarium, Department of Biology, Art and Sciences Faculty, Recep Tayyip Erdogan University. 1 kg soil samples for each sample were collected from 0-30 cm depth. These samples were analyzed in Trabzon Provincial Special Administration Agricultural Services Directorate. The pH degree, phosphorus, potassium, organic matter, total salt and water saturation features were examined.

Result and Discussion: The results were summarized for each taxa below; *Sorbus aucuparia*: water saturation 39-72%, total salt 0.010-0.080%, pH 4.49-6.89, phosphorus 0.18-13.66 kg/da, potassium 17.9-133 kg/da, organic matter 0.29-4.70 kg/da. *Sorbus subfusca*: water saturation 88%, total salt 0.035%, pH 4.83, phosphorus 3.24 kg/da, potassium 310.3 kg/da, organic matter 2.84 kg/da. *Sorbus caucasica* var. *yalıtkıii* water saturation 94%, total salt 0.010%, pH 6.22, phosphorus 1.30 kg/da, organic matter 4.18 kg/da ve potassium 190 kg/da. *Sorbus umbellata* var. *cretica* water saturation 66%, total salt 0.020-0.060%, pH 4.87, phosphorus 1.38-1.80 kg/da, potassium 102.4-195 kg/da organic matter 0.85-1.27 kg/da.

Keywords: Ecology, *Sorbus*, Rize, Turkey
Variation in Chemical Compounds of Chestnut Leaves Infected by Blight Disease

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Introduction: Chestnut trees are mostly cultivated for their fruit and wood. Due to its economic and nutritional value, the world production of chestnuts is increasing as new stands are being planted in various regions of the world. According to FAO statistics (FAO, 2012), Turkey was the third world’s largest producer in 2011 with 59.789 tons (40,000 tons in the 60s). Recently, chestnut production follows an unstable trends and chestnut production in yield per tree is decreasing. One of the main reasons of this reduction is undoubtedly chestnut disease (chestnut blight disease and ink disease) which are common in the World and Turkey and often result in completely dry chestnut trees in the area, especially by the blight disease. Main goal of this present study was to investigate the variations in the leaf chemical compounds of chestnut tree infected by chestnut blight disease. In addition, the comparisons of the variation in the leaf chemical compounds were made between the old and young chestnut trees and also between two altitudes (470 m and 765 m).

Material and Methods: Chestnut fresh leaf samples were collected in August from two altitudes (470 m and 765 m) in İnebolu. At the altitude of 470 m, the chestnut leaves were sampled from (1) healthy medium age trees (2) healthy young age trees, (3) healthy old age trees, and (4) unhealthy infected medium age trees. At the altitude of 765 m, the leaves were only collected from healthy medium age trees. The leaf samples were then analyzed for photosynthetic pigments (chlorophyll a, chlorophyll b and carotenoids), flavonoid, peroxidation level (MDA-malondialdehyde), hydrogen peroxide (H₂O₂) and antioxidants such as ascorbate peroxidase (APX), catalase (CAT) and superoxide dismutase (SOD) activities.

Results: The infected chestnut trees showed the lowest chlorophyll-a (0.075 mg), chlorophyll-b (0.034 mg), total chlorophyll (0.087 mg), carotenoids (5.22 mg) and total flavonoids (0.38 mg) in the leaf samples. APX (0.042 EU), CAT (0.29 EU) and SOD (46.4 EU) activities in the infected tree leaves were also found lowest, whereas H₂O₂ (425 µmol/g) and MDA (0.104 µmol/g) were highest in the infected tree leaves. The chemical compounds in the chestnut leaves did not vary significantly between the two altitudes. However, photosynthetic pigments (chlorophyll a, chlorophyll b and total chlorophyll), total flavonoids, APX and CAT in the younger chestnut trees were higher than the older chestnut trees, whereas, H₂O₂ and SOD were lower in the younger chestnut tree leaves.

Discussion: There are not much studies available to discuss our results with the finding of theirs. This present study seems to be a pioneer one on that issue. We have shown significant variation in the chemical compounds of chestnut leaves between the healthy and unhealthy-infected chestnut trees. The results indicate that the infected chestnut trees produce lower photosynthetic pigments, carotenoids, total flavonoids, APX, CAT and SOD, while they have higher H₂O₂ and MDA. However, more studies are needed to draw a general conclusion.

Keywords: Castanea sativa L., Chemicals, Blight Disease, Kastamonu
Determination of PCDD Levels in Milk, Meat, Cheese And Butter Samples by HR-GC/MS

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Abstract: 3,7,8-TCDD, 1,2,3,4,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD and OCDD as PCDD levels in milk, meat, cheese and butter samples collected from local markets in Mardin were determined by HR-GC/MS.

Introduction: Due to chemical stability and high metabolic persistence, degradations of PCDD/F, dl-PCB and indicator PCBs require long time. It was highlighted that they have high affinity to accumulate in the food chain and humans are exposed to them mainly by dairy diets. In recent studies, dioxin and related compounds were detected in a variety of food samples such as milk, dairy foodstuffs, organic farmed eggs, fish and environmental samples such as sediment, air, soil and animal food. The aim of this study monitoring the PCDD levels in milk, meat, cheese and butter samples consumed in Mardin.

Material and Methods: Samples were prepared by considering the Bligh & Dyer and by using the PowerPrep Multi-Column Sample Cleanup System (total prep extraction and clean-up system for rapid analysis of dioxins, PCBs, and other POPs in food and other environmental samples). Milk, meat, cheese and butter samples were bought from local markets in Mardin, Turkey.

Results: 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD and OCDD were detected in meat samples while 1,2,3,7,8-PeCDD, 1,2,3,4,6,7,8-HpCDD and OCDD were detected in milk, cheese and butter samples.

Discussion: Results from validation and routine monitoring of PCDD levels by HR-GC/MS in meat, milk, butter and cheese samples were presented and compared with regulated values. It was clear from the results that PCDD levels meet the related requirements.

Acknowledgement: We would like to express our appreciation to the Mardin Artuklu University Scientific Research Project Commission, which supported this study (MAÜ -BAP-16-SHMYO-07).

Keywords: Mardin, PCDD, meat, milk, butter and cheese , HR-GC/MS
Introduction: Heavy metal pollution is a serious environmental problem reported worldwide, especially in developing countries. Heavy metal contamination of the environment may result from natural activities such as volcanic emissions, forest fires, and leaching by acid rain. Such contamination of soil and water leads to the accumulation of heavy metals in plants and (especially aquatic) animals. Physical and chemical approaches such as filtration, ion-exchange, and chemical precipitation are widely used to remove heavy metals from the environment. However, most of these methods are expensive, non-specific, and of limited effectiveness, especially when the concentrations of polluting materials are below 100 mg L\(^{-1}\). In recent years, biological methods of heavy metal clean-up such as microbial remediation have stimulated increased interest because they are not only environmentally friendly but also cost-effective. Commonly, biosorbents derived from microorganisms such as fungi, yeast, and algae are suitable for removal of heavy metals because of their high surface to volume ratio, large available quantities, and low cost.

Materials Methods: Thermophilic \textit{Bacillus cereus} were used for determination of Mn(II) tolerance and bioaccumulation. The minimum inhibitory concentration (MIC) of Mn(II) was tested in solid and liquid medium. The metal binding surface groups of \textit{B. cereus} were analyzed by FT-IR spectrometry and SEM. Influence of Mn(II) concentration on \textit{B. cereus} growth and bioaccumulation were also investigated. The level of Mn(II) was measured by ICP-OES.

Results: The minimum inhibition concentration (MIC) values of Mn(II) was found as 360 and 2000 mg/L for liquid and solid medium, respectively after 48 h. Growth of \textit{B. cereus} was measured periodically (4, 8, 12, 16, 24, 36, and 48 h) by UV-vis at 540 nm. The bacterial growth was increased in the presence of 2.5 and 5.0 mg/L Mn(II) at 48 h and the growth was partially affected in the presence of 10 mg/L Mn(II) at 48 h. What was achieved from this investigation is that there was diversity in the various periods of the growth phases of metal bioaccumulation capacity, which was shown by \textit{B. cereus}. The highest Mn(II) bioaccumulation was determined as 87.96 \(\mu\)g metal/dry bacteria weight at concentration of 10 mg/L and 36\(^{th}\).

Discussion: This investigation clearly indicated that thermophilic microorganisms can also be used for removal and recovery of heavy metals from industrial wastewater. Moreover, studies of thermophilic microorganisms can supplement to our present knowledge of heavy metal resistance and bioaccumulation, which is completely based on mesophilic organisms.

Keywords: Bioaccumulation, Resistance, Mn(II), Thermophilic bacteria, \textit{Bacillus cereus}
The Therapeutic Effects of Gilaburu (Viburnum opulus L.) Seeds Extracts on Growth Hormone (GH) and Insulin Like Growth Factor 1 (IGF-1) of Carp Fish (Cyprinus carpio L. 1758) Exposed to Ammonia

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Introduction: Ammonia is toxic to fish in natural and artificial waters. High levels of ammonia nitrogen may occur during intensive fish culture as a result of excretion and decomposition of feces and residual feed. Gilaburu plant (Viburnum opulus L.) is a plant with antioxidant, anticarcinogenic and antibacterial effects and used for this purpose. Despite the negative conditions of the environment where the fish live in fish breeding, it is important to grow in time of the fish. In this study, our aim was to investigate the therapeutic effect of gilaburu seed extract on the negative effects of the ammonia on the carp growth hormones.

Material and Methods: The carps used in the experiment were transported from Yedikır Fisheries Farm (Samsun, Turkey). They had the weight of 70-80 g and length of 15-17 cm. The experiment was carried out with a semi-static system in natural light (12h light-12h dark). During the experiment, fish were nourished with Pinar pellet feed (45% protein, 19% fat, 3% crude fiber) once a day. Hormone analysis was performed by using commercial ELISA kit. GH and IGF-1 were tested in this context.

Results: Both in the acute and subchronic period serum GH and IGF-1 levels of ammonia-applied carp fish groups were statistically decreased compared to the control group (p<0.05). Serum GH and IGF-1 levels were not statistically significant compared to the control group at 25, 50 and 100 mg / kg gilaburu dose groups (p>0.05). The application of gilaburu 25 mg/kg + ammonia, gilaburu 50 mg/kg + ammonia and gilaburu 100 mg/kg + ammonia dose groups statistically increased serum GH and IGF-1 levels, which were reduced by ammonia application (p<0.05). The difference between serum GH and IGF-1 levels between acute and subchronic durations in the ammonia and all gilaburu + ammonia dose groups was significant.

Discussion: Our study showed that ammonia exposure had a negative effect on fish growth hormones, as stated in the literature. In addition, our study showed that gilaburu plant seed extract had the therapeutic effect against the ammonia toxic effect on growth hormones. If our work will be supported by future studies then we can suggest that gilaburu can be used for the therapeutic effect against fishes' ammonia stress in fish farms.

Acknowledgement: We would like to express our appreciation to the Aksaray University Scientific Research Project Commission, which supported this study (Project no: 2017-015). Approval of the Ethics Committee of the study was taken at the Ahi Evran University Ethics Committee for the Local Use of Animals in Experiments (approval letter dated 16.12.2016 and numbered 44).

Keywords: Gilaburu, Cyprinus carpio, GH, IGF-1
HR-GC/MS Monitoring of PCDF in Meat Samples

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Introduction: Since the Intergovernmental Forum on Chemical Safety promoted by UNEP (Decision 19/13 C from 1997) and later the Stockholm Convention (2001), international efforts have been made to eliminate and/or reduce the emissions and discharges of a set of 12 toxic organic chemicals, also called the “12 Dirittes”. These chemicals are classified as persistent organic pollutants (POP) and include different groups of molecules that are very resistant to (bio) degradation and thus prone to biomagnification, exerting their toxic effects at different trophic levels. Among them, dibenzofuranes (PCDF) are accepted as persistent organic pollutants with enhanced chronic toxicity. PCDF can be emitted by different human activities and industrial processes where they can be present as unwanted by-products. PCDF can also be emitted from biomass and fossil fuel burning and stationary sources like waste incineration. Taking into account this information, PCDF can be considered as environmental indicators of anthropogenic activities since their occurrence can always be linked to the human activities.

Material and Methods: Samples were prepared by considering the Bligh & Dyer and by using the PowerPrep Multi-Column Sample Cleanup System (total prep extraction and clean-up system for rapid analysis of dioxins, PCBs, and other POPs in food and other environmental samples). Milk, meat, cheese and butter samples were bought from local markets in Mardin, Turkey.

Results: 2,3,4,7,8-PCDF, 1,2,3,4,7,8-HxCDF, 1,2,3,6,7,8-HxCDF, 2,3,4,6,7,8-HxCDF and 1,2,3,4,6,7,8-HpCDF were detected in meat samples while 2,3,4,7,8-PCDF, 2,3,4,6,7,8-HxCDF and 1,2,3,4,6,7,8-HpCDF were detected in cheese and butter samples. PCDF concentrations were found as lower than LOQ in milk samples.

Discussion: Results from validation and routine monitoring of PCDF levels by HR-GC/MS in meat, milk, butter and cheese samples were presented and compared with regulated values. It was clear from the results that PCDF levels meet the related requirements.

Acknowledgement: We would like to express our appreciation to the Mardin Artuklu University Scientific Research Project Commission, which supported this study (MAÜ -BAP-16-SHMYO-07).

Keywords: PCDF, meat, routine monitoring, HR-GC/MS
Heavy metals in the coastal sediment of some the beaches of Al-Jabal Al-Akhdar (Libya)

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Introduction: The problem of heavy metal pollution is a global problem it causes concern in most of the world's cities. The presence of environmental pollutants as a result of industrial and economic growth are all causing serious dangers to the environment and human. The human pollutes the marine environment through input municipal, agricultural and industrial waste. The aim of the present study was to estimate the concentrations of heavy elements of the sediments of some of the shores of Al-Jabal Al-Akhdar, such as the beaches of Derna, Ras Al-Hilal, and El-hamama and to determine the degree of pollution and the causes of the problem of pollution

Material and Methods: The study was conducted in Al-Jabal Al-Akhdar area, which is located in the north-east of Libya, where the city of Derna was chosen as the main location of the study, as well samples of sediment were collected from sites on the beaches for each of El-hamama and Ras Al-Hilal. Heavy metals were estimated for each of iron, zinc, copper, lead, cadmium, and cobalt by digesting sediment samples using 10 ml of nitric acid, 10 ml of hydrofluoric acid, and then cooling the samples in the lab for several hours and then adding concentrated phosphoric acid. And then evaporation of the samples to about 3 ml After cooling, add distilled water, samples were nominated and were diluted with distilled water in a 100 ml flask and then estimate the heavy elements using a device of type Atomic Absorption Spectrophotometer (AAS), Perkin-Elmer Model (2380).

Results: The results of the study indicated that iron concentrations were between (152.33-1198.90 μg/g), and zinc concentrations ranged from (17.35-117.45 μg/g), and copper concentrations ranged between (1.14-17.50 μg/g), and lead concentrations ranged between (8.55-87.7 μg/g), and cadmium concentrations ranged from (1.08-5.72 μg/g), and cobalt concentrations ranged from (0.19-2.03 μg/g).

Discussion: The highest concentrations of Iron were recorded at the site (VIII), which is close to the desalination plant. This may be due to the erosion of some metals. The highest concentrations of Zinc were recorded at the site (I), this is due to increased zinc sedimentation rates in the form of Zinc Sulphide by bacteria at low levels of dissolved oxygen due to wastewater. The highest concentrations of copper were recorded at the site (VII), which is often due to the waste of pigments and coatings produced by industrial mountain company. The relatively high concentrations of Lead were recorded at location (I, VI, VII), this is due to the sewage. It may be the use of lead in water pipes manufacturing. The highest concentrations of cadmium were recorded at sites (VII and I), be due to the impact of the movement of ships and fishing boats through the pigments and paints of these vessels The highest concentrations of cobalt were recorded at the site (VII), are due to sewage and industrial waste.

Keywords: Libya, Marine Contamination, Heavy Metals, Sediment
Chromosome Studies on *Origanum \times intermedium* (Lamiaceae) and Its Parents (*O. sipyleum* and *O. onites*)

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Introduction: *Origanum* L. is one of the high-value medicinal and aromatic plant species used for various purposes in the field of food and health. The use of this species as a raw material in spices, pharmaceuticals and cosmetics industries in world trade is important in local markets (İnce et al., 2014). The genus *Origanum* (Lamiaceae, subfam: Nepetoideae, tribe: Mentheae, subtribe: Menthineae) has 43 species and 19 hybrids worldwide (http://apps.kew.org; Dirmenci et al., 2018). Species are predominantly concentrated in warm temperate regions of the Mediterranean. In Turkey, 22 species (25 taxa), 11 hybrids were found; 22 of them are endemic (Ietswaart, 1982, Davis et al., 1988, Güner et al., 1998, Dirmenci et al., 2018). The aim of study is to determine chromosome analyses of *Origanum \times intermedium* and compare with its parents (*Origanum sipyleum \times Origanum onites*).

Material and Methods: Chromosome analysis was performed on mitotic metaphases using Image System Analysis. Root meristems from germinating seeds collected in the wild were used. Root tips were pretreated with α-monobromonaphthalene at 4 °C for 16 h. The tips were fixed with Carnoy solution for 24 h at 4 °C. Before staining, the material was hydrolyzed with 1 N HCl for 12 min at room temperature. The chromosomes were stained with 2% acetic orcein and mounted in 45% acetic acid. Permanent slides were made using the standard liquid nitrogen method. Photographs were taken with a BX51 Olympus microscope.

Results: The somatic chromosome number of *Origanum \times intermedium* (*Origanum sipyleum \times Origanum onites*) was counted as 2n=30. According to the karyological results, *Origanum \times intermedium* (*Origanum sipyleum \times Origanum onites*) have a similar somatic chromosome number, which is n=15 for the haplotype. Chromosome analyses support that *O. \times intermedium* is a natural hybrid that is generated from crossed homoploidy of *O. sipyleum* and *O. onites*, which means that the hybrid taxon is generated by homoploid hybridization (all taxa have 2n = 30 chromosomes).

Discussion: Origination of a hybrid species in the same chromosome number as its parents is called homoploid hybrid speciation (Abbott et al., 2013; Dirmenci et al., 2018). Polyploidy hybridization is a more commonly encountered mechanism in plants in comparison to homoploid hybrid speciation at the diploid level (Grant, 1971; Thompson and Lumaret, 1992; Rieseberg, 1997; Otto and Whitton, 2000; Soltis et al., 2005; Dirmenci et al., 2018). It is probably associated with the detection of a lack of small chromosome change in homoploid species (Rieseberg et al., 2003; James and Abbott, 2005; Dirmenci et al., 2018). The frequency of ecogeographical displacements is higher among homoploid than polyploid hybrid species (Kadereit, 2015; Dirmenci et al., 2018).

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Keywords: Chromosome, *Origanum \times intermedium*, Turkey
A Preliminary Study on Simuliidae Fauna of Isparta Stream

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Introduction: There are 2219 species (2204 living, 15 fossils) of the Simuliidae family in the Nematocera suborder of the Diptera collection, which is spread all over the world except the Antarctic continent. 54 species belonging to the genus Metacnephia, Prosimulium, Simulium and Sulcicnephia were determined in Turkey. It is aimed to determine the seasonal distribution of larvae and pupa species belonging to the Simuliidae family in the Isparta Stream which is poured into the Karacaören Dam Lake in this study that started in 2017 and is still going on.

Material and Methods: Simuliidae specimens were collected from the stone, gravel and water plants in the ground of stream with the help of benthic bucket and pens, and brought to the laboratory. Specimens of the Simuliidae family stored in 80% alcohol were identified as species by using binocular stereo microscope.

Results: 12 species of 3 genus (1 from the genus Metacnephia, 9 from the genus Simulium and 2 from the genus Prosimulium) were detected and Simulium (Wilhelmia) pseudequinum was detected every season. Species with the highest number of individuals were Metacnephia sp. in winter, Simulium (Simulium) variegatum in spring, Simulium (Wilhelmia) pseudequinum in summer and autumn seasons.

Discussion: The least number of species and individuals were found in the fourth station where work was done. The reason for this may be that the location of the station is located in a region close to the water source and is clean due to this. The highest number of individuals was encountered in the sixth station. This may be due to the fact that the sixth station is too polluted due to its position being close to the Karacaören Dam Lake in the next place where all the other arms are joined together. According to the results obtained in this study, the samples belonging to the Simuliidae family were found to be more common in the polluted waters while it was rare in clean waters.

Acknowledgement: This work is supported by Süleyman Demirel University, SDUBAP 4827-YL1-16 project.

Keywords: Isparta Stream, Diptera, Simuliidae, Larvae
A Preliminary Study on Epilithic Diatom Flora of Ulupınar Stream (Antalya)

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Introduction: Algae are important to determine the biological efficiency in the aquatic environment. In particular, diatoms are among the most studied algae groups at the present time. This work, which started in 2017 and is still going on, aims to observe the seasonal changes of the diatoms located at the Ulupınar Stream, which is located within the borders of Antalya and is poured from Çıralı coast to the Mediterranean.

Material and Methods: This study was carried out at 4 different stations from Ulupınar Stream, epilithic specimens were taken with the aid of a brush over stone in every station. Subsequently, water sample which including the diatom samples were brought to the laboratory were boiled on a hot plate adding an equal volume of a mixture of sulfuric acid and nitric acid. Identification and counting of diatom samples were done with microscope.

Results: As a result of the work, a total of 42 species belonging to the genus Achnanthes, Achnanthidium, Amphora, Cocconeis, Cymbella, Denticula, Diatoma, Diploneis, Epithemia, Fragilaria, Gomphonema, Gyrosigma, Melosira, Meridion, Navicula, Nitzschia, Rhoicosphenia and Surirella were detected. The most dominant species were Achnanthidium minutissimum in winter, spring and autumn seasons and Cocconeis placentula var. euglypta in summer. Achnanthidium minutissimum, Cocconeis placentula var. euglypta, Fragilaria ulna species were determined in every station and in every season.

Discussion: When we examine the seasonal changes, the season with the lowest number of diatoms is the winter season. This result may be due to both the decrease in temperature and the changes in other physico-chemical parameters depending on this decrease.

Acknowledgement: This work is supported by Süleyman Demirel University, SDUBAP 4825-YL1-16 project.

Keywords: Epilithic diatoms, Algae, Ulupınar Stream, Antalya.
Some Biological Features of Tinca tinca Population in Asartepe Dam Lake (Ankara)

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Introduction: The invasive species implanted into inland waters ecosystems have an increasing effects on domestic and local species. This situation requires a periodic determination of the same species living in different habitats. Tinca tinca (Linnaeus, 1758) entered the Turkish inland waters from the North in 1970s and showed a constantly widely distribute since then. It is a locally consumed species which has no economic value. The elucidation of length-weigh relation, condition factor and biological features are of great importance for the determination of the effects of different habitats on particular species. Tinca tinca is regarded as a species to be monitored among the fish taxa. This study is related to the investigation of Tinca tinca population in Asartepe Dam Lake and compare the resulting data with the literature.

Material and Methods: This study has been carried out on 131 Tinca tinca species caught in Asartepe Dam Lake (it a depth of 36 m and surface area of 1.7 km²) between March 2015-February 2016. The weight-length relation was determined from W=axLᵇ, condition factor from CF=W/L³x100 and variation parameter from VC=SD/Meanx100 formulae. The morphometric and meristic properties were elucidated and the ratio of some diagnostic features to the standard length were evaluated.

Results: The age distribution of Tinca tinca population was between the ranges of I-IX year’s age. The average weight and length were found to be 520.58±207.84g (103-1302) and 308.68±41.38cm (190-429). The parameters of (a) and (b) of length and weight relation were found to be 0.9692 and 3.0522 and the correlation coefficient were found to be 1.6807±0.1264 (1.4199-2.0368). The highest and the lowest variation among the morphometric features were in body length with 21.35% and eye diameter with %8.31. The corresponding values for the meristic features were pectoral fin unbranched rays with 30.09% and number of vertebrae with 2.68%. The highest percentage relative to the standard length was found in predorsal distance with 56.95%.

Discussion: The parameter (b) of the weight-length relation gave us valuable information about the body shape of the fish. The value obtained in this study indicate the positive allometric growth of the fish. The condition factor and (b) parameter values were generally comparable with the literature values. The meristic values are also in good compliance with the literature and the differences were attributed to the changes in biotic and abiotic conditions of different habitats. The information about the biological feature are of great importance for the effect of different habitats upon the same species. The results indicate that the growth level of Tinca tinca population is satisfactory.

Keywords: Asartepe Dam Lake, Tinca tinca, Length-weight, Condition factor, Meristic, Morphometric
Some Biological Features of *Vimba vimba* Population Living in Asartepe Dam Lake

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**Introduction:** The distribution and future of *Vimba vimba* species in different habitats require their bio-ecological features to be constantly monitored. The weight-length relation, metric and meristic properties and condition factor of the species are of great importance to compare their populations. The economic value of *V. vimba* is low. Asartepe Dam Lake (1.7 km\(^2\)) hosts 13 natural, invasive and economically valuable fish species. The lack of studies on *V. vimba* living in the Dam Lake forced us to study of their meristic and morphometric features. The data obtained were compared with the literature.

**Material and Methods:** The study was carried out on 32 *V. vimba* species caught in Asartepe Dam Lake between March 2015-February 2016. The dam lake has an average depth and average area of 36 m and 1.7 km\(^2\). The weight-length relations and condition factors of the species were determined and the variation coefficients of morphometric and meristic features and the ratios of some diagnostic features with standard length were computed.

**Results:** The average weight and lengths of the fish were found to be 393.87±139.38 g and 318.31±47.10 mm. The length-weight relation was \(W=0.0002xL^{2.5052}\). The correlation coefficient of length-weight relation was \(R^2=0.9278\) (t test \(p<0.001\)) and condition value was observed to be 1.652034±0.2117. The highest and the lowest variation were observed in eye diameter with 19.32% and total length with 14.79%. The highest and lowest ratios of some meristic features with the total length were found to be predorsal distance (with 55.16%) and nose length (with 4.30%). The average number of linea lateral scales was 58.33±0.90 (57-60) numbers of vertebrae was 44.67±058 (44-45). Concerning the meristic features the highest and lowest variation was observed in number of pelvic fin non branched rays with 22.78% and number of vertebrae with 1.30%.

**Discussion:** The (a) and (b) values were computed as 0.0002 and 2.5052. These values were lower than the literature data. The condition factor of 1.652034 was observed to be similar and different compared with the data reported in the literature. This was attributed to the change taking place in biotic and abiotic features of the habitats. The morphometric and meristic properties were generally similar.

**Keywords:** Asartepe Dam Lake, *Vimba vimba*, Lengths-weight, Condition, Morphometric, Meristic
Some Biological Characteristics of *Carassius gibelio* (Bloch, 1782) Living in Ankara Asartepe Dam Lake

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**Introduction:** Biodiversity is the wealth indicator of aquatic ecosystem. The excessive destruction of the aquatic ecosystems and the unconscious works of humans have rapidly consumed this wealth. In order to improve the natural stocks by supporting biodiversity, a number of exotic species have been enriched by inoculating them to aquatic ecosystems. One of these exotics is *Carassius gibelio* (Bloch, 1782). It has been determined that this species has adapted to environmental conditions very quickly, rapidly matured, continued throughout the year, and that the offspring are generally female by different studies. In this study, it was aimed to determine some biological properties of *C. gibelio* living in Asartepe Dam Lake.

**Materials and Methods:** The samples were carried out in the Asartape Dam Lake between March 2015 and February 2016. The average depth of the dam was 36 m and the area was 1.77 km². In the hunting, 20x20, 25x25, 30x30 and 50x50 mm eye spaced panel agars were used. For the morphometric measurements of the samples, ±1 mm precision measuring board and for the weight measurements, ±0.01g precision scales were used. Using \( W = a \times L^b \) formula, the length-weight relation parameters, the correlation coefficient and the condition factor with the formula \( K = W / L^3 \) were calculated.

**Results:** The ages of the samples are in the I-V age range. The mean total height was found as 278.98 ± 39.12 SD (190-365 mm) and the mean weight was 466.37 ± 204.15 SD (113-984 g). In morphometric characteristics, it was determined that the greatest variation was the ventral fin base length (25.319%) and the lowest variance was head length (14.289%). In the case of meridian features, it was determined that the highest variation was the number of anal fins branching (27.213%) and the lowest variation was the number of ligne literal flakes (6.669%). The growth parameter \( b \) was calculated as 3.0435, the correlation coefficient \( r^2=0.8833 \) and the condition factor 2.0283 ± 0.275 SD (0.915-2.740).

**Discussion:** It is stated that when the \( b \) value is between 2.5 and 3.5, the growth is normal; when \( b \) is smaller than 3 \( (b<3) \), the negative allometric growth happens. \( b=3.0435 \) was found in *C. gibelio* in Asartepe Dam Lake. It shows the growth is at normal level. When compared with the values found in other ecosystems, this value differs from others. It is believed that these differences are caused by entering the ecosystems at different times and different characteristics of the equipment used in hunting.

**Keywords:** Asartepe Dam Lake, *Carassius gibelio*, Growth, Condition Factor, Biometric
Reflection Of Changed Catch Composition On Characteristics Of Fishing Gear; Gökova Bay Case Study

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Introduction: In This Study, It Was Investigated That Changed Catch Composition Reflected On Characteristics Of Small Scale Fishing Gear In Gökova Bay. For This Purpose, Technical Characteristic Of Fishing Gears, Used In Cooperative Members Of Akyaka, Akçapınar And Akbük, Were Identified.

Material And Methods: FAO Standardizations Were Taken Into Consideration When Technical Drawing Of Fishing Gear. The Changes In Fishing Gears Have Been Presented To Be Compared With The Previous Studies In The Same Region.

Results: In Total 11 different Nets, 5 Gillnet, 5 Trammel Net And Combine Nets (Gill+Trammel Net), Were Identified In The Gökova Bay. In Addition, 3 Different Long Line Called Thin, Middle And Thick Were Presented. The Most Important Changes Were Found In Gill Nets. While Three Types Of Gill Nets As Red Mullet, Atlantic Bonito And Sardine Were Used Before 2005, Five Different Gill Nets As Red Mullet, Pink Dentex, Yem, Air Species And Atlantic Bonito Were Operated. For Trammel Nets, Shrimp And Bilidyeye Nettings Are No Longer Used.

Discussion: There Are Some Differences On Technical Structures (Hanging Ratio, Length, Height, Etc.) Of Both Gill And Trammel Nets Used Before And After 2005. Possible Reason For These Differences In To Adapt Them For Catching Of Inhabiting Of Lessepsian And Invasive Species And Begins To Exploit Them Commercially. In Such Areas Where Catching Composition Changes Due To Global Warming, Similar Studies Will Be Repeated At Specific Periods To Contribute To Better Management Of Fisheries.

Acknowledgement: This Study Was Carried Out Under EU Project (TR2011/0135, 15-08/024 Number “Promoting The Implementation Of The EU Common Fisheries Policy In Gökova Bay, Turkey). We Would Like To Thank Project Leader Zafer Kızılkaya For Supporting And Collaborations.

Keywords: Small Scale Fisheries Catch Composition, Gökova Bay.
Effect of Lipopolysaccharide on Antioxidant Capacity of Rat Brain

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Introduction: Lipopolysaccharide (LPS) is a component of the outer membrane of Gram-negative bacteria used in experimental models of inflammation. The toxic component of LPS, an endotoxin lipid A, is important in the initiation and progression of the septic process. LPS stimulates proinflammatory cytokine steps by plasma membrane proteins such as TNF-α, NF-κB and IL-6. LPS causes damage to many tissues and organs, especially nerve cells. One of them is a brain. The FRAP-TEAC method is an effective method for determining the antioxidant level. In this study, impairments that occurred in rat brains with LPS origin were determined by the FRAP-TEAC method.

Material and Methods: Erciyes University’s Experimental Animal Laboratory (HADYEK) Institute (16/133) approved experimental procedures of the study. Six male adult Wistar-Albino rats bred in laboratory. Housing was at 22-24 °C with provided 12 hours sunlight during ten days. Ad libitum feeding method was performed with standard laboratory diet. At the start of the experiment, the rats weighed 250-300 g. LPS substance was given by gavage to adult rats. After 6 hours, rats were dissected and antioxidant level was measured by FRAP-TEAC method with spectrophotometer for determine the damage in brain.

Results: As a result of the experiment, a decrease in antioxidant capacity was observed in brain cells of rats compared to the control group. The significance was calculated using a one-way analysis of variance (ANOVA) followed by the Tukey multiple comparison procedure. A value of p < 0.05 was considered statistically significant.

Discussion: LPS is one of the strongest activators of macrophages and is found in the cell wall of gram-negative bacteria and provides production of proinflammatory cytokines. Excess cytokine production and proinflammatory mediators are involved in many inflammatory diseases and ROS. The FRAP-TEAC method is an effective method for controlling antioxidant capacity. The decrease in antioxidant capacity seen in the treatment groups showed that LPS caused antioxidant capacity in rats.

Acknowledgement: We would like to express our appreciation to the Bozok University Scientific Research Project Commission, which supported this study (6602b-FEF/17-69).

Keywords: Lipopolysaccharide, TEAC, FRAP, Rat, Antioxidant.
Introduction: Heavy metals have significant impact on human health due to their toxicity. These minerals are produced by the random emptying of waste from petrochemical industries. These include mercury (Hg\(^{2+}\)), cadmium (Cd\(^{2+}\)) and silver (Ag\(^{+}\)), which are potent toxic compounds and pose a threat to any physiological function. Hg can be transferred in human blood and tissues through inhalation and in the presence of human blood and tissues reflect the high pollution from the surrounding environment. The present study was the ongoing work to assess mercury in the environment adjacent to the chemical industries in Libya.

Material and Methods: Blood samples (10 ml) were collected from people working in the Arabian Gulf region and the surrounding area. It was cut samples of hair and then washed with acetone and water deionized. The samples were transferred to the laboratory and kept in a deep freezer at -4 °C until analysis. Heavy metal concentrations were determined using inductively coupled plasma (ICP-MASS) spectrometry.

Results: This work concentrate on the valuation of toxic metals in the blood and hair samples. The presence of Hg\(^{2+}\) in blood samples indicated that contamination with mercury arrived the human body. Concentrations Hg\(^{2+}\) registered a relationship with age. However, some of the samples getting from young adults were recorded at very high concentrations. It has been reported on the effect of heavy metals on human health on a large scale. The maximum concentrations (849 μg/L) in the blood sample taken from a 47 year-old person.

Discussion: The existence of Hg\(^{2+}\) in human blood specimens indicated that the contamination with Hg has reached human body. Among 97 blood samples, 13% registered more than 200 μg/L which is more than WHO Standards limits (200 μg/ L), while 22% contain more than 25 μg /L. However, some of the obtained samples from young people also recorded very high concentrations. For example, a blood sample taken from a 28 year-old person registered 234.37μg /L.

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Keywords: Heavy metals, Mercury, Human Blood, Libya
A Preliminary Study on Ephemeroptera (Insecta) Fauna of Demre Stream

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Introduction: Ephemeroptera is an order which is represented by in 42 families and over 3,000 described species in the world. The aim of this study was conducted between April 2015 and December 2015 to determine the Ephemeroptera fauna of Demre Stream.

Material and Methods: Samples, belonged to Ephemeroptera were collected from 12 stations on Demre Stream. Ephemeroptera communities along the stream were sampled at each and every one of the 12 stations using a standard hand net (30x50 size with 500µ mesh). The samples were taken from an area of 100 m in order to include all possible microhabitats at each station. Collected organisms were fixed in to %70 ethylalcohol. The Ephemeroptera were identified to the lowest possible taxon.

Results: As a result of this study, 16 species and 15119 individuals belong to Ephemeroptera were determined in Demre Stream. Baetis rhodani and Baetis sp. were found in all stations. Ecdyonurus venosus was only found at 8th station, while Caenis rivulorum at 10th station, Caenis macrura at 12th station, Baetis alpinus and Baetis fuscatus at 9th station and Baetis digitatus at 5th station. Rhirogena semicolorata, Rhirogena sp., Heptagenia sulphurea, Heptagenia sp., Ecdyonurus venosus, Seratella ignita, Caenis rivulorum, Caenis macrura, Caenis luctosa, Caenis sp., Baetis alpinus and Baetis fuscatus were only determined at the 8th station and after this station.

Discussion: Members belonging to Heptageniidae, Ephemerellidae and Caenidae families, which are very susceptible to pollution, were not found in the first 7 stations and the samples of these groups were only determined at station 8 and after this station. The fact that these first 7 stations are dry at some seasons, the presence of settlements and agricultural lands around the stations may be the reason for this situation. Members of the Baetidae family are more tolerant to pollution and Baetis rhodani and Baetis sp. were found in all stations. According to the results obtained from this study, specimens from Heptageniidae, Ephemerellidae and Caenidae were found in clean waters, whereas samples from Baetidae were found in relatively dirty waters.

Acknowledgements: This work is supported by Süleyman Demirel University, SDUBAP 4267-D2-15 project.

Keywords: Insecta, Ephemeroptera, Demre Stream, Turkey
Introduction: Heavy metals have a relatively high density compared to other metals and they are toxic or poisonous even at low concentrations on the metabolic functions of living organisms after certain levels and even cause their deaths. There is plenty of lead as an element in nature and transported to the seas and oceans from natural resources in various ways. Some of the inorganic salts such as lead acetate, lead nitrate ($\text{Pb(NO}_3\text{)}_2$) are soluble in water. There are many studies on the toxic effects of lead nitrate on plants. The aim of this study, investigate the effect of lead nitrate on the antioxidant capacity of Allium cepa root meristem cells by FRAP-TEAC method.

Material and Methods: Onions taken from the local market were kept in the tap water for 1 night and were germinated. Allium cepa, which was left in lead nitrate solutions at increasing doses (1, 10, 100 and 1000 µM) were kept for 3 days. Antioxidant levels were measured by applying FRAP-TEAC method to samples taken from root tips. The significance was calculated using a one-way analysis of variance (ANOVA) followed by the Tukey multiple comparison procedure. A value of $p < 0.05$ was considered statistically significant.

Results: As a result, reduction in antioxidant capacity were observed in A. cepa root cells in directly proportion to the doses given. According to the FRAP and TEAC assays, 1 and 10 µM of lead nitrate showed significantly lower and 1000 µM of lead nitrate showed significantly higher antioxidant capacity than all other tested doses. Also, FRAP and TEAC values were in the order: 1 µM < 10 µM < 100 µM < 1000 µM.

Discussion: The heavy metals are noted to be as severe pollutants in environment due to their toxicity and stable structure. Nowadays heavy metal emissions into the environment have considerably increased because of the industrial activity. Thereby increasing the contamination and accumulation of heavy metals in the food chain. Many studies have been carried out on the effect of lead nitrate on living organisms. In this study, A. cepa was exposed to lead nitrate in certain doses in order to study the effects of this heavy metal on the A. cepa root cells. Increased doses of lead nitrate solution have been observed to reduce antioxidant capacity on root cells.

Keywords: Allium cepa, Heavy metals, Lead nitrate, FRAP, TEAC.
Linear Alkyl Benzene Sulphonic Acid Exposure Cause to Delay Gonadal Differentiation in Zebrafish (Danio rerio)

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Introduction: Linear alkyl benzene sulphonic acid (LAS) is one of the widely used surfactants in detergent production. It is generally used for production of dishwashing liquids, laundry powders and household cleaners. When LAS is discharged to aquatic environments, it affects water quality and aquatic life. In this study, investigation of the effects of LAS on gonadal differentiation in zebrafish larvae was aimed. Zebrafish is a vertebrate model, which is widely used in toxicological and developmental studies. There are some advantages for studying with zebrafish such as its transparent embryos, low cost, high fecundity and short generation time. These properties make this species an ideal animal model for research laboratories with limited funds.

Material and Methods: Adult zebrafish individuals with 1:2 for female to male ratio were maintained in 20L capacity spawning aquarium. Dechlorinated tap water was used in recirculating chamber. Culture conditions were as follows; 14 h light/10 h dark photoperiod, 28.5 ± 1°C temperature, 7.0 ± 0.5 pH and 6.0 mg/L dissolved oxygen. When the light was turn on, spawning was induced and embryos were collected immediately. Fertilized and unfertilized eggs were separated under a stereo microscope. Embryos were washed with distilled water (dH₂O) three times and fertilized embryos were transferred into petri dishes. After 3 hour post fertilization (hpf) embryos, which had developed normally and reached blastula stage, were separated under the stereo microscope. The embryos were exposed to different concentrations (0.25, 0.5 and 1 mg/L LAS). Samples have been collected during 60 days and fixed with Bouin’s fixative. Routine histological methods were done. The sections were stained with PAS, Toluidine Blue, Best Carmine and Alkaline Phosphatase. Results were evaluated with light microscope.

Results: In control group normal gonadal development were observed. Gonial cells, type 1 and type 2 germ cells, perinucleolar oocytes and spermatocytes were seen clearly. In 0.25 mg/L LAS exposure group, delay in gonadal formation and differentiation were detected. Degenerated oocytes were observed. In 0.5 mg/L LAS exposure group, degeneration were more severe. In 1 mg/L LAS exposure group, vacuolization in gonad, increase in the number of residual bodies and degenerated oocytes, delay in gonadal differentiation were detected.

Discussion: Aquatic organisms are affected by the increase usage of detergent significantly. It was concluded that LAS exposure affected sexual differentiation in zebrafish. When the gonadal structures of the fishes in the control group were examined, a differentiation was observed in the direction of ovariurn or testis. On the other hand, it has been found that LAS exposure slows gonadal development and causes histopathological changes in gonadal structure. A definite diagnosis of gender in the experimental group could not be made. This long-term effect showed that detergent exposure prevents the reproduction of fish. Therefore, unnecessary use of detergent should be avoided as much as possible and detergent release to the environment should be minimized.

Acknowledgement: This study was supported by Sakarya University Scientific Research Foundation (Project Number 2015-50-02-006).

Keywords: Zebrafish, Surfactant, LAS, Histology, Gonad
Developmental Toxicity of Linear Alkyl Benzene Sulphonic Acid on Zebrafish (Danio rerio) Embryos

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Introduction: Linear alkyl benzene sulphonic acid (LAS) is one of the widely used surfactants in detergent production. It is generally used for producing of dishwashing liquids, laundry powders and household cleaners. LAS is discharged to aquatic environments because of its usage conditions and consequences of discharges cause low water quality affecting aquatic life. To investigate the degree of LAS toxicity, zebrafish is chosen as a vertebrate model organism in terms of showing toxical effects during developmental period.

Materials and Methods: Adult zebrafish individuals with 1:2 for female to male ratio were maintained in an aquarium having 20 L spawning capacity. Dechlorinated tap water was used in recirculating chamber. The culture conditions were as following: 14 h light / 10 h dark photoperiod, 28.5 ± 1°C temperature, 7.0 ± 0.5 pH and 6.0 mg.L⁻¹ dissolved oxygen. When the light was turn on, spawning was induced and following the spawning, zebrafish eggs were collected immediately. Under a stereo microscope, fertilized and unfertilized eggs were identified. After 3 hour post fertilization (hpf) period, the embryos which had developed normally and reached blastula stage, were seperated under stereo microscope. Then, the embryos were exposed to LAS at the different concentrations (16 mg.L⁻¹, 8 mg.L⁻¹, 4 mg.L⁻¹, 2 mg.L⁻¹, 1 mg.L⁻¹, 0.5 mg.L⁻¹, 0.25 mg.L⁻¹ and 0.125 mg.L⁻¹) for calculations of the average lethal concentrations (LC₅₀). Following the 5 days incubation period at 28°C ± 0.5 in 24 well plates containing 2 ml solution in each plate, the embryos were divided into 4 experimental groups; one is as control and the other 3 groups exposed to 1 mg.L⁻¹, 0.5 mg.L⁻¹ and 0.25 mg.L⁻¹ LAS according to LC₅₀ values. Developmental abnormalities, hatching, mortality and length of the embryos were observed under the inverted microscope. All statistical analyzes were done using SPSS 20.0. Probit analysis were used for determining of LC₅₀ for LAS on zebrafish embryos for 24, 48, 96 and 120 h periods. After that, identifications of the defects caused by LAS at developmental stages on the embryos were done and the presence of significant differences between experimental groups exposed to different levels of LAS were determined by using one-way analysis of variance (ANOVA) in comparising with the control group. Also, Tukey HSD post-hoc test were performed for further analyzes.

Results: The average lethal concentrations (LC₅₀) (in mg.L⁻¹) were found to be as 5,769 ± 0,791, 4,769 ± 0,759, 2,306 ± 1,037, 2,095 ± 0,955 for 24, 48, 96 and 120 h, respectively, with probit analysis. Therefore, the exposure doses of LAS (in mg.L⁻¹) were determined as 1.0, 0.5 and 0.25. Increase in mortality, abnormality and hatching time whereas decrease in body length were observed by increasing exposure doses in experimental groups. Pericardial and yolk sac edema, tail malformation and bent spine were seen in LAS exposed zebrafish embryo groups used in this work during the developmental period.

Discussion: The utilization of detergents is increased rapidly day by day. Due to excess utilization of them causes pollution in the environment affecting aquatic organisms significantly. Our results showed that LAS exposure affected the development of zebrafish embryos. Therefore, releasing of detergents to the environments must be minimized as much as possible.

Acknowledgement: This study was supported by Sakarya University Scientific Research Foundation (Project Number 2015-50-02-006).

Keywords: Zebrafish, Surfactant, LAS, Embryo development
Protective Effect of Sodium Selenite Against H$_2$O$_2$ in *Allium cepa*

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**Introduction:** Hydrogen peroxide (H$_2$O$_2$) is a clear, colorless, water-miscible liquid. The areas of use of H$_2$O$_2$ are very broad. High concentrations of H$_2$O$_2$ (usually at doses of 10-100 μM) are cytotoxic for animal, plant and bacterial cells. Sodium selenite has anticarcinogenic and antimutagenic effects. Recent studies have shown that selenium is protective against oxidative damage caused by heavy metals. *Allium cepa* is a highly preferred material for genotoxic studies. The aim of this study is to determine the effects of H$_2$O$_2$, a genotoxic agent, on the *Allium cepa* root meristem cells using the comet assay.

**Material and Methods:** Onions taken from the local bazaar were kept in the tap water for 1 night and were germinated. Increased doses of H$_2$O$_2$ and sodium selenite with directly proportion were given to *Allium cepa* and were kept for a certain time. *Allium cepa* plants were treated with H$_2$O$_2$ in 1st group, sodium selenite in 2nd group and H$_2$O$_2$ + sodium selenite in 3rd group. The samples were taken from the growing roots and the comet assay was applied. The results were examined by fluorescence microscopy. The statistical data obtained from the different dose groups was evaluated using the One Way Variance Analysis (ANOVA) and Tukey test in the Windows SPSS 11.0 computer program. A value of P <0.05 was be considered statistically significant.

**Results:** As a result, it was observed that nuclei were degraded in the H$_2$O$_2$ treated group and the degradations were decreased in the H$_2$O$_2$ + sodium selenite treated group. The results showed for treatment groups a dose dependent increase in tail DNA%, tail length and tail moment in *Allium cepa* when compared to control group. When control values were compared in the studied parameters in the treatment concentrations, H$_2$O$_2$ was found to exhibit the highest level of DNA damage followed by H$_2$O$_2$ + sodium selenite.

**Discussion:** H$_2$O$_2$ is a dangerous chemical and has been proven to be damaging in experiments on many plants and animals. The protective role of sodium selenite has been studied and proven so many times. The protective role of sodium selenite against the genotoxic effect of hydrogen peroxide was determined on *A. cepa* in this study. When only the H$_2$O$_2$ applied groups were observed, reduction of impairment has been detected in H$_2$O$_2$ + sodium selenite treated groups.

**Keywords:** Sodium Selenite, H$_2$O$_2$, Comet Assay, *Allium cepa*, Genotoxicity.
A New Record for the Turkish Oribatid Mite (Acari) Fauna from Yozgat Province: 
*Eremulus flagellifer* Berlese, 1908

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**Introduction:** Known as beetle mites or moss mites, oribatid mites are often found to be largest group in abundance among microarthropods in soil and comprise just about 11,000 named species representing 1269 genera and 163 families. As a result of the work done up to now, approximately 300 species were recorded from this group. *Eremulus* Berlese is a genus within the family Eremulidae. Up to now 36 species belonging to this genus are known in the world. To date, there is no record of this genus from Turkey. In this study, we aimed to contribute to species diversity in Turkey.

**Material and Methods:** The examined material was extracted with the help of a Berlese-Tullgren funnel extractor from soil, litter, moss and lichen collected from the Karanlık Valley (Yozgat). They were fixed and stored in 70% ethanol. Olympus CX21 the light and Leo 440 scanning electron microscopes (SEM) were used to examine mites. Specimens examined were deposited in the Biology Department of Bozok University, Turkey.

**Results:** *Eremulus flagellifer* Berlese is reported first time in Turkey. It can be recognized by rostrum rounded; sensilli flagelliform; costulae well developed; transcostula absent; 11 pairs of notogastral setae; genital and aggenital setae branched, six pairs of genital and three pairs of aggenital setae with two to five branches; monodactyle. Our specimens have been found in the soil in Karanlıkdere Valley.

**Discussion:** *Eremulus flagellifer* Berlese is cosmopolitan species. As a result of the evaluation of the examined mite sample *Eremulus flagellifer* Berlese was determined. This species is a new record for the Turkish fauna. In conclusion, the morphological and ecological features of our specimens are in accord with those of the specimens known from other countries.

**Acknowledgement:** This study was supported by the Fund of Bozok University Scientific Research Project (Project no: 2013FEF/A56).

**Keywords:** Oribatid, mite, Eremulus, Karanlıkdere Valley, Yozgat, Turkey.
Investigation of Shells Structure of Pacific oyster (*Crassostrea gigas* Thunberg, 1793) by Scanning Electron Microscope (SEM) and Energy Dispersive Spectroscopy (EDS) Analysis

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Introduction: Worldwide annual production of Pacific oyster, *Crassostrea gigas* in 2015 is 29594 tones by capture production and 583463 tones by aquaculture production. If we can roughly calculate that shell weight approximately 60-70% of total weight of oyster. Waste oyster shell is produced about 350450 thousand tons in worldwide. Nowadays shells of bivalve and gastropod species have been used as a raw material for various applications such as marine habitat restoration and biomaterial. The shells consist of calcium carbonate offers a great advantage for use in different areas. Therefore, the shells allow the construction of composite materials with different additives in different areas such as cementing material and calcium supplement. The aim of this work, it is to learn about the chemical structure of the shells.

Material and Methods: Pacific oysters (*Crassostrea gigas* Thunberg, 1793) were collected from Bandırma Bay, Marmara Sea of Turkey. The oyster shells were washed firstly with pure water, and then homogenized by grinding. In this study, shells of oyster were determined elemental contents by SEM analysis and EDS analysis. Analyses were carried out with JEOL SEM-7100-EDX in central laboratory of Çanakkale Onsekiz Mart University.

Results: It was given in element compositions of EDS spectrums and SEM image in Figure 1. According to the results, the maximum amount of oxygen in the CaCO₃ compound was expected and it was determined as 54.9 %. Since the amount of carbon comes from both the carbonate and the protein, it is expected that the amount is higher than that of the calcium, and the results are confirmed as 28.4 %. Also, it is seen that the amount of calcium was determined as 10.1 % in EDS spectrum.

Discussion: The results of the EDS analysis provide more important information on the elements present in the shell structure. The calcium carbonate which forms the major raw materials of the shells was determined as the carbon (C), calcium (Ca) and oxygen (O) by EDS analysis. In addition, the nitrogen (N) of the proteins in the shell structure was found as low percentages.

Keywords: waste oyster shell, *Crassostrea gigas*, EDS analysis, SEM
Histopathological Effects of Endothall (7-Oxabicyclo[2.2.1]Heptane-2,3-Dicarboxylic Acid) on Heart Tissue of Zebrafish (Danio rerio)

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Introduction: Endothall is a relatively water-soluble contact herbicide, which is primarily used to control of submerged weeds. Since endothall is effective in treating a large range of plants, it may have a widespread effect on non-target plants, especially when applied as a whole-pond treatment. Although many studies have been realized with various endothall formulations that address both toxicity and environmental fate and persistence, it is still an herbicide under investigation for its effect.

Methods: After one week adaptation period zebrafish were divided into four groups (n=20) as one control and 3 experimental (0.1, 0.5 and 1 mg/L). Heart tissues were dissected out after 5 day of the exposure. Tissues were fixed with Bouin’s fixative and dehydration were carried out in an ascending series of ethanol. Tissues were cleared in xylene, embedded in paraffin wax and cut into 5 µm sections on a microtome. The sections were stained with hematoxylin (H&E). Results were evaluated with light microscope.

Results: In control group normal heart histology have been observed. In 0.1mg/L endothall exposed group, degeneration and vacuolization at ventricle structure, hyperplasia at muscle cells in the ventricle, dilatation, vacuolization and rupture at pericardium, hemorrhage at ventricle and bulbus arteriosus, vacuolization at bulbus arteriosus and pleomorphic case at ventricle were detected.

In 0.5 mg/L endothall exposed group, vacuolization and degeneration at ventricle structure, hyperplasia at muscle cells in the ventricle, dilatation, necrosis and vacuolization at pericardium, degradation and severe vacuolization at bulbus arteriosus, hyperplasia at bulbus arteriosus structure and pleomorphic case at ventricle were observed.

In 1 mg/L endothall exposed group, dilatation, rupture and vacuolization at pericardium, vacuolization and degeneration at ventricle structure, hyperplasia at muscle cells in the ventricle, pleomorphic case at ventricle, hemorrhage at ventricle and bulbus arteriosus, degeneration and vacuolization at bulbus arteriosus, hyperplasia at atrium endothelial cells were observed.

Discussion: In this study, histopathological changes in ovaries of zebrafish were observed after the application of endothall. As a result, it can be said that endothall may cause some toxic and histopathological effects on other organisms (especially aquatic ones). Therefore, if endothall interferes with the underground water, it threatens aquatic ecosystems. However, further studies are required for understanding these effects.

Keywords: zebrafish, endothall, heart, histology
Histopathological Effects Of Endothall (7-Oxabicyclo[2.2.1]Heptane-2,3-Dicarboxylic Acid) On Liver Tissue Of Zebrafish (Danio rerio)

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Introduction: Endothall is the contact herbicide for weed control in aquatic systems that prevent certain plants from making the proteins they need. It is also used as a defoliant and desiccant in some terrestrial situations. First discovered in 1950 and used as defoliant agent from 1960’s. Since endothall is effective in treating a large range of plants, it may have a widespread effect on non-target plants, especially when applied as a whole-pond treatment. It is still an herbicide under investigation for its effect.

Material and Methods: One week adapted zebrafishes, divided into 1 control and 3 dose groups (0.1, 0.5 and 1 mg/L) (n=20). Endothall were applied for 5 days. Livers tissue harvested from fishes and fixed in Bouin’s fixative. Tissues were dehydrated with alcohol and xylene series. Livers embedded in paraffin wax and sliced into 5 μm sections with a rotary microtome. Samples stained with Hematoxylin & Eosin and photographed with Leica microscope.

Results: In the control group, normal liver histology has been observed. At 0.1 mg/L endothall exposed group, aggregation of blood cells, steatosis, and enlargement of the blood vessel, cytoplasmic vacuolization, necrosis and vacuolization at the liver tissue, sinusoidal congestion, and degeneration of hepatocyte cells were detected.

At 0.5 mg/L endothall exposed group, steatosis, degeneration of hepatocyte cells, necrosis and degeneration in liver tissue, cytoplasmic vacuolization, degeneration at portal vein, sinusoidal congestion were observed.

At 1 mg/L endothall exposed group, necrosis and vacuolization at the liver tissue, sinusoidal congestion, cytoplasmic vacuolization, steatosis, cytoplasmic degeneration at hepatocyte cells, aggregation of blood cells and enlargement at blood vessel were observed.

Discussion: Endothall exposed zebrafish liver has histopathological changes, especially in high dose group. Therefore, it is possible to say endothall has negative effects on liver of other organisms specifically aquatic organisms. Also, if endothall disperses in aquatic systems it could damage ecosystem and should be further tested.

Keywords: zebrafish, endothall, liver, histology
Histopathological Effects of N-Ethyl-N-Nitrosourea On Gill Tissue of Zebrafish (Danio rerio)

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Introduction: N-nitroso compounds are widely distributed in the environment due to natural processes and industrial activities. A variety of N-nitroso compounds are active potent carcinogens in many different vertebrate species. Both direct- and indirect-acting agents related with environmental and dietary N-nitroso compounds have been studied extensively in mammalian laboratory animals in regarding of having information on human health effects. These compounds are used as nutrient additives in food products or are nitrates and nitrites naturally occurred by the ingestion of nitrite salts added to meat, fish and cheese products for providing microbial resistance by the reaction occurring between nitrates/nitrites and amines. For the food protection, N-Ethyl-N-Nitrosourea (ENU) is widely used as an ingredient in foods in our present time. Therefore, aim of this study is to investigate the histo-pathological effects of N-Ethyl-N-Nitrosourea (ENU) on gill tissue of zebrafish.

Material and Methods: After one week adaptation period, zebrafish population is divided into three groups: one is as control and 2 experimental groups, one is treated with 0.5 mg/L ENU and the other is treated with 0.25 mg/L ENU. After one hour treatment, halves of the group one and two were removed from the experimental aquarium and dissections were performed on those. The remaining experimental groups were left for an additional one hour and exposed to the substance. After 2 hour treatment period, dissections were performed for the remaining fishes. Following dissections, standard histological procedures were applied.

Results: In control group, normal gill histology was observed. In 0.5 mg/L ENU exposed group; dysmorphism at secondary lamellae, vacuolization and hyperplasia at primary lamellae, necrosis and hypertrophy at secondary lamellae, total fusion, hypertrophy at secretory cells and hemorrhage were observed after one hour treatment period while total fusion, apical fusion, necrosis, vacuolization and hypertrophy at primary and secondary lamellae, hypertrophy at secretory cells, dysmorphism at secondary lamellae, hemorrhage, hyperplasia at primary lamellae, desquamation at secondary lamellae, degeneration at primary lamellae were noticed after 2 hour of treatment period.

In 0.25 mg/L ENU exposed group; hyperplasia at connective tissue, vacuolization, necrosis and hypertrophy at primary and secondary lamellae, hyperplasia at primary lamellae, dysmorphism at secondary lamellae, hemorrhage, total and apical fusion were observed after one hour treatment period while vacuolization and necrosis at primary and secondary lamellae, hypertrophy at secondary lamellae, hyperplasia at primary lamellae, hypertrophy secretory cells, apical and total fusion, hemorrhage, dysmorphism at secondary lamellae were seen after 2 hour of treatment period.

Discussion: In this study, histo-pathological changes were observed on the gill tissue of zebrafish following ENU treatments. Our results indicated that ENU may cause some toxicity leading to histo-pathological effects on organisms. However, further studies have to be done for understanding of these effects.

Keywords: zebrafish, n-ethyl-n-nitrosourea, gill, histo-pathology
Histopathological Effects of Tau-Fluvalinate on Intestine Tissue of Zebrafish (Danio rerio)

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Introduction: Tau-fluvalinate is an active ingredient present in pesticides, which has been commonly used in North America to control Varroa destructor mites in honey bee (Apis mellifera) colonies. Pesticides generally mix with groundwater and effect aquatic ecosystems. In this study, investigation of the histopathological effects of tau-fluvalinate on intestinal tissue of zebrafish was aimed.

Material and Methods: After one-week adaptation period, zebrafish were divided into three groups (n=10) as one control and 2 experimental groups (8 µg/L, 16 µg/L). The intestine was dissected out after 5 days of the exposure. Tissues were fixed with Bouin’s fixative and dehydration was carried out in an ascending series of ethanol. Tissues were cleared in xylene, embedded in paraffin wax and cut into 5 µm sections with a rotary microtome. The sections were stained with hematoxylin (H&E). Sections were photographed with Leica light microscope.

Results: In the control group, normal intestinal histology was observed. In 8 µg/L tau-fluvalinate exposed group, degeneration at villi structures, edema at submucosa, hypertrophy at submucosa and seroza, separation between submucosa and epithelial cells, necrosis at submucosa were observed. Moreover, hypertrophy of muscularis externa, hemorrhage, total fusion, separations between muscularis externa and epithelial cells, vacuolization at submucosa were detected.

In 16 µg/L tau-fluvalinate exposed group, degeneration at villi structures, total fusion, hypertrophy at epithelial cells, necrosis at lamina propria, hemorrhage, vacuolization at muscularis externa and submucosa, separations between submucosa and epithelial cells, separations between seroza and muscularis externa were observed.

Discussion: In this study, histopathological effects of tau-fluvalinate on zebrafish intestinal tissue were observed. Contaminants can affect organisms' behavior and survival. Although many studies have been conducted on various tau-fluvalinate formulations that address both toxicity and environmental fate and persistence, it is still a pesticide under investigation for its effects. However, further studies are required for understanding these effects.

Keywords: zebrafish, tau-fluvalinate, intestine, histology
Histopathological Effects of Tau-Fluvalinate on Ovary Tissue of Zebrafish (Danio rerio)

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Introduction: Contaminants can affect organisms’ behaviors and survival. Tau-fluvalinate is the active ingredient in a pesticide commonly used in North America to control Varroa destructor mites in honey bee (Apis mellifera) colonies. Although many studies have been conducted on various tau-fluvalinate formulations that address both toxicity and environmental fate and persistence, it is still a pesticide under investigation for its effect. At the same time, pesticides are mixed with groundwater and affecting the ecosystem. In this study, investigation the histopathological effects of tau-fluvalinate on the ovary tissue of zebrafish were aimed.

Material and Methods: After one week adaptation period zebrafish divided into three groups (n=10) as one control and 2 experimental groups (8 µg/L, 16 µg/L). Ovaries were dissected after 5 days of the exposure. Tissues were fixed with Bouin’s fixative and dehydration was carried out in an ascending series of ethanol. Tissues were cleared in xylene, embedded in paraffin wax and cut into 5 µm sections with a rotary microtome. The sections were stained with hematoxylin (H&E). The results were photographed with a Leica light microscope.

Results: In control group, normal ovary histology was observed. In 8 µg/L tau-fluvalinate exposed group, degeneration, swelling, fragmentation, fluctuation at zona radiata was detected. Separation between at vitelline membrane and zona radiata, degeneration at connective tissue and nucleolus, rupture at follicular epithelium, clumping at nucleus, degeneration of oocytes structure was detected.

In 16 µg/L tau-fluvalinate exposed group, degeneration of connective tissue, separation between zona radiata and follicular epithelium, clumping at nucleus, irregularities at nucleolus, degeneration at cortical alveoli, degeneration and vacuolization at ooplasm, separation between zona radiata and vitelline membrane were detected. Swelling of cortical alveoli, degeneration and irregularities at nucleus were observed.

Discussion: Various negative histopathological effects of tau-fluvalinate on zebrafish ovarian tissue were observed. While many studies have been carried out on tau-fluvalinate and similar endocrine disrupting pesticides to indicate both toxicity and environmental effects, the effect is still a pesticide that is under investigation. However, future research is needed to understand these effects.

Keywords: zebrafish, tau-fluvalinate, ovary, histology
**Introduction:** Aquatic products are a source of alternative animal protein for a balanced and healthy diet. Aquaculture products are becoming increasingly important in compensating the protein shortcomings and meeting animal protein needs. It is known that proteins which constitute the starting material of many important substances and amino acids which are the building blocks for living things have important roles in energy metabolism. In countries where aquaculture is carried out, alternative fish species are being investigated and are known to be successful in hatchery production. One of the alternative varieties, meagre (*Argyrosomus regius*) is a type of fish which can be easily produced in hatcheries and has a composition of low fat and high unsaturated fatty acids with wide salinity and temperature tolerance.

In this study, it was aimed to determine the protein efficiency and the amino acid composition changes in fish muscle tissues during the growth period of cultured meagre fish.

**Material and Methods:** The research was conducted in the cage production area of a commercial producer in the Aegean Sea (Aydin-Didim) between September 2015 and November 2016. Fish samples were taken from the cages according to random sampling method, biometric indexes were calculated and fish meat amino acid analyzes were performed. Crude protein content was determined as total nitrogen content by Kjeldahl method and the analysis was performed in TUBITAK. Amino acid analysis of fish meat was performed according to the Hydrolysis method using Eppendorf LC 3000 Amino acid analyzer at TUBITAK Marmara Research Center Food Institute.

**Results:** The initial weights of the fish were 8.22±0.13 g and reached 373.96±15.65 g at the end of the study. In the study, the protein efficiency ratio of meagre was 1.05±0.11%, the protein storage ratio was 11.49±2.98%, and the protein consumption value was 56.67±14.52 g. At the end of the study, the highest amino acids were glutamic acid (16.92%), lysine (12.04%) and aspartic acid (9.92%) and the total EAA value was 7.86±0.07-9.48±0.06 g/100g; and the total NEAA value was found to be between 6.95±0.01-10.00±0.15 g/100g.

**Discussion:** At the end of the study, it was determined that the protein efficiency ratio, protein storage ratio and protein consumption values varied between periods, and seawater temperature, fish size and feed consumption were effective. At the end of the study, it was determined that the amino acid values of meagre changed during the growth periods and that the samples were rich in lysine and leucine from essential amino acids, and also in aspartic acid and glutamic acid which are the most important amino acids used in energy metabolism.

**Acknowledgement:** This study was supported by Sinop University Scientific Research Coordination Unit. Project Number: SÜF-1901-15-01.

**Keywords:** *Argyrosomus regius*, meagre, amino acid composition, protein yield
A contribution to the knowledge on flea (Insecta: Siphonaptera) diversity in Turkey: the first record of *Chaetopsylla (Arctopsylla) hyaenae* (Kolenati, 1846)

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**Introduction:** Fleas (Insecta: Siphonaptera) are small, wingless, obligate blood-sucking ectoparasites of mammals and birds. Fleas have also a medical importance, because they are reservoirs and vectors of bacteria, protozoa and helminthes. Currently, flea fauna of Turkey are composed of 115 taxa (83 species, 32 subspecies) belonging to 36 genera, seven families. In the present study, we reported a new flea species, *Chaetopsylla (Arctopsylla) hyaenae* (Kolenati, 1846), for flea fauna of Turkey.

**Material and Methods:** During our parasitical survey, small numbers of flea samples were collected from a striped hyena, *Hyaena hyaena* (Linnaeus, 1758), killed by train-crash in Divriği district, Sivas province of Turkey in January 2017. Flea specimens were cleared 20% solution of potassium hydroxide (KOH) in 1–2 days and mounted with Canada balsam. Afterward, all specimens were identified under a stereo-microscope based on their morphological characters.

**Results:** A total of 15 flea sample were collected from striped hyena. Fleas were identified as *Chaetopsylla hyaenae* (1 female, a very big flea), and *Chaetopsylla (Chaetopsylla) trichosa* Kohaut, 1903 (10 females and 4 males). With the present study, *Chaetopsylla hyaenae* and *Chaetopsylla trichosa* on *Hyaena hyaena* were reported as new flea-host associations for Turkey. In addition, *Chaetopsylla hyaenae* was reported for the first time in Turkey.

**Discussion:** Fleas are small insects belonging to order Siphonaptera. As ectoparasites, they consume the blood of their birds and mammalian hosts. Therefore, they have huge medical and veterinary importance. A number of studies on flea fauna have been conducted in Turkey; however, there is still a big literature gap in the flea diversity in Turkey. *Chaetopsylla trichosa* is mainly parasite of badgers, *Meles meles* (Linnaeus, 1758), but rarely found on red foxes, *Vulpes vulpes* (Linnaeus, 1758) or other mammals. Hyenas are obviously very specific hosts of *Chaetopsylla hyaenae*. In addition, there are also some reports on the brown bears, *Ursus arctos* Linnaeus, 1758. *Chaetopsylla hyaenae* has limited distribution in Iran and Caucasus; however, we believe that distribution area of *Chaetopsylla hyaenae* will expanded with migrations of hyenas.

**Keywords:** Fleas, Hyenas, Siphonaptera, Turkey.
Histopathological Changes in the Stomach Tissue of Rats Fed with Great Scallop (Pecten maximus) Containing Heavy Metal Salts

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Introduction: Heavy metals, industrial and household wastes and pesticides are threats for the aquatic ecosystem. Polluted water sources are streaming into the seas and cause pollution in these systems. Dardanelles is exposed to pollution from the Marmara and Black Sea. Our previous studies demonstrated that the seawater and mollusc from certain regions of the Dardanelles contained heavy metal salts. In our previous researches, we found Al and Fe values were higher in samples taken from Çardak region of the Dardanelles. The purpose of the study is to demonstrate the histopathologic changes in the gastric tissues of rats which are fed with great scallops that are collected from the Çardak region of the Dardanelles.

Material and Methods: The great scallop given as food to the rats were removed from the Çardak region of the Dardanelles. Average 40-60 g weight were selected. After the beaks were overcooked, the meat broke off and the meat at 100 degrees was dried. Four groups of rats are included in the study, group 1 (n=6), control group fed with standard rat food, group 2 (n=6), 75% great scallop and 25% standard rat food daily, group 3 (n=6), 75% great scallop and 25% standard rat food every two days, group 4 (n=6), 75% great scallop and 25% standard rat food every three days. After routine histopathologic examination, all gastric tissue specimens were stained with hematoxylin-eosin. After the routine histopathologic processing all gastric tissue samples are evaluated in terms of 8-hydroxy-2’-deoxyguanosine (8-OHdG) immunoreactivity with light microscopy and image analysis software.

Results: No histopathologic differences found in standard hematoxylin and eosin stained gastric tissue samples of the control group. Second group showed active chronic gastritis, third group showed less inflammation and chronic gastritis compared with the second group and fourth group showed less mononuclear inflammation compared to the second and third groups. In immunohistochemical staining, 8-OHdG immunoreactivity in gastric epithelial cells. 8-OHdG immunoreactivity was negative in stomach tissues in all groups. There was no statistically significant difference between the groups that were fed every day, every other day and every three days with clam (p>0.05).

Discussion: Many studies have shown that foods contaminated with heavy metal salts can be harmful to health. Our previous researches, we found Al and Fe values were higher in samples taken from Çardak region of the Dardanelles. The histopathologic changes in the gastric mucosa of the great scallops fed rats assumes that gastrointestinal diseases are highly likely in people who consume these great scallops The authors think that care must be taken when consuming this kind of seafood.

Acknowledgement: We would like to express our appreciation to the Çanakkale Onsekiz Mart University Scientific Research Project Commission, which supported this study (ÇOMÜBAP-2010/246).

Keywords: Stomach, Great scallop, Hematoxylen and Eosine, Heavy Metal, Dardanelles
**Known as Super Vegetable Purslane (Portulaca oleracea L.), Can It Be Possible Antigenotoxic Effect?**

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**Introduction:** The rapid increase in the human population today has also led to an increase in nutritional needs. Producers use a variety of chemical substances to make more money and to meet the nutritional needs of people in a shorter time. These chemicals are called pesticides. They are produced for pests that threaten public health and agricultural areas and their eggs and larvae. Imidacloprid (IMI) from insecticides which are a group of pesticides, is a systemic insecticide. It is especially used against aphids and white fly in various vegetables and fruits. The effect period is quite long and when used with irrigation water, it can be effective for 2-3 months against pests by reaching sprout, leaves and fruits through roots from the soil. But there are various studies that may be toxic to the person applying this insecticide in case of unconscious and excessive use. In this presented study, possible genotoxic effects of IMI were investigated by micronucleus test (MN).

The oxidative effects of various chemical pollutants that affect people in daily life can also be eliminated with antioxidant substances in the foods taken with the daily diet. Purslane (Portulaca oleracea L.) is rich with vitamins A and C, omega-3 fatty acids and such as iron, magnesium, calcium, potassium minerals, however is not consumed much in our country. In this study, it has also been determined that the methanol extract of the purslane (PO\(_{met}\)) can be antigenotoxic.

**Material and Methods:** Two separate experimental sets were prepared for this purpose. In the first set of experiments, four different concentrations of IMI (50, 100, 250, and 500 ppm) for the MN assay were added to human peripheral blood cultures left to incubate for 72 hours and the frequency of the resulting micronucleus was calculated from microscopic examinations. In the second set of experiments, PO\(_{met}\) was added (1:1 v/v) to the highest application group of IMI (500 ppm) to determine antioxidative effects.

**Results:** MN frequency was 0.70±0.38 and 0.83±0.65 for negative control group distilled water and DMSO and 5.63±1.60, for positive control group EMS, respectively, while these values were found as 0.95±0.80 and 1.90±0.66 for the lowest (50 ppm) and highest (500 ppm) IMI application groups (P<0.05). While the MN frequency decreased from 1.90±0.66 to 0.85±0.65 in the case of IMI (500 ppm)+PO\(_{met}\).

**Conclusion and Discussion:** These results show that the purslane plant has a strong antioxidative property by significantly reducing the MN ratio (P>0.05) and that it should be consumed at different meals daily with 0.4gr fat and 0 cholesterol within 100 gr.

**Acknowledgment:** This work was supported by Atatürk University Scientific Research Fund [Project Number: 2011/112].

**Keywords:** Imidacloprid, micronucleus, genotoxicity, purslane, antigenotoxicity.
Effects of Municipal Wastewater Treatment Sludges on Some Soil Properties in Field Experiment

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Introduction: The agricultural use has become the principal disposal method for sewage sludge in Europe, agricultural use accounts for 37% of the total sludge produced and it is expected that stabilized sludge will be used in agriculture in large quantities in the next years in many important EU member states. The reuse of treated municipal sewage sludge (biosolids) in agriculture provides the nutrients and micronutrients (such as N, P, K but also Fe, B, Cu and Ni among others) necessary for plant and crop growth. The use of sludge in agriculture also enhances the organic content of soils, increases the water-holding capacity, the soil aggregation, reduces the soil bulk density, increases the cation exchange capacity, enhances the plant root environment. Therefore, plants are better able to withstand drought conditions, extract water, and utilize nutrients.

Material and Methods: This study examines the effect of sewage sludge application on some soil properties. A year-long field experiment was set up in the district of Haymana. Dewatered anaerobically digested sewage sludge were collected from Ankara municipal treatment plants. The sludge doses are adjusted according to the nitrogen requirement of the wheat plant. Within this scope, sewage sludge were individually used in doses of approximately 500, 1000, 2000, and 4000 kg/da with and without chemical fertilizer. Bread wheat (Tosunbey variety) followed its normal pattern and plants were harvested. In the all of experiments, some of properties of soil such as pH, EC, organic matters, total nitrogen, ammonium and nitrat nitrogen, available P₂O₅, exchangeable K₂O, CEC, and CaCO₃ were determined.

Results: As a result of the field study, increases in total nitrogen, available P₂O₅, exchangeable K₂O, organic matter, CEC and EC values were determined depending on the increasing sludge dose in soil samples. A significant change in the pH values of the soils has not been determined. In all treatments, it was determined that the sludge application affects some chemical properties of soil (OM, CEC, N, P) positively. The lime and pH were unaffected and the salt content of the soil increased.

Discussion: Soil salinity is an important problem of Turkey, unconscious use of sewage sludge can affect the salting of the soil. Therefore, this issue should not be taken into consideration when using sewage sludge. The use of the combinations of biosolid and chemical fertilizers may be more effective than alone application of biosolid.

Keywords: Sewage sludge, soil, pH, CEC, nitrogen, available P₂O₅, exchangeable K₂O
Introduction: A large number of persistent organic micro-pollutants have been found in wastewaters around the world. As the conventional treatment technologies are ineffective in removing those compounds from wastewaters, additional treatment steps like ozonation and advanced oxidation processes (AOPs) are discussed. Ozone removes organic contaminants either by direct reaction, or through the formation of hydroxyl radicals which can then react with the target molecule. This study aimed to assess the efficiency of ozonation of three personal care detergents (shampoo, chloric cleaning agent and shower gel) in synthetic solutions. Efficiency of ozonation was examined based on DOC and UV$_{254}$ absorbance removals.

Material and Methods: Three personal care detergents (S1, S2, S3) were collected from different a four stars hotels located in Turkey. All samples were first dissolved in 500-1000 mL distilled water and then diluted for having geometrical varying concentrations for EC$_{50}$ determinations. Diluted samples were stored at +4 cooled during chemical and ecotoxicological characterization. Ozone was supplied by an air-ozone generator (LAB2B Degremont Technologies-Triogen model with a maximum 4 g/h capacity) and transferred through a closed cylindrical pyrex glass reactor with a diameter of 40 mm and height of 1100 mm. A tubular cylindrical porous diffuser was replaced at the bottom of the reactor to transfer input O$_3$ gas into aqueous solution. Teflon tubing line was used for the connection between generator and the reactor. Two doses of 0.096 and 3.84 mg/L.min ozone was adjusted by changing the electrical current of the ozone generator. All experiments were performed at room temperature (25 °C) and at original pH of the solution. After ozonation, the samples were aerated for 5 min to remove possible residual O$_3$. The O$_3$ concentrations in input and off-gas were destroyed by two sequential washing bottles containing 250 mL of acidified 2 % KI solution to define the transferred ozone dose. The organic content of the samples was defined with the parameters to be COD (standart methods) or TOC (Shimadzu TOC analyzer, 6KVA model). Efficiency of ozonation was examined based on DOC and UV$_{254}$ absorbance removals indicating the mineralization and degradation rates of the chemicals respectively. pH was measured using a WTW 3110 model pH-meter.

Results: Both COD and TOC parameters of S1 was higher than S2 and S3. TOC/COD ratios of all three products were low requiring biodegradability increase by applying ozone. pH of S1 and S6 were close to each other to be around 6.0 that is lower than pH value of S2. A peak value of absorbance was observed around 254 nm for all there products although the peak was more significant for S1. Low ozone dose could substantially degrade all PCDs after 2.5 min oxidation while an acceptable COD removal (20%) for S1 could be obtained by applying high ozone dose.

Discussion: Ozone was found to be effective to degrade and mineralize all products in a short oxidation period by applying a relatively low ozone dose compared to wastewater treatment in the literature.

Keywords: Personal care detergents, micropollutants, ozonation, biodegradability
Copper Removal from Aqueous Solution Using a Wetland Plant as Biosorbent

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Introduction: Heavy metal pollution in water poses a severe threat to public health. For example, copper (Cu) is an essential micronutrient for aerobic life and yet, like other heavy metals, is potentially toxic. Evidences have been reported that Cu can be harmful or fatal to human beings at high concentrations and could be carcinogenic as well. Adsorption is generally preferred for the removal of heavy metal ions due to its high efficiency, easy handling, availability of different adsorbents and cost effectiveness. The aim of the study was to evaluate the biosorption performance of the wetland plant, Juncus sp., for the removal of copper from the aqueous solution.

Material and Methods: The batch biosorption experiments were conducted to investigate the influence of various parameters. The concentration of the metal ions in the aqueous phase was measured by using inductively coupled plasma mass spectrometry (Agilent Technologies / 7700X ICP-MS). For each isotherm experiment was conducted at equilibrium time.

Results: The biosorbent was characterized using scanning electron microscopy (SEM) images and FT-IR. The SEM observation indicated that the surface of biosorbent had an irregular and porous surface texture containing a considerable number of pores, which might promote the heavy metal biosorption. FT-IR showed that, the existence of major functional groups such as O-H, C-H, C-O. 180 minute is required for the equilibrium biosorption for Cu and 6.0 of pH generally favors biosorption for Cu. Maximum biosorption capacity of 10 mg L⁻¹ Cu (qm) onto Juncus sp. was found. The adsorption isotherm followed the Freundlich isotherm model. The kinetic studies of the Cu(II) are best in accordance with the Intraparticle diffusion model.

Discussion: The results of the present investigation showed that Juncus sp. is a potentially biosorbent for the adsorption of Cu(II). The biosorption increased by the increase in contact time. The pH experiments showed that the significant biosorption occurs in 6.0 of pH. The increase in biosorbent dosage causes increase in Cu biosorption. Finally, the present study indicated that instead of chemicals, non-hazardous natural materials like a common wetland plant: Juncus sp. can be used as biosorbent from wastewaters to overcome heavy metal pollution.

Acknowledgement: This study was supported by the Scientific Research Project of the Sinop University, under grant number of RBB -1901-16-28.

Keywords: Biosorption, Copper, Juncus sp., Kinetics, Isotherm
Seed Mucilage Contents in Some Taxa of Draba L. (Brassicaceae) And Their Significance from Systematic and Ecological Aspects

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Introduction: The genus Draba includes some taxonomic problems as a result of high variation in habit, fruit and floral morphology, and the used morphological characters in infrageneric classification are fairly restricted. In this condition, it becomes a necessity uncovering of the new characters, which will help the current diagnostic in classification. Mucilage is placed in distinguished epidermal cells to hydration in contact with water. Also, it is identified to be active with concerning germination, dispersion, and adhesion to soil in colonization. The mucilage content of the seeds in Draba genus has not been examined so far. The target of this study has been to work the mucilage contents of the seeds and adhesion volume of soil crusts, and systematical and ecological importance of the mucilage in the seeds of D. brunifolia subsp. olympica, D. elegans, D. siliquosa, D. muralis and D. verna.

Material and Methods: Taxa were taken from nature populations in Turkey. The differences on soaked seeds was watched, and evaluations on the capability to hydrate were performed. Methylene blue and safranin dyes were utilized to determine the mucilage type. Pure sea sand was utilized for defining the soil adhesion volume of the seeds of the studied taxa.

Results: The soaking seed examinations show that specialized cells on surface of seed produce mucilage and form a mucilage layer around the seeds. The mucilage in seeds is in cellulosic form show a heterogenous structure. The seeds stained with safranin and methylene blue indicate that Draba mucilage is formed from pectin matrix and cellulosic frame. Mucilage production among the studied Draba taxa was the highest at D. verna. As well as, it is the lowest at D. elegans.

Discussion: Micro-staining showed that the mucilage of the studied Draba taxa includes cellulosic structure, including cellulose and pectin. The cellulosic mucilage is a specimen of collooidally spread cellulose and typically create from pectins. The presence of mucilage can play a key role in seed dispersion and colonization for the new habitat in Draba taxa. This paper is the first record on the mucilage form of Draba genus.

Keywords: Cellulose, Cruciferae, Draba, Morphology, Myxospermy, Pectin
Examination of Cytotoxic and Genotoxic Properties of Teflubenzuron Insecticide on
Allium cepa Somatic Cells

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Introduction: The usage of pesticides in cultivated fields is increasing gradually. However, pesticides are of the possible detrimental effects on the living systems. Teflubenzuron is used to control insect pests such as Cydia pomonella, Cacopsylla pyri, Spodoptera littoralis and Phyllocnistis citrella in cultivated areas at concentrations in the range of 1 – 1.5 ppm. Although there is no study on the effect of teflubenzuron on non-target organism in onions to our knowledge. In this study, the cytotoxic and the genotoxic properties of teflubenzuron insecticide on somatic cells of Allium cepa L. have been studied for the first time.

Material and Methods: The onion bulbs were exposed to 0.5, 1, 2 and 4 ppm concentrations of the insecticide for 12, 24 and 36 h. Distilled water was used as a negative control, and ethyl methane sulfonate was used as a positive control. Applied insecticide solutions were determined according to the used doses in agricultural fields.

Root tips obtained from the control and seedlings treated with teflubenzuron were fixed in ethanol-glacial acetic acid (3:1) and maintained at 4 °C overnight. Afterwards, they were hydrolyzed in 5 N HCl for forty minutes and colored with Schiff’s reagent for 1 h at room temperature. Five slides were taken randomly from all the slides for each group and were investigated the mitotic index, micronucleus in interphase, and chromosome aberrations in dividing cells in cytogenetic analysis.

Results: The mitotic index decreased with increasing the insecticide concentrations. The mitotic abnormalities were defined as disturbed prophase, c-mitosis, stickiness, laggard chromosomes, and chromatid bridges. Besides, micronucleus formation was gradually augmented with increasing teflubenzuron concentrations when compared to control at each application time. It was clearly higher at 4 ppm than the other teflubenzuron concentrations at all the used exposure times.

Discussion: As a result, the cytotoxic and genotoxic potency of the used insecticide with different tests were assessed by utilizing somatic cells of A. cepa, and the usage of a defined non-toxic dose was suggested.

Keywords: Chromosome, Cytotoxicity, Genotoxicity, Insecticide, Teflubenzuron
City Cluster and Difference in Air Quality in Ergene Basin: Urban Livability

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Introduction: City clusters consist of large, almost adjacent urban groups with many satellite cities and towns close to each other. In the last two decades, such clusters, for their collective economic capacities, play leading role in Turkey’s economic growth. However, this economic growth causes a general decline in the quality of the environment and lowers the quality of life in the cities. The purpose of this study is to show the difference in air quality depending on the difference in the city cluster in the Ergene basin. For this purpose, Edirne, Kırklareli, Tekirdağ, which are important settlements of the Ergene Basin, and the place of Organized industrial region of Çorlu-Çerkezköy in the basin, is discussed in terms of urban livability in this study.

Material and Methods: BTEX values (benzene, ethylbenzene, m-p xylene, o-xylene and toluene) were measured throughout the basin and in the cities. Measurements were made in 200 stations by passive sampling method between 29.07.2015 - 27.08.2015 for representing summertime and between 01.02.2016 - 23.02.2016 for wintertime. The inverse distance weighted (IDW) algorithm is used for the interpolation of passive samples. The difference in livability according to air quality is emphasized in the cities in the basin at both Summer and Winter.

Results: The study shows that each pollutant has a different pattern on the basin scale. This has led to different urban livability in the basin. Urban clustering and industry have been controlling factors in the formation of spatial patterns in air quality. These controlling factors differ for each volatile organic pollutant, but two areas in the basin dimension are notable. One of these is the Çerkezköy-Tekirdağ urban cluster line in the upper basin; and the other is the vicinity of Havsa (Edirne) in the middle basin. These two areas are remarkable as a hot zone in the distribution of volatile organic pollutants, and . As a result, livability in terms of air quality increases upwards from the basin center and to the lower basin from the upper basin depending on the change in elevation around the basin.

Discussion: As a result, air pollution remains largely unexplained and unpredictable. However, the general clues from geo-statistical analysis are interesting and informative. The study provides a methodology that can be applied to urban planners and decision-makers to effectively investigate and manage contaminated sites in order to reduce air pollution's harmful effects on the environment and public health.

Keywords: Air Quality, City Clustering, Geographical Information Systems, Passive Sampling, Urbanization
Use of Composite Alginate Beads for Heavy Metal Removal by Continuous Flow Reactors: A Literature Review

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Introduction: Domestic and industrial wastewaters may contain heavy metals which lead serious problems. Sometimes, very low doses of heavy metals are resulted in poisoning or even death. For these reasons, it is significant to remove these metals. There are lots of methods used for the treatment such as chemical precipitation, ion exchange, and adsorption. Most of these methods are not efficient at low heavy metal concentrations or costly at high flow rates. Adsorption might be a better alternative if the adsorbent is cheap, easy to find like alginates which are abundant polysaccharides obtained from brown algae. They have carboxyl groups which are claimed to be functional sites for the treatment of various pollutants. For this reason, alginates are applied for heavy metal uptake. This study is aimed to supply core information gathered from reviewing literature about using composite alginate beads for heavy metal removal by column reactors.

Material and Methods: The study was conducted using sources of Web of Science database. The search keyword was adsorption (as topic). Then, the results were refined by heavy metal (as topic), alginate (as topic) and column (as topic). The related journal papers were reviewed.

Results: Although alginates are applied in different forms for heavy metal removal, mostly they are used as calcium alginate beads. First, alginates were utilized as sole materials for beads formation. However, recently, studies were focused on improvement of treatment efficiency by forming composite alginate beads with different materials. For example, alginates were combined with montmorillonite, activated carbon, clinoptilolite, chitosan, magnetic materials, nano particles to remove Pb^{2+}, Mn^{2+}, Cd^{2+}, Cu^{2+}, Zn^{2+}, Fe^{3+}, Al^{3+} and Hg^{2+}. Efficiency of the treatment are changing depending on target metals, adsorbent composition and medium conditions. But in general, high removal rates being around 69-100% could be achieved.

Discussion: Continuous column systems allow most efficient use of adsorption capacity of adsorbents which leads to high purification degree for wastewater. In studies, it was claimed that heavy metal removal mechanism is generally associated with calcium ion release representing ionic interaction between metals and calcium ion in the center of beads structure. Also, heavy metal removal efficiencies were observed to be reduced in real wastewater treatment studies or together with coexisting ions due to competition between other ions for adsorption sites. Furthermore, studies suggested regeneration of used adsorbent for cost effectiveness and application potential of proposed adsorption processes.

Keywords: Adsorption, biopolymer, column, treatment, wastewater
The effects of different proportions of the 17α-methyltestosterone and 17β-estradiol on growth, sex reversal and skin coloration of electric yellow cichlid (Labidochromis caeruleus Fryer, 1956)

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Introduction: Sex steroids play a significant role in aquarium fish production. They allow the producers to grow the desired gender and they have significant positive impacts on sexual dimorphism-dependent coloration of the fish. These steroids are used generally to produce male or female stocks. Effects of steroid hormones on edible fish species such as salmon, rainbow trout, eel, sea bass, tilapia and carp on aquarium fish such as cichlid, guppy, swordtail, beta and black molly have been already investigated worldwide.

Materials and Methods: In this study, no hormone was added to the control feed, while six other feeds were prepared by adding 20, 40, 60 mg kg⁻¹ 17α-MT and 20, 40, 60 mg kg⁻¹ 17β-ES hormone to each, resulting in seven different types of feed for the study. Cichlid mean weight was determined as 0.64±0.01 g, were stored such that there replications for each group. The fish were fed with the feeds for a period of 2 months. Water temperature was measured daily, while pH, dissolved oxygen and ammonia level were analysed weekly. All aquariums were maintained under natural lighting photoperiod for 60-day period. At the end of the experiments, ten fish of each experimental group were captured for colorimetric analyses. Colour measurements were performed around the body of fish. At the beginning of experiments, colour characteristics of randomly selected 30 fish were measured. Then, fish were individually measured for skin colour using a Minolta CR-400 Chroma Meter (MINOLTA Camera, Asaka, Japan) at the end of the experiments (2 months).

Results: At the end of the study, the highest weight gain was observed in the 20 mg kg⁻¹ 17α-MT group (0.39±0.17 g), and the difference with groups fed with 17β-ES was found to be statistically nonsignificant. Similar statistical differences were also identified with regards to the specific growth rate, the relative growth rate, and feed conversation. When the sex change rates were evaluated, it was determined that all fish in the 17α-MT hormone groups were male, while the rates of feminization for the 17β-ES hormone groups were 80.00%, 82.22% and 86.67%, respectively. Survival rates were determined as 82.23%, 86.68%, 64.43%, 62.2%, 73.33%, 66.67% and 53.33%, respectively, with the best survival rate was observed in the 20 mg/kg 17α-MT (86.68%). When the results of the physical color analysis were evaluated, it was determined that the best coloration was achieved in the 17α-MT groups, and that the difference with the groups was statistically significant (P<0.05). Accordingly, the L* values varied between 64.82±4.89 and 71.64±1.06, the a* values between -0.51±0.01 and 4.23±0.64, and the b* values between 12.98±0.12 and 35.56±5.92, while the Chroma (C*) and Hue (Hab°) angle values varied between 13.06±0.07 and 31.20±0.65 and between 80.90±1.06 and 92.44±0.08, respectively.

Discussion: In this research, relevant hormones had both positive and negative impacts on different parameters of electric yellow cichlid (Labidochromis caeruleus Fryer, 1956). If we consider the effect of hormones on coloration and viability rates, which is the most important issue for aquarium fish, 20 mg kg⁻¹ 17α-MT treatment was found to be the optimum dose with regard to skin colouration (Hab°, a°) of males and 20 mg kg⁻¹ 17β-ES treatment was found to be the optimum dose with regard to survival rates of females. Similar values were procured from the groups with regard to growth, development, feed conversion and sex ratio.

Acknowledgement: We would like to express our appreciation to the Sinop University Scientific Research Project Commission, which supported this study (SUBAP-MYO 1901-16-21).

Keywords: Electric yellow cichlid, 17α-methyltestosterone, 17β-estradiol, Growth, Sex change, Pigmentation
Histopathological Effects of Thiourea Dioxide on Zebrafish (Danio rerio) Heart Tissue

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Introduction: Thiourea dioxide is generally used in the leather industry, pulp and paper industry, photography, textile processing industry and reductive bleaching in textile. It is a strong reductant and it is also a component of decolorizing agents. Thiourea dioxide bleaching has recently been used instead of sodium hydrosulphite in post-bleaching after the replacement of NaOCl bleaching in non-wood waste or mechanical paper bleaching. In our study, examination the histopathological effects of thiourea dioxide on zebrafish heart tissue was aimed.

Material and Methods: Adult zebrafish individuals were kept in 25 L capacity aquariums and they were maintained under standardized laboratory conditions (28.5 ± 1°C temperature, 14 h light / 10 h dark photoperiod, 7.0 ± 0.5 pH and 6.0 mg/L dissolved oxygen). Zebrafish individuals divided into three group (n=10) as one control and 2 experimental groups (3 mg/L and 4.5 mg/L). After 5 days of exposure, tissues were dissected and fixed with 10% neutral buffered formalin. Dehydration were carried out in an ascending series of ethanol. After tissues were cleared in xylene, embedded in paraffin wax and cut into 5 µm sections on a microtome. The sections were stained with hematoxylin and eosin (H&E). Results were evaluated with light microscope.

Results: In control group, normal heart histology was observed. Bulbus arteriosus, ventriculus, muscle cell and endocardial cell were monitored clearly. In 3 mg/L exposure group, degenerated muscle cells were detected. Hemorrhage at ventricle, hyperplasia, vacuolization and pleomorphic case at muscle cells, degeneration at pericardium were observed. Hyperplasia at atrium endothelial cells were detected. In 4.5 mg/L exposure group, pleomorphic case at ventricle, degeneration and vacuolization at pericardial cells, hyperplasia at bulbus arteriosus were monitored. Pleomorphic states were observed at ventricular structure.

Discussion: Environmental pollution due to toxic components is one of the most important problems in the world. Excessive and unconscious use resulting in increased consumption of environmental pollutants leads to various problems in terms of living healthy. Our results showed that thiourea dioxide exposure causes deterioration in fish heart tissues.

Keywords: Heart, Zebrafish, Thiourea dioxide, Histology, Toxicology
Effect of Medium pH on Copper Removal and Kinetics of Adsorption by Alginate-Clinoptilolite Beads

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Introduction: Uncontrolled increase in human population and industrialization resulted wastes leading to environmental pollution. Heavy metals, classified as hazardous, are toxic pollutants. Thus, treatment of them are important for natural life. There are various methods used for heavy metal removal. Adsorption would be a good alternative when particularly economical adsorbents are used. Todays, studies are focused on natural adsorbents and interest in alginate is getting increased. Alginates are industrial biopolymers obtained from algae. In this work, it is used together with clinoptilolite to improve heavy metal uptake capacity of alginate beads. The main purpose of the work is to investigate the effect of pH on copper removal by alginate-clinoptilolite (A-C) beads using batch reactors.

Material and Methods: Clinoptilolite from Manisa-Gördes combined with 2 % alginate to form A-C beads by dropping into CaCl₂ solution. First, kinetic of copper removal was followed by 100 mg A-C beads (1g/1g) within 100 mg/L Cu²⁺ at pH 4 during 48 hours at 150 rpm. Then, there different pH (3, 4, 5) values were examined at the same conditions until equilibrium reached. Sampling was performed at 0 and 24 hours to determine the effect of pH and samples were acidified before analysis.

Results: Adsorption of copper onto A-C beads was fast in the first 30 min that initial Cu⁺² concentration was reduced from 101.1±0.3 to 79.6±2.2 mg/L. After 4 hours, rate of adsorption slowed down and the metal concentration was measured as 55.6±1.1 mg/L. The system was equilibrated at 24 hours with final Cu²⁺ concentration of 18.7±2.5 mg/L. On the other hand, the effect of pH on copper adsorption onto A-C beads was not drastic. Similar removal efficiencies were obtained although the optimum value seems pH 4.

Discussion: In general, adsorption is faster during early treatment since there are lots of suitable sites on adsorbents for attachment of the metals. Similar trend is observed here and somehow longer time is required to obtain equilibrium by A-C beads which is compatible with the literature. This might be both related with the metal and properties of the adsorbent. pH is one of the important parameters affecting availability of surface groups on adsorbents for the removal process. Low pH values are not suitable due to competition of metals with hydrogens and high pH values may lead precipitation of copper. Thus, differences are not sharp at least in the working range of pH examined in this study.

Acknowledgement: We would like to express our appreciation to the Akdeniz University Scientific Research Project Commission, which supported this study (FYL-2016-2001).

Keywords: Adsorption, Biopolymer, Heavy metals, Zeolite
Effect of Clinoptilolite Size and Alginate-Clinoptilolite Ratio on Copper Removal by Alginate-Clinoptilolite Beads

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Introduction: Heavy metals are widely used in lots of industries that make them common components of wastewaters. Since they are known with their toxicity, treatment is important. One of the methods used for removal is adsorption. It is particularly preferred if adsorbents are cost effective, abundant, and physically stable. In recent years, studies are focused on using natural adsorbents, alginate might be an example. It is a biopolymer composed of mannuronic and guluronic acids. Studies showed that alginate beads formed by calcium can exchange heavy metals such as Cu$^{2+}$ and Pb$^{2+}$ successfully. Also, formation of composite alginate beads is a rising trend. In this study, clinoptilolite, which has ability to capture metals, is selected to form composite beads for copper removal. The main purpose of this work is to determine the effect of clinoptilolite size and alginate-clinoptilolite (A-C) mass ratio on copper removal by A-C beads in batch reactors.

Material and Methods: A-C beads were formed by 2% alginate and clinoptilolite (Manisa-Gördes) by dropping into CaCl$_2$. First, 100 mg A-C beads (1g/1g) with different clinoptilolite sizes of <100 µm, 100 µm<x<300 µm, 300 µm<x<500 µm were subjected to 100 mg/L Cu$^{2+}$ solution at pH 4 and 150 rpm for 24 hours. Then, 100 mg A-C beads with various A/C ratios of 1/1, 1/2, 2/1 were used at the same conditions. Samples were taken at 0 and 24 hours and acidified before analysis.

Results: According to the findings, initial copper concentration is reduced to 23.3±0.3 mg/L, 21.5±3.5 mg/L, and 28.7±1.7 mg/L by A-C beads at clinoptilolite sizes of <100µm, 100 µm<x<300 µm and 300 µm<x<500 µm, respectively. These correspond to higher than 70 % removal. On the other hand, final copper concentrations changed between 23.3±0.3 and 61.1±1.6 mg/L by A-C beads at different A/C ratios.

Discussion: In general, when particle size is reduced, it is expected adsorption efficiency is improved due to increase in available area. However, there is not much influence observed at different clinoptilolite sizes of A-C beads at least in this working range. In addition, increase in both alginate and clinoptilolite ratios has no positive effect and optimum ratio is 1/1 of A-C. This might be because increase in clinoptilolite decreases migration of ions in A-C beads. Also, increase in alginate resulted high viscosity which leads to uneven shaped beads. Therefore, removal was not satisfactory to use twice more alginate or clinoptilolite in forming beads.

Acknowledgement: We would like to express our appreciation to the Akdeniz University Scientific Research Project Commission, which supported this study (FYL-2016-2001).

Keywords: Adsorption, Biopolymer, Heavy metals, Zeolite
Determination of PCBs in Red Mullet (*Mullus barbatus*) and Annular Sea Bream (*Diplodus annularis*) Collected from Izmir Gulf (Eastern Aegean)

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**Introduction:** Polychlorinated biphenyls (PCBs) are aromatic, synthetic chemicals which do not occur naturally in the environment. PCB congeners are highly lipophilic increases with increasing degree of chlorination. Congeners with a lower degree of chlorination are more volatile than those with higher degree PCB congeners. PCB congeners have been used as dielectric isolators in electrical equipment. Although the use of PCBs was banned or, at least, intensely reduced in the last two decades, it is still frequently detected in environmental samples due to their highly persistence and accumulation within food chains. Fish are one of the marine species often used as an environmental bioindicator to monitor a level of pollution in the marine environment. In the present study, the first comprehensive data of PCBs were evaluated in two fish species from the Gulf of Izmir. The aim of this study is to investigate PCBs levels in two fish species and to assess health risk of PCBs for people.

**Material and Methods:** A total of 624 individuals of *Mullus barbatus* (N=298), *Diplodus annularis* (N=326) were collected from three sites in Izmir Gulf between 2010 and 2013 during cruise of Research Vessel Koca Piri Reis. The samples were extracted using analytical procedure which is called “Modular Multiple Analytical Method for the Determination of Pesticide Residues in Foodstuffs” (DFG Method S 19, 1999).

**Results:** The levels of extractable organic matter ranged between 35 and 182 mg/g in the sampling sites. The highest level was found in *Mullus barbatus*, while min value was observed in *Diplodus annularis* in Gülbahçe. PCB 101 and PCB 180 were not detected in fish samples. The highest PCB congener was PCB 153 for both species. Max levels of PCB 153 were measured in Gülbahçe for *Mullus barbatus* during 2011 and in Gülbahçe for *Diplodus annularis* during 2010.

**Discussion:** According to this study, health risk assessment was performed for PCBs due to consumed fish. According to EC regulation 1259/2011, the limit for the sum of the six ‘target’ PCB congeners (PCB 28, 52, 101, 138, 153 and 180) is set to 75 ng/g ww. Fish samples did not exceed the safe limits of iPCh6 set by EU.

**Keywords:** PCBs, red mullet, annular bream, risk assessment, Izmir Gulf
Reducing Effects of Humic Acid on Chromium Stress in a Bread Wheat (Triticum aestivum L. cv. Huseyinbey)

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Introduction: Chromium (Cr) stress is one of the most adverse environmental factors that affect plant growth. Humic acid (HA) has many beneficial effects such as increasing drought resistance to plants, improving uptake of nutrients and stabilizing soil pH. However, little information is available on the contributions of HA for plants exposed to Cr toxicity. The present study was carried out to analyse the effects of HA on photosynthetic pigments and malondialdehyde content in a bread wheat cultivar (Triticum aestivum L. cv. Huseyinbey) exposed to Cr stress.

Material and Methods: As a plant material, a bread wheat (Triticum aestivum L. cv. Huseyinbey) grown in Suluova was used. After the wheat plants germinated, seedlings were transplanted to pots and they were cultivated in the laboratory under the 18/6-h light/dark regime. HA and Cr were not applied to the control group. One group of seedling were treated with 0.20, 0.40, 0.60 mM chromium (Cr) and Hoagland’s nutrient solution. The other group of seedlings were treated with Cr at same concentrations, 2.0 mg/L HA and Hoagland’s nutrient solution.

Results: Cr stress decreased the pigment and carotenoid content compared to control plants. High concentrations of Cr were caused to increase of malondialdehyde content of the leaf. At the application of Cr+FA, the decreases at content of pigments and carotenoid were not remarkable as in plants exposed to only Cr. However, the increase at malondialdehyde content was less compared to plants exposed only to Cr treatment.

Discussion: The present study demonstrated the important role of HA in wheat plants under Cr stress. The HA could reduce Cr toxicity in wheat plants through inhibiting the uptake and translocation of Cr. These results suggest that the application of HA can decrease the damages of Cr stress in plants.

Acknowledgement: We would like to express our appreciation to the Amasya University Scientific Research Project Commission, which supported this study (FMB-BAP 17-0247).

Keywords: Heavy metal, photosynthetic pigment, carotenoid, malondialdehyde
Effects of humic acid against chromium stress in a Bread Wheat (Triticum aestivum L. cv. Syrena Odeska)

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Introduction: Contamination of agricultural land with heavy metals is an important problem in the world. This problem has been especially seen in developing countries. The main cause of excess chromium accumulation in the soil is the anthropogenic and natural ways. The most important indications for Cr toxicity in plants include seed germination and reduction of growth, inhibition of enzymatic activities, deterioration of photosynthesis and oxidative imbalance. Humic acid had a direct effect on the growth of wheat plant. It was also reported that humic acid is a significantly positive effect in leaf chlorophyll content. The present study was carried out to analyse the effects of HA on photosynthetic pigments and MDA content in a bread wheat exposed to Cr stress.

Material and Methods: In this study, a variety of bread wheat (Triticum aestivum L. cv. Syrena Odeska) grown in Amasya Suluova was used as plant material. After the wheat plants were germinated, seedlings were transferred to pots and they were grown in the laboratory for 18/6 hours under light / dark conditions. The wheat plants were divided into two groups except for the control group and the first group was treated with 0.20, 0.40, 0.60 mM chromium solution and the second group was treated with chromium solution and 2.0 mg / L HA (humic acid) solution in the same concentrations. All groups were treated with Hoagland’s nutrient solution.

Results: In this study chlorophyll a, chlorophyll b, total chlorophyll and carotenoid content were found to be decreased in the chromium-treated group compared to HA+Cr treated group depending on the chromium stress application. However, only chlorophyll a/b ratio and MDA content were increased in chromium treated group compared to HA+Cr treated group.

Discussion: As a result, we can say that the humic acid protects chlorophyll pigments and carotenoids from the toxic effects of chromium. According to the obtained data, humic compounds such as HA in plants are believed to stimulate growth and development by increasing activities and defense capacities of antioxidant enzymes as well as preventing lipid peroxidation.

Acknowledgement: We would like to express our appreciation to the Amasya University Scientific Research Project Commission, which supported this study (FMB-BAP 17-0247).

Keywords: Heavy metal, photosynthetic pigment, carotenoid, malondialdehyde
Wild Captive *Solea senegalensis* Sperm Quality Analysis and Improvement

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**Introduction:** In aquaculture like in any other animal production industry, optimal broodstock husbandry management is a key issue for reproduction control. Even so, most approaches to this subject are still very empiric, the majority of cultivated species show some reproductive dysfunctions and in several species fish are captured from the wild for broodstock repopulation. Correct reproduction control implies control of gametogenesis and the development of appropriate techniques for its evaluation. In this context male reproductive status and the evaluation of spermatogenesis and sperm quality of cultivated species are of utmost importance. Sperm quality is the ability of a sperm sample to fertilize the egg and produce normal offspring. Nevertheless for aquaculture and research purposes, easiest and more rapid parameters/methods are needed, whereas researchers require complementary methodological approaches to understand the basic factors affecting sperm quality. In this study, will be summarize the studies about sperm quality analysis of *Solea senegalensis* spermatozoa.

**Material and Methods:** Sperm samples (n=11) were obtained from fluent males during the reproductive season, from March to May. Fishes were anesthetized in a seawater tank with 300 ppm 2-phenoxyethanol. To obtain the semen, the urogenital pore was cleaned from mucus, faeces and water and a syringe without needle was used to collect the semen by gently pressing the testes in the fish blind side. Samples contaminated with urine and seawater were discarded. Sperm motility was assessed using the CASA system (ISAS-Integrated System for Semen Analysis, Proiser, Valencia, Spain) coupled to a phase contrast microscope (Nikon E-200, Nikon, Tokio, Japan) with a 10× negative phase contrast objective.

**Results:** All males showed a significant decrease in motility with time and at 60 sec the percentage of motile cells ranged from 4 to 21%. The cluster analysis identified four different clusters (subpopulations). Each subpopulation was characterized by a mean value of the descriptors rendered by CASA. The 1st subpopulation included spermatozoa with high values of VCL, LIN and STR (curvilinear velocity, linearity and straightness) hence they were labeled fast and linear spermatozoa. The 2nd subpopulation included spermatozoa with high values of VCL and low values of LIN and STR: fast non-linear spermatozoa. The 3rd subpopulation included spermatozoa with low values of VCL and high values of LIN and STR: slow linear spermatozoa. The 4th subpopulation included spermatozoa with low values of VCL, LIN and STR, hence slow non-linear spermatozoa.

**Discussion:** These analyses allowed the classification of heterogeneous semen samples into homogeneous subpopulations with spermatozoa showing similar motility characteristics, using the overall CASA data. Beside the large decrease in motility observed in sole sperm after activation (51.18% motile cells at 15 sec to 13.33% at 60 sec), there was an evolution in the motile population pattern (subpopulations) through time. At 15 sec, fast spermatozoa represented 49.73% of the motile population, while at the 60 sec they only represented 7% of the motile population, corresponding to about 1% of the overall sperm population. Additionally, at that time, most of the spermatozoa presented a non-linear path.

**Keywords:** *Solea senagalensis*, *Sparus aurata*, Spermatozoa, Motility
Evaluation of The Effects of Odor Pollution Occurring in Some Entomological Studies

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Introduction: Today, insects are an extremely important place which veterinary medicine, the resolution of criminal cases, in medical wound treatment study. In particular, some of the families of Diptera in this study are located. In this field of study in the most commonly used members such as of the family Calliphoridae, holometaboly metamorphosis passing to developing these insects prefer different types of food at each stage of development. Calliphoridae adults needs organic nutritional for egg and sperm formation. Also for leaving their eggs on carcasses, on raw meat, on fresh stools, they have to feed meat in the laboratory environment. This type of nutrition and reproductive in the laboratory causes intense odor formation.

Material and Methods: Continuity of insect work culture which larval stages of development is provided fed constantly. For this nutrition to the larvae, meat, liver etc. are given. In order to reduce intense odor formed in the laboratory occasion, ventilation system is installed. The chimney of the ventilation system directly conveys the decayed meat smell inside.

Results: This type larval rearing laboratory heavy smell of carrion. This odor emission is created disturbances in public areas and work quality of researchers are affected adversely. Hence this type larval rearing studies does not appropriate in these areas and it work is interrupted. However, ventilation systems are installed to remove the odor consisting environment, but the area where the odor carry out is invading many types of insects and scavengers. This situation leads to problems such as social discomfort and visual pollution. In order to control odor pollution for society and the environment, such laboratories have to be set up away from the social environment. Removing the lab does not solve the problem.

Discussion: Despite all these problems, there is a need for such studies for scientific researches. So, either the type of feeding or the functional ventilation system technique must be changed. But, since we cannot find a better alternative food type in such studies yet, we think that it will be a more effective solution to try to improve the ventilation systems.

Keywords: Odor pollution, Medical entomology, Forensic entomology
Investigation of oxidative response of malonialdehyde levels of *Gammarus pulex*, a non-target organism exposed to dimethoate pesticide

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**Introduction:** Pesticides are all chemical substances and preparations used in agricultural struggle research and applications in order to prevent, control, or reduce harmful organisms. Today, insecticides most commonly used in agricultural, commercial and urban areas are organophosphorus (OP) and carbamate (Cbs). Many of these compounded pesticides have raised concerns about the potential for causing adverse effects on non-target wildlife populations with low persistence in aquatic ecosystems. One of the chemical compounds that are used widely in the agricultural agriculture struggle is dimethoate. In this study, it was aimed to investigate the antioxidant response of *Gammarus pulex*, which is an extraneous organism exposed to the dimethoate pesticide.

**Material and Methods:** *G. pulex* organisms were collected with dip nets from side arms of Munzur River in Tunceli, Turkey. Ten organisms in triplicate iteration were exposed in 1 L glass vessels to concentrations deferent ranging for 96 h. LC50 values has calculated for *G. pulex* specimens after interval determination tests for dimethoate pesticide. Malondialdehyde (MDA) levels measured *G. pulex* exposed to sub lethal concentrations (1/16, 1/8, 1/4) dimethoate pesticide. Control group and sub lethal concentrations during 24th and 96th h were tested. The concentration of MDA of the *G. pulex* organisms’ homogenates was determined by the method of Placer et al (1966) and expressed as nmol/g tissue.

**Results:** According to the study of the oxidative stress response of dimethoate pesticide, the MDA levels were increased when compared to control for 24th and 96th h (p<0.05). As the concentration increased, the MDA level also increased, but the MDA level at the 24th hour increased more than the 96th hour. A decrease in MDA level was observed with respect to the live adaptation of the living individuals over time, but it was higher than the control group (p<0.05).

**Discussion:** In conclusion, the present study demonstrated the abilities of dimethoate pesticide to induce oxidative stress. Findings of the study suggest that MDA level is useful in understanding the biochemical mechanisms of *G. pulex* exposed to dimethoate pesticide as early warning indicators.

**Keywords:** *Gammarus pulex*, dimethoate, malonaldehyde, antioxidant response
The Study of SHE Plant Diversity Analysis of Rangelands with Different Slopes in Aydın Province

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Introduction: One of the most important natural resources, the rangelands, has the rich biodiversity and cheap and quality roughage for livestock. Biodiversity of rangeland ecosystems directly affects plant species diversity and vegetation characteristics, which contributed to ecosystem stability against environmental and biological disturbances. One of the most important environmental effect, the slope, differences in rangeland areas directly affect biodiversity of rangelands. For this reason, in this study, biodiversity comparisons were made by evaluating rangeland areas with different slopes in Aydın with SHE (S = Species richness, H = Shannon-Wiener index, E = equality, balance) analysis from alpha diversity formulas.

Material and Methods: In the province of Aydın, vegetation measurements were made with quadrats of 0.5x0.5 m in 6 rangelands with different slopes. After vegetation measurement, SHE analysis was performed by using alpha diversity formulas. SHE analysis is carried out to see all of the species richness, species diversity and equality expressions together. SHE analysis is a graphical representation of H, E, ln (E) and ln (E) / ln (S), where S = Type richness, H = Shannon-Wiener index, E = equality.

Results: It was determined that the area with the highest species diversity is the area with the lowest slope and the area with no grazing for 3 years. As the slope is increased, the species diversity is shown on the index tables and on the graph, and it can be seen that the other 5 areas species diversity may show differences.

Discussion: According to the obtained results, as the slope increases, it can be shown as the soil slip as a factor to decrease the rangeland diversity, whereas in the areas with less slope, it is considered that the heavy grazing conditions decrease the species diversity. It is thought that the increase in species diversity in the area that has not been grazed for 3 years is caused by the seed bank located in the soil.

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Keywords: SHE analysis, rangeland, slope, alpha diversity
Histology and Morphology of Female Reproductive System of *Tanymecus dilaticollis* Gyllenhal, 1834 (Coleoptera: Curculionidae)

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**Introduction:** The grey corn weevil, *Tanymecus dilaticollis* is an economically important polyphagous pest on maize and sunflower in Eastern and Central Europe. In order to combat *T. dilaticollis* which is economically important insect need to well-know the structure of the reproductive system of this insect. Therefore, in this study, the morphological and histological structures of the female reproductive system of *T. dilaticollis* were described.

**Material and Methods:** Adult weevils were collected from maize plants in fields from Sakarya, in June-July 2017. The females were killed with ethyl acetate fumes and dissected in 70% ethyl alcohol under a stereo microscope. The gross morphology of the reproductive systems of the females were examined and photographed with a Leica EZ4D stereomicroscope. For the histological analysis, the reproductive systems of ten females were fixed in Formaldehit for 24 h. and washed, dehydrated in a grade series of ethanol solutions and finally embedded in paraffin. Sections were stained with Mallory’s Triple Stain and Hematoxylin-Eosin and photographed by using Olympus BX51 microscope. For SEM, samples were cleaned and dried with Hexamethyldisilazane (HMDS) and coated with gold in a Polaron SC 502 sputter coater, then examined with JEOL JSM 6060 LV SEM.

**Results:** The female reproductive system of *T. dilaticollis* has two ovaries, two lateral oviducts, a common oviduct, a spermatheca and a pair of accessory glands. Each ovary is composed of a pair of telotrophic ovarioles. Each ovariole is divided into four regions: the terminal filament, the germarium, the vitellarium and pedicel which is connected to a lateral oviduct. The terminal filament extends anteriorly from the each ovariole. The germarium has trophocytes (nurse cells). Germarium region is followed by vitellarium region. The vitellarium contains a lot of different developmental zones: previtellogenesis, vitellogenesis and choriogenesis. Each ovarian follicle possesses numerous yolk spheres and lipid droplets contains an oocyte enveloped by the follicular epithelium cells. Mature oocytes pass through the pedicel, to the lateral oviduct. The lateral oviduct of each ovary linked to a common oviduct. The oviducts contain a single internal layer of epithelial cells and external layer of muscle fibers. Each female generally laid a lot of fertilized eggs. The eggs were light brown color at deposition but changed to dark brown after embryonic development.

**Discussion:** This study contribute to the knowledge of the female reproductive biology of other Curculionidae.

**Keywords:** Grey corn weevil, ovary, telotrophic ovariole, light microscope, SEM.
Effect of Skiffing at Different Times on Harvest Date and Yield in Tea (*Camelia sinensis*)

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Introduction: During the development season of the tea plant, the abundance of rain and the temperature must be enough for the shoots to form continuously. Otherwise, there will not be enough shoot growth and therefore the amount of product will decrease considerably. With the healthy growth of the tea plant, the ecological conditions are very important for obtaining quality and abundant crops. Cultural practices must be made in time to give tea plants abundant and good quality products. The most important factors affecting yield and quality are pruning, fertilization, and plant age, and climate, soil, harvesting in time and processing of harvested crop within the shortest time.

Pruning is one of the cultural practices was made to controls growth and stimulates new growth, develop a sturdy framework. Lighter forms of cuts given to the tea plants in between two consecutive prune years are called skiffing. Introduction of skiffing has eliminated the necessity of light pruning every year. Skiffing may allow excess product load at tea factories in May to shift to other harvesting periods. This study was carried out to determine the effect of skiffing at different times on tea harvest date and yield.

Material and Methods: This study was carried out at a farmer orchard in Of district (Trabzon province of Turkey) in 2015 and 2016 years. Experiment was set up out in completely randomized design with one factor and three replications. In the tea bushes, skiffing applications were made from 10 cm below the harvesting table in 8 different dates as 15 December, 1 January, 15 January, 1 February, 15 February, 1 March, 15 March and 1 April by pruning shears. Tea leaves were harvested and weighed in all applications and every 3 harvesting periods to determine the yield.

Results: The results showed that the harvest dates was affected by skiffing applications. In the harvest dates, it was determined that 33 days delay compared to the control during the first harvest period, 22 days in the second harvest period and 20 days in the third harvest period. In tea bushes where skiffing is applied and in all harvesting periods, yield was low compared to control.

Discussion: Findings related to the effect of skiffing on harvest date and yield in our study are in harmony with the results of previous studies. As a result, after this study which is a preliminary study on skiffing, it is beneficial to determine the changes of the criteria examined on a yearly basis and to expand and maintain the subject.

Acknowledgement: This is a part of Master Thesis. The authors would like to thank to the Ordu University Research Department (ODUBAP) for its financial support (project TF-1613).

Keywords: *Camelia sinensis*, Tea, Skiffing, Harvest Date, Yield
Variation of Mineral Matter Contents According to Sunshine Conditions and Shooting Periods in Fresh Tea (Camelia sinensis L.) Leaf

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Introduction: Our tea orchards that dominated by Chinese varieties are made up of a large number of genotypes with significant differences in terms of traits such as morphology, quality, vegetative, generative and adaptation to ecological conditions. The most important factors affecting the growth of tea plants are climate and soil. It is sometimes harmful for bright solar ray to come directly to the tea plant. It is more beneficial for the solar rays to be intermittently scattered among the clouds after a continuous rainfall. This situation is considered important because of its positive effect on the quality of tea. Negative effects can also be seen when the shade cannot be applied to tea plants with important effects. Mineral matters are also important for physiological, chemical and biochemical functions in plants as well as in the growth of tea plants. Mineral substances show an increase or decrease depending on the season, the age of the tea plant, the position of the leaf, the vegetative and cultural factors such as fertilizer, pruning and climatic factors. In our country, there is not any study conducted on the effect or need of shade in tea. This study was carried out to determine the changing of mineral matter contents according to sunshine condition and shooting period in fresh tea leaves (Camelia sinensis L.).

Material and Methods: The study was carried out in 2015 in the village of Ortaköy, Güneysu district of Rize province, Turkey. The PAR (active radiation in photosynthesis) values of the orchards were determined to determine the sunshine conditions of the orchards. In 2015, mineral matter analyzes (copper, manganese, iron, zinc, calcium, magnesium, aluminum, sulfur) were made on leaf samples taken during the 3 harvest periods from May to September. This study was planned at three tea orchards which sunny during the day (SDD, 100 % PAR), sunny half-day (SHD, 66 % PAR) and shady (SH, 41 % PAR), and at three harvest periods. Experiment was set up out in randomized blocks design with three replications.

Results: As a result of the analysis of variance, it was determined that the Al content was significant for the orchards; Ca and Mg were significant for harvest periods; Cu, S and Zn were significant for the orchards and harvest periods; Fe and Mn were significant for the orchards, harvest periods and the orchards*harvest periods interaction.

Discussion: The maximum values in fresh tea leaves were determined, respectively in the SDD, SH and SHD orchards for Al; in the third, second and first harvest periods for Ca; in the first, second and third harvest periods for Mg; in the SDD, SH and SHD orchards, and in the third, first and second harvest periods for Cu; in the SDD, SHD and SH orchards, and in the second, third and first harvest periods for S and Zn; in the SDD orchard*first harvest period, SHD orchard*third harvest period interactions for Fe; and in the SDD orchard*first harvest period, SDD orchard*third harvest period interactions for Mn. According to these results, it can be said that the content of mineral matter in fresh tea leaf may change according to the sunshine conditions of the orchards and harvesting periods.

Acknowledgement: This is a part of Master Thesis. The authors would like to thank to the Ordu University Research Department (ODUBAP) for its financial support (project TF-1518).

Keywords: Camelia sinensis, PAR, Sunshine, Mineral matter, Tea leaf
Introduction: Garlic is one of the most important agriculture crops because it is specially tolerant against climate conditions at production stage. It is suitable for export because it’s head parts are big and high quality and it characterize to area as “Taşköprü garlic”. Weeds; is a plant that reduces the yield and quality of cultivated plants, prevents the cultural processes from being carried out on time and in desired activity, affects human and animal health negatively by mixing poisonous seeds into the crop, and hosts disease and harmful host. On the other hand, weeds are especially mite species to become a shelter and reservoir plant. Pests and diseases are playing an important role in the garlic production, depending on these effects crop losses may up to 50% from 10%. This loss sometimes reaches 100% depending on crop plants, species and density of the pest. Mites causes largely the product and yield loss.

Material and Methods: This study was realized with the weekly sampling were made on garlic cultivation areas in Taşköprü, Hanönü and Central Districts of Kastamonu Province in 2015-2016. The samplings were made from March to July. The samples were taken from Cirsium arvense (L.) (Plantae: Dicotyledonae), Sinapis arvensis (L.) (Plantae: Brassicaceae), Convolsulus arvensis (L.) (Plantae: Convolvulaceae), Medicago sativa (L.) (Plantae: Fabaceae), Vicia sativum (L.) (Plantae: Fabaceae), Agropyrum repons (L.) and Lolium rigidum (Gaud.) (Plantae: Gramineae).

Results and Discussions: In this study, 2 species from Acaridae and 1 species from Tetranychidae totally 3 plant parasitic mite were determined. So Turkish fauna of plant parasitic mites on weed plant in garlic cultivation areas were put forth first time. The density of the harmfull mite species that were identified were given on family and genus level according to localities.

Acknowledgement: We would like to express our appreciation to the TUBİTAK TOVAG, which supported this study (Projet No: 114O416). We would like thanks to Maka MURVANİDZE from Georgia Agriculture University who identified to Oribatid mites.

Keywords: Plant parasitic mites, Acari, Weed, Garlic, Kastamonu
Retinol-Induced Aging in Female and Male Populations of Drosophila melanogaster Oregon R (wild-type)

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Introduction: Secondary metabolites are bioactive compounds produced by various plants. Terpenes are also secondary metabolites. Retinol, one of them, is a vitamin A derivative. However, this substance can cause vitamin A poisoning, especially if taken for a long time from animal foods that can not be easily thrown from the body. Does retinol affect the longevity in organisms from a different perspective? In this study, the Oregon R wild strain of Drosophila melanogaster was used. In vivo, acute and chronic retinol was applied to male and female populations of this strain, and possible longevity changes were investigated.

Material and Method: Two separate test sets have been prepared for our studies. One of these is the experimental groups containing different doses of retinol (50, 100, 200, 400 ppm) and the other is the DMSO control group which is the solvent of retinol, and distilled water control group. In acute application, individuals who were left starve for about four hours were exposed to different doses of retinol only once. The chronic experimental groups were also maintained in different doses of retinol+SDM. The same old (72±4 hours) 100♂ and 100♀ were used for all groups. This application was continued until the last individual died. Our experiments were repeated three times and ANOVA was used for statistical.

Result and Discussion: According to the obtained data, mean lifespan for the ♀ population was 49.16±1.99 and 48.85±1.95 days in distilled water control and DMSO control groups, respectively. In this population, the average life span for the lowestand highest (50-400 ppm) acute retinol application groups was 48.24±1.61 and 41.62±1.46, respectively; in chronic retinol application 46.23±1.35 and 29.31±1.00 days. The difference between DMSO control group and experimental groups is significant. The mean lifespan in the ♂ population was found to be 48.48±2.24, 48.32±2.22 days in distilled water control and DMSO control group. The difference between the control groups for the ♂ population is statistically insignificant at P>0.05. The lowest and highest (50-400 ppm) acute application values in the ♂ population decreased from 46.66±1.46 to 34.72±1.26 and chronic application values also decreased from 41.85±1.20 to 26.79±1.20 (P<0.05). Negative correlation values were also calculated for the reduction in longevity due to dose increase in both trial groups. These values were found to be R=-0.459 for ♀♀, R=-0.447 for ♂♂ in acute application group and R=-0.718 for ♀♂, R=-0.698 for ♂♂ in chronic application group. Retinol accumulation at the cellular level probably increased the total oxidant level. This can cause the aging of the population.

Keywords: Drosophila melanogaster, retinol, aging, dose-time effect
Mechanical Soil Cohesion Measurements with Fluidized Bed Approach

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Introduction: Soil cohesion is a measure of the external forces necessary to separate soil particles and aggregates, hence it is an indicator of the inherent soil strength against erosive forces. However, it is thought as one of the most important deficiencies of process based water erosion assessments. Within the scope of the study, it was aimed to determine the mechanical soil cohesion values for two different soils with a fluidized bed approach, investigate the effects of changes in organic matter on aggregate strength and measured cohesion values.

Material and Methods: Mechanical soil cohesion measurements were performed in two similarly textured soils (Palouse and Nansene) with a fluidized bed approach in order to investigate the variations and soil cohesion under saturation condition. The soils used in this study was sampled from two WEPP cropland erosion sites located at the ARS Research Station in Whitman and Franklin County, Washington, USA. This approach is based on the principle of applying a gradually increased hydrostatic pressure at the bottom of a soil mass until the point when the soil mass fluidizes, i.e., the upward fluid stress on the soil particles or aggregates overcomes the weight of the soil and cohesion that holds the particle/aggregate together.

Results: Obtained results showed that Palouse soil has a cohesion value about 5.5 times higher than the Nansene soil. This difference may be attributed to the difference in soil organic carbon as the Palouse soil is much higher (3.91%) than the Nansene soil (1.93%), although these two soils have very similar textural composition.

Discussion: Soil organic matter content affects the long term trends of macro aggregate formation and surface hydrologic conditions, and these play significant roles in soil erodibility and mechanical soil cohesion; their effects on soil physical properties should be studied in more detail.

Keywords: Mechanical soil cohesion, fluidized bed approach, soil erosion, aggregate stability, soil organic matter
Evaluation of Lignocellulosic Waste in Wood Composite Production

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Introduction: Rapid urbanization and population growth experienced in parallel with technological developments and industrialization are increasing the pressure on the environment of human activities all over the world. The increase in production and marketing activities has led to more intensive use of natural resources. In parallel with the rapidly increasing world population, the demand for natural and synthetic products is increasing day by day, and with this increase consumption and the amount of waste generated increases. The environmental policies of countries have become a necessity for limiting the harmful effects of the wastes generated in the environment. In this context, we can classify the wastes generated in the environment as liquid, solid, dangerous and recyclable wastes. Solid wastes are examined in two main groups according to their sources and compositions. The forest industry and agricultural wastes subject to this study will be examined in this section. This study will examine the potential of lignocellulosic waste to be evaluated in wood composite production.

Results: Despite the vast forest resources, Turkey is an agricultural country. Agriculture is still being carried out in many places, including Cukurova and Southeastern Anatolia. There is a great interest in evaluating the agricultural wastes buried in the soil in different forms. Basically, forest industry and agricultural residues are being produced in very large amount each year around the world. However, an only minor portion of these generated waste materials is used in the form of fodder, household fuel, etc. The rest of the residue is either discarded or burned, which eventually causes air pollution. Therefore, the best alternative to this problem is to reuse residues for the preparation of composites.

Discussion: Wood composites can be defined as materials made by gluing together small pieces of wood, residue materials from wood processing operations, or other elements into larger materials to produce products with specific definable mechanical and physical properties. Wood composites such as particleboard, fiberboard, OSB (Oriented Strand Board) and WPC (Wood Plastic Composites) are high-value products with very high demand in material industries for numerous potential applications. Varieties of composite materials can be derived from cellulose/lignocellulose derived from forest industry and agricultural residue which is no doubt excellent candidate for the safe and green future. In many studies, the physical, mechanical and thermal properties of the wood composites either is high or remains similar.

Keywords: Forest Industry, Agricultural Wastes, Composites, Wood
**Hydnobolites, A New Genus Record for Turkish Pezizaceae**

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Introduction: *Hydnobolites* Tul. & C.Tul. is a genus of the family Pezizaceae. Fungi within this genus are generally characterized by hypogeous, subglobose and generally lobed or cerebriform ascocarp; pseudoparenchymatous cortex; opening generally between folds of ascocarp surface; ellipsoid to pyriform, 8-spored and irregularly arranged asci, and globose, alveolate and irregularly arranged ascospores. Currently existing species of the family belong to the genera, *Adelphella* Pfister, Matočec & I.Kušan, *Iodophanus* Korf, *Marcelleina* Brumm., Korf & Rifai, *Pachyella* Boud., *Peziza* Dill. ex Fr., *Plicaria* Fuckel, *Sarcosphaera* Auersw., *Terfezia* (Tul. & C.Tul.) Tul. & C.Tul. and *Tirmania* Chatin. According to the current checklists and recently published any member of the genus *Hydnobolites* have previously been recorded from Turkey. The work aims to contribute to the mycobiota of Turkey.

Materials and Method: *Hydnobolites* specimens were collected within the boundaries of Trabzon and Rize provinces. Routine mycological techniques were followed for the identification of the species. The specimens are preserved in the fungarium of Karamanoğlu Mehmetbey University, Science Faculty, Department of Biology.

Results: The collected *Hydnobolites* specimens were identified as *Hydnobolites cerebriformis* Tul. & C.Tul., which has a hypogeous, globose to irregularly lobed or cerebriform ascomata of 6-30 mm in diameter.

Discussion: *Hydnobolites cerebriformis* Tul. & C.Tul. is reported as the first member of the genus to exist in Turkey. Except the size of some of the samples, all the morphological characteristics of the determined specimens are generally in agreement with the literature. Though Knapp, Cherry, Pegler et al. and Vidal reported the maximum size of ascocarps as 10, 12, 13 and 10 mm, respectively, some of our samples reached almost to 30 mm.

Acknowledgement: We would like to express our appreciation to the Karamanoğlu Mehmetbey University Scientific Research Project Commission, which supported this study (02-D-17).

Keywords: Biodiversity, hypogeous ascomycete, new records, Turkey
Introduction: Mites living in the soil, contribute to the degradation of organic matter, to humus synthesis, to the preservation of biological elements, to the stimulation of fungal and bacterial metabolism, and to the biological efficiency of soil. Mites are one of the richest invertebrate groups in terms of both species and number of individuals in forest and soil ecosystems. Order Gamasida is an important group in Turkish mite fauna and contain numerous mite species. This study aims to determine the gamasid mites spread in the region Honaz district, Turkey and thus contribute to the world mite fauna.

Materials and Methods: The main material of this study, made between November 2014 and October 2015, is the litter and soil sample collected from the Honaz district and its surroundings. Samples with mites were placed into plastic bags, labelled and transferred to the laboratory. Samples were placed into combined Berlese funnels, and mites were extracted for 5–7 days according to their humidity. Mites were separated under a stereo-microscope (Nikon SMZ745T). They were placed in 60% lactic acid for clearing and mounted onto permanent microscope slides using a glycerin medium. The examination of mites were done using an Olympus CX41 microscope with DP25 camera and were photographed. Then, the samples were put in stock bottles containing 70 % alcohol and 1-3 drops glycine and labelled.

Results: After the examinations, 24 gamasid mite species which belonging to 9 different families were identified. Identification of detected gamasid mites has been tried at species level. Specimens that can not be diagnosed are given at the genus level. Examination of the detected species was carried out on a light microscope, the definitions were reviewed, photographs were taken, and the distributions in the world were given according to the literature.

Discussion: In this study, the gamasid mites fauna of the Honaz region were determined. Gamasid mites are closely related to the vegetation of the surrounding area. The litter on the forest floor is a very suitable habitat for gamasid mites. On this basis of the collected specimens, the descriptions of 24 species have been given and their geographic distribution have been discussed.

Keywords: Acari, Gamasid mites, Honaz, Denizli, Turkey
Comparison of Methods Used in Slaughterhouse Wastewater Treatment: A Review

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Introduction: Water and wastewater treatment has become very important, especially in developing countries, due to the increase in freshwater pollution resulting from the fact that the wastewater which is drained to the aquatic environment has not been sufficiently treated. In addition, the decrease in freshwater resources has enabled the development of concepts of recycling and reuse in wastewater treatment. The meat packing industry is one of the largest consumers of the total clean water that is used in the agricultural and livestock industry worldwide. Meat packing plants produce large amounts of slaughterhouse wastewater during slaughtering and cleaning of facilities. Slaughterhouse wastewaters are classified as one of the most harmful wastewater for the environment by the American Environmental Protection Agency (EPA). These wastewaters which contain high concentrations of organic matter, floated solids, oil and grease, nitrogen and phosphate must be purified to ensure sustainable and safe discharge to the environment. For this reason, the treatment and final disposal of slaughterhouse wastewater is necessary in terms of public health.

Material and Methods: The studies in the literature which were done by using different processes for the treatment of slaughterhouse wastewater were compared and the performance of the treatments was evaluated in this study.

Results: Physicochemical methods (coagulation-flocculation, precipitation, dissolved air flotation, electrocoagulation and membrane processes), advanced oxidation processes (gamma radiation, ozonation, ultrasound technology, UV/H2O2, UV/O3 and photocatalysis) and biological treatment (aerobic or anaerobic treatment, artificial wetlands) can be used for slaughterhouse wastewater treatment. However, each treatment process has different advantages and disadvantages depending on the characteristics of the wastewater, the best available technology and regulations.

Discussion: Slaughterhouse wastewaters are generally pre-treated using settling, blood collection systems, screening, and fat separation, followed by physicochemical treatment methods, such as coagulation/flocculation, dissolved air flotation, and/or secondary biological treatment. Although the nutrient and organic removal can provide high yield, the treated slaughterhouse wastewater effluent usually need further treatment by membrane technologies, advanced oxidation processes, or other suitable treatment methods as combined processes. Advanced oxidation processes may also provide high-quality treated water allowing water recycle in the meat processing industry. Therefore, combined processes have evolved into a reliable technology that is recently successfully used for many types of slaughterhouse wastewater effluents. However, the selection of a specific treatment mainly depends on the characteristics of the slaughterhouse wastewater being treated, the best available technology, and the compliance with current regulations.

Keywords: Slaughterhouse wastewater, physicochemical treatment, advanced oxidation process, biological treatment.
Lipopolysaccharide Toxicity on DNA Damage in Blood of Rats

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Introduction: Lipopolysaccharide (LPS) has harmful effects on organisms at certain concentrations. Many studies have shown the harmful effects of LPS on animals. LPS is a molecule isolated from E. coli bacteria and is an important outer membrane component of Gram-negative bacteria. Animal blood cells are an experimental subject in many studies and are suitable for genotoxic studies. The aim of this study is to determine the genotoxic effect that occurs in the cells of rats exposed to LPS by comet assay.

Material and Methods: Six healthy male rats (280-340 gr) were selected and given a certain dose (10 mg / kg b.w.) of LPS by gavage. After waiting for 6 hours, the animals were euthanized and blood samples were taken. The blood samples were tested according to comet assay and the resulting preparations were examined under fluorescent microscope. Permission for the study was taken from Erciyes University’s Animal Experiments Local Ethics Committee (16/133).

Results: In this study, the toxic effects of LPS given to rats were determined. As a result of the study, genotoxic effects were observed in LPS-treated individuals by comparing with the control group. The significance was calculated using a one-way analysis of variance (ANOVA) followed by the Tukey multiple comparison procedure. A value of p < 0.05 was considered statistically significant.

Discussion: LPS is a dangerous substance for living organisms and causes genotoxicity by considering duration and amount of exposure. LPS is a harmful molecule and damaging has been proven in experiments on many animals. This study contributes to the literature to prove the genotoxic effect of LPS. This study clearly demonstrates a statistically significant increase in the DNA damage induced by LPS. According to our study results have implications for man in terms of risk assessment and such damaging effects to germ cells need more detailed studies in view of the use of LPS.

Keywords: LPS, Comey Assay, Rats, Blood, E.coli
Introduction: Increasing electric energy demand due to increases in population and industrial development, especially in developing countries, is met by the burning of fossil fuels such as coal. Lignite coal contains naturally occurring primordial radionuclides, including uranium ($^{238}$U), thorium ($^{232}$Th), their decay products and the radioactive isotope of potassium $^{40}$K and also heavy metals. During lignite burning, huge amounts of fly ash, bottom ash and slag are produced as by-products, which also contain the natural radionuclides mentioned above. Ionising radiation such as alpha, beta, and gamma rays emitted from the natural radionuclides in fly ash and slag may lead to radiological exposure of workers and the local population via two pathways: external exposure, internal exposure due to inhalation or ingestion of fly ash particles. The detailed data relating to the radiotoxic and heavy metal characteristics of coal, slag and fly ash samples collected from the Kangal lignite-burning power plant have not appeared in the literature. In this study, the radiotoxic elements and heavy metal concentrations of coal, slag and fly ash samples collected from Kangal lignite-burning power plant area were determined using an energy dispersive X-ray fluorescence (EDXRF) spectrometer.

Materials and methods: For elemental analysis, 5 lignite coal samples, 10 coal slag samples and 10 ash samples were collected from the Kangal lignite basin, the Kangal lignite-burning power plants and the open ash deposit, respectively. The samples were brought to the laboratory and coded. Each of the samples was pulverised using a grinder; then the samples were dried. The samples were transferred to plastic containers. The radiotoxic elements and heavy metals concentrations in the samples were determined using EDXRF spectroscopy (Spectro Xepos, Ametek).

Results and discussion: Radiotoxic elements and heavy metals are found in the environment in many forms including as an oxide, organic or inorganic complex, and rarely as a free metallic ion. The toxicity of radiotoxic elements is closely related to its mobility. Such as, the most soluble of the uranium species are associated with acute toxicity in organisms. Although absorption of some soluble compounds through the skin is possible, uptake through the skin is normally superseded by either surface damage due to exposure or accumulation to toxic levels through other routes of entry such as inhalation and ingestion.

Acknowledgement: We would like to express our appreciation to the Kastamonu University Central Research Laboratory.

Keywords: Lignite coal, Radiotoxic elements, Heavy metals, Sivas
**Visual Landscape Quality Assessment of Amisos Hill, Samsun-Turkey**

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**Introduction:** The planning of historical sites in the framework of conservation and utilization balance is a very sensitive issue. According to current approaches, the visual quality of the space has a very important place in the space preferences. In this context, the purpose of study is to determine the visual quality and preference of use of the historical settlement area reflecting the traces of different archaeological periods.

**Material and Methods:** Amisos Hill located in the study area Samsun, also known as Baruthane Hill, was declared as a protected area on November 28, 1995. A photo survey study was conducted in order to evaluate the visual quality in this area. In the evaluation of visual quality, a survey of Likert scale with 5 options (strongly agree, agree, neutral, disagree and strongly disagree) was applied using pairs of adjectives such as interesting, refreshing, peaceful, moving, intimate / warm, colorful / vivid, pleasant, spacious / wide.

**Results:** 50.9% of the respondents are male, 49.1% are male. 36.4% of the participants visited the area several times a month, 27.3% several times a year, 20% several times a year and 16.4% a few times a week. The majority of visitors to the site (27.3%) involved that the study area is perceived clearly, easy to access. They also think that it has a variety of living and non-living materials the presence of navigational points the clear perception of the scenic spots, the visual effect of the walking paths in the area and the perception of historical time layers. Water item is found to be low in terms of visual quality.

**Discussion:** When you look at the results of the study, Amisos Hill offers many activities such as resting, hiking and sightseeing. Scenic spots in the field, surrounded by trees, walking paths and recreational areas intertwined with nature positively affect visual quality. In addition, the hill in the area and the Tumulus graves reflect the identity of the city and positively affect the visual quality of the city. However, the visual landscape quality of the water element in the field needs to be raised. Cultural heritage sites are expected to have a positive impact in terms of conservation work and tourism planning by increasing the visual landscape quality.

**Keywords:** Visual Landscape Quality, Amisos Hill, Samsun
Introduction: Slaughterhouse wastewaters (SWW) are classified as one of the most detrimental industrial wastewaters to the environment by the United States Environmental Protection Agency (US EPA) because the inadequate disposal of SWW is one of the reasons for river deoxygenation and groundwater pollution. Thus, SWWs require significant treatment for a safe and sustainable release to the environment, and the treatment and disposal of wastewater from slaughterhouses are an economic and public health necessity. Lipid peroxidation and antioxidant defense mechanism have been successfully used as oxidative stress biomarkers in environmental studies and used in the assessment of effects of pollutants in aquatic environments. Crustaceans are often used as bioindicators in many aquatic ecosystems. With their abundance in freshwater, their high ecological relevance, and their crucial role in the food chain, amphipods of the genus *Gammarus* are often employed in ecotoxicological studies. Electrochemical coagulation is an easy and effective method. It is the electrochemical production of destabilization agents that brings about charge neutralization for pollutant removal, and it has been utilized for wastewater treatment. The aim of the study is to evaluate the efficiency of electrocoagulation process for treatment of slaughterhouse wastewater by using biochemical biomarkers in *G. pulex*.

Material and Methods: Some physiochemical parameters were measured in untreated and treated slaughterhouse wastewater by electrocoagulation process using aluminium electrode. Five experimental groups was designed; Tap water, untreated 1/10 diluted SWW, untreated 1/20 diluted SWW, treated 1/10 diluted SWW, treated 1/20 diluted SWW. Malondialdehyde (MDA) levels in *Gammarus pulex* exposed to the all experimental groups (n=50) during 24 and 96 h were tested by using ELISA method. One-way ANOVA and the Duncan multiple range test were used to determine the statistical differences in parameters among the experimental groups.

Results: MDA levels generally were increased in untreated group compared to control and treated groups (p<0.05). The highest MDA levels were measured as 36.55 nmol/g tissue in untreated 1/20 diluted group. The lowest MDA level was determined as 6.26 nmol/g tissue in treated 1/20 diluted group.

Discussion: The result of this study demonstrated the abilities of electrocoagulation process to eliminate pollutants caused the lipid peroxidations in slaughterhouse wastewater. The results also revealed that MDA levels are useful biomarkers to determine treatment efficiency of electrocoagulation process.

Keywords: MDA levels, *Gammarus pulex*, Electrocoagulation process
Enzymatic Decolorization of Textile Dyes by Laccase from Bacillus subtilis

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Introduction: Laccases (p-benzenediol: oxygen oxidoreductase EC 1.10.3.2) are the members of multi-copper protein family, dependent to the group of blue-copper proteins, and are broad divided among plants, fungi, and bacteria. These enzymes have the broad of organic and inorganic substrate range and especially they are used in many industrial and biotechnological applications such as bioremediation, decolorization of synthetic dyes and biosensors. The aim of this study is to investigate the ability of laccase to decolorization of textile dyes.

Material and Methods: In present study, the recombinant laccase was trialed for its ability in decolorization of synthetic dyes. In this research, the laccase gene was cloned from Bacillus subtilis isolated from petroleum contaminated soils. Bacillus subtilis was grown in Luria- Bertani medium at 37°C and its genomic DNA for PCR reaction and cloning was isolated and PCR was perform using specific primers to amplify the gene of 850 bp encoding Laccase. The product of PCR was transformed in expression host cell (E.coli BL21DE3) after ligation in to appropriate expression vector (pET22 b). Dye decolorization experiment was conducted using four dyes, Reactive Red 123, Remazol brilliant blue R, Remazol violet 5R and Remazol brilliant orange 3R. The reaction mixture contained 0.1 M citrate phosphate buffer (pH 6.0), dye (25 ppm), purified laccase (100 U) and the CuSO4 (0.1 mM). The reaction incubated at 50 °C under mild shaking conditions for 6 hours. The control samples were run in parallel without the addition of laccase. After 6 hours of incubation at 50 °C in the test tubes, significant differences were observed.

Results: The FT-IR spectra of Reactive dye 123 control dye display peaks at 3338.52, 2109.43, 1635.01 and 590.87 cm⁻¹. Compared to the control dyes spectrum the FT-IR spectrum of metabolites showed a significant change in the positions of peaks. The above mentioned peaks at 3339.18, 2108.26, 1634.10, 1533.80, 1470.90, 1064.48 and 591.28 cm⁻¹, respectively. For Remazol brilliant blue R control dye display peaks at 3338.69, 2109.93, 1637.97 and 587.15 cm⁻¹. Compared to the control dyes spectrum the FT-IR spectrum of metabolites showed a significant change in the positions of peaks. The above mentioned peaks at 3339.70, 2107.11, 1634.03, 1533.80, 1473, 1064.74 and 595.10 cm⁻¹, respectively. The FT-IR spectra of Remazol brilliant orange 3R. Control dye display peaks at 3338.63, 2108.50, 1634.99 and 595.77 cm⁻¹. Compared to the control dyes spectrum the FT-IR spectrum of metabolites showed a significant change in the positions of peaks. The above mentioned peaks at 3339.60, 2107.13, 1634.13, 1527.3, 1468.8, 1064.24 and 583.71 cm⁻¹, respectively. The FT-IR spectra of Remazol violet 5R control dye display peaks at 3338.60, 2119.35, 1637.98 and 599.12 cm⁻¹. Compared to the control dyes spectrum the FT-IR spectrum of metabolites showed a significant change in the positions of peaks. The above mentioned peaks at 3339.49, 2108.23, 1634.19, 1533.6, 1470.90, 1064.69 and 595.59 cm⁻¹, respectively.

Discussion: The results of this study showed that recombinant laccase could be used for decolorization of textile dyes.

Acknowledgement: The authors thank Pamukkale University, Scientific Research Project Funding (PAÜBAP) for their financial support [Project number: 2016FEBE043].

Keywords: Bacillus subtilis, decolorization, recombinant laccase, textile dyes.
Effect Of Temperature on Brilliant Green Removal from Aqueous Solutions Using Poly(1-vinyl-2-pyrrolidone-co-acrylonitrile)/Zeolite Composite Polymer

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Introduction: Synthetic dyes are widely used in industries like textile, pulp and paper, paints, carpet and printing. These dyes are major contaminants which cause damages to the human health, aquatic life and food chain as it has carcinogenic, allergenic and mutagenic effects. For this reason, it must be treated before being discharged to the environment of such a toxic wastewater. In this study, the adsorption of brilliant green that is one of the commonly known cationic dye was investigated by using poly(1-vinyl-2-pyrrolidone-co-acrylonitrile)/zeolite (poly(VP-co-An)/zeolite) polymer composite.

Material and Methods: Batch adsorption experiments were carried out to removal toxic brilliant green from aqueous medium using poly(VP-co-An)/zeolite as an adsorbent. The experiments were performed by stirring 0.2 g of adsorbent with 50 mL brilliant green dye solution in different concentrations (25-100 mg/L). To examine the effect of temperature on the adsorption capacity, experiments were also carried out at different temperatures (20 °C, 30 °C and 40 °C).

Results: The temperature has important effect on the adsorption process. It is known, that increasing the temperature affects the rate of diffusion of the dye molecules across the external boundary layer and in the internal pores of the adsorbent particles. According to the results, the adsorption capacity was increased with increasing temperature. This indicates that the adsorption process is an endothermic nature.

Discussion: Results showed that brilliant green can be effectively removed from aqueous solution using poly(VP-co-An)/zeolite as a adsorbent.

Keywords: Brilliant green, poly(1-vinyl-2-pyrrolidone-co-acrylonitrile)/zeolite, composite polymer, adsorption.
A New Locality Record of Emitrombidium giocondi (Acarı: Trombidiidae) from Turkey

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Introduction: The genus of Emitrombidium Lombardini, 1949, which is located in the Trombidiidae family, is composed of 2 species and these two species are known only from postlarvae stage. In this study, we aimed to contribute to distribution of the species and Turkish acar fauna. This is the second report of the species by now.

Material and Methods: The mite specimens were collected from Çanakkale Province, Turkey by pitfall traps (leg. M. Elverici). The material was preserved in 70% ethyl alcohol and then fixed on slides in Hoyer’s medium. For measurements and drawings, a Leica DM 4000 microscope with phase contrast was used. Examined specimens were deposited in the Biology Department of Erzincan Binalı Yıldırım University, Turkey.

Results: This is the second report of the species from Turkey. 17 postlarval specimens are examined. This species only known from postlarval forms. Since there is no other record on the world so far, this genus should be regarded as extremely rare.

Discussion: The genus Emitrombidium was erected firstly by Lombardini, 1949, based on a single female collected in the botanical garden in Roma. Later, as the second species of this genus, Emitrombidium giocondi, is given by Makol and Sevsay in 2014. The type locality IS Turkey. This species is known from only Muğla province of Turkey. The general appearance of the newly found samples is similar to the Muğla samples collected earlier. It was understood that Aegean region is rich for Emitrombidium mite.

Keywords: Biodiversity, Parasitengona, Emitrombidium, Turkey
Urban Air Pollution Study in Baku (Azerbaijan) Using Moss Bags with NAA and AAS Analytical Techniques

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Introduction: The present research was conducted to assess the air pollution in Baku. Baku characterizes with intensely transportations, construction of buildings, and oil and gas industries that associate to it human health hazard and the natural releasing from active volcano.

Material and Methods: For the first time, moss bags technique (Sphagnum girgensohnii) as an active biomonitor was implemented to (in bags) characterize the different sources of air pollution in Baku. Moss bags were exposed at twenty-one urban sites for 3 and 6 months starting from December 2016, respectively. The concentration of elements was determined by means of two complementary analytical techniques were used: neutron activation analysis (NAA) and atomic absorption spectrometry (AAS).

Results: A total of 38 elements were determined namely; Na, Mg, Al, Cl, K, Ca, Sc, Ti, V, Cr, Mn, Ni, Cu, Co, Fe, Zn, As, Se, Br, Sr, Cd, Rb, Mo, Sb, I, Ba, Cs, La, Ce, Sm, Tb, Hf, Ta, W, Au, Pb, Th and U. Out of 38 elements 3 elements were determined by using AAS namely; Cd, Cu, and Pb. Descriptive statistics, and principal component analysis were calculated. Spatial and temporal distribution of selected elements were constructed by using ArcGIS.

Discussion: Elevated concentrations of Mg, Fe, Ni, and Sb are observed to be higher in case of 6 (December-May) months exposure than 3 months exposure duration during the period.

Keywords: urban population, Sphagnum girgensohnii, moss bags, neutron activation analysis
Introduction: Exopolymeric substance (EPS) is synthesized by many gram positive or gram negative bacteria. It envelopes the bacterium as a protective covering and protects. Various conditions such as bacterial growth phase, carbon sources, culture conditions, nutrient composition, pH and temperature affected on EPS production. In present study, the production of EPS by thermophilic Bacillus licheniformis B18 was investigated and it was characterized.

Material and methods: exopolysaccharide production of Bacillus licheniformis B18 isolated from Pamukkale thermal region was optimized. Tryptic soy broth (TSB), Luria Bertani (LB) and Nutrient broth (NB), different incubation times (24-108 h) and different temperature (40 and 45°C) were investigated. Total carbohydrate, uronic acid and protein content of pure EPS were determined and also morphology of EPS was analysed by SEM.

Results: The best EPS amount was achieved LB medium (152.63 mg/L and 108 h). The highest EPS production was observed at 40°C. It also contained 392.30 mg protein/g EPS and 47.58 mg uronic acid/g EPS. The SEM analysis was shown that the EPS was in filamentous or lamellar structure and that the filaments extended to the surface or to each other by filamentous extensions.

Discussion: The amounts of protein, uronic acid and total carbohydrate in EPS changed according to nutrient type and growth parameters. Also, SEM analysis of EPS confirmed structure of filamentous or lamellar.

Acknowledgements: We would like to thank the scientific research council of Pamukkale University (2014FBE037).

Keywords: Bacillus licheniformis, EPS, growth medium, uronic acid, SEM analysis
Introduction: Agricultural systems are the most important agent of environmental degradation and the pesticides used in these systems harm the freshwater invertebrate populations which play a crucial role in the structure and functioning of the aquatic ecosystem. Although pesticides are widely used around the world, there is no comprehensive evaluation based on data on the risks related to global surface waters. In this study, with reference of Ephemeroptera species collected from the Gediz river basin and used as a bioindicator in the evaluation of water quality, the pollution in the basin was evaluated and suggestions for protecting water quality were presented.

Material and Methods: In this study, collected and diagnosed taxa from Gediz river basin were used as data. The total number of species in each station has been determined. Accordingly, the species diversity and field observations were evaluated.

Results: It has been determined that Ephemeroptera species diversity is highest in the stations around the Murat mountain where the Gediz river was born and in the forest area in Manisa province. In nine of the 42 sampling stations species were not found. Only Tubifex spp. species were found in four of these nine stations and in the other five stations could not be found any aquatic organisms. In field observations, it was observed that the stations where the number of species is lowest or where no species are detected was found in agricultural and residential areas.

Discussion: According to the results of the study, it was determined that the species belonging to the families of Heptageniidae and Leptophlebiidae, which are sensitive to pollution, were distributed especially in the areas where the Gediz River was born. On the other hand, in the stations close to agricultural, industrial and residential areas it has been found that Caenidae and some Baetis species, which are highly tolerant to pollution, have spread. It is inevitable that water pollution will emerge due to the fact that the Gediz River basin remains in the areas concentrated on agriculture, industry and population. However, it may be possible to prevent or minimize the pollution that may occur in the water due to the use of chemicals by raising awareness of farmers and people / organizations using chemicals in production activities.

Keywords: Pesticides, Water quality, Ephemeroptera, Gediz River
Introduction: Fruit flies (Diptera: Tephritidae) is one of the largest Diptera family including 500 genera and 4500 species. In Turkey, 160 species of fruit flies have been distributed. Larvae of Tephritinae feed on flower heads of Asteraceae. In this study, fauna of Terellinae were determined which were collected from Samsun province between 2015 and 2017 years.

Material and Methods: Adult specimens were collected from possible host plants using an insect net in different localities of Samsun province of Turkey between 2015 and 2017 years. Collected materials were killed in the killing jar and pinned in the laboratory for identification. Specimens were diagnosed using identification key of Freidberg and Kugler (1989), Merz (1994), Korneyev and White (1999), Kütük (2003), Görmez (2011) and Yaran (2014). Specimens are deposited at the Zoology Museum of Gaziantep University.

Results: In this study, 13 species (Chaetorellia carthami Stackelberg, C. conjuncta (Becker), C. jaceae (Robineau – Desvoidy), C. loricata (Rondani), C. succinea (Costa), Chaetostomella cylindrica (Robineau – Desvoidy), Orellia stictica (Gmelin), Terellia gynaecochroma (Hering), T. luteola (Wiedemann), T. nigripalpis Hendel, T. ruficauda (Fabricus), T. serratulae (Linnaeus), T. virens (Loew)) of 4 genera belonging to Terellinae were obtained in the research region. Species are listed in alphabetical order. In addition, material examined, wings figures of each species will be presented.

Discussion: Samsun province is under the effect of Black Sea and Central Anatolia climates. The research region has a rich biological diversity because of humidity is high in the region. A parallel result was obtained in this study. 13 of 36 species belonging to Terellinae Fauna of Turkey were determined in research region.

Acknowledgement: We would like to thank the Scientific Research Projects Management Unit for provides funding with FEF.15.08 code project.

Keywords: Fruit flies, Terellinae, Fauna, Samsun, Turkey.
Potential Use of Crab Species in Turkey for the Marine Aquariums

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Introduction: Marine aquarium sector is rapidly growing in recent years. With the increment the number of both home and public aquariums, diversity of living organisms handled in ornamental marine trade are increasing. Aquarium enthusiasts have mostly preferred colourful and desirable fish species, such as clownfish or blue tang and different shapes of invertebrates. As understood from here, the main criteria of evaluating a species for suitable for the ornamental trade is physical appearance. Coloration is very important factor for aquarists while picking their ornamental species. However, if this species lacks the attractive coloration but exhibitions a unique aspect, such as mimetic species or displays a specific function like characteristics behaviour in the aquarium, it may be targeted by the ornamental industry. The crabs are used in the marine aquariums due to their strange appearances. The aim of this study was to determine the suitable crab species, which exist in Turkey, for the marine aquariums.

Material and Methods: In this study, the crab species existed in Turkish waters (Black Sea, Marmara Sea, Aegean Sea and Mediterranean) were reviewed and then potential target species for the marine aquarium were determined. The crabs were grouped as trading in marine aquarium industry based on their ecological characteristics, including coloration, body or carapace shape, behaviour, size and rearing in laboratory conditions.

Results: A total of 35 crab species were considered as potential for ornamental marine trading. Amongst these species, some of them, such as blue crab (Callinectes sapidus), sponge crab (Dromia personata), shamefaced crab (Calappa granulata), sally lightfoot crab (Percnon gibbesi), etc. have been recently traded in ornamental marine sector. Some species, including blue swimming crab (Portunus pelagicus), violet-eyed swimming crab (Carupa tenuipes) and warty crab (Eriphia verrucosa) are foreground with their distinctive colours. Several crabs like marbled crab (Pachygrapsus marmoratus), Monod’s crab (Paracte monodi), wrinkled swimming crab (Liocarcinus corrugatus), crenate crab (Eucrate crenata) and dark-fingered crab (Daira perlata) have patterned and embroidered carapace shape. Four-horned spider crab (Pisa tetraodon), tufted ghost crab (Ocypode cursor), red masked crab (Lissa chiragra) and Atlanto Mediterranean spider crab (Herbstia condyliata) have quirky body shapes.

Discussion: The invasiveness records have increased day by day in Turkish waters and the invasive species have dramatically threatened to natural stocks. In particular, invasive species cause a great risk for marine aquariums. Thus, it is critically important to determine the alternative native species for the aquarium sector. This study is useful because of presenting the potential aquarium species in our coasts and this situation can help to stop the invasiveness occurred by ornamental trade. In addition, the culture of ornamental brachyuran crabs and anomuran porcelain crabs are not as difficult as the culture of popular lobsters and shrimp. In conclusion, a total of 35 crab species were considered as suitable for the marine aquariums in terms of body shape, coloration and size.

Keywords: Ornamental trade, invasive species, marine crab, laboratory conditions.
Morphometric Characteristics in the Marbled Crab (Pachygrapsus marmoratus)

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Introduction: Pachygrapsus marmoratus (Fabricius, 1787), is a semi-terrestrial crab species, commonly known as the marbled crab or marbled rock crab, and is found throughout the Mediterranean Sea, Black Sea, north-western Atlantic from Brittany to Morocco. Little is known about the population structure and relative growth of the marbled crab in the Aegean Sea. This study aimed to assess information on allometry and size-weight relationship in the marbled crab in the Aegean Sea.

Material and Methods: A total of 393 crabs were collected by hand from rocky shores in İzmir, Aegean Sea. In the laboratory, the following somatic parts of crabs were measured by calliper: carapace width (CW), carapace length (CL), abdomen width (AW), cheliped length (CheL), and cheliped height (CheH). Wet weight of specimens were determined by an analytical balance (the nearest 0.001g). Statistical analyses were performed with the SPSS software (Version 20). The standard power function was used in order to determine carapace width-wet weight relationship for crabs. Regression analyses were performed to explain the relationships between morphometric parameters and the predictor variable (CW).

Results: Results showed that the mean carapace width (CW) was calculated as 11±4 mm for males and 13±5 mm for females of marbled crab. There was a significant relationship between the CW and CL for crabs (P<0.001, R²=0.94). Similarly, significant relationships were found between the predictor variable and other body measurements (AW and CheL). The CW-wet weight relationship for the overall population (both females and males) was found as W=0.0004CW³.107, R²=0.94.

Discussion: Numerous studies have shown that the relative growth of crustacean body parts is used to determine the morphological size at maturity. In particular, the abdomen width in females and cheliped length in males are the secondary sexual characters. This study demonstrates the significant relationships between the CW and the aforementioned secondary sexual characters. Moreover, the present study compares the mean body size and CW-weight relationships of marbled crab in the Aegean Sea and Black Sea based on the literature.

Acknowledgement: We would like to thank officers of the Ministry of Forestry and Water Affairs who provided the research permission for the fieldworks.

Keywords: Pachygrapsus marmoratus, allometry, size-weight relationship, Aegean Sea
Introduction: A number of animals, especially aquatic animals living in freshwater and marine habitats, are at the risk of many toxic pollutants. One of these pollutants is a pesticide which is a group of toxic pollutants such as rodenticides, herbicides, nematocides, insecticides and fungicides that are used in the majority of agricultural countries. Pesticides can enter freshwater systems in different ways, but extreme quantity of input can be caused by irrigation or precipitation. They contain synthetic chemicals used in agriculture to control pests and may have many different chemical compounds such as atrazine, dieldrin, diazinon, lindane, malathion, simazine, prometon, propanil etc. Some pesticides cause damage to many tissues and organs of the fish including vital organs, some of which destroy the natural morphological appearance of the fish species. Moreover, pesticides can damage DNA of fish species. In addition to this, it negatively affects the life of the organism and reduces the quality of life.

Material and Methods: In this study, Cyprinus carpio, Carassius auratus, Ctenopharyngodon Idella, Cyprinella lutrensis, Gila elegans, Leuciscus idus, Notropis atherinoides, Pimephales notatus, Pimephales promelas, Ptychocheilus lucius and Tinca tinca species belonging to the Cyprinidae family which was commonly found in freshwater systems have been investigated and different pesticide derivatives affecting these species are examined according to the literature. In order to make it easier to compare the investigated studies, evaluations in table format were prepared based on species, pesticide contents and pesticide types.

Results: In this review, we compiled eleven cyprinid fish species and fifty-three different pesticide contents. When studies are examined, it has turned out that the majority of the studies are carried out in the laboratory, because the living organism can affect other factors which may lead to negative results in determining the effect of the pesticide on fish species in own habitat. One of the important points is in the studies which were conducted in the laboratory, the exposure of pesticides to fish is usually much less than in natural environments, but fish are exposed to such pollutants for longer periods of time in the natural habitat. Another important point is that the amount of chemical content used in these studies is rather high in living organisms.

Discussion: When pesticides are evaluated in terms of fish in their natural environment, their amount, toxic effect values, interaction with other chemicals, and the resistance of the organism is very important. It should not be forgotten that all fish cannot show the same resistance against the same chemistry. Despite the fact that commonly used chemicals in agriculture do not significantly affect resistant species of the fish because of their low or toxic effect value it is still unclear how it will have an effect on other fish species. For this reason, the work to be carried out in this area is not limited to one or two fish species, but at the same time a wider scale to include complex chemicals will be very useful for risk assessment.

Keywords: Toxic pollutant, Pesticide, Cyprinidae, Freshwater
A Study of Ecological, Anatomical and Morphological Features of Endemic Two Related Barbarea Species Barbarea duralii and Barbarea anfractuosa

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Introduction: The genus Barbarea represents 29 species in world, and it includes 10 species in Turkey. This study was conducted on the anatomical structure of the root, stems, leaves, and ecological features and morphological characters of 2 species growing on Sandras Mountain in Southwest Anatolia in Turkey.

Material and Methods: Anatomical research materials have been collected from their natural habitats when they are mature and have preserved in 70 % ethanol. In anatomical investigations of these two species were taken section from root, stem, and leaves by hand. After that, the cross sections were photographed with an automatic camera attached to an Olympus BX-50 microscope. In morphological studies of these species, parts of stem, leaves, flower and fruit were measured and given as tables. In addition, the habitat features of two species were determined in fieldwork.

Findings: Although both species are spreading in the same geographical region, but their habitat preferences differs. Barbarea anfractuosa grows slightly humid habitat in subalpine region on Sandras Mountain, between 2050 and 2200 meters, and B. duralii grows only Pinus forests open, stream and lake sides, and meadow, between 1700 and 1800 meters, and the species accompanying both taxa vary. For this reason, both anatomical features and morphological characteristics are different.

Results: In this study, two closely related relatives were identified as stem, stem and leaf features. It is also mentioned in ecological characteristics.

Acknowledgement: This research was financially supported by TUBITAK, (Project no: TBAG-106T179)

Keywords: Brassicaceae, Barbarea, ecology, anatomy, morphology
Limb loss in the European Edible Crab (*Cancer pagurus*)

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**Introduction:** The appendages of decapod crustaceans play an important role for some of their activities such as feeding, walking, burrowing, swimming, mate protection and sensory reception. Limb loss negatively affects the reproduction, foraging efficiency and growth of crustaceans. In addition, a reduced number of limbs reduces the quantity of harvestable white meat. However, in some European countries, de-clawing (landing of claws) is permitted and these are sold as a separate product. This study aimed to determine a ratio of limb loss in the European edible crab in the scallop fishery and crustacean fishery. Furthermore, the study investigated whether egg volume and fecundity were affected by limb loss.

**Material and Methods:** The crabs were collected by scallop dredges and crustacean pots in 2012 and 2013 in the Isle of Man, Irish Sea. When evaluating limb loss due to dredge or pot operations, only new wounds with no melanisation were noted because a lack of melanisation indicated recent loss or damage. In laboratory, a total of 78 specimens were investigated to determine the egg volume and fecundity. Statistical analyses were performed with the SPSS software (Version 20).

**Results:** In the dredge surveys, 55% of all crabs had missing limbs, whilst the limb loss ratio was 23% in the crustacean pot fishery. The significant difference were found between the limb loss ratio in scallop dredges and pots (Pearson Chi-square = 157.156, \(P < 0.001\)). Results shows that all limbs were equally vulnerable to loss as a result of dredge operation (Chi-square = 0.204, \(P = 0.98\)). Additionally, this study indicates that egg volume decreased with when crabs had lost either chelae (\(P = 0.009\)), whilst the fecundity was not affected by the chela loss (\(P = 0.478\)).

**Discussion:** It should be noted that the most likely explanation for the observed limb to the European edible crab in scallop dredges is the mechanical trauma that occurs from direct contact with the fishing gear and the catch contents. On the other hand, it was considered that the interactions between other species was the main factor of limb loss in the pot fishery. In case of limb loss, the reproduction, feeding and growth of crabs are negatively influenced. Although de-clawing is prohibited in the Isle of Man, it is permitted and these are sold as a separate product in some European countries (Scotland, England, and Ireland). Thus, de-clawing may threat the crab stocks in some regions in the future.

**Acknowledgement:** We thank the Department of Environment, Food and Agriculture (DEFA) officers and Manx crab and scallop fishermen for their contributions. This study was funded by the Ministry of National Education, Republic of Turkey (awarded to F.Ö.) and the DEFA, the Isle of Man Government (awarded to M.J.K.).

**Keywords:** limb loss, de-clawing, European edible crab, Irish Sea
Cases of Defective Wing Vein Anomalies in Two species of Ammophila (Hymenoptera: Sphecidae)

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Introduction: Hymenopteran wing shape and venation has long been used for distinguishing taxa such as subfamilies, tribes and genera. Having distinctive characters and due to its relatively stable morphology, forewing is commonly used through the family Sphecidae. Important generic characteristics in the forewings of the family are: the termination points of recurrent veins on the media, size and shape of submarginal cells. Sometimes wing anomalies are encountered in insect samples which may cause confusions in their identifications. The most common anomalies have been recorded in Hymenopteran wings are supernumerary or defective veins and supernumerary cells. In this study, defective vein anomalies in specimens of Ammophila (Hymenoptera: Sphecidae) collected from various provinces of Turkey were presented for the first time.

Material and Methods: In this study, 731 specimens of Ammophila were examined in terms of wing venation anomalies collected from 1999 to 2016 which are deposited in Entomology Laboratory, Department of Biology, Gaziosmanpasa University (Tokat, Turkey). Forewings having anomaly were taken off and placed between glasses as permanent preparations each of which were photographed with Canon 650D camera.

Results: Six cases of defective vein anomalies were detected in 19 samples belonging to two species, Ammophila heydeni and Ammophila sabulosa, from examined 731 samples belonging to seven species. All the specimens having anomalies are males. The most common of the anomalies (n= 7, 36.8%) was incomplete 1rs-m crossvein which causes a partial merging of 2nd and 3rd submarginal cells.

Discussion: The causes of wing anomalies are not clear yet, but they are considered to be caused by biological or non-biological factors such as somatic or germinal mutations, exposure to chemical agents or environmental stress.

Keywords: Ammophila, Sphecidae, Anomaly, Wing venation, Defective vein
Determinant of Some Flavonoids and Antimicrobial Behaviour of Some Plants Extracts

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Introduction: Despite the traditional medicine limitations, it is crucial for the health care needs of millions of people worldwide. Discovery of modern drugs from folk remedies and their usage are better safety and efficacy profiles. Phytomedicines may be effective in combating or preventing disease due to their antimicrobial effect. This paper is concerned with antimicrobial activity of ethanol (65%) extracts of Juniperus oxycedrus, Linum usitatissimum, Coriandrum sativum and Buxus sempervirens against 15 microorganisms by using the disk diffusion method, MIC, MBC and MFC tests. In addition, composition of catechin, epicatechin, rutin, naringin, myricetin, luteolin, naringenin and apigenin were analyzed with normal-phase HPLC in the obtained extracts.

Material and Methods: J. oxycedrus (seed), L. usitatissimum (seed), C. sativum (seed) and B. sempervirens (leaf) were obtained from Özşen Lokman Hekim Company located in Ankara/Turkey, Gimat in 2016. Plant material were dried at room temperature and on draft for three weeks. About 10-30 g ground plant sample was extracted with 250 mL of ethanol (%65) in a Soxhlet apparatus by continuous heat extraction for 24 hours. Filtrate was evaporated with a rotary evaporator. The filtrate was freeze dried and stored in refrigerator at about 4°C after sealed with paraffin for further studies.

Results: Results showed that J. Oxycedrus is active against extract of Enterococcus faecalis, Klebsiella pneumonia and Salmonella enteritidis with MIC values of 52.03 µg/mL, 104.06 µg/mL and 13.01 µg/mL respectively, where L. usitatissimum is active against only S. enteritidis, with MIC values of 3.33 mg/mL and L. usitatissimum although an activity was observed against C. albicans MIC test showed that the concentration range tested was inactive against C. albicans, which means that the MIC value is higher than 3.33 mg/mL. On the other hand C. sativum is active against only S. enteritidis with MIC values of 13.01 µg/mL, where B. sempervirens was active against C. albicans and E. faecium with a MIC value of 416.25 µg/mL and 26.02 µg/mL respectively and B. sempervirens although an activity was observed against S. aureus MIC test showed that the concentration range tested was inactive against S. aureus, which means that the MIC value is higher than 3.33 mg/mL. and also, HPLC analysis revealed that catching in J. oxycedrus and C. sativum extracts, apigenin; L. usitatissimum and B. sempervirens extracts were determined.

Discussion: MBC/MFC test showed that all the MIC values observed were bacteriostatic/fungistatic concentrations, which means they only inhibit the reproduction of microorganisms.

Keywords: J. oxycedrus, L. usitatissimum, C. sativum, B. sempervirens, antimicrobial activity, flavonoid
Introduction: Generally, the sediment load of the rivers, the sediment load carried by the river through the sea and the distribution in the sea environment constitute the least studied subjects as far as quality and quantity. The reason why this subject is studied so little is that the structure of this phenomenon is complex and it is difficult to make measurements. In this study, advection, dispersion and settling areas of cohesive and non-cohesive sediments discharged from the Karadere to the sea mathematical model has been obtained in the Eastern Black Sea Region. In this way, information on the fate of the sediments in the marine environment was obtained shortly. In the model, different boundary conditions were applied considering actual situations and the results were compared with actual situations. Cohesive and non-cohesive sediment amount, inlet-angle, wind direction and intensity, and sediment drift velocity on sedimentation areas were investigated.

Material and Methods: The equation giving the advection and dispersion of the sediments in the marine ecosystem is as follows:

\[
\frac{\partial C_k}{\partial t} + \frac{\partial UC_k}{\partial x} + \frac{\partial VC_k}{\partial y} + \frac{\partial(W - W_{S,k})C_k}{\partial z} = \frac{\partial}{\partial x} \left( A_H \frac{\partial C_k}{\partial x} \right) + \frac{\partial}{\partial y} \left( A_H \frac{\partial C_k}{\partial y} \right) + \frac{\partial}{\partial z} \left( K_H \frac{\partial C_k}{\partial z} \right)
\]

where,

Cohesive Sediment for \(k=1\)
Non-Cohesive Sediment for \(k=2\)
\(U, V, W\): 3-D velocity vector
\(C_k\): sediment concentration
\(W_{S,k}\): settling velocity
\(A_H\): horizontal diffusion
\(K_H\): vertical vortex diffusion

Boundary conditions:
\[K_H \frac{\partial C_k}{\partial z} = 0, \ z \to \eta\]
\[K_H \frac{\partial C_k}{\partial z} = E_k - D_K, \ z \to -H\]

Results: The amount of cohesive and non-cohesive sediment entering the sea, the direction and intensity of the wind and the sediment drift velocity affect sediment settling areas in the marine ecosystem. As sediment drift velocity increases, the probability of sedimentation increases as well. The entrance angle to the sea affects the sedimentation area in the marine environment.

Discussion: Do hydroelectric power plants (HES) have effects on coastal accumulation and coastal erosion? If there is an effect, is this effect a coastal accumulation? or is this effect a coastal erosion?

Keywords: Sediment, Discharge, Continental shelf
Comparison of Black-Scholes Models and Linear Regression Model in Maritime Transportation for Financial Risks

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Introduction: In the money and capital markets traded in classical financial products, due to the economic crises experienced at the beginning of the 1970s, protection from financial risks and new financial products that could control these risks were needed. Options, one of these financial instruments, were first traded in the United States in 1973. With the increase in activity in the global financial markets, developing countries have modeled the financial markets and techniques of the developed countries in order to attract the necessary investments to their countries and have enabled the spread of derivative markets on the world rapidly. Transportation has also increased in parallel with the global increase in trade. Today, transportation activities are divided into five basic types, these are air, road, rail, sea and pipeline transportation. Despite all these alternatives, 90% of global trade surplus sea transportation. Therefore, the negativities that may be experienced in the world economy can seriously affect the maritime transport. In this study, the Black Scholes model and the Linear regression model are compared to the option price and the advantages of the Linear regression model are shown.

Material and Methods: The Black-Scholes model was developed by Fischer Black and Myron Scholes in 1973 to calculate the prices of European options. The Black-Scholes equation and boundary condition for the European buying option are as follows:

\[
\frac{\partial C}{\partial t} + \frac{1}{2}\sigma^2 S^2 \frac{\partial^2 C}{\partial S^2} + rS \frac{\partial C}{\partial S} - rC = 0
\]

\[
C(0, t) = 0 , \ S \to \infty \ for \ C(S, t)\sim \S \ve \ C(S, T) = \max(S - E, 0)
\]

and

\[
C(S, t) = SN(d_1) - Ee^{-r(T-t)}N(d_2) : \text{Call Option premium}
\]

\[
P(S, t) = Ee^{-r(T-t)}N(-d_2) - SN(-d_1) : \text{Put Option Premium}
\]

Linear Regression Model:

\[
C(r, \sigma) = \alpha r + \beta \sigma + c : \text{Call Option premium}
\]

Results: The call option price is positively related to the stock price, risk-free interest rate, volatility, and time to maturity. The call option price was found to be negatively related to the exercise price. A linear regression model is obtained that calculates the call option for stock prices next to the exercise price.

Discussion: The Linear regression model is more advantageous than the Black-Scholes model for examining the effects of volatility and interest rates. The Linear regression model gives the same results as the Black-Scholes model in the premium calculations neighborhood to the exercise price.

Keywords: Financial Derivatives, Option, Option Premium
Cytotoxic and Genotoxic Effects of Flupyradifurone on Human Lymphocytes

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Introduction: Flupyradifurone (FPD) is a member of the new class of butenolide insecticides. A literature survey has shown that studies on genotoxic effects of FPD are very limited. Genotoxicity and carcinogenicity data of FPD are restricted to unpublished report in manufacturer. In addition, cytotoxicity and genotoxicity of FPD have not been studied in human in the presence and absence metabolic activation system (S9 mix). Therefore, the aim of this study is to investigate cytotoxicity and genotoxicity of FPD in cultured human peripheral blood lymphocytes.

Material and Methods: We investigated the cytotoxic and genotoxic effects of FPD and its metabolites on human lymphocyte cultures with or without S9 mix using chromosomal aberration (CA) tests. The cultures were treated with 85, 170 and 340 µg/ml of FPD in the presence (3 h treatment) and absence (48 h treatment) of S9 mix. The mitotic index MI was also calculated to evaluate cytotoxic/cytostatic effects of FPD.

Results: Statistically significant decreases were detected in MI at the medium and highest concentrations for 48 h treatments while all decreases in presence of the S9 mix in MI were found statistically significant at all FPD concentrations tested when compared with solvent control. When compared with solvent control, increases in CA frequencies were significant at the medium and highest concentrations. The results of the present study indicate that FPD and its metabolites can show cytotoxic and genotoxic effects in human lymphocytes.

Discussion: Many epidemiological studies have suggested a correlation between pesticide exposure and increase in the incidence of diseases and cancer. Therefore, more genotoxicity studies by using different cell lines are necessary to elucidate the cytotoxic, genotoxic and carcinogenic mechanisms and effects of this new pesticide, and to make a possible risk assessment in human.

Acknowledgement: This study was financially supported by a grant from Scientific Research Funding of Ordu University (Turkey) with the project number: TF-1533.

Keywords: Flupyradifurone, Chromosome aberration, Metabolic activation, Lymphocytes
Determination of Essential Elements and Heavy Metals of Groundnuts by XRF Spectrometric Method

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Introduction: Human civilization and a concomitant increase in industrial activity has gradually redistributed many heavy metals from the earth's crust to the environment and increased the possibility of human exposure. Crops intended for human nutrition and food production containing different essential elements (S, K, Ca, Fe, Cu, Zn, As, Br and Sr) and heavy metals (Cr, Cd, Hg, Se and Pb). Groundnut (Arachis hypogaea L.) is an important valuable oil plant of the leguminous family. It is a valuable source of nutrients for humans and has all the potential to be used as an economic food supplement to struggle malnutrition. The knowledge of content of heavy metals in groundnuts is very important to assess the health hazards for population exposed. The aim of this study is to determine the essential elements and heavy metal characteristics of groundnuts samples collected from Osmaniye Province of Turkey were determined using an energy dispersive X-ray fluorescence (EDXRF) spectrometer.

Materials and methods: For elemental analysis, 42 groundnuts samples were collected from the Osmaniye. The samples were brought to the laboratory and coded. The samples to be measured were passed through the crusher and sieved. Approximately 3 gr of powdered samples were used for the measurements. The elemental analysis survey was conducted using energy dispersive x-ray fluorescence (Spectro Xepos, Ametek). This device is a very versatile EDXRF spectrometer. It optimizes excitation using polarization and secondary targets. The target changer, with up to 8 polarization and secondary targets, offers many different excitation conditions ensuring optimum determination of all elements from Na to U. The measurements are conducted in Helium gas atmosphere. For the analysis of the powder samples, the "powder method" registered on the device was used.

Results and discussion: The essential elements and heavy metals in the groundnut samples were determined using the EDXRF spectrometer. Among the various heavy metals cadmium, lead, and mercury are especially prevalent in nature due to their high industrial use. These metals serve no biological function and their presence in tissues reflects contact of the organism with its environment. They are cumulative poison, and are toxic even at low dose. Studies of metabolism and toxicity of these elements have revealed important interactions between them and some essential dietary elements like calcium, zinc, iron, selenium, copper, chromium, and manganese. The essential elements may contribute to the protection of human from the effects of heavy metal exposure.

Acknowledgement: We would like to express our appreciation to the Kastamonu University Central Research Laboratory.

Keywords: Groundnuts, Essential Elements, Heavy Metals, Osmaniye
Cytotoxic Effects of Mixture of Deltamethrin and Thiacloprid on Human Bronchial Epithelial Cells

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Introduction: Deltamethrin and thiacloprid mixture is the formulation of an effective insecticide widely used in agriculture. However, there is no report about cytotoxic and genotoxic effects of mixture of deltamethrin and thiacloprid in human lung cells. Therefore, the aim of this study is to investigate the cytotoxicity of mixture of these insecticides on human bronchial epithelial cell line, BEAS-2B.

Material and Methods: Determination of the possible cytotoxic activities of deltamethrin and thiacloprid were carried out using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. BEAS-2B cells were treated with deltamethrin and thiacloprid mixture at concentrations ranging from 0.03+0.5 to 5+75 mM for 24 and 120 h at 37°C.

Results: Our results indicate that mixture of deltamethrin and thiacloprid can inhibit the proliferation of BEAS-2B cells. Cytotoxicity increased with increasing concentrations of these insecticides. Mixture of deltamethrin and thiacloprid showed stronger inhibitory effects on cell viability at the higher concentrations.

Discussion: It has been stated that some kind of these insecticides can cause loss of heterozygosity, gene mutations and molecular changes such as the irregular gene promoter methylation which is the potential molecular biomarkers in the development of lung cancer. Therefore, more genotoxicity studies on different cell lines are necessary to make a possible risk assessment in human. Taking into consideration the increase in cancer cases and relationship between lung cancer and pesticide exposure, such studies are very important for human health.

Acknowledgement: We would like to thank to The Scientific and Technological Research Council of Turkey (TÜBİTAK) for the financial support of this work (Project No: 115Z817).

Keywords: Deltamethrin, Thiacloprid, Cytotoxicity, MTT assay
The Study of Morphological Structure of Medicinal Leech Species (*Hirudo sulukii* and *Hirudo verbena*) of Turkey

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**Introduction:** Medical leeches live in freshwaters, especially in reeds and marshy areas. Therapeutic use of medical leeches has been formally adopted in Turkey under the Convention on Traditional and Complementary Medicine in 2014. Turkey is one of the most important countries exporting medicinal leech. However, medical leeches, endangered species, have been listed in Annex II of the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES).

**Material and Methods:** This study was conducted on the medicinal leech samples collected from various regions of Turkey between the years of 1995-2016. Also, in the study, the medicinal leeches which were sent for identification purposes to our department was used. These leeches, which have been collected in various studies for about 20 years, have been identified, tagged and stocked up in Firat University, Faculty of Fisheries.

**Results:** Two different species of medicinal leeches (*Hirudo sulukii* and *Hirudo verbena*) in Turkey were determined. One of these species (*H. sulukii*) was discovered by a genetic research only in Southeast Anatolia Region of Turkey in 2016. Both species of leech have flattened dorso-ventrally. *H. sulukii* was measured as the length 27.0 - 117.0 mm and the width 3.7 - 12.0 mm, while *H. verbana* was measured as the length 55.4-123.0 mm and body width 8.5 - 13.1 mm. *H. sulukii* has black, segmentally-arranged united ellipsoid and elongated spots, and a pair of zigzagged black longitudinal stripes in dorsolateral of body. The ventral surface of *H. sulukii* is greenish to brown and has a small number of irregular black spots. *H. verbana* has broad and diffuse paramedian orange stripes in dorsal. The ventral of *H. verbana* is greenish to yellow, bounded by a pair of black ventrolateral stripes.

**Discussion:** Medicinal leech species of the genus *Hirudo* was reported in European countries, Turkey, North Africa coast, some Middle Eastern countries, Azerbaijan, Ukraine and Russia. Two (*H. sulukii* and *H. verbana*) of a total six medicinal leech species found in the world is located in Turkey. *H. sulukii* is smaller than *H. verbana* and its dorsal patterns are also different. The epididymes of *H. sulukii* are medium-sized. But, the epididymis of *H. verbana* are relatively small. The vagina of *H. sulukii* is relatively long tubular and folded. The vagina of *H. verbana* do not show the central swelling and sharp folding typical. Ejaculatory duct of *H. sulukii* is smaller than *H. verbana*. The atrium of *H. verbana* shows a more rounded structure than that of *H. sulukii*.

**Acknowledgement:** We would like to express our appreciation to the Firat University Scientific Research Project Commission (FUBAP), which supported this study (SÜF.14.04).

**Keywords:** Medicinal leeches, *Hirudo sulukii, Hirudo verbena*, morphological structure, CITES
The first record of *Ixodes inopinatus* Estrada-Peña, Nava & Petney, 2014 ticks (Acari: Ixodidae) from Turkey

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**Introduction:** Ticks are blood-sucking ectoparasites of terrestrial vertebrates. The genus *Ixodes* is the largest among ixodid ticks; and the members of the genus is spread around the world. So far, approximately 250 species of the genus *Ixodes* are known worldwide whereas only 13 species of the genus *Ixodes* are identified in Turkey. In the present study, we recorded *Ixodes inopinatus* Estrada-Peña, Nava & Petney, 2014 ticks in Turkey, for the first time.

**Material and Methods:** During our tick survey in Ordu province, we collected a number of *Ixodes* ticks on domestic cattle. All of the collected ticks were placed into labeled small plastic tubes containing 70% ethanol and send to Acarology Laboratory, Department of Biology, Gaziosmanpasa University, Tokat, Turkey. Ticks were identified based their morphological characters using of descriptions and identification keys. All samples were deposited to our tick collection for the further analysis.

**Results:** A total of 61 *Ixodes* ticks were collected from domestic cattle in Ordu province. Ticks were identified as *Ixodes ricinus* (Linnaeus, 1758) (11 males, 43 females, 5 nymphs) and *I. inopinatus* (1 males and 6 females). With this study, *I. inopinatus* is recorded from Turkey for the first time.

**Discussion:** *I. inopinatus* has been recently described among the specimens of *I. ricinus*. *I. inopinatus* also share morphological features with several species of Palearctic *Ixodes*; therefore *I. inopinatus* might have been historically confused with and erroneously reported as Palearctic *Ixodes*, especially *I. ricinus*. Presence of the species has been documented from Austria, Portugal, Romania, Spain, and Tunisia. Although, *I. inopinatus* was described as allopatric with *I. ricinus*, but recent studies shown that they can occur sympatrically. We strongly suggest that tick specimens identified as *I. ricinus* in tick collections should be re-examined based on the current taxonomic concepts. The medical importance of *I. inopinatus* is also currently unknown; therefore, new studies should be aimed at the presence and prevalence of tick-borne pathogens in *I. inopinatus*.

**Keywords:** Ticks, new-record, fauna, *Ixodes inopinatus*, Turkey.
Introduction: Onobrychis Miller (Hedysareae, Fabaceae) is represented by approximately 342 species throughout the World. Members of the genus are commonly found in dry open habitats with a continental, Northern temperate regions, Eastern Mediterranean region and Southwest Asia. The diversity and concentration of these species are high in the Anatolia–Iran–Caucasia region. In Turkey, Onobrychis genus is divided into five sections and is represented by 65 taxa, 33 of them are endemics. O. argaea Boiss. & Balansa is endemic species to Erciyes Mountain in Kayseri. In the present study, palynological and seed surface properties of the O. argaea were examined.

Material and Methods: Plant materials were collected during the flowering period from the natural locality in Erciyes Mountain. The plants were dried according to standart herbarium techniques and stored in the Herbarium of Erciyes University (ERCH). For palynological studies, the pollen grains were obtained from dried herbarium specimens. The pollen slides were prepared according to the method of Wodehouse. Seeds were collected from natural populations or herbarium specimens in order to study seed micro-morphological features. On an average, 30 measurements were made for all quantitative characters.

Results and Discussion: The results of our study have shown that pollen grains of investigated O. argaea species are radially symmetrical, isopolar, tricolpate. Pollen shape is prolate and ornamentation reticulate-microreticulate. The exine and intine are 1.15 μm and 0.83 μm thick respectively. The general shape of the seed is reniform and laterally compressed. Seed colour is yellowish-brown. Seeds are suboblate (P/E = 0.77) and rugulate. Pollen and seed have an important role in the modern issue of plant taxonomy. And, the pollen and seed characters were used for the establishment of relationships among the Fabaceae taxa.

Acknowledgement: We would like to express our appreciation to the Erciyes University Scientific Research Project Commission, which supported this study (FDK-2015-5693).

Keywords: Onobrychis argaea, Endemic, Erciyes, Kayseri.
The Role of Soil Beneficial Bacteria in Organic Vegetable Production: A Review

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Introduction: Vegetables are one of the most important sources of human nutrition because they are rich sources of vitamins and minerals, dietary fibre, plant sterols, flavonoids and other antioxidants. Vegetables help to ensure an adequate intake of many of these essential nutrients. Therefore, the consumption of vegetables has increased considerably. Vegetables as part of the daily diet may reduce the risk of some cardiovascular diseases and certain types of cancer. The increasing demand for crop production with increasing synthetic chemical fertilizers and pesticides applications in intensive farming practices has been a very important problem nowadays. Plant Growth Promoting Rhizobacteria (PGPR) which has beneficial characteristics on plant growth and yield as bio-fertilizers in agriculture has been the focus of research for a long time. The use of PGPR has been shown to be an environmentally way of increasing crop yields by facilitating plant growth through either a direct or indirect mechanism. Direct mechanism consists of phytohormone production including auxins, cytokinins and gibberellins, nitrogen fixation, solubilizing inorganic phosphates, mineralizing organic phosphate and producing organic matter such as amino acids. As indirect mechanisms, PGPR help plants in combat against the pathogen microorganisms by means of stimulating the disease-resistance mechanism of plants, promote favorable symbiosis, decontaminate the soil of xenobiotics. PGPR can also help plants to cope against abiotic stress by lowering ethylene levels, or against pathogenic microorganism by means of secreting antibacterial/antifungal substances. Exact mechanisms of PGPR characteristics which stimulate the plant growth or product formation are still under investigation, yet in agriculture, PGPR are used as environmental friendly biofertilizers, biocontrol agents or biostimulants.

Materials and Methods: All sources (ie web, web of science, Google, books and e-books) related to organic vegetable farming, PGPRs as bio-fertilizer in vegetables growing were surveyed.

Results and Discussion: This paper will try to shed more light on the effects and the role of PGPR as a bio-fertilizer, and the advantages in PGPR as a bio-fertilizer in vegetable production. In this review it was evaluated usage possibilities and the effect of PGPR on plant growth and yield of vegetable. The information gained from this compilation can be very useful for those concerned about environmental protection and agricultural sustainability.

Keywords: organic farming, vegetable, PGPR
Introduction: Fishing is one of the oldest ways by which people have fed themselves and their families. Except for gathering shellfish by hand and spearing fish, primitive trapping is probably the oldest form of fishing. International consensus is emerging that the adoption of ecosystem based fisheries management is essential for sustainable fish stocks and sustainable fisheries over the long term. Multispecies fisheries is a major problem for ecosystem based fisheries management in point of selection of target species and target size groups, from among other species and size groups. Selective fishing gear has an important place in the solution of this problem in terms of both species and size selectivity. Pots and traps are highly selective fishing gears and they have being used in commercial fishing to catch both fish and crustaceans. In this paper, the importance of traps for ecosystem-based fisheries is discussed by guidance of related literature and our studies.

Materials and Methods: The observations were made from our studies but basic issues were compiled from related literature. Fishing experiments with traps and pots were carried out in sea and inland waters to investigate the selectivity and efficiency of the traps and pots. During the ten years fishing experiments shrimp, crabs and various fish species were caught.

Results and Discussion: Traps are large stationary nets or barrages, while pots are small gears in which the fish are retained or enter voluntarily and will be hampered from escaping. Trapping allows some control over the species and sizes of the fish. The trap entrance, or funnel, can be regulated to control the maximum size of fish that enter. The size of the mesh, in the body of the trap can regulate the minimum size that is retained. To a large extent, the fish species that will be caught depend on the type, model and characteristics of the pot or trap being used. It is possible to limit the species and size of the fish before caught by arranging entrances of traps. Even if the small fish enter the trap then they can come out of between the wall mesh or escape gaps. Specially designed escape gaps allow to release non-target species too, like water birds, turtles, otters, crabs, crayfish and lobsters. This is a very important feature in terms of ecosystem. Other important feature of the traps are preserve the captured fish as alive. This makes it easy to select non-target species and small fish with the hand and eye, and so that it is possible to release them to their habitat as alive without harm. They have low negative environmental impact because, caught juveniles, undersized species or non-target species can be released alive. On the other hand, specially designed fishing traps and pots can be used expediently to struggle against invasive fish species. For the protection of increasingly distorted ecological balance the use of traps should be encouraged.

Acknowledgement: We would like to express our appreciation to the Sinop University Scientific Research Project Commission, which supported this study (SÜF – 1901–14-06).

Keywords: ecosystem based fisheries, fishing traps and pots, selectivity, non-target species
Contributions to genus *Platystoma* (Diptera: Platystomatidae) of Turkey

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**Introduction:** Platystomatidae family belongs to the Tephritoidea superfamily. Platystomatidae adults can be found on tree trunks, flora, feces or decomposing plants. Larvae may be found on vegetation or roots, and also on animal carrions. Species belonging to the *Platystoma* genus have different sizes ranging from small to large (3-11 mm). In this research, researcher’s evaluated specimens belonging to *Platystoma* genus, which have been collected from different provinces in Turkey between the years 1992-2007 and are currently presented at the Zoology Museum of Gazi University (ZMGU) and collected 12 species and 2 subspecies belonging to this genus were identified. In this study, wing pictures and distribution maps of the discovered species are given.

**Material and Methods:** As a contribution to Turkey’s *Platystoma* fauna, between the years 1992-2007 during the months between April and August, specimens were collected from different geographical areas and habitats by the second author. Specimens were collected in Adana, Aksaray, Ankara, Antalya, Bolu, Gaziantep, Hatay, Isparta, Kahramanmaras, Karaman, Kayseri, Konya, Mersin, Muğla, Nevşehir, Niğde, Sivas and Yozgat. They were collected using by a sweeping net (40 cm diameter). A total of 192 specimens (77 females and 115 males) were examined. All specimens are preserved at the Zoological Museum of Gazi University (ZMGU). The specimens were identified according to the keys and descriptions from the works of Hendel (1913, 1914) and Hennig (1945). Wings of the species were placed between a cover glass and microscope slides, and the photos were taken with a digital camera using a stereo microscope.

**Results:** *Platystoma crysotoxum* from Konya; *Platystoma dimidiatum* from Adana, Antalya, Isparta, Kayseri, Konya, Niğde and Sivas; *Platystoma gemmationis* from Kayseri; *Platystoma hendeli* from Antalya, Isparta and Karaman; *Platystoma ilguenense* from Antalya; *Platystoma lugubre pleuronites* from Antalya and Mersin; *Platystoma nitidiventre* from Adana, Antalya, Gaziantep, Hatay, Isparta, Kayseri and Mersin; *Platystoma plantationis* from Antalya and Mersin; *Platystoma pubescens* from Antalya and Isparta; *Platystoma rufipes* from Aksaray, Karaman, Kayseri, Konya, Mersin, Nevşehir, Niğde and Yozgat; *Platystoma seminationis* from Antalya; *Platystoma subfasciatum* from Adana, Aksaray, Ankara, Antalya, Hatay, Isparta, Kahramanmaras, Kayseri, Konya, Mersin, Muğla, Nevşehir, Niğde and Sivas; *Platystoma subtile bezzii* from Bolu; *Platystoma tegularium* from Adana were identified.

**Discussion:** This study includes general assessments of the species belonging to *Platystoma*, acquired from studies conducted in different regions of Turkey at different times. Among the species have been identified as a result of this study, *Platystoma dimidiatum* (Hendel, 1913), *Platystoma tegularium* Loew, 1859, *Platystoma gemmationis* (Rondani, 1869), *Platystoma chrysotoxum* Hendel, 1913, *Platystoma pubescens* (Loew, 1845), *Platystoma plantationis* (Rondani, 1869) and *Platystoma subtile bezzii* (Hendel, 1913) are newly recorded fauna in Turkey. With this faunistic study, the number of Platystomatidae taxa in Turkey has increased to 17. Additionally, the Platystomatidae family’s distribution has been widened and detailed.

**Acknowledgement:** This study is part of a Master’s thesis by Seda Mesci titled “Faunistic and Systematic Evaluation of Family Platystomatidae and Otitidae (Diptera) at the Zoological Museum of Gazi University”.

**Keywords:** Diptera, Platystomatidae, *Platystoma*, Turkey.
Introduction: With an advancement of Space Technology, it possible to monitor the quality of the ground air on large areas of the Earth's surface, in particular, tracking the average air quality over large cities with millions of inhabitants.

Goal: Searching for an answer to the question: “Is it possible to monitor the dependence of mortality in large urban centers by the air quality in them through satellite monitoring?”

Material and methods: Statistics on annual mortality in major Turkish cities were derived from Turkey’s national statistics website. Data on 22 meteorological parameters and pollutant concentrations in the ground air for the Ankara area measured by satellite-based appliances were derived from a NASA site. The data were examined for the existence of statistically significant correlations between mortality rates in the city of Ankara and the meteorological parameters and concentrations of ground air pollutants.

Results: The change in mortality from respiratory diseases in Ankara closely follows the change in atmospheric pressure over the years (correlation coefficient +0.966, significance level 0.001). The correlation coefficient of methane concentration with atmospheric pressure is +0.970, a significance level of 0.001, and the correlation coefficient of methane concentration with respiratory mortality in Ankara is +0.938, a significance level of 0.01. Methane concentration has a statistically significant correlation coefficient also with the mortality from neoplasms (0.768, statistically significant for level 0.05), cardiovascular diseases (0.861, statistically significant for level 0.05), neoplasms (0.772, statistically significant for level 0.05), and diseases of the nervous system and sensory organs (0.827, statistically significant for level 0.05). Mortality in Ankara from cardiovascular diseases also has a large correlation coefficient (+0.941, significance level 0.01) with the parameter UV aerosol index, characterizing the presence of aerosols in the ground air. Statistically significant correlation coefficients of the mortality in Ankara with air quality parameters over the city measured by satellites were found for four out of six groups of causes of death – respiratory diseases, cardiovascular diseases, neoplasms, and diseases of the nervous system and sensory organs.

Discussion: It turned out that the air pollutant, whose concentration correlates most with atmospheric pressure and mortality in Ankara, is methane. The liquid aerosol with dissolved NO2 probably contributes to the mortality in Ankara also. For the type of aerosol can be judged by the correlation coefficients of the index with the concentrations of other air pollutants.

Keywords: Urban Air Pollution, Environmental monitoring from Space, Mortality, Ankara, Methane, UV Aerosol Index
An Evaluation on the Current Bird Diversity of the South-eastern Anatolia Region

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Introduction: Related to its strategic geographical position, climatically conditions and habitat diversity, it is well known that South-eastern Anatolia Region sheltering many bird species. Nevertheless, ecological changes that happen in the region -especially associated with the dam projects that completed in recent years- affect the bird diversity and avifauna of the region. Therefore, monitoring the bird diversity of the region has a great importance. The present study aims at presenting a global account of bird diversity of the region by provide full list of bird species together with the seasonal status and threat categories of species.

Material and Methods: The bird species that showing distribution in the South-eastern Anatolia Region constituted the material of this study. The results of the published main ornithological studies that conducted in the region from the beginning of the 1990s to 2017 period were evaluated together with the personal observation records in the region. Field observations was performed by standard ornithological equipment which is consisted of GPS, field glasses (8×40), telescopes (20-60×80), and a camera (with a 300 mm lens).

Results: The obtained results have shown that this part of Turkey sheltering many bird species and the region has a great importance on account of bird diversity. During the mentioned period 296 bird species that belong to 17 orders and 56 families were detected and represented. Among the recorded species 133 are belong to Passeriformes while 163 are Non-passeriformes group. The seasonal status of the recorded species determined as 76 residents, 91 summer migrants, 61 winter visitors and 62 passage migrants. The seasonal status of six species was not defined fully and revealed as a vagrant species. Also, among the recorded species 25 of them are globally threatened species and at least five of them (Ferruginous Duck Aythya nyroca, Egyptian Vulture Neophron percnopterus, Great Bustard Otis tarda, European Turtle Dove Streptopelia turtur and Cinereous Bunting Emberiza cinereacea) are breeding in the area. In addition, there is possibility of the breeding of the Cinereous Vulture Aegypius monachus which is a globally threatened species, in high altitude areas in the region.

Discussions: The South-eastern Anatolia Region offers special habitats for many bird species including some species which are only found in this part of Turkey. In addition, there are ecological changes in the region related to dam projects together with the agricultural regime changes, so it is essential to monitoring the status and distribution of bird species for determination of scope and size of ecological changes.

Keywords: Bird diversity, Avifauna, Ecological changes, South-eastern Anatolia.
POSTER PRESENTATION

The Stigmaeid Mites (Acari: Stigmaeidae) From Yedigöller, Esence Mountains (Turkey)

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Introduction: Stigmaeidae, a mite family within the superfamily Raphignathoidea, is a large cosmopolitan group with more than 580 described species. Most of these mites have considered as important predators of plant feeding mites and small insects and have attracted much attention among researchers. Yedigöller are composed of seven ice lakes and located in the Çayırlı district of Erzincan province. The lakes are located in the Esence Mountains and at an altitude of 3000 m. This paper reports six species belonging to two genera in Stigmaeidae Oudemans, 1931. The short descriptions, habitats and the distributions of these species were given. With the present work, we aimed to contribute to distribution in Turkey of the species.

Material and Methods: It was used Berlese-Tullgren funnels for extraction of mites from grassy and mossy soil collected from the investigation area. Extracted mites were killed, fixed and stored in 70% ethanol. Mite specimens were cleared in 60% lactic acid and mounted on microscopic slides in Hoyer’s medium. A light microscope was used to examine the mites.

Result and Discussion: In the present study, six species belonging to the family Stigmaeidae Oudemans, 1931 were found: Eustigmaeus collarti (Cooreman, 1955), E. erciyesiensis Doğan, Ayyıldız & Fan, 2003, E. jiangxiensis Hu, Chen and Huang, 1996, E. sculptus Doğan, Ayyıldız & Fan, 2003, E. segnis (Koch, 1836) and Stigmaeus pilatus Kuznetsov, 1978. These species were determined as a previously reported from Turkey, and found in new localities in the mountain ecosystem, Yedigöller, Esence Mountains, Turkey.

Acknowledgements: We are grateful to Dr Sevgi Sevsay (Erzincan Binali Yıldırım University, Turkey) for her help with collecting mites.

Keywords: Distribution, mountain, new locality, Stigmaeidae, Yedigöller
The Effect of Water Temperature and Body Size on Predation Capacity of Gambusia on Mosquito Larvae

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Introduction: Mosquitoes are the vectors of diseases such as malaria and West Nile fever that cause more than one million deaths each year. Gambusia fishes are hunter creatures feed with mosquito larvae. Gambusia species are widely used as biological control agents against mosquito larvae in Turkey. In this study, effect of three different water temperature and two fish size on consumption of fourth instar larvae of Culex pipiens L. by Gambusia sp. was investigated.

Material and Methods: The fishes (Gambusia sp.) were collected from ornamental pools in the campus of the Akdeniz University, Antalya. In laboratory, the fishes were divided into two groups; Small; 3.5-4 cm and big; 5-5.5 cm, according to their body size. Each fish was placed in plastic containers (12x18x9 cm) with water at the depth of 5 cm. These containers were kept at 15°C, 20°C and 25°C to reach a desired temperature level. One hundred fourth instar larvae were added into these containers and larvae consumption rates were recorded at the end of 24 h.

Results: According to the results obtained, both small and big Gambusia consumed less larvae at 15°C than at 20°C and 25°C. When comparing the size of fish and the consumption of larvae, big fishes consumed more larvae at 20°C and 25°C than small ones. At about 15°C, there was no difference in larvae consumption rate between big and small fish.

Discussion: The result of this study is that the size of the fish and the temperature of the water affect the mosquito larvae consumption. According to this study, water temperature should be taken into consideration when it is necessary to use fish as a biological control agent in ornamental or irrigation pools.

Keywords: Culex, Gambusia, Mosquitofish, Predation
Larvicidal Activity of Acetone Extract of Sideritis ozturkii Against Culex pipiens

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Introduction: Mosquitoes are vector of many diseases like Chikungunya, Dengue fever, Lymphatic filariasis, Yellow fever, Zika and West Nile fever. That’s why, billion tons of chemical insecticides are used to combat these vectors in the world each year. Because of the negative effects of chemicals on non-target organisms and the environment, scientists focused on researching new, biological and safer insecticides. Botanical insecticides are very interested products in this area. This research was conducted to determine the insecticidal potential of the acetone extract of Sideritis ozturkii Aytaç & Aksoy, an endemic plant for Turkey, against second instar larvae of the house mosquito, Culex pipiens L. under laboratory conditions.

Material and Methods: The aerials parts of plant at flowering stage were collected from Kızıldağ (Derebucak-Konya), Turkey in July 2017. The plant was dried in the shade at room temperature for 2 weeks and then chopped into small pieces using blander. For extraction 200 g of plant sample was soaked in 1.5 liter of acetone and incubated at room temperature for 24 h. After this period the extract was sieved into a clean jar and kept in the refrigerator until larvicidal assays. Four concentrations (10, 25, 50 and 100 ppm) of the plant extract were prepared using water. Larvicidal assays were made according to the WHO recommendations with minor modifications. Six replicates with ten second instar larvae were used for each concentrations and mortalities were recorded after 120 h. Results were analyzed statistical analysis program (SPSS), mortalities were compared with the Tukey test (p≤0.05).

Results: Generally, larval mortality increased with concentration. Sideritis ozturkii extract resulted in 20%, 48.3%, 53.3% and 60% mortalities at 10, 25, 50 and 100 ppm concentrations, respectively. There are no statistical differences at 25, 50 and 100 ppm concentrations. No mortality was observed in control group.

Discussion: According to the obtained results the extract of S. ozturkii showed moderate larvicidal activity. Botanical insecticides are safer for environment, human health and non-target organisms. Thus, more research should be done for developing of botanical insecticides.

Keywords: Culex pipiens, Extract, Larvicidal activity, Sideritis ozturkii.
**Palpimanus orientalis** Kulczyński, 1909 (Araneae: Palpimanidae) is new record for Turkish Spider Fauna

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**Introduction:** The family Palpimanidae contains 144 species from 18 genera and the genus of *Palpimanus* has 36 species being listed in the latest version of the World Spider Catalog (2018). There are only 3 species, *Palpimanus gibbulus* Dufour, 1820, *Palpimanus sogdianus* Charitonov, 1946 and *Palpimanus uncutus* Kulczyński, 1909 known from Turkey. The aim of this study is to contribute the Turkish spider fauna.

**Material and Methods:** In this study, male and female specimens were obtained by aspirator and hand collecting from Kütahya Province in inner Part of Western Anatolia. Examined specimens were preserved in 70% ethanol and deposited in the Arachnology Museum of Niğde Ömer Halisdemir University (NOHUAM). The identification and photographs were made by means of Olympus SZ61 stereomicroscope.

**Result:** The palpimanid spider species, *Palpimanus orientalis* Kulczyński, 1909 is recorded for the first time from Turkey.

**Acknowledgement:** The authors acknowledge the Scientific and Technological Research Council of Turkey (TÜBİTAK) (Project no: 214Z016).

**Keywords:** *Palpimanus orientalis*, New Record, Spider, Turkey
Effects of Dietary Fish and Vegetable Oils on the Growth and Feed Utilization of Rainbow Trout Fingerlings (Oncorhynchus mykiss) at the High Temperature, and Recovery of Survival and Growth by Using Fish Oil Finishing Diets

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Introduction: In the fish feed industry, one of the major issues has been the use of vegetable based oils as alternatives to fish oil due to increased costs of fish oil, which has been due to the reduction of fish stocks and rising demand. Balanced feed rations play an important role for the application of most of the physiological functions for fish. To compose an economical and balanced ration for feed, finding alternative sources of fish oil that can meet the same need of fish fatty acids without causing metabolic deterioration and health disorder will decrease the expenses of the market sector and will benefit the economy. In this study, effects of dietary fish and vegetable oils on the growth and feed utilization of rainbow trout fingerlings (Oncorhynchus mykiss) at the high temperature and recovery of survival and growth by using fish oil finishing diets were investigated.

Material and Methods: Rainbow trout fingerlings were obtained from a commercial trout farm and acclimated in Research and Application Center of Sinop University Fisheries Faculty for one week before the start of the experiment. After acclimatization, fish (mean weight of 11.27±0.01 g) were fasted for a day, weighted and randomly distributed among fifteen fiberglass circular tanks at a density of 17 fish per tank. Five experimental diets were formulated to be isonitrogenous (48%) and isolipidic (17%), but contain different sources of lipids (100% fish (FO, control), canola (CANO), sunflower (SFO), corn (CO) and peanut oil (PNO)). Nine weeks later, the growth-out trial was finished and five fish from each tank were sampled. The finishing diet trial began after feeding rainbow trout fingerlings with FO, CANO, SFO, CO, PNO based diets for nine weeks. After this point, all fish were fed the finishing diet, which had the same composition as the FO diet used in the grow-out trial. The average water temperature in grow-out and finishing diet trials were measured as 17.74±0.01 and 19.28±0.11°C, respectively. Ten fish, remaining per tank, were used for the finishing diet trial. Initial and final samples were stored at -80°C for proximate analysis.

Results: The best growth performance of rainbow trout fingerlings fed the experimental diets in the grow-out trial were determined in CO diet. The survival was 100% in experimental groups, except the control group fed with fish oil (94%). The best growth performance of rainbow trout fingerlings fed the fish oil finishing diets for four weeks, after being previously fed vegetable oil-based diets were detected in PNO diet. while the survival was 100% in all groups fed with vegetable oil diets, it was 54% in control group fed fish oil.

Discussion: However, the best growth was obtained from the group fed with corn oil. death was observed only in the control group among all groups. No deaths were observed from the groups fed with vegetable oils before the end of the experiment at the higher temperature. However, death was quite high in the control group. Mourente et al. (2007) stated that the use of vegetable derived lipids as an alternative to fish oil yielded optimal growth and feed cycle and can also optimize immune system functions of fishes if it is included in the right amounts.

Keywords: Fish oil replacement, sunflower oil, peanut oil, canola oil, corn oil
Introduction: The germination speed indicates seed strength and the high-strength seed germinates faster than the low-strength seed. *Carpinus orientalis* Mill. is native from south-eastern Europe to northern Iran and has wide natural distribution area. It usually can be found on dry lower altitudes than *Carpinus betulus* Mill. Oriental hornbeam is natural distribution area includes Thrace, Aegean, Marmara Region, Northern Anatolia and Eastern Anatolia. Oriental hornbeam has high drought tolerance and usually grows on dry, shallow and stony soils. The purpose of the study, it is determined that germination speeds of oriental hornbeam seeds, which is one of two native species of *Carpinus* genus in Turkey, according to different pre-treatments and altitudes.

Material and Methods: Seed material was collected from Trabzon-Maçka watershed where is a natural distribution area of oriental hornbeam. Seeds were obtained from three different altitude levels (0-400 m, 400-800 m, 800-1200 m), from sea level to highest point of the watershed, and collected from total of 43 trees. Several pre-treatments (seed tip cut; gibberellic acid 100, 250, 500 ppm; citric acid 5000, 10000, 15000 ppm; sulfuric acid 30, 60, 180 min; hot water 10, 30, 60 seconds; cold stratification 4,8,12 weeks; cold stratification 4,8,12 weeks+GA3 500ppm) were applied on oriental hornbeam seeds to overcome seed dormancy which is originated from seed coat and embryo. In all pre-treatments, filled seeds identified through floatation in 96% alcohol were used.

Results and Discussion: As a result of the study, germination speeds among the populations at different elevations and among the pre-treatments of each population were determined. The highest germination speed among the populations was observed in the second population, while the lowest was observed in the third population. Given the germination rates between pre-treatments in each population, the highest germination speeds were found in pre-treatments of citric acid (5000 ppm), GA3 (500 ppm) and cold stratification (4 weeks).

Acknowledgement: We would like to express our appreciation to the Research Fund of the Karadeniz Technical University, which supported this study (Project No: ARGEBD-8962).

Keywords: Oriental hornbeam, germination speed, seed dormancy, pre-treatment
Introduction: Contributed to decomposition and mineralization of dead organic matter for the enhancement of soil fertility, oribatid mites are free-living and the most abundant group among microarthropods in soil. So far, from this group have recorded approximately 11,000 species on the earth. This study have been carried out to determine the oribatid mites of Laçin district.

Material and Methods: Total 107 specimens consisting of litter, lichen, moss and soil were collected during field studies performed on Laçin district (Çorum) in between October 2014 – August 2016. The examined material was extracted with the help of a Berlese-Tullgren funnel extractor. They were fixed and stored in 70% ethanol. The light and scanning electron microscopes (SEM) were used to examine mites. All specimens were deposited in the Biology Department of Bozok University, Turkey.

Results: Four oribatid mite taxa were obtained from Laçin district (Çorum). These are: Rhinoppia (R.) alidagiensis Toluk, 2016, Berniniella (B.) serratirostris hauseri (Mahunka, 1974) and Quadroppia (Q.) quadricarinata (Michael, 1885) and Eupterotegaeus ornatissimus (Berlese, 1908). In conclusion, their morphological features were reviewed along with the SEM images based on our samples.

Discussion: R. alidagiensis, B. serratirostris hauseri, Q. quadricarinata and E. ornatissimus are known from Erzurum, Kayseri, Sivas and Yozgat. Laçin district is the new locality record for these species.

Acknowledgement: This study was supported by the Fund of Bozok University Scientific Research Project (Project no: 6601-FBE/16-1).

Keywords: Oribatid mites, Systematic, Laçin District, Çorum, Turkey.
Description of A New Species of *Cavernocypris* from Texas, U.S.A.

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**Introduction:** There are about three species (*C. coreana* with two subspecies (*C. c. coreana* and *C. c. elongate*), *C. subterranea*, *C. wardi*) in the US. Up to now, living populations of *C. subterranea* and *C. wardi* are known from USA where distribution of *C. wardi* tend to be more common than *C. subterranea* although *C. subterranea* has broader distribution in the world. Most recently, another new species of the genus (*C. danielopoli*) was described from Gosu Cave, South Korea.

**Material and Methods:** The materials were collected with a hand net (100 µm mesh size) from Jelly Bean Spring (8A-1), Camp Bullis, Bexar County, Texas, U.S.A. 17 April 2001. Soft body parts were drawn with a camera lucida and digitized with the aid of Adobe illustrator at the Limnology Laboratory of Abant Izzet Baysal University. Colored photos were taken with a camera attached to a stereomicroscope at the laboratory of Freeman Aquatic Center, Texas State University.

**Results:** *Cavernocypris* n.sp. is proposed as a new species of the genus. The species is the sixth species of the genus described so far. It can be distinguished from the other members of the genus by the shape and length of carapace, presence of robust marginal pore canals on right valve, numbers and length of setae on second antenna, shape of hemipenis, numbers of whorls in Zenker’s organ and differences in other parts of chaetotaxy.

**Discussion:** *Cavernocypris* n. sp. has several different characteristics. However, three of them are needed to be discussed at species and genetic levels such as (i) length ratios (H:L:W) of the carapace, (ii) occurrence and/or shape of inner list in LV, and (iii) length of swimming setae on A2. This is because these characters are mostly used in taxonomic keys and species identification in the literature. After comparing the species with others, it is now clear that *Cavernocypris* n.sp. is a new species of the genus.

**Acknowledgement:** I would like to thank Dr. Mehmet Yavuzatmaca for his help on digitazing the soft body parts. Drs. Benjamin F. Schwartz and Weston Nowlin are acknowledged for providing a working space in their laboratory at Freeman Aquatic Center. It is also important to thank to Dr. James Reddell and M. Reyes (Texas Memorial Museum Invertebrate Zoology Collection) for him to give me his materials. I also thank to Fulbright Research Scholarship program for their support.

**Keywords:** Spring waters, Texas, Podocopida, bisexual population, distribution
Isolation, Characterization and Pathogenicity of an Effective Entomopathogenic Fungi From White Grubs (Coleoptera: Scarabaeidae) in Turkey

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Introduction: Entomopathogenic fungi are important microbial control agent against noxious insects. It is always desired to have better biological control agent from local pest populations. Beauveria (Balsamo) Vuillemin and Metarhizium (Metschnikoff) Sorokin genus are the most common entomopathogenic fungi used in microbial control programs all over the world. White grubs (belonging of Coleoptera: Scarabaeidae) are plenty of underground systems and cause substantially damage to a broad array of plants by feeding on roots. In this study, isolation and characterization of entomopathogenic fungus from A. solstitiale was performed for the first time and assessed the growing ability of high lethal effect indicate the isolates at different temperatures (8, 16, 25 and 37 ºC) and UV exposures (30 and 60 min), and virulence against A. solstitiale.

Material and Methods: Morphological characteristics of fungus isolates were detected from macro- and micro-morphological features of fungal colonies. To determine the molecular identification of fungal isolates, the sequences of ITS1-5.8S-ITS2, RPB1 (RNA polymerase II largest subunit) and β-Tubulin genes region were amplified by polymerase chain reaction (PCR) and subsequently sequenced and detection pr1 gene. Fungal growth at different temperatures (8, 16, 25 and 37 ºC) and UV exposures was determined according to the method described by Bidochka.

Results: According to morphologic and molecular characterizations, the fungal isolates were identified as Metarhizium flavoviridae (As1, As2, As18 and As19). While strains were closely related each other, they displayed different dispersion in phylogenetic analysis. They were isolated from A. solstitiale for the first time. In bioassay, strains yielded varied mortalities. The highest mortality was obtained with As2 as 96% mortality within 15 days at 1x10⁶ conidia mL⁻¹ concentration. The median lethal concentration (LD₅₀) of strain As2 required killing the larvae of A. solstitiale was 0.69 x 10⁶ conidia per milliliter. Our results indicate that Metarhizium flavoviride As2 strain is a very promising biocontrol agent against A. solstitiale pests.

Discussion: We showed that Metarhizium flavoviride strain As2 has numerous potential for further exploratory as a probable fungal biocontrol agent against Amphimallon solstitiale and the other similar pests living in soil-habitats relied on its entomopathogenic effects. However, additional studies to determine the effectiveness of this strain is needed to be done in field conditions.

Keywords: Entomopathogenic fungus, Metarhizium, White grubs, biocontrol
Effects of Different Vermicompost Fertilizer on Corn (Zea mays L.) Antioxidant Activity Under Different Irrigation Levels

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Introduction: Cereals are generally largely consumed worldwide and contribute significantly to antioxidant intake with beneficial health effects. Water deficiency is an increasingly important issue in many parts of the world because of climate change. Various abiotic stresses lead to the overproduction of reactive oxygen species (ROS) in plants which are highly reactive and toxic and cause damage to proteins lipids and carbohydrates. On the other hand very low organic matter content of agriculture soils affects negatively crop production and health. Earthworms are known to have beneficial effects on the physical, chemical and biological properties of soils and contribute to increased plant growth and yield. In this study, it is aimed to determine the effects of water deficiency and vermicompost fertilizer on corn kernel antioxidant activity.

Material and Methods: The experiment was conducted in Aydın province with randomized split plot design. Three different irrigation doses (300, 400, 500 mm) and four different vermicompost doses (0, 100, 200, 300 kg/da) are used to determine corn kernel total phenol content and antioxidant activity. Total phenol content was based on Folin Ciocalteu method using gallic acid as standard. Antioxidant activity was determined by radical scavenging capacity using the DPPH radical.

Results: There are statistically significant differences between applications and examined parameters. Total phenol content changed between 119.825-524.072 µg GAE/g and it is affected poassitively by vermicompost fertilizer and irrigation doses. The highest phenol content was obtained from 500 mm irrigation and 100 kg/da vermicompost combination. The total antioxidant activity values ranged from 23.93 to 39.21% inhibition. 100 kg/da vermicompost dose had the highest value and irrigation doses had no effect on antioxidant activity of corn kernel. As a result 100 kg/da vermicompost fertilizer had the best results in both parameters.

Discussion: As a result of the study vermicompost applications have significant effect on total phenol content and antioxidant activity compared to non applied doses. Vermicompost doses above 100 kg/da had a negative effect on antioxidant activity. Higher irrigation doses lead to a possitive effect on total phenol content of corn in the experiment.

Keywords: Corn, earthworm, vermicompost, irrigation, antioxidant
Investigation of The Plant Extracts of Brassica oleracea var. capitata f. alba L., Brassica oleracea var. capitata f. rubra and Brassica oleracea L. var. acephala on Some Microorganisms

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Introduction: Brassica oleracea var. capitata f. alba, Brassica oleracea var. capitata f. rubra and Brassica oleracea var. acephala known as white, purple and black cabbage, respectively, are winter vegetables which belong to Brassicaceae family. B. oleracea is a good carotene source. It is rich in vitamins A, B1, B2, B3, B5, B6, C, calcium, copper, iron, manganese, phosphorus, potassium and zinc. It contains a lot of antioxidant compounds. According to the researchers, regular consumption of cabbage decreases the risk of colon cancer. B. oleracea var. capitata f. rubra strengthens the immune system and contains high amounts of C and K vitamins, and sulphur. It also has antioxidant properties. B. oleracea with dark green leaves is rich in vitamins and minerals. It has antioxidant and photochemical properties. It helps to reduce the risk of many cancers and cardiovascular diseases. In this study, it was aimed to investigate the antimicrobial effects of various pathogenic microorganisms by extracting active compounds of three plants with different solvents.

Material and Methods: The plants were powdered with liquid nitrogen. Ten grams of this material was added separately in 100 mL of acetone, n-hexane and ethyl acetate. Then the mixtures were agitated with shaker for a period of 72 hours. They were filtered through Whatman no 389 filter paper. Under aseptic conditions the extracts were sterilized by 0.45µ-pore size diameter filters and stored at 4°C. To test the antimicrobial activity of each extracts, Mueller Hinton Agar medium (25 mL) was poured into each petri plate and was inoculated with 0.1 mL broth culture of bacteria or yeasts. Then using sterile cork borer of 6 mm diameter, wells were bored into the seeded agar plates and were loaded with a 50 μL volume of extracts.

Results: B. oleracea var. capitata acetone extract showed antimicrobial effect while other extracts showed no effect. Acetone extract showed 11 mm activity against Pseudomonas aeruginosa ATCC 35032 and Klebsiella pneumoniae ATCC 13882. Acetone extract of B. oleracea var. rubra showed the highest activity (12 mm) against Escherichia coli ATCC 35218, lowest effect on Candida utilis ATCC 9950 (8 mm). Hexane and ethyl acetate extracts showed no effect on any microorganisms tested. B. oleracea var. acephala ethyl acetate and acetone extracts showed its highest activity on Pseudomonas ATCC 35032 (13 mm) while it showed 10 mm activity against Enterobacter aerogenes ATCC 13048, Serratia marcescens ATCC 13880 and Klebsiella pneumoniae ATCC 13882.

Discussion: It can be seen from the results that B. oleracea varieties have activities between 8 – 13 mm against tested microorganisms. Neither of the hexane extracts showed any antimicrobial activity. This can be due to hexane’s non-polar property. Further research must be conducted to reveal active compounds so they can be studied and used more effectively.

Acknowledgement: This research was carried out in Microbiology Laboratory of Adnan Menderes University.

Keywords: Brassica oleracea, Brassica oleracea var. capitata f. rubra, Brassica oleracea acephala, Antimicrobial Effect
POSTER PRESENTATION

Electrodeionization and Electrodeionization Reversal Processes And Operating Parameters

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Introduction: The Electrodeionization (EDI) process is a hybrid process that involves the ion-exchange membrane and ion-exchange resins, which use electrical potential difference as a driving force. The system consists of anion and cation exchange membranes arranged between the anode and the cathode and ion exchange resins added to the dilute compartment for the purpose of increasing the conductivity. Water is separated into H⁺ and OH⁻ ions by the electrical current during the process. These ions are responsible for the regeneration of the resins without chemical need. EDIR is an also separation process by reversing the polarity of the electrical current periodically that applied in the EDI process. The deposition of the substance on the membrane surface is also relieved by reversing the current polarity. EDI and EDIR processes performance can be affected by the operating parameters such as applied voltage, flow rate, pollution concentration, and electrolyte solution. The aim of this study is to determine the cell design and parameters that affecting the performance of the EDI and EDIR processes.

Material and Methods: In this study, EDI and EDIR cell have been designed. For this purpose, 5 compartment EDI cell were provided by commercially. Anion and cation exchange membranes were arranged between anode and cathode sequentially. The cation exchange resin was added to the dilute compartment for increasing the conductivity. After the process design was completed, operating parameters were determined and the effects on the system were investigated.

Results: Two anion and two cation-exchange membranes were used in the EDI cell. The arrangement of the membranes provides two dilute water flows and one concentrated water flow. Cell design was made for the purpose of obtaining high purity product water. It is very important to determine the operating parameters that affecting the process. As the applied voltage increases, ionic mobility increase and higher removal efficiencies are achieved in a shorter time. However, using of high voltage causes the high energy consumption. It has been determined that EDI process has higher removal efficiency at low voltages in some studies. As the initial pollutant concentration increases, the ionic transportation increases. However, high concentrations also cause the membrane fouling. Ions have short contact time at high flow rates. Besides ion transition from membranes and resins becomes more difficult when flow rate is too low. Increasing of the concentration of the electrolyte solution leads to increase of ion mobility and current. In addition to this, very high concentrations can cause extra ionic charge on the membrane.

Discussion: Operating parameters are significant for high removal efficiency of EDI and EDIR processes. EDI and EDIR operate at optimum conditions in order to increase the removal efficiency and decrease the energy consumption of processes. Optimum values must be found and implemented for all changing conditions because of an economical and efficient removal operation. Thus, the usage area of the electromembrane processes, which are known as high energy consumption and the non-waste treatment techniques, will be widespread.

Acknowledgement: We would like to express our appreciation to the Bulent Ecevit University Scientific Research Project Commission, which supported this study (BAP-2014-77047330-04).

Keywords: Electrodeionization, Electrodeionization Reversal, Wastewater Treatment, Operational Parameters.
Contribution to the inventory of Macrophytes of the Upper Oum-errbia river Basin

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Introduction: The present study of aquatic macrophytes has been undertaken in the upper Oum-errbia river basin. It is part of an initiative aimed at the biological assessment of water quality in a river system. The study area is drained by several rivers that are influenced by different sources of pollution (wastewater, fertilizers, and pesticides). These sources have consequences for water quality, composition and structure of river ecosystem organisms. Given this ecological imbalance, some policies for the management and evaluation of water resources quality should be given priority. The aim of this study is to evaluate the current macrophyte species richness of Oum-errbia river and its tributaries. The results obtained will then empower us to evaluate the biological quality status of surface water using Macrophytes as bioindicators of the quality of the hydrosystem based on the NF T90-395 Standard.

Material and Methods: The study was carried out in the upper Oum-errbia river. At first, seven stations have been selected to study the aquatic macrophytes of this watercourse and to acquire the maximum data on their diversity and ecology. Sampling of vegetation was carried out during 12 missions spread between April 2017 and July 2017. A transect in zigzag of 100 m was performed in every station according to the longitudinal gradient of the watercourse. The abundance of species was estimated based on a five-degree scale using the BRAUN-BLANQUET cover/abundance coefficients.

Results: During the whole study period, a total of 16 macrophytic plant species belonging to 14 families were found. The study area is dominated by the grouping of algae followed by phanerogams and then bryophytes. The most abundant taxa are Potamogeton pectinatus and Tabellaria sp. The Cladophoraceae family represents the highest proportion of all the stations studied. The least abundant taxa were Helosciadium nodiflorum, Nasturtium officinale, Stigeoclonium tenue, Brachythecium rivulare, Ceratophyllum demersum, Groenlandia densa, Spirogyra sp., Vaucheria sp., Zannichellia palustris, Callitriche obtusangula, Myriophyllum spicatum whereas Persicaria amphibia has an negligible presence.

Discussion: The results of inventory showed the presence of a limited number of species (16 in total), but it reflected a highly specific conditions of the study area. Different species have little or poorly known ranges, thus, in the study area, it might be necessary to increase the number of sampling stations and studying the physicochemical conditions of each station.

Keywords: Inventory, Macrophytes, Upper Oum-errbia river Basin.
Introduction: Heavy metals are one of the most important pollutants in aquatic systems. High metal levels in surface water can pose a health risk for humans and the environment. When heavy metal concentrations are high, they can have negative effects on aquatic life. Consumption of aquatic food that contains toxic metals may cause health problems. There are a number of methods to purify water and remove toxic metals; phytoremediation is one of them. Phytoremediation uses plants to remove pollutants, including heavy metals from the environment. Plants can accumulate heavy metals in their tissues and, therefore, can be used to purify water. In this study, we aimed to determine the bioaccumulation of the heavy metals zinc (Zn) and copper (Cu) in the free-floating plant *Azolla filiculoides*.

Material and Methods: The experiment was carried in November 2016 at Wageningen University & Research, Netherlands. The experiments were performed in the laboratory in small aquaria (15x15x25 cm) filled with 4.5 liters of water. The bioaccumulation of Zn and Cu were studied using *Azolla filiculoides*. The experiment had a control-impact design. In the treatment series, three individual metal concentrations for Zn; (400, 200, 100 µg L\(^{-1}\)) and, three for Cu; (100, 50, 25 µg L\(^{-1}\)) were used. Furthermore, a third set of combined Zn and Cu mixture was used concentrations 400 µg L\(^{-1}\) Zn + 100 µg L\(^{-1}\) Cu (high), 200 µg L\(^{-1}\) Zn + 50 µg L\(^{-1}\) Cu (medium), 100 µg L\(^{-1}\) Zn + 25 µg L\(^{-1}\) Cu (low). A fourth treatment group contained only effluent water and one control group was included with only plants and no metals. There were only plant species and water in this treatment group. The WC-medium(Combo – animate +TES) was added as a nutrient at the start of the experiment. The experiment was done with 3 replicates of each and run for 15 days. *Azolla filiculoides* and water samples were treated with HNO\(_3\) in the HACH HT200S thermostat and then analysed with a HACH 3900 spectrophotometer. LCK 529 and LCK 360 cuvette test were used respectively for Cu and Zn metal concentrations. Next, bioaccumulation factor was calculated (Zayed et.al., 1998).

Results: The bioaccumulation factor for Cu in *Azolla filiculoides* was higher than 1000.

Discussion: A bioaccumulation factor (BAF) over 1,000 is considered positive in phytoremediation. *A. filiculoides* proved to be effective for the bioaccumulation of Cu. Therefore, *Azolla filiculoides* can be accepted as a bioaccumulator plant for Cu.

Acknowledgement: We would like to express our appreciation to Wageningen University and Research and The Scientific and Technological Research Council of Turkey (TUBITAK 2214-A)

Keywords: Copper, *Azolla filiculoides*, bioaccumulation.
Investigation of Antimicrobial Effect of Some Species of *Euphorbia* (Euphorbiaceae)

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Introduction: The genus *Euphorbia* (Euphorbiaceae) is represented by 118 taxa in Turkey. Some species of *Euphorbia* are also used in the food making factories and are widely used in traditional Chinese medicine. The main objective of this study is to evaluate the antimicrobial effect of ethanol solution extracts of two *Euphorbia* species (*E. helioscopia* subsp. *helioscopia*, and *E. paralias*) on fourteen gram positive and negative bacteria (*Bacillus subtilis*, *Enterococcus faecium*, *Enterococcus faecalis*, *Enterobacter aerogenes*, *Escherichia coli*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Salmonella infantis*, *Salmonella typhimurium*, *Salmonella Kentucky*, *Salmonella enterica*, *Pseudomonas aeruginosa*, *Pseudomonas fluorescens*) and one fungi (*Candida albicans*).

Material and Method: Different parts (flowers, leaves, stems, and roots) of *Euphorbia* samples, were extracted with 60% ethanol solution. These extracts were tested *in vitro* for their antimicrobial activity against 15 microorganisms by disk diffusion (DD) and minimum inhibitory concentration (MIC) tests.

Results: Ethanol extracts showed antimicrobial activity against some bacteria. According to the results of disk diffusion test *E. helioscopia* subsp. *helioscopia*, *E. paralias* have effect on three bacteria (*S. aureus*, *S. epidermidis*, *E. faecium*, *E. faecalis*, *P. fluorescens*) and (*C. albicans*) and didn’t show effect on other microorganisms. The strongest antibacterial effect observed in 100 µL extract of *E. paralias* against *E. faecium* with 17 mm zone diameter the lowest antibacterial effect observed in 10 µL extract of *E. helioscopia* subsp. *helioscopia* against *S. aureus*, 50 µL extract against *S. epidermidis* with 7 mm zone diameter. MIC result for *E. helioscopia* subsp. *helioscopia* equal to 50 mg/ml against *C. albicans* and 100 mg/ml against *E. faecium*, *S. aureus*, *S. epidermidis*. *Euphorbia paralias* showed MIC value equal to 100 mg/ml against *C. albicans* *E. faecium*, *S. aureus*, *S. epidermidis*, *S. faecalis* and *P. florescens*.

Discussion: This is the first results for *E. paralias*. In previous studies it is observed that *E. helioscopia* subsp. *helioscopia* showed activity against *S. aureus*, *E. coli*, *C. albicans*. In this study *E. helioscopia* subsp. *helioscopia* didn’t show activity against *E. coli*. We mentioned that this is result of different ecological factors of collected localities.

Keywords: *Euphorbia*, Euphorbiaceae, Antimicrobial effect, MIC, Disk diffusion
Introduction: Nanotechnology is a fast-developing technology field that has many potential applications. Nanoparticles (NPs) have been studied for the evaluation of cell toxicity, cytotoxicity, and genotoxicity in living organisms. This study aims to determine the genotoxic effect of zinc oxide titanium nanocomposite (ZnO-TiO2)NCM in peripheral blood lymphocyte cell culture by using structural and numerical chromosomal abnormalities (CA) and micronucleus (MN) assay tests.

Materials and Methods: Stock solution of (ZnO-TiO2)NCM was prepared by dispersing the powders of the NPs in deionized water and vortexed for 20 seconds. Human lymphocytes were stimulated by (ZnO-TiO2)NCM and cultured for about 72 h. Increasing concentrations of zinc oxide titanium nanocomposite (12.5, 25, 50, 100 and 125mg/L) were used in 24 and 48 h. Evans (1984)’s technique was used for determinate CA and Fenech (2000), Rothfuss et al., (2000) and Kirsch-Volders et al. (2003) procedures were used to detect MN rate in peripheral blood lymphocyte cell cultures.

Results: The formation of abnormal cells in all (ZnO-TiO2)NCM treated groups at 24 and 48 h was significantly increased compared to the negative control group. On the contrary, compared to the negative control group, mitomycin C caused a considerable increase in CA and MN frequencies.

Discussion: There were no studies about the genotoxicity of (ZnO-TiO2)NCM in human peripheral blood lymphocyte cell culture. The present results clearly revealed that (ZnO-TiO2)NCM had a potential genotoxic effect on human blood cell cultures. The possible reason for this toxic effects in the study may be due to the application dose, period and size of the nanoparticles.

Acknowledgments: This study was supported by Ordu University Research Foundation. The authors would like to thank Ordu University for financial support for the project [Project Number:2014/AR1405].

Keyword: ZnO-TiO2 nanocomposite, Human blood, Genotoxicity, Cytotoxicity
A Compilation on the Phytosociological and Phytoecological Structure of Pinus nigra subsp. pallasiana var. pallasiana Associations in the Transition Region of Middle Black Sea and Central Anatolia

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Introduction: The distribution of Pinus nigra subsp. pallasiana var. pallasiana, is highly seen in different regions of Anatolia and on the Taurus Mountains and on the different soil types of west and North Anatolian mountains. In this study, the phytosociological and ecological structures of P. nigra subsp. pallasiana var. pallasiana associations distributed on some mountains located in the transition area of Middle Black Sea and Central Anatolia. The names of the areas are: between Amasya-Yozgat-Çorum, the Eğerli Mountain-Amasya, the Karaömer Mountain-Amasya, the İnegöl Mountain-Amasya, the Tavsan Mountain-Amasya. It is tried to explain the phytosociological and phytoecological characters of the mentioned associations.

Material and Methods: In this study, the phytosociological and ecological features of P. nigra subsp. pallasiana var. pallasiana associations were investigated depending on the researches carried by Ketenoğlu & Aydoğdu, 1994, Cansaran & Aydoğdu, 2001, Cansaran et al., 2010, Yıldırım & Kılınç, 2011 and Yıldırım et al., 2014. The syntaxonomic categories were compared at different regions. These associations were also compared related to the altitude that they distribute, the bedrock that they grow, the soil that they grow, general coverage, direction and slope.

Results and Discussion: According to the result, the distribution of P. nigra subsp. pallasiana var. pallasiana associations is seen on some of the mountains located in the transition region of Middle Black Sea and Central Anatolia at 1034-1600 m. altitudes on limestone, schist and andesite bedrocks and brown forest and alluvial soils. The ratio of the general coverage of the associations is 65-100 % and their distribution is in the north, northeast, northwest, east, southeast, southwest and west directions. The slope of the distribution areas is 20–40 degrees. The researchers categorised P. nigra subsp. pallasiana var. pallasiana associations into "Quercetea pubescentis" class, into "Querco cerridis–Carpinetalia orientalis" order and "Quercion anatolicae" and “Carpino betuli–Acerion hyrcani” alliance.

Keywords: Pinus nigra subsp. pallasiana var. pallasiana, phytoecology, phytosociology, Turkey
Toxicity of *Pittosporum tobira* Acetone Extract on *Culex pipiens* Larvae

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**Introduction:** *Culex pipiens* L. (Diptera: Culicidae) is the most widely distributed mosquito worldwide and it is a potential vector of West Nile fever. According to the many reports that *Cx. pipiens* develop resistance to many synthetic insecticides in a short time. Insecticides that are derived from plants extracts and essential oils have been used for centuries. Usually, it takes longer for mosquitoes to develop a resistance to plant-based pesticides because these pesticides have broad or non-specific mode of actions. The aim of this research was the determine the insecticidal activity of the acetone leaf extract of *Pittosporum tobira* (Thunb.) W.T. Aiton (Pittosporaceae) against second instar larvae of the house mosquito, *Cx. pipiens* under laboratory conditions.

**Material and Methods:** Leaves of the shrub were collected from the Campus of Akdeniz University, Turkey in April 2015. The leaves were dried in the shade at room temperature for 2 weeks. After that, they were grounded into small pieces by employing blender. For extraction 100 g of leaves sample was soaked in one liter of acetone and incubated at room temperature for 72 h. After this period the extract was sieved into a clean jar and kept in the refrigerator until larvicidal assays. Four concentrations (62.5, 125, 250 and 500 ppm) of the extracts were prepared in 250 ml water. Larvicidal activity tests were performed according to the WHO recommendations with some minor modifications. Twenty larvae (second instar) were used for each concentration with three replicates. Mortalities were recorded after 5 days. Analyses were made using SPSS Statistical program and percent mortalities were compared with the Duncan test (p≤0.05).

**Results:** Larvicidal effect enhanced with concentration and exposure time. It was seen that mortalities were 1.85%, 9.26%, 20.37% and 68.52% at 62.5, 125, 250 and 500 ppm concentrations, respectively. There are no statistical differences with control group, 62.5, 125 and 250 ppm concentrations. The most effective concentration was found as 500 ppm.

**Discussion:** *Pittosporum tobira* leaf extract showed low larvicidal activity according to the results. Because many botanical insecticides do not have negative effects on human health and non-target organisms, they can be used safely for pest control. Therefore, more studies should be done in order to explore new botanical insecticides.

**Keywords:** *Culex pipiens*, Larvicidal activity, Leaf extract, *Pittosporum tobira*. 
Introduction: This study has been conducted in the coastal dune in the delta of Gönen in order to point out the problems of the environment from the view of flora, fauna, and ecological observations. At the end of the study, there has been offered solutions on the damaging factors of the biodiversity in the area.

Material and Methods: The study has been completed between 2016-2017. There has been research and observations done within the four seasons in order of fauna and flora of the area.

Results: Delta of Gönen is not the best RAMSAR area, however it is a very significant wet land. The area has the potential to become a world known wet land for its population of little Karabatak species and its Pelican species. Even though the area has all the richness of species in the wet land, the Gönen Delta still has conservation problems of the land. Especially the anthropogenic factors get the attention. These areas have been deteriorating and polluted quickly due to several factors such as; usage of sand from the coastal area, industries in the area, leaking sewage to the sea, and the farming in the area. There has been an intensive amount of Celtic Farming. Farming in this area give access to nutritive elements to the wet lands. There has been constant usage of the streams in the surrounding areas in order to provide water, seeds, and pesticides for farming. Especially the ladder industry has been extremely damaging to the streams and wet lands.

Discussion: The main causes of the ecological problems in the area are the absence of audit and unconsciousness. Due to these reasons, it is very important to teach the population of the surrounding areas the importance of the wet lands in the Gönen Delta for to bring consciousness to the issues.

Keywords: Balıkesir, Biodiversity, Ecology, Flora, Gönen, Halophytes, Dune.
Research on Crambidae (Lepidoptera) Fauna of Adıyaman Province

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Introduction: Crambidae is the largest family under super-family Pyraloidea with approximately 10000 described species across the World. The aim of this study is to determine the species belonging to the Crambidae (Lepidoptera) fauna which were distributed in Adıyaman.

Material and Methods: Adult materials were collected between March and August 2015-2016 using different altitudes, different climatic conditions and different types of vegetation owners. In the collection of samples to be much more active species that Pyralidae night 3 different methods have been used. Robinson type and white light trap were installed and during the day they were collected with the standard insect net over the plants they were host to. Collected samples were stored in Gaziantep University Entomology laboratory.

Results: As a result of this study, three subfamily of Crambidae, 13 genera and 16 species [Angustalius malacellus Duponchel, Aporodes floralis (Hübner), Cynaeda dentalis (Denis & Schiffermüller), Cynaeda superba (Freyer), Dolicharthria burigeallis (Duponchel), Dolicharthria punctalis (Dennis&Schiffermüller), Epascestria cruentalis (Geyer), Epascestria pustulalis (Hübner), Hellula undalis (Fabricius), Metasia octogenalis Lederer, Nomophila noctuella (Denis & Schiffermüller), Ostrinia nubilalis (Hübner), Palpita unionalis (Hübner), Pleuroptya balteata (Fabricus), Tegostoma baphialis (Staudinger), Udea ferrugalis Hübner] have been identified from study region. Species listed alphabetical order. Materials examined, adult figures and zoogeographic distribution of each species will be presented.

Discussion: There is no study in Adıyaman province to determine fauna of Crambidae. All species were recorded for the first time from Adıyaman. Results of this study will be an important source for next studies.

Acknowledgement: We thank the Gaziantep University Scientific Research Projects Department (BAP) for all support (Project Number: FEF 14.04.).

Keywords: Lepidoptera, Crambidae, Fauna, Adıyaman.
Investigation of the Meat Yield and the Length–Weight Relationships of Freshwater Crayfish (*Pontastacus leptodactylus* Eschscholtz, 1823) Population in Kocahıdır Reservoir (Edirne, Turkey)

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**Introduction:** Although the increased demand to consumption of marine products observed in recent years mainly stems from the demand to fish, freshwater crayfish can also be considered to be among the important aquatic species because of their quality of nutritional contents and economic values. They are equally important in both import and export markets and mostly have a higher market price. This study aims to investigate the length–weight relationships and meat yields of the freshwater crayfish living in Kocahıdır Reservoir.

**Material and Methods:** The freshwater crayfish samples were collected using fyke nets in a monthly basis between July 2015 and June 2016. A total of 653 crayfish (398 males and 255 females) were used in the study. The samples were stored in a humidified styrofoam and brought to the laboratory in the Faculty of Marine Sciences and Technology at Çanakkale Onsekiz Mart University. Morphological measurements were all performed by standard methods.

**Results:** Female individuals consists 39.05% and male samples consists 60.95% of the whole collected samples. Average carapace length and total weight in females were observed to be 57.58 mm (min 38.99 mm, max 78.9 mm) and 40.43 g (min 11.13 g, max 90.01 g) respectively. Those values in males were observed to be 61.04 mm (min 37 mm, max 89.06 mm) and 53.45 g (min 10.16 g, max 165.61 g). A negative allometric growth was detected in male and female specimens in terms of carapace length and weight relationship.

**Discussion:** The study reveals a great deal of differences between carapaces length, carapaces width, carapaces weight, abdomen width, abdomen weight, chela length, chela width, chela weight, and total weight properties of male and female individuals. The ratio for specimens over the allowed length for capturing (≥100 mm) was detected 80.7% and this greatly differs from the other studies in the literature. Also, they show no sign of lesions which might be indications of pathological conditions or cause of disease in terms of metric and meristic characteristics. In conclusion, it can be plausible to assume that the freshwater crayfish species living in the reservoir could be used as broodstock individuals.

**Acknowledgement:** This study is a part of MSc thesis of Fatih Boyalık from Department of Basic Sciences, Graduate School of Natural and Applied Sciences at Çanakkale Onsekiz Mart University.

**Keywords:** Kocahıdır Reservoir, Freshwater crayfish, Length-weight relationships, Meat yield
**Assessment of Antimicrobial effect of Remazol brilliant orange 3r**

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**Introduction:** Synthetic dyes are extensively used in textile dyeing, paper printing, color photography, pharmaceutical, food, cosmetic, and leather industries. It is estimated that 280,000 t of textile dyes are discharged in textile industrial effluent every year worldwide. Remazol brilliant orange 3r is one of reactive dyes which used to treat textiles. Remazol brilliant orange 3r is using in dyeing textile fibres, particularly, wool, viscose and synthetic fibers. This study was aimed to investigated the antibacterial effect of Remazol brilliant orange 3r on *Escherichia coli* and *Bacillus subtilis* with MIC, MBC and disc diffusion methods.

**Material and Methods:** In this study dilution method was used to detecting the minimum inhibitory concentrations (MIC) and minimum bactericidal concentrations (MBC) of the test substance. For disc diffusion analysis Remazol brilliant orange 3r was tested at 12.5, 25, and 50 µg doses.

**Results:** The result of this study showed that the MIC values of Remazol brilliant orange 3r on *Bacillus subtilis* was 100 µg/ml, and MBC values was 1600 µg/ml and MIC values of Remazol brilliant orange 3r on *Escherichia coli* is 75 µg/ml, and MBC values is 800 µg/ml. The result obtained from disc diffusion test showed that Remazol brilliant orange 3r does not antimicrobial activity on *Bacillus subtilis* and *Escherichia coli*. The diameter of inhibition zone at all concentration was zero mm.

**Discussion:** It can be concluded that Remazol brilliant orange 3r do not pose a potential risk for nature. However, it must be evaluated with different studies.

**Keywords:** Antibacterial Activity, Bacillus subtilis, Escherichia coli, Remazol brilliant orange 3r.
Observations on the Ecology and Flora of the Serpentine Soils in Kahramanmaraş

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Introduction: Turkey has a rich structure in terms of floristic diversity and endemism. The contribution of edaphic structure to biodiversity is quite large. Serpentine soils, despite their low reproducitvity have natural flora that contain many endemic species specific to local habitats. Serpentine soils which contains significant amount of magnesium are not suitable for plant growth but on these soils some plants which are adapted to difficult ecological conditions with genetic solutions are emerging. These unique plant groups also represent economic value, while some plants are seen as an important potential way to clear soils contaminated with human-derived metals such as industry and mines. The subject of this research is the flora of the serpentine fields in Kahramanmaraş province with the ongoing project study of these plants and the soils and their ecological characteristics.

Materials and Methods: Plant samples were collected during the two years (2016-2018) and in the vegetation period on the examination areas. The obtained plant samples were pressed, dried and identified according to the herbarium technique. After the general flora was determined, the conservation biology of the local endemics in the flora was studied and the biotic and abiotic factors that threatened the spread of the species were examined for this purpose. In addition, hyperaccumulate characteristics of the plants which are specific to serpentine habitats are investigated for heavy metals.

Results: In the scope of the conducted project land studies that planned are continuing. According to the findings so far, 300 plant samples were collected from the locations where eight serpentine soil formation which are determined in the region was observed in the area. When the flora of the area is evaluated according to the determined taxa; Brassicaceae (19%) on the family basis was the first place, followed by Caryophyllaceae (15%), Fabaceae (14%) and Asteraceae (10%). The rate of endemism is 12%. Some of the plants’ which are detected in the area Nickel hyperaccumulate feature is determined and the most successful plant types that attract attention are Alyssum filiforme Nyár and Thlaspi elegans Boiss..

Discussion: This study is the first study on the flora of the serpentine soils in Kahramanmaraş. It is also important that the conservation biology and ecology of the endangered species in the studied serpentine areas are studied. In addition, the database to be created for such areas will be made later in our country and will allow comparison with similar studies in the world. Again, this study will contribute to the few studies carried out on conservation biology of threatened plant species in our country and will lead the way to similar studies in the future.

Acknowledgement: We would like to express our appreciation to the Kahramanmaraş Sütçü İmam University Scientific Research Project Commission, which supported this study (KSUBAP-2015/3-89M).

Keywords: Serpentine, Flora, Hyperaccumulator, Nickel, Kahramanmaraş
The Characteristics of Serpentine Soils in Kahramanmaraş

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Introduction: Flora of Turkey attracts attention because of the large number of endemic species also contain besides the richness of the species that it has. One of the important reasons of the level of endemism rate in Turkey is due to the diversity of the plant growth areas. The different types of soil causes differentiation of plant formations and species diversity. The most important features of the serpentine soils stated as poorly growing vegetation, high endemism rate and different vegetation type. The soils which have serpentine as bedrock dissociate difficultly and have a shallow-stony structure. Serpentine soils which consist significant amount of magnesium are not suitable areas for plant to grow. Only the plants, which are adapted to these conditions and specified in these areas, exist. In this study, the information about the soil structure of the serpentine areas in Kahramanmaraş province is given.

Material and Methods: The disturbed and undisturbed soil samples were taken from the surface (0-30 cm) and subsurface (30-60 cm) layers from the areas which have serpentine soil structure. For the purpose to reveal the fundamental characteristics of the soils which are formed on serpentine; maximum water holding capacity (MSK), pH, lime, organic matter, useful Phosphorus-Magnesium-Calcium assays with heavy metal (Ni, and Pb) and obtainable micro element (Zn) assays were made.

Results: The productivity of the serpentine soils are a limited structure due to the reasons Ca/Mg imbalance, Ni and Pb toxicity, inadequate nutrients for plants. It is determined from the soil samples that taken from study areas, that the areas which have the highest heavy metal rate (Ni, Pb) are Hacınınoğlu, Tevekkeli and Sarıkaya and the ones which have the lowest rate are Dadağlı and Afşin regions. Başdervişli and Sarıkaya regions have the highest value on calcium amount and it is determined that Dadağlı region has the lowest rate. In the study, the characteristics of the soil structure is given with tables as comparatively at the regional level.

Discussion: The serpentine soils which are rich in heavy metals contains high rate of Mg but it is poor from some of the main nutrition such as Ca, K, P. It is important to evaluate edaphic conditions together with plants that grow in such soils. The obtained results from this study which is about serpentine soils structure on Kahramanmaraş province is important for nature conservation studies and biotope mapping of such soil characters in other provinces. Also it will constitute data for protection biology studies and for the studies to reveal National and local natural potentials – richness.

Acknowledgement: We would like to express our appreciation to the Kahramanmaraş Sütçü İmam University Scientific Research Project Commission, which supported this study (KSUBAP-2015/3-89M).

Keywords: Serpentine, Soil, Kahramanmaraş.
Research on Pyralidae (Lepidoptera) Fauna of Malatya Province

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Introduction: Pyraloidea is divided into two families, Pyralidae and Crambidae and 16,500 described species across the world. Wingspan of most of the species belonging to this family are usually about 15 mm. Compared with body size makrolepidopter property it carries but are separated by a lack of rear wings cup vein as different from them. At the bottom of their abdomen, they have a tympanal organ, just like the Geometridae family. In this study, fauna of Pyralidae has been determined in Malatya province.

Material and Methods: Adult pyralidae specimens were collected with 3 different methods in Malatya province between 2015-2016 years. Robinson type, white light trap and standard insect net have been used to collect adult samples. Collected samples are preserved in Gaziantep University Entomology Museum.

Results: As a result of this study, three family Pyralidae, 6 genera and 8 species [Etiella zinckenella (Treitschke), Lamoria anella (Denis & Schiffermüller), Myelois cirumvoluta (Fourcroy), Myelois pumicosa (Lederer), Synaphe consecretalis (Lederer), Synaphe moldavica (Esper), Synaphe punctalis (Fabricus)] of Pyralidae moths have been identified from study region. Species listed alphabetical order. Material examined, adult figures and zoogeographic distribution will be presented.

Discussion: There is no comprehensive study in Malatya province to determine fauna of Pyralidae. Result of this study will be an important source for next studies.

Acknowledgement: We thank the Gaziantep University Scientific Research Projects Department (BAP) for all support (Project Number: FEF 14.04.).

Keywords: Pyralidae, Lepidoptera, Fauna, Malatya.
Investigation of Heavy Metal Contamination in Cubuk II Reservoir

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Introduction: The population has increased with the industrialization that started in Europe in the 18th century and continues today in all continents. Therefore, the construction of reservoirs has become a necessity all over the world for drinking water, irrigation, and generating power. While some problems are being solved by converting the streams from the lotic system to the lentic system, it may pose many problems as well. Some of these are urbanization and the inflow of agricultural and industrial wastes into rivers and their access to dams. Our objective of this study was to investigate the heavy metal accumulation and quality status of Cubuk II Reservoir.

Material and Methods: Water and sediment samples were taken from five different stations seasonally in Cubuk II Reservoir which its construction was completed in 1964 to supply drinking water requirements for Ankara. The accumulation of heavy metals in the water (As, Ba, Cr, Cu and Li) and in the sediment (As, Cu, Cr, Pb, Zn, Ni, Mn, Fe and Al) of the reservoir were investigated by ICP-MS. Shapiro Wilk and Spearman Correlation Test were used to test metal accumulations between seasons and stations.

Results: Heavy metals and metalloid accumulations in sediment and water were Fe > Al > Mn > Zn > Ni > Cr > Cu > As > Pb and Ba > Cr > Li > Cu > As, respectively. According to correlation analysis, although there were strong interactions between metals, the strongest and significant correlation in sediment was between Ni – Cu (r=0.942, p < 0.01), and between Li and Ba (r=0.906, p<0.01) in water. It was observed that 2nd station for water and 3rd station for sediment accumulated more metal than the others during the year. It was determined that more metal accumulated in summer for the water and in spring for the sediment.

Discussion: The water quality of Cubuk II Reservoir which still provides some of the drinking water needs of Ankara, is seen 1st class quality according to Water Pollution Control Regulation of the Ministry of Forestry and Water Affairs. It is thought that to be surrounded by the agricultural areas caused more metal accumulation in the 2nd station and it is also predicted that the highest accumulation of metal in sediment in summer may be due to stratification (stagnation) and increased evaporation.

Acknowledgement: We would like to express our appreciation to the Ordu University Scientific Research Project Commission, which supported this study (AR-1509-2016).

Keywords: Sediment, water, heavy metal, metalloid, Cubuk II Reservoir
Observation of Morphological Variation in *Haplodrassus dalmatensis* and *Haplodrassus signifer* (Araneae: Gnaphosidae)

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**Introduction:** Gnaphopsid spiders are known as the ground spiders and they are one of the biggest spider families of the World. They have identified 45 genus inside 30 species in our country and are represented by 2216 species belonging to 122 genera in the world. Family members generally live on terrestrial areas, under stone, rock and on the dried plants. In this study were investigated ecological preferences and morphological variations of specimens *Haplodrassus signifer* (L. Koch, 1839) and *Haplodrassus dalmatensis* (L. Koch, 1866) belonging to Gnaphosidae family.

**Material and Methods:** Spiders were collected by different methods (catching by hand, aspiratory, pit trap and sweeping) between 2007-2016 from Kahramanmaraş, Adıyaman and Gaziantep provinces. Specimens stored in 96% ethanol at -20 °C. They were caught from different altitude biotopes as pines forest, fire-influenced biotopes, rocky-stone areas, grassland and near water. The collected material were deposited in the University of Gaziantep, Zoology Museum (GAUZM). Morphological identifications were based on reference publications on the taxonomy of Palearctic region spiders with species nomenclature following the World Spider Catalog.

**Results:** In the result of study, specimens belonging to *Haplodrassus dalmatensis* and *H. signifer* were examined morphologically. Colour differences were observed between prosoma and opisthosoma depending on altitude.

**Discussion:** In female, the spacing between ring ducts is not standard and spermatheceae are shaped ring and oval. In male, genitalia is not different intraspecific. The morphological changes of *H. signifer* and *H. dalmatensis* are depend on ecology and altitude.

**Acknowledgement:** The authors are grateful to Gaziantep University, Department of Scientific Research Projects (FEF.10.06) for financial support.

**Keywords:** Spider, *Haplodrassus dalmatensis*, *Haplodrassus signifer*
Determination of the Biological Properties of Some Wild Fruits Grown in Bayburt

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Introduction: Our country is one of the most important countries in terms of endemic species and biodiversity. Wild fruits are used as food, have medical values, processed in different forms and evaluated in agrotourism. Wild fruits are important to feed with the aromatic substances they contain, fruit acids, carawayoids, flavonoids and mineral substances. They also reduce the harmful effects of carbon emissions on the area they are in, and protect them from disasters such as floods and erosion. In this research, important compound elements were determined in some wild fruit species grown in the province of Bayburt in Çoruh Valley, which is a transition area between Euro-Siberia and Iran-Turan flora areas.

Material and Methods: The materials of this study is the pear (Pyrus elaeagnifolia Pall.), wild fig (Ficus spp), wild apple (Malus sylvestris), rosehip (Rosa canina), sloe (Prunus spinosa), barberry (Berberis vulgaris) fruits that grow in Bayburt province. These wild fruits were performed Mineral element analysis, Hormone analysis, Amino acid analysis, Organic acid analysis.

Results: The mineral matter contents of wild fruits ranged from 1,14 to 2,20 mg/kg (N), 1712-2968 mg/kg (P), 78,68-121,82 (Fe), 10,38-29,35 (B). In addition, Serine, Asparagine, Aspartate, Glutamate, Glutamine, Glycine, Histidine, Alanine, Theonine, Arginine, Cystine, Methionine, Tryptophan, Valine, Leucine, Lysine, Phenylalanine, Isoluec, Proline, Oxalic acid, Propionic acid, Tartaric acid, Butyric acid, Malic acid Lactic acid Citric acid Maleic acid Fumaric acid Succinic acid, Giberalllic acid, Salicylic acid, Absisic acid, Indole acetic acid concentrations have been determined.

Discussion: Wild fruit species can grow under non-productive and extreme ecological conditions. Therefore, they are also important in terms of erosion prevention and biodiversity support. These fruits are mostly consumed freshly, but also processed like jam and marmalade. These fruits and the food produced from them are also of interest in the outer market. Today, people, pesticides, artificial fertilizers and so on. untapped food grown on natural conditions and so-called organic foods is more interested and paying more money. Especially after the positive effects of certain substances on the health of the wild fruits have been revealed, these substances are attracting more and more interest. Although the wild fruit species are at least as valuable as the cultivated fruit in terms of their nutritional content, they are not cultivated for various reasons and the necessary importance is not given.

Acknowledgement: We would like to express our appreciation to the Bayburt University Scientific Research Project Commission, which supported this study (2017/01-69001-05).

Keywords: Wild edible fruits, biological diversity, Bayburt
**Introduction:** Darwinulids are considered as ancient asexual because of the absence of male fossil record since Triassic (about last 200 million years). The most famous species of this family is *Darwinula stevensoni* that is reproduce apomictically over 25 myr. This cosmopolitan species has been reported in all continents except Antarctic, Pacific and Oceanic Islands. Along with this wide distribution, species shows wider tolerance ranges to different ecological variables and so that is called as a cosmoecious species. The aim of the study is to determine the distribution and ecological preferences of *D. stevensoni* from Turkey.

**Material and Methods:** A total of 92 samplings were performed between 2000 and 2015. The samples were collected with a standard sized (200 µm) hand net and fixed in 70% ethanol. Physicochemical variables of sampling sites were recorded before sampling. Then after specimens were separated from sediment under stereomicroscope and fixed in 70% ethanol. Taxonomic identification was done according to the carapaces and soft body parts dissected in lactophenol solution by using taxonomic key of Meisch (2000).

**Results:** We encountered 1763 individuals of species in eight different aquatic habitats (lake, creek, trough, reservoir, stream, pond, spring and slough) from 11 provinces in Turkey. These provinces were located in the six geographical regions of Turkey. The range of ecological variables where species found are like that pH (6.90-10.60), dissolved oxygen (0.32-18.31 mg/L), electrical conductivity (21-844 µS/cm), water temperature (6.10-30 °C), air temperature (13-40.20 °C), elevation (39-2160 m a.s.l.), salinity (0-0.41 ‰) and total dissolved solids (0.06-503.17 mg/L). Accordingly, species lives in waters with freshwater range and is characterized from mesothermophilic to polythermophilic.

**Discussion:** Along with the results of the present study and literature, recent form of species was recorded from 27 provinces that are distributed in all seven geographic regions of Turkey. On the other hand, the fossils of *D. stevensoni* were reported only in 20 provinces and much of them were located at the west side of Turkey. Besides the ecological ranges of some variables of *D. stevensoni*, its geographical distribution has been expanded with the current study.

**Acknowledgement:** This study was partially supported by TÜBİTAK (project no: 213O172).

**Keywords:** *Darwinula stevensoni*, Turkey, Ecology, Fossil, Distribution.
Micromorphological Properties of Endemic *Onobrychis huetiana* (Fabaceae) from Turkey

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**Introduction:** *Onobrychis* Mill. is distributed throughout Northern temperate regions, Eastern Mediterranean region and Southwest Asia. Anatolia is the most important origin centre of this genus which is widely distributed and have been also used as forage plants. Turkey has 55 *Onobrychis* species representing five different sections and half of them are endemic to this area. Several studies have been made within the genus *Onobrychis* in Turkey using palynological, anatomical and cytotaxonomical characters. However, there is no detailed study on the micromorphological characters *O. tournefortii* (Willd.) Desv., endemic to Turkey. The aim of this study is to investigate the micromorphological characters of leaf, calyx and seed of *O. huetiana* Boiss.

**Material and Methods:** Plant material were collected at flowering stage during 2016 from natural populations in Amasya, Turkey. The collected specimens were dried according to standard herbarium techniques. For scanning electron microscopy, dried leaf, calyx and seed samples were directly mounted on stubs using double-sided adhesive tape and coated with gold. Their photographs were taken using JEOL-JSM 7001S scanning electron microscope.

**Results:** The leaves are amphistomatic and the stomata are anomocytic type. The stomata are more abundant on the lower epidermis of leaf. There are eglandular unbranched trichomes on the both leaf epidermises. SEM observation showed that the calyx of *O. huetiana* is covered by densely long, single celled eglandular trichomes. Seeds of *O. huetiana* are ellipsoidal kidney shape. The mature seeds have a favulariate type sculpture with finely wrinkles.

**Discussion:** In this study, leaf, calyx and seed micromorphology of Turkish endemic *O. huetiana* were studied by scanning electron microscopy. The present study showed that *O. huetiana* has the densely unbranched non-glandular trichomes on the leaf and calyx. Our observations about seed micromorphology are agreement with data reported by previous studies.

**Keywords:** *Onobrychis huetiana*, endemic, micromorphology, SEM.
Introduction: The article 177 of Turkish Criminal Code (TCC) entitled “releasing animals in a risky way” disposes that the person who releases an animal which is under his custody in a risky way for the life and health of other people or neglects of taking this animal under control is sentenced up to six months of prison or punitive fine. This crime involves alternative conducts which means that it can be committed by an active – here, release- or passive – here, negligence- act. Also this crime can be committed by only the person who is responsible for the custody of the animal.

Material and Methods: In this study, we will examine the crime of releasing animals in a risky way regarding to decisions of Turkish Supreme Court by the method of document review.

Results: The crime of releasing animals in a risky way prevents not the danger towards an animal but the danger caused by an animal. In other words, the right to life and to health of humans are the legal interests protected by this crime type.

Discussion: The Highway Traffic Code of Turkey also disposes in the article 69 that it is forbidden to release a possessed animal on the highway which lies out of the residential area except compulsory situations. The person who disobeys the rule of the article 69/1 is sentenced to punitive fine. If the animal causes a traffic accident, the person who acted against the rule of custody is sentenced to three months of prison. The field of application of the article 177 of TCC and the article 69 of HTC consists a controversial point in Turkish criminal law.

Acknowledgement: This study is supported by TUBITAK Postgraduate Scholarship Program.

Keywords: Environmental Criminal Law, Crimes Related to Animals.
Glutathione and Malondialdehyde Levels in White Rot Fungus *Phanerochaete chrysosporium* exposed to Municipal Landfill Leachate from Elazığ, Turkey

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**Introduction:** Landfill leachate (LL), characterized by its high concentrations of organic matter, is mainly generated due to the penetration of precipitation through the waste mass and due to biodegradation of the waste as leachate migrates away from a landfill, it may cause serious pollution to the groundwater aquifer as well as to adjacent surface waters. White-rot fungi are important environmental microorganisms, which have been applied in many fields. *Phanerochaete chrysosporium* is a commonly studied white rot fungus to mineralize and degrade wide variety of agricultural and industrial pollutants. This present study aims to evaluating the glutathione and malondialdehyde levels in *P. chrysosporium* exposed to LL.

**Material and Methods:** *Phanerochaete chrysosporium*, ME 446 was maintained at 4°C after subculturing at 28°C on Sabouraud Dextrose Agar (SDA). Glutathione and malondialdehyde levels in *P. chrysosporium* were tested after exposure of different dilution rates of leachate (1/10 and 1/20) to fungus pellets obtained during agitated culture conditions (in 150 rpm at 28°C). At the end of the exposure period, pellets were filtered with Wathman filters, filtered pellets were weighed, then diluted with potassium chloride buffer (pH 7.4) and homogenized. Then, samples were centrifuged at 2500 rpm for 5 min at 4°C. The supernatant was assayed for glutathione and malondialdehyde levels.

**Results:** In this study, MDA levels were increased in the groups (1/10 and 1/20 diluted with tap water) (p<0.05) compared to control group for both 24- and 96-h exposure time. GSH levels in diluted 1/10, 1/20 diluted with tap water were decreased compared to control group for 24- and 96-h exposure time but the differences among the application groups were not statistically significant (p>0.05).

**Discussion:** Our results suggest that landfill leached caused a significant oxidative stress in the antioxidant system. Different toxicants may induce different antioxidant/prooxidant responses depending on their ability to produce reactive oxygen species to detoxify them. Furthermore, more biochemical biomarkers should be tested against the LL before valid interpretations could be made.

**Keywords:** Glutathione and Malondialdehyde levels, *Phanerochaete chrysosporium*, Landfill leachate
Introduction: Legumes are economical sources of protein, energy, vitamins and minerals. Production of legume-based-food materials should be developed throughout the world to increase nutritional intake, production and consumption of legumes, because of their high protein, calorie, vitamins and minerals content. Heavy metal accumulation in the terrestrial environment has become a global problem. As excess amounts of metals enter the pedosphere, soil quality decreases followed by a reduction in soil productivity and food security. Heavy metal enrichment in organisms through the food chain would inevitably pose threats to humans and ecosystems. Food products such as legumes, fruits and herbs accumulate heavy metals from the soil, water or air. They are being grown in the contaminated soil, most of the time unknowingly, toxic heavy metals from these polluted soils may accumulate in these food stuffs grown in them (especially underground part) there by entering into the human food chain. Legumes are an important part of the human health. In this study, the heavy metal levels such as Ni, Cu, Co, Zn, Cr, Mn, Mg, Fe, Ca and Pb in bulgur and fine bulgur offered for sale in Karaman were investigated.

Material and Methods: The samples were collected in the summer and winter seasons of bulgur and fine bulgur from market places in Karaman. The solutions were prepared by following the wet digestion procedure and the analysis of the mineral contents were determined by Flame Atomic Absorption Spectrometry (FAAS).

Results: The mean contents of minerals in bulgur and fine bulgur were determined as 26.83 and 35.30, 1.496 and 2.770, 11.08 and 11.82, 23.78 and 16.82, 13.88 and 14.67, 218.1 and 244.9, 551.4 and 459.3, 534.4 and 832.1, 54274 and 65294, 17.24 and 17.77 mg/kg for Ni, Cu, Co, Zn, Cr, Mn, Mg, Fe, Ca and Pb respectively.

Discussion: Though both legumes contained considerable amounts of minerals, all the contents (Cr excluding) are in the range reported from Turkey and other countries and in acceptable limits for human consumption. The samples were found in Cr toxic level.

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Keywords: Bulgur, Heavy metal, FAAS, Karaman, Turkey
Introduction: Banana is one of the most commonly consumed and economically important fruit in the global market. The banana is a very nutritious nutrient source. It contains many vitamins, proteins, minerals and amino acids. In underdeveloped countries, children eat bananas by protein, which they need. Ascorbic acid (vitamin C) is one of the most important antioxidants found in fruits and vegetables. This vitamin is important for human nutrition and for the food industry as an additive of processed foods. Determination of vitamin C can be performed by various methods such as direct titration with iodine or flow injection analyses. High-performance liquid chromatography (HPLC) has emerged over the last years as a high-resolution, precise, reliable and sensitive method for the analysis of vitamin C in foods. In this study, the content of vitamin C of grand naine banana grown in Alanya was determined by HPLC method.

Material and Methods: In the April and May of 2016, the Vitamin C concentrations were determined in the banana specimens collected and matured. A total of 50 samples were collected from 10 different gardens from Alanya. Vitamin C quantities were measured by High Pressure Liquid Chromatography (HPLC) method.

Results: The vitamin C determinations in the samples were made with precision and mean values were found. The range of C vitamins in the samples was found to be 108.84-366.34 mg/kg, with a mean of 246.64 mg/kg. The quantities varied according to the measurement centers. According to the mean values, the amount of vitamin C was found to be high.

Discussion: Grand Naine grown in Alanya has been found rich in vitamin C vitamins. This study is one of the first studies on vitamin C in Grand Naine banana grown in Alanya. Studies can be done to increase the yield of high quality bananas by improving this work.

Keywords: Banana, Vitamin C, HPLC, Alanya, Turkey
Antimicrobial Activity of Essential Oils from Pinus nigra and Cedrus libani Grown in Kahramanmaraş

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Introduction: Turkey has a rich biodiversity ecologically and one of the important country in medicinal-aromatic plant market. Approximately one hundred plant family is an essential oil producers in nature and Pinaceae is one of them. The component of essential oils are changing from plant to plant and season to season. Recently essential oils has taking a place in pharmacology. In this study, antimicrobial activity of essential oils from needles and fruits of Cedrus libani and Pinus nigra were investigated.

Material and Methods: The plant materials were collected from campus area of KSU and air dried materials were distilled using Clevenger type apparatus. After loading essential oils to sterile paper disc, antimicrobial activity was determined according to the disc diffusion method.

Results: The essential oils of Cedrus libani revealed antimicrobial activity in April but there was no activity detected in July and September. On the contrary, Pinus nigra revealed an antimicrobial activity in July and September but April.

Discussion: When antimicrobial activity of essential oils which obtained from different period were considered, different inhibition zones were observed, which is probably due to changing chemical components of essential oils in different time periods. The results confirmed that the essential oils of C.libani and P.nigra has an antimicrobial activity against both for gram positive, negative and fungi.

Keywords: Cedrus libani, Pinus nigra, Antimicrobial, Kahramanmaraş
Introduction: The herbs/plants are used medicinally among the people around the World. According to the WHO, approximately there are 20,000 registered natural plants used in different purposes. *Plantago major* which is known as ‘sinirli ot’ among the Turkish people and grows widely in many geographical area. In literature, there are so many information about traditional usage of *Plantago major* for dermatological problems, gastrointestinal disorders, respiratory and vascular diseases, urogenital and infectious diseases around the World. In this study, the antimicrobial activity of methanol, ethanol and aceton extract of *Plantago major*, grown in Kahramanmaraş, was investigated. As test organisms, MRSA and *Acinetobacter baumannii* isolated from hospital environment showing multiple antibiotic resistance were chosen.

Material and Methods: Aerial part of plant specimens were collected from campus area of KSU, Kahramanmaraş. After grinding the dried plants, extraction was accomplished with 3 different solvent in a soxhlete. Antibacterial activity of extracts was studied with disc diffusion method. Additionally, the extract was also tested for synergistic effect with antibiotics that is not having any antimicrobial activity.

Results: The extracts obtained with three solvents loaded (250ml) on 10 mm sterile discs produced an inhibition zone up to 40 mm against MRSA while an inhibition zone of 28mm against *Acinetobacter baumannii*. According to the results, the extract has shown a synergistic effect against *Acinetobacter baumannii* with Amoxicillin/Clavulanic Acid and Ceftriaxone.

Discussion: The growing microbial resistance to antibiotics is a serious concern around the World. Therefore, new agents are receiving an attention for control of microorganisms. This study revealed that *P. major* could be an alternative hope to combat the microorganisms showing antibiotic resistance.

Acknowledgement: We would like to express our great appreciation to the Kahramanmaraş Sutcu İmam University Scientific Research Project Unit, which supported this study (2017/1-46 YLS).

Keywords: *Plantago major*, antibacterial, resistance, Kahramanmaraş
A Biological Approach to Some Rarely-Observed and Frequently-Observed Fish Species of the Akmermer Coast in Çandarlı Bay (Aegean Sea, Turkey)

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Introduction: Most of the fish production in the world's seas has been provided from coastal waters, lagoons and river-mouths. Besides the increased biological diversity, these areas are nutritious and growth areas for adult and juvenile fish due to the nutrient loads they have. During the last decade, there has been an increase in studies to determine the fish fauna of northern Aegean coasts.

Material and methods: Monthly sampling between May 2007 and June 2008 were carried out with hand-seine-net. Fish species caught were identified according to Whitehead et al. (1984). Total lengths of the specimens were measured in centimeters using a measuring board nearest to 1mm and the weight of each fish was determined with a digital scale at an accuracy of ±0.01g. For the condition factor, $K = W/TL^3 \times 100$ was used. LW relation was calculated using the equation $W = aL^b$, where $W$ is the weight (g), $TL$ is the length (cm), “$a$” is a constant and “$b$” is an allometric coefficient. The equation of LW relation was then transformed into a linear form: $ln W = ln (a) + b ln (L)$. The linear relationship between variables is calculated with the coefficient of determination ($r^2$). ANOVA and t-test were applied for statistical analyses.

Results: The specimens in 38 different species were sampled during study. Of them, frequently encountered species were S. abaster, Gobius sp. S. ocellatus, S. tinca, D. annularis, D. vulgaris and H. guttulatus, while 5 species D. macrophythalmus, D. puntazzo, S. aurata, C. risso and Parabilennius spp. were rare. LW relationships for frequent species were computed as $W = 0.014L^{1.45}$ ($r^2 = 0.73$) for S. abaster, $W = 0.004L^{2.29}$ ($r^2 = 0.96$) for Gobius sp., $W = 0.013L^{2.83}$ ($r^2 = 0.48$) for S. ocellatus, $W = 0.013L^{2.89}$ ($r^2 = 0.97$) for S. tinca; $W = 0.009L^{2.28}$ ($r^2 = 0.99$), for D. annularis, $W = 0.011L^{5.05}$ ($r^2 = 0.92$) for D. vulgaris and $W = 0.0014L^{1.09}$ ($r^2 = 0.99$) for H. guttulatus. During research, only a single specimen of the species, D. macrophythalmus, D. puntazzo, S. aurata, C. risso and Parabilennius, spp., were sampled. Their length and weight values were respectively; D. macrophythalmus: TL: 5.5 cm W: 2.55 g; D. puntazzo: TL: 10.9 cm W: 18.76 g, S. aurata: TL: 4.7 cm W: 1.01 g C. risso: 4.7 cm W: 0.7 g; Parabilennius, spp.: TL: 10.2 cm W: 10.69 g.

Discussion: As a results, the fish fauna of the shallow coastal zone consists of small species that live here. The results obtained in this study provide various information both in determining the coastal fish species with economic importance where fishery activities are intense, and in observing the indicators and vulnerable fish species which are distributed in Bay and its near environment.

Acknowledgement: The data used in this study consisted of samples obtained from the Ege University Scientific Research Project (2006/SUF 017). We would like to thank the stuff in the Project.

Keywords: Fish fauna, biodiversity, Akmermer coasts, Aegean Sea
Effect of Coating on Germination Characteristics in Alfalfa (Medicago sativa L.) Under The Drought Conditions

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Introduction: Alfalfa (Medicago sativa L.) is an essential hay product and a protein-rich forage crop which grow in arid and semi-arid regions of the world. This plant is used for hay, pasture, silage, green-chop, pellets, cubes, soil improvement and also grazing. In this study, to improve the germination properties of alfalfa seeds, which are sensitive to environmental conditions during germination and early seedling development was aimed.

Material and Methods: For this purpose, seeds of “Nimet” alfalfa variety were covered with seed coating preparation, named Panoramix and germinated under drought stress conditions. The experiment was conducted in randomized parcel design with 4 repetitions. Six different drought stress levels (0, -2, -4, -6, -8 and -9.8 bar) were handled in this study and were used Polyethylene glycol-6000 (PEG-6000) to create of drought stress at different levels. Panoramix was applied in 3 doses, as 0 doses (control), 2 liters / 1000 kg seeds and 4 liters/1000 kg seeds respectively. 50 seeds were laid in each petri dish (with 9 cm diameter) and placed in germination cabinet (70% humidity, 20°C temperature 14 hours light (2000 lux) 10 hours darkness). At the end of the tenth day, the petri dishes were opened and the germination rate, fresh and dry weight of the shoots and roots, length of shoots and roots were determined.

Results and Discussion: The results indicated that the coating treatments increased the germination properties of alfalfa seeds under drought stress conditions.

Acknowledgement: We would like to express our appreciation to the Akdeniz University Scientific Research Project Commission, which supported this study (FYL-2017-2373).

Keywords: Alfalfa, Medicago sativa L., germination, drought conditions
POSTER PRESENTATION

Metal status in the Kesik Köprü Dam Lake

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Introduction: Dams are mainly built for irrigation, power generation, flood control, and water supply. The Kesikköprü Dam Lake is located on Kızılırmak, in Ankara. It is a dam built between 1959 and 1966 with the purpose of irrigation and energy production. Dams can serve as a sink for accumulation of heavy metals. The aim of this study is to determine the concentration of metal in the lake and to investigate the effect of the situation on life.

Material and Methods: The accumulation of heavy metals (Cr, Mn, Pb, As, Cu, Ni, Zn, Fe and Al) in the water and sediment of the lake were investigated by ICP-MS. Mann Whithey U test (SPSS 21.0v) were performed to test the significance of the difference of heavy metal contents among water and sediment samples. The relation of heavy metal accumulation in sediment and water samples was evaluated by correlation test.

Results: The accumulation in the sediment is in the form of Fe> Al> Mn> Ni> Cr> As> Zn> Pb> Cu while the accumulation in the water is As> Cr> Cu> Zn. As for the metals with high toxic effect, it is seen that the metals with the highest risk levels are As and Ni. The amounts of As and Ni in the sediment indicate that the sediment is at a low degree of contamination level. The highest correlation was found to be between Fe-Pb (r = 0.957) when examined by the correlation test of the sediment metal accumulation profile. No correlation was observed between the elements in the water.

Discussion: When compared to the Water Pollution Control Regulation of the Ministry of Forestry and Water Affairs, it is seen that water quality for almost all elements is first class in the dam reservoir. However, when considered from the point of view of As value, lake has 2nd grade water quality value. The results show that for dam reservoir there is no danger of pollution except for As and Ni elements. However, the amount of As and Ni suggests that this lake should be monitored regularly.

Acknowledgement: We would like to express our appreciation to the Ordu University Scientific Research Project Commission, which supported this study (AR-1509-2016).

Keywords: Sediment, water, heavy metal
Application of Taguchi method for optimizing the delta-endotoxin production from the indigenous isolate of *Bacillus thuringiensis* Se13

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**Introduction:** *Bacillus thuringiensis* is well known for its ability to produce parasporal crystalline protein inclusions, which have attracted worldwide interest for various pest management applications because of their specific pesticidal activities. The insecticidal activity of *Bacillus thuringiensis* directly depends on the yield of delta-endotoxins. In this study, various nutritional and cultural parameters influencing delta-endotoxin synthesis by a local isolate of *B. thuringiensis* Se13 were investigated using Taguchi method.

**Material and Methods:** In the first experiment, four factors, incubation period, incubation temperature, initial pH and medium, each at four levels, were selected and an orthogonal array layout of L₁₆ was carried out. In the second experiment, Taguchi’s orthogonal array method of L₂₇ was used to evaluate the effects of the different concentration of medium components. Taguchi’s signal–noise ratio and variance analysis were applied to determine the effect of the factors. After each experiment, verification studies were carried out using determined optimum conditions.

**Results:** The optimum conditions for incubation period, incubation temperature, initial pH, and medium determined as 48 h, 30 °C, pH 9, and M4 medium, respectively. In the second experiment, soybean flour (5%), glucose (5%), KH₂PO₄ (0.3%), K₂HPO₄ (0.1%), MgSO₄ (0.4%) were determined as the optimum conditions. The delta-endotoxin yield was elevated to 1559.25 µg ml⁻¹ when the factors were adjusted to optimum level.

**Discussion:** Biological pesticide is one of the most promising alternatives over conventional chemical pesticides, which offers less or no harm to the environments and biota. Their crystalline proteins called delta-endotoxins are responsible for the infection and their yield is important for the pathogenicity. In addition, cultural conditions and nutritional requirements show differences for each strain of *Bacillus thuringiensis*. So, Taguchi’s experimental design was used for optimization of delta-endotoxin production from a local isolate of *B. thuringiensis* strain Se13 in this study and appeared to be a good choice for the overproduction of delta-endotoxin.

**Acknowledgement:** We would like to express our appreciation to the Karadeniz Technical University Scientific Research Project Commission (KTUBAP-5778) and The Scientific and Technological Research Council of Turkey (2211-C).

**Keywords:** *Bacillus thuringiensis*, Optimization, Taguchi Method, Delta-endotoxin
A Study on Distribution of Chlorophyll-α Amount in the Stream, Sinop (Turkey)

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Introduction: The protection of water resources, aquatic ecosystems and the aquatic environment are important for all organisms. River basin management is extremely important in terms of preserving the quality of stream ecosystems. Physical and chemical properties are constantly changing because of the displacement of water in rivers, changing climatic conditions and increasing human impact. This situation causes continuous changes in the biological structure of the rivers. The changes of water quality are firstly effect to primary producers and then other living organisms in food chain. The measurement of the amount of chlorophyll-α is important in terms of determining the biomass of the algae, as well as informing about the changes that may occur in the water quality. This study aimed to determine the change in chlorophyll-α amount throughout the year in the stream.

Material and Methods: In this study Çakıroğlu Stream (Sinop) was investigated between July 2015 and June 2016 in selected three stations. Chlorophyll-α was extracted by using acetone method. Two liters of water samples taken from the stations were dropped with 1 mL of saturated MgCO₃ solution and then filtered through 0.45 μm porosity membrane filter paper. The filter paper was folded and placed in a centrifuge tube and 3 mL of a 90% solution of acetone was added. The tube was centrifuged at 1 minute at 35000 rpm. After centrifugation, 10 mL of acetone is completed. It was covered with aluminum foil outside the tubes and kept in the refrigerator for 24 hours for full extraction. Absorbance values were measured at 630, 647, 664 and 750 nm wavelengths, which was blinded with 90% acetone by taking clear of the obtained extractions.

Results and Discussion: The chlorophyll-α values of the Çakıroğlu Stream were measured at the highest in August (1.466 mg/m³) at station 2, while the lowest values were measured at station 1 and 2 (0.050 mg/m³) in January and at all stations in December. The mean value was found to be 0.430 mg/m³. These values have shown that the change in chlorophyll-α amount, especially depending on the temperature, may be related to the change in living biomass in the water. According to the maximum and average chlorophyll-α values given by the OECD values, the stream water has oligotrophic character.

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Keywords: Chlorophyll-α, Çakıroğlu Stream, Sinop
Antibacterial effects of Multi-walled Carbon Nanotubes and Nanosilica Against Oral pathogens Associated with Human Periodontitis In Vitro

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Introduction: Periodontitis is an infectious disease that affects the teeth supported tissues and is characterized by the loss of tooth-supporting tissues. Periodontal pathogens such as Aggregatibacter actinomyctcomitans, Prevotella intermedia that are in the gram negative, dwell in the anaerobic environment of the peripheral pocket causing periodontitis. In addition, these periodontal pathogens can prevent various host defenses and cause tissue degradation. At present, increasing resistance of microorganisms to antibiotics is an important problem. Nanomaterials have encouraging applications to bypass the problem of antibiotic resistance in microbiology. In particular, studies have been reported that carbon based nanomaterials exhibit high antimicrobial activity that affects the antibacterial activity of size and surface areas. In this study, antibacterial efficacy against A. Actinomyctcomitans and P. intermedia of carbon-based nanotubes and silica nanoparticles was studied.

Material and methods: The antibacterial effect of MWCNT and SiO₂ nanoparticles was determined by using 5 different doses of 10, 20, 30, 40 and 50 μL/ml by the agar well diffusion method. The nanoparticles were allowed to undergo sonication for 30 minutes immediately prior to the experiments. Each application was made in 3 replicates and the petri dishes was allowed to incubate at 37 °C. At 24 hours after application, the inhibition zones formed in the medium were measured in mm.

Results: MWCNT and SiO₂ antibacterial activity, bacterial growth in the applied petri dishes and inhibition rate on bacterial as the dose of both MWCNT and SiO₂ nanoparticles increased. The most effective SiO₂ nanoparticle for A. Actinomyctcomitans and P. intermedia was 50 μl. In general, there is no significant difference between the zone diameters for both bacteria (P>0.05). As a result, MWCNT and SiO₂ nanoparticles antibacterial substances have potency in use in the human periodontitis disease.

Discussion: Previous studies have examined the antibacterial and antimicrobial properties of MWCT and SiO₂ nanoparticles. However, the antibacterial properties of these nanomaterials have not been examined on important oral pathogens.

Acknowledgments: This work was supported by Ordu University Scientific Research Projects (BAP) as a project AP-1736.

Keywords: Antibacterial effect, MWCNT, Oral pathogens, Nanoparticles, SiO₂
The Morphological Variation of *Nomisia ripariensis* (Araneae: Gnaphosidae)

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**Introduction:** Spiders generally live in terrestrial environments (under stone, in rocky areas, in grassland areas and on the dried plants). Gnaphosidae has a wide variety of species and they are represented by 2216 species belonging to 128 genera in the World. In our country, Gnaphosids have identified 35 genera and 45 species. In this study, the morphological variations of *Nomisia ripariensis* (O.P.-Cambridge, 1872) were investigated.

**Material and Methods:** Samples were collected by different methods (pitfall traps, aspirator from rocky areas, sweeping from the field areas and catching by hand from grassland) between 2007-2008 from Kahramanmaraş and Adıyaman provinces. The spiders were deposited in the University of Gaziantep, Zoology Museum (GAUZM) in the %70 ethanol. Morphological identifications were based on reference publications on the taxonomy of Palearctic region spiders with species nomenclature following the World Spider Catalog.

**Results:** Color differences belong to *Nomisia ripariensis* were observed in prosoma and opistosoma. The samples used in the study were collected from different altitude, 524m -1147m. The morphological variations related habitat and altitude were investigated. It was observed that there was no change in the pedipalps of the male specimens but in female, there were differences between spermathecal channels and chitin structure.

**Discussion:** *Nomisia ripariensis* were collected from different localities in Adıyaman and Kahramanmaraş. It was observed that the in-species morphological color differences observed with the research were changed according to the altitude and the habitat they live in.

**Acknowledgement:** The authors are grateful to Gaziantep University, Department of Scientific Research Projects (FEF.10.06) for financial support.

**Keywords:** Spider, *Nomisia ripariensis*, Gnaphosidae, Morphology
Assessment of Organochlorine Residue Levels in Edible Fish from the Eastern Coast of Aegean Sea, Turkey

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Introduction: Organochlorine pesticides (OCPs) are persistent anthropogenic contaminants in the environment. Because of their lipophilic characteristics OCPs accumulate in the food chain and cause numerous contrary effects in marine organisms. PCBs introduced into the marine ecosystem through the human activities have been the focus of scientific research and monitoring studies. They have also been observed in sediment and biota. Fish is a useful bioindicator due to bioaccumulation pattern of pollutants. Generally, fish can metabolize organochlorines moderately; therefore, fish is well reflective of the status of pollution in marine ecosystem. To obtain more data on the status of contamination of İzmir Gulf located in the eastern Aegean Sea, affected by agricultural and industrial wastewater inputs and to evaluate potential risks for fish consumers, present study focused the residue levels, distribution and temporal variability of persistent organochlorine compounds in one commercially valuable marine edible fish species.

Material and Methods: Fish samples were gathered by trawling at three sampling regions (Gediz, Gülbahçe, Uzunada) during the R/V K. Piri Reis Cruise in Gulf of İzmir in 2012. Red mullet (Mullus barbatus) was selected for analyses. This species is distributed extensively and the most consumed species in the Gulf of İzmir. The total weight, length of each specimen was measured in the ship. Organisms were dissected and preserved at -20 °C until transferring the laboratory.

Results: In M. barbatus, Aroclors were determined in higher concentrations than OCPs. The significance level of 0.05 (p<0.05) was set for the results. Statistically significant (p < 0.05) correlation was detected between fish lipid content and DDTs (R = 0.70) levels in fish samples. Concentrations of OCPs and Aroclors measured in the edible part of fish samples were 19-46 and 338-883 ng g⁻¹ lipid weight (lw), respectively. DDTs (sum of DDT and metabolites) and cyclodienes ranged from 4-6, 16-40 ng g⁻¹ lw, respectively.

Discussion: The results from this study pointed out old DDT input and showed that no recent use of DDT from agricultural areas in Gulf of İzmir. Aroclor 1254 could have entered the Gulf through the industrial activities from the river inputs. Furthermore, the potential risks for fish consumers were assessed. Although the estimated daily intake (EDI) for DDTs, heptachlor and drins through the sampled fish species by İzmir inhabitants was quite lower than the ADI (Acceptable Daily Intake) established by FAO/WHO, EDI for Aroclor 1254 was close to the ADI value of 20 ng g⁻¹ recommended by IPCS. These findings proposed that intake values obtained in this study would currently not pose any health risk in Gulf of İzmir.

Acknowledgement: We express gratitude to the scientists and crew of the R/V K. Piri Reis for their assistance during the biota sampling.

Keywords: Ecological risk, Fish, Organochlorines, Gulf of İzmir (Eastern Aegean)
Design of Fluorescently Labeled Molecular Sensor and Investigation of Spectroscopic Behaviours

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Introduction: Ruthenium (II) polypyridine complexes have been the focus of considerable attention over the last few decades. They have been widely used as DNA sensors, ion sensors for environmental studies, catalysis because their outstanding photophysical and electrochemical properties are quite sensitive. Considering the spectroscopic properties of Ruthenium (II) polypyridyl complexes are strongly dependent on the size, shape, and electronic nature of the bridging ligand.

Material and Methods: The reagents used were purchased from Sigma Aldrich and Merck. Synthesis of fluorescently labeled sensor was performed. Then Ruthenium (II) complexes was synthesized. Their spectroscopic properties were investigated by UV-vis Spectroscopy and Fluorescent Spectroscopy.

Result: Phenanthroline-appended polypyridine ligand has been synthesized by means of Schiff base condensation reaction; 1,10-phenanthroline-5amine was used for sensor formation. Highly fluorescent Schiff base polypyridine ligand has remarkable photophysical behaviours. From their spectroscopic studies, it was observed that the fluorescence intensities of the ligand is higher than their metal complexes. This is because of quenching effect of Ruthenium (II) metal on chromophore groups.

Discussion: In this work we have synthesized highly fluorescent phenanthroline-appended molecular sensor which have N-donor groups for ion sensitivity mechanism. Fluorescent property is an excellent indicator for environmental studies.

Keywords: Fluorescent, sensor, spectroscopy, environment.
Determination of Saline Water Interference in Samsun Bafra Plain by Conductivity

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Introduction: From an agricultural point of view, water and soil are two essential compartments. In our country, surface and ground water sources are used as irrigation water. In the case where natural conditions are effective in coastal aquifers and the pressure of fresh water is greater than the pressure of salty water, fresh water - salty water is balanced along an intermediate surface and the fresh water moves from land to sea. Bafra Plain is a delta plain where paddy farming is performed intensively on the coast of the karedeniz. Too much water is needed in the production of paddy. The need for water used in agriculture in the field of work is supplied by underground water. When overuse of underground water during irrigation period, aquifer attempts to sea water and affect the quality of irrigation water. For this purpose, it is aimed to determine the amount of sea water initiative by measuring conductivity, which is an important parameter in determining the quality of groundwater used in irrigation in Bafra Plain. Conductivity analysis was carried out according to TS-9748 EN 27888. Analysis results were evaluated according to TS 7739.

Material and method: In this study, conductivity values were measured by taking drill samples from 48 points used for irrigation purposes in Samsun-Bafra Plain. As the date of sampling, the end of irrigation season (end of October – beginning of November 2016) time was selected. Therefore, the changes in the soil with the irrigation water used and the ground water will be passed and conductivity results will be more clearly observed. TS - 9748 EN 27888 standard as an analysis method for conductivity determination.

Results: The conductivity results measured in the samples obtained from 48 points at the end of the study were evaluated according to the conductivity classification of TS 7739 irrigation water standard and were measured between 990-6973 µs/cm and it was determined that it was salty and very salty class. Conductivity value 6973 µs / cm the highest point is at sea place 5. Salt-resistant plants should be grown in salty class points and should not be used especially where drainage is not sufficient. In very salty waters, these waters are not suitable for irrigation under normal conditions. These waters can only be used under very special conditions. For example, the plants are salt resistant, drainage and soil permeability is sufficient and can be used under the conditions of excessive washing.

Conclusion: Salty and very salty water is not a desirable property in agricultural irrigation. Therefore, the products grown in the region should be preferred in the salt-resistant plant class. Conductivity value 6973 µs / cm the highest point is at sea place 5. Looking at the data obtained, the presence of underground water in salty and very salty classes in the Bafra Plain in comparison to TS 7739 suggests that sea water may be an attempt. It is very important to use the water drawn from the drilling wells in the irrigation season in the plains very close to the sea in a controlled way so as not to interfere with the underground water.

Keywords: Bafra Plain, Aquifer, Water Conductivity, Irrigation Water
Introduction: Lagoons are defined as wetlands that are separated from the sea by natural or artificial forms with sand or other sediments and are connected to the sea by channels of varying numbers and sizes. Lagoons are sheltered areas where many species of fish and organisms are fed, developed and underwent at least one cycle of life because lagoons have naturally rich shallow water masses. Muğla-Köyceğiz Dalyan Lagoon system, is in the southwest of Turkey, consists of two drainage area and four main sections. The first drainage area is Köyceğiz Lake and the second is Dalaman Channel Network, Sülüngür and İztuzu Lake. Köyceğiz Lagoon Basin fishery has been rented and operated by the Dalaman Fisheries Cooperative (DALKO) since 1971 for a certain period of time. In this study, it was aimed to determine the fish species and their market share in the catch composition of DALKO using the fence net method.

Material and method: This study was conducted between January 2017 - December 2017 in Köyceğiz Dalyan Lagoon system. The data was obtained by face to face interviews with employees of the DALKO, which is the management of Köyceğiz Dalyan. The obtained data was analyzed in the Microsoft Office Excel program on the computer.

Results: The fishery activities in the Köyceğiz Dalyan lagoon system are carried out with 5 barriers and 34 fences in their body. The main products of lagoon is mullet, caviar of mullet, sea bream, sea bass, eel fish, striped seabream and blue crab. According to the information obtained from the DALKO, total fisheries production is 431.995 kg on 2017. In this production, mullet fish with a quantity of 420.777 kg received the first order with 97.4%. In terms of annual production, Köyceğiz lagoon, is the first in the rank of lagoons located in Turkey. Köyceğiz Dalyan Lagoon system also has an importance because it is located in İztuzu beach which is one of the important breeding centers of sea turtles.

Discussion: According to obtained data, aquaculture and fisheries policies should be carried out to enable optimum and sustainable use of lagoon areas. Studies to identifying biodiversity should be support. Concentration of scientific studies should be provided for sustainability in lagoons. Work should be carry out to remove tourism pressure and reduce boat traffic.

Acknowledgement: We would like to thank to the Muğla Sitki Koçman University Scientific Research Project Office, which supported this study (BAP 17/119).

Keywords: Köyceğiz Lagoon, mullet caviar, grey mullet, fisheries
Introduction: Common sole (Solea solea) has a high economic value in Turkish fishery market. It was constituted 0.13% of total annual catch in 2016. This high economic value makes a serious pressure on stocks of common sole in some fishing areas. But we should use these stocks sustainable for ecological benefits. Some researches mentioned that even if we don’t have any biological data, fish prices reflect the fish stock status. Accordingly, decreasing in fish prices means high catch and increasing in fish prices means low catch in that fishing season. This situation shows itself as a fluctuation on properly managed fish stocks. But, if yield shows a decrease year on year and prices increase, fish stock starts to warn us. In this study, it was aimed to show this relationship between fish prices and capture statistics.

Material and Methods: Turkish common sole capture fishery statistics and common sole prices in İzmir Fish Market were compared. Almost regional common sole prices in Turkey are close to each other. We chose the İzmir Fish Market due to it has price list that shows fluctuations about fish prices on yearly basis.

Results: Total Turkish common sole capture statistics and price tendency have inverse relationship. While common sole production was increasing, its prices were decreased. This phenomenon has made us to think that a decline in common sole stocks. According to results, it was observed a rising in prices and considerable decreasing in common sole capture statistics, year by year, since 2011.

Discussion: Common sole is important for Turkish fishery due to its high commercial value. In spite of the fishery regulations, conservative precautions are insufficient. As is known, all big fish markets are related with each other and fish transportation to whole country is realized according to regional demands and İzmir Fish Market distributes significant amount of fish to other regions. These decrease in catch statistics and increase in fish prices were thought as a signal from common sole stocks’. Fishery management should be regulated by taking species catch statistics into consideration. Both biological data and catch values may be useful for decision makers about fishery regulations.

Acknowledgement: We would like to thank to the Muğla Sıtkı Koçman University Scientific Research Project Office, which supported this study (BAP 13/119).

Keywords: Solea solea, Common sole, Flatfish, Fish price, Fish landing
Introduction: The Psychodidae (moth flies and sand flies) family has cosmopolitan distribution with approximately 3000 described species in six subfamilies. The subfamily Psychodinae is commonly known as the drain, moth or filter fly due to often presence on sites like buildings, sewers, cesspools, septic tank, sewage treatment plants and other dark and moist places. Drain fly’s species [Psychoda and Telmatoscopus (formerly Clogmia)] in the Psychodinae subfamily have public health and veterinary importance. Adult moth flies can be mechanical vectors of several bacterial pathogens associated with nosocomial infections. Moth fly larvae may cause accidental myiasis (e.g., urinary, intestinal and nasal myiasis). This study aimed to determine the phylogenetic characterization of moth flies (Diptera: Psychodidae) based on the variations in mitochondrial cytochrome oxidase c subunit I (mt-COI) DNA sequences.

Material and Methods: Totally 240 adult moth flies were collected from toilet, bathroom and basement walls of homes in different locations of Kayseri between May 2016 and April 2017 years. The genomic DNA was extracted from individual fly specimens. PCR analyses with common barcoding primers targeting the mt-COI gene region of adult flies were conducted. Phylogenetic characterization and relationships of the isolates with the published sequences in GenBank were utilized by blastn and Maximum likelihood analyses.

Results: In total, five isolates were gel purified and sequenced for molecular characterization and phylogenetic analyses. Sequence analyses of mt-COI revealed the presence of Telmatoscopus albipunctatus (ERU-Telmatos3 and ERU-Telmatos6) and Psychodidae sp. (ERU-Psych1,4,5) in the examined specimens. According to phylogenetic analysis, it was determined that the ERU-Telmatos3 and ERU-Telmatos6 isolates are clustered into haplogroup A. ERU-Psych1,4,5 isolates were placed within haplogroup B. ERU-Psych1 isolate was characterized as a new haplotype in haplogroup B.

Discussion: In this study, adult moth flies were collected from the walls of toilets, bathrooms and basement of building where they rest places of adult flies. There are a limited number of studies on the phylogenetic relationship of the Psychodinae subfamily based on the mt-COI gene region in the world. There have been no molecular-based studies conducted on drain flies in Turkey up to date. We describe the genotype characterization of drain flies by the DNA barcoding method based on mt-COI. In conclusion, our study provided the first data on the phlogenetic characterization of moth flies based on the mt-DNA barcoding in Turkey. For understanding phylogenetic composition of these species, further studies are needed to investigate epidemiology and vector competence of moth flies in Turkey.

Keywords: Moth fly, molecular characterization, myiasis, phylogenetic analysis
Morphological Traits of Some Natural Population’s Fruit Of Myrtus Communis L. From Morocco

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Introduction: Myrtle or Myrtus communis L. is a Mediterranean evergreen shrub belonging to the myrtle family which comprises about 100 genera and 3000 species. In its range, it generally grows in association with Pistacia lentiscus L., Phillyrea spp. Arbutus unedo L., Quercus suber L. and Quercus ilex rotundifolia. In Morocco it is distributed in different distinct ecoregions from a geomorphological and climatic point of view. This species as long as it is an aromatic and medicinal plant (MAP), it has great importance on the food, industrial and therapeutic scale. The exploitation of this species remains restricted to the collection of natural plant material from the forest. Out of state and the trend of demand for natural resources of myrtle is increasing relatively to the supply of ecosystems. To meet economic, sociological and ecological needs, it is necessary to develop conservation and domestication programs for this species. The objective of this study is to carry out a morphological characterization of myrtle fruit from natural populations from biographically different origins. This in order to determine the genetic variation linked to the fruit and its adaptation to the environmental factors for a vision of selection and valorization of this species.

Material and methods: The fruit is systematically collected in December 2017 from four natural populations of this species distributed in different biogeographical regions: the Pre-Rif, the North and the Central Plateau.

Results and discussion: single-factor analysis of variance (ANOVA) and comparison of means show that there is a significant difference between populations for the morphological traits studied, including fruit width and length, number of seeds per fruit, fruit weight, and seed weight per fruit. Thus, we noticed a slight correlation between the variation of the traits studied and the origin of the specimens. Fruit characterization could be a good criterion for selecting Moroccan myrtle for segregationist generations in future domestication and plant breeding programs.

Keywords: myrtle (Myrtus communis L.), fruits, morphological traits, Morocco.
The Effects on Standard Microorganisms Strains by Activities of Some of the Disinfectant Used in the Pharmaceutical Industry in Classified Areas

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Introduction: In this study, it is desired to determine the activity of the disinfectants used in the periods. The validity and effect of the repeated disinfection process will be determined when there are appropriate disinfectants for the appropriate disinfectant class of disposal, when they are present at the surface or at different discharges.

Material and Methods: X disinfectant, Y disinfectant, Z disinfectant, T disinfectant, P disinfectant, Q disinfectant, W disinfectants, were used against to 6 standard ATCC strains Staphylococcus aureus, Bacillus subtilis, Pseudomonas aeruginosa, Escherichia coli, Candida albicans, Aspergillus brasiliensis and isolated Micrococcus sp. For this process, the sections taken from the surfaces of the plants are used. (Ground, wall, stainless steel, glass, ceiling, LAF pad and sterile glove surface). Membrane filtration method has been applied to the disinfectants to determine appropriate contact time first. Following the determination of the effective contact times, the disinfectant solutions were prepared according to the application area or directly disinfected. Apart from disinfectants, A brand detergent used without surface treatment was also analyzed. At the end of the processor, samples were taken from the surface with rodak TSA and SDA media. Acquired samples were incubated in TSA medium for 5 days at 30-35 °C incubator, SDA medium at 20-25 °C incubator for 7 days.

Results: As a result of the incubation, Q disinfectants, T disinfectants and Z disinfectants which The surface cleaning detergent did not contribute to the disinfection and was effective in eliminating the microorganisms that were carried out. All the results obtained show the effect of disinfectants in detail and to be aware of the difference between detergent and disinfectant.

Discussion: The high concentration of T disinfectant using for disinfection of large surfaces of disinfectants; Q disinfectant and Z disinfectant are suitable for use in areas A, B and C, disinfectants and X disinfectants, because of their spray structure, and it is very preferred for large surfaces since the physical expansion capacities are low However, it has been determined that use in classed areas is appropriate.

Keywords: Disinfectant efficacy, pharmaceutical industry, clean areas, class
Introduction: Life is getting faster every day, and as a result of this unhappiness and tiredness of people who are in a continuous chase are getting increasingly for people. People who live like a marathon with a complete sense of life can not enjoy the moment while rushing to their specified goals. Fast living and fast-paced people are sick and unhappy because they are deprived of beauty in the moment they have lived. That is why Cittaslow philosophy adopts the fact that people's lives are misplaced and that people live by knowing and appreciating the moment of their lives, especially fast food. Settlement locations that meet 50% of 72 criteria can be Cittaslow Union members. In this study, it is investigated how the inspection mechanism is working and after acceptance of the membership works and how sanctions are applied to these cities in case the membership cities of the member cities cannot fulfill or fulfill the criteria of membership. How the inspections after the membership are made will be examined through the candidacy and membership files of these cities.

Methods: In this study, application files will be examined. Then, mutual correspondence will be tried to be achieved. Thus, the programs that are officially watched can be exposed and the way in which problems are identified and by whom, as well as how the solutions to identified problems are identified during the implementation will be examined.

Findings: The International Cittaslow Association’s criteria has identified will determine the extent to which both the member and candidate cities are in alignment. The implementation of these criteria will be examined by the Union. It will be examined how often the cities that operate in accordance with the criteria are audited and how the negative situations have been subjected to a sanction.

Conclusion and Recommendations: The Cittaslow criteria, which are divided into two compulsory and perspective terms, are in fact the union of the municipalities working as a project association. As a result, the structure is not established as a functional audit unit; however, as an advisor or coordinator unit. Particularly, the priority orders of investments made in these cities are determined by different standards in our country. Information and documents on how sanctions are concluded with regard to issues such as the termination or suspension of membership by the Association have not yet been reached.

Keywords: Cittaslow, Cittaslow control.
Determination of Accumulation, Elimination and Ion Release Rates in *Daphnia magna* Organisms Exposed to Alpha and Gamma Fe₂O₃ Nanoparticles

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**Introduction:** Nanoparticles (NPs) have comprehensive ecological impacts and are significant pollutant due to their small sizes and high reactivity. In general, they display different toxicity profiles while compared with larger particles because of their nano-sizes. Iron oxide (Fe₂O₃) NPs, which forms an important group of nano-sized materials, present uncommon physical and chemical properties while demonstrating magnetic properties different from their volumetric structures. The three most common forms of Fe₂O₃ in nature are magnetite (Fe₃O₄), hematite (alpha-Fe₂O₃) and maghemite (gamma-Fe₂O₃). The main purpose of this study is to investigate the potential effects of alpha- and gamma-Fe₂O₃ NPs on *Daphnia magna*, which is the primary consumer (zooplankton) and constitutes the first step of food chain, at different concentrations under experimental conditions.

**Material and Methods:** *D. magna*, the primary consumer and zooplankton living in freshwater, were exposed to alpha-Fe₂O₃ (20-40 mm) and gamma-Fe₂O₃ (20-40 mm) NPs and nanotoxicity immobilization experiments were carried out according to test guidelines of Organization for Economic Cooperation and Development (OECD) at different concentrations (0.2, 1, 5, 10, 25, 50 mg/L). Determination of possible accumulation and elimination rates related to NPs in organisms and metal ion distribution ratios in the environment where NPs were present were determined by Inductively Coupled Plasma-Mass Spectrometer (ICP-MS) analysis.

**Results:** The accumulation amounts increased exponentially while the concentration ratio of both NPs increased. However, when the accumulation rates are evaluated in terms of their application durations, it has been determined that the accumulation decreases in parallel with the increase in duration. It was also determined that the highest accumulation was reached at the end of 24th hour, and gradually decreased at the 48th and 72nd hours at all concentrations of both NP applications. Fe elimination at an average rate of 30% was occurred from both NPs in the elimination process (environment where NPs are not found).

**Discussion:** The results of accumulation in organism and elimination revealed that gamma-Fe₂O₃ NPs caused more accumulation than alpha-Fe₂O₃ NPs in organisms.

**Acknowledgement:** This study contains some of the results of the MSc thesis of Bilal Aydin from Department of Basic Sciences, Graduate School of Natural and Applied Sciences at Çanakkale Onsekiz Mart University, which was supported by TÜBİTAK-ÇAYDAG, Project Number: 114Y087.

**Keywords:** *Daphnia magna*, Alpha-Fe₂O₃, Gamma-Fe₂O₃, Nanoparticles, Accumulation, Elimination, Ion Release
Examination of Water Samples Taken from Fountains in Kartal (Yakacik) District in Istanbul for Coliform Bacteria and *Escherichia coli*

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**Introduction:** Drinking water containing bacteria may affect public health adversely. Due to economic reasons, people in Turkey use fountain’s waters for drinking water. According to TS 266 and drinking-using water regulation, 100 ml of drinking-using water should not contain coliform bacteria. To examine whether or not water samples taken from the three fountains (located in Kartal (Yakacik) District of Istanbul, Turkey) were safe to drink according to drinking-using water regulation, the water samples from the fountains of Haci Mustafa Efendi’s Tomb, Eldiginli Haydar Cavus and Teke Bayiri (located in Kartal (Yakacik) District of Istanbul, Turkey) were collected in winter and summer seasons. These samples were analyzed for coliform bacteria and *Escherichia coli*.

**Material and Methods:** Water samples obtained from three fountains in Kartal were collected according to TS EN ISO 19458. The numbers of coliform bacteria and *E. coli* were detected on chromogenic coliform agar media by membrane filtration technique. After incubation at 36°C for 24 h, dark blue colonies on the agar medium were thought as *E. coli* and pink-reddish colonies were thought as coliform bacteria. Then, oxidase negative colonies were counted. The pure colonies were identified using API 20E test kits.

**Results:** The numbers of total coliform and *E. coli* in the samples were analyzed in December and July. Both coliform bacteria and *E. coli* were detected in all samples analyzed. The numbers of coliform bacteria (10^3 cfu) and *E. coli* (10^2 cfu) in the water samples of taken from the fountains of Eldiginli Haydar Cavus and Teke Bayiri in both winter and summer seasons were almost the same. The highest numbers of coliform bacteria (10^4 cfu) and *E. coli* (10^3 cfu) were detected at the water samples taken from the fountain of Haci Mustafa Efendi’s Tomb in winter and summer seasons. In addition, coliform bacteria such as *Escherichia coli*, *Enterobacter cloacae*, *Klebsiella pneumoniae* and *Citrobacter freundii* were isolated from the water samples examined.

**Discussion:** According to TS 266, drinking-using water should not contain coliform bacteria and *E. coli* in 100 ml. However, it was determined that the water samples collected from the fountains in Kartal were contaminated with coliform bacteria and *E. coli*. This indicates that it is not acceptable to use the analyzed samples as drinking-using water according to the regulations in our country. Hence, waters, taken from these fountains, should not be used as drinking water.

**Acknowledgement:** We are grateful to Republic of Turkey Ministry of Health, Istanbul Public Health Laboratory Number 3.

**Keywords:** Coliform bacteria, *Escherichia coli*, fountain waters
Remote Sensing for Historical Change Detection of Wetlands at the Göksu River Delta, Turkey

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Introduction: Wetlands are important areas, locating transition zones between terrestrial and water environments. These areas issues of sustainability are paramount because of several people living around those fertile lands. Thus, these areas are environments with high risk of several natural and human induced problems. Large and increasing extent of human activities around wetlands have enhanced or caused several kinds of environmental problems in the world and Turkey. It is thus important that the quantification and characterization of types and conditions of deltas are required for sustainable use of such resources and for better understanding the impact of changes in those areas via technology based approaches. Land use/cover maps can be used to assessment and management of wetland environments. Reliable land cover/use maps are required for monitoring temporal changes, for quantifying or assessing natural habitat conditions and examining their access to other ecosystem components which directly or indirectly related to them. In this study, historical process of natural and unnatural changes in Göksu Delta wetlands will be examined by using satellite data.

Material and Methods: In this study, four remote sensing images were used to examine coastal wetland change in the Göksu Delta. Summer time images were selected because, for this area, wetland plants flourish and have different height and density in mid-summer, which reduced the spectral confusion between reeds and other land cover types during interpretation from the images.

Results: According to results, agricultural lands continuously increased from 1984 to 2011. On contrary, wetland vegetation area showed decreasing trend with most of the decrease recorded in the eastern and southern parts of the areas. Rice plantation areas also have been significantly decreased during the study period. The most dramatic increases detected in buildup areas due to population growth.

Discussion: Results showed that the shorelines, lakes and wetlands of the Göksu Delta have been constantly changing. Alterations of the water content and quality of wetlands were identified effectively by remote sensing analysis during the period of the image data set was taken between 1984 and 2011. Although the delta area is protected by many legal statuses, any changes in the Göksu river basin affect the delta directly. Therefore, when preparing management and conservation plans, the whole basin should be taken into account and planning should be done in this framework.

Keywords: Wetlands, Temporal Changes, Göksu Delta, Unsupervised Classification, PCA
Introduction: Electromagnetic factors, especially non-ionizing microwave radiation, have become an integral part of the environment and have an impact on all living organisms, regardless of their level of organization. Scientific studies have shown that the most sensitive to the effects of various radiations are organisms in which intense cell division is one of the foundations of intensive growth, reproduction and healing of cells, tissues and the whole organism. Therefore, it is no accident that many researchers note a special sensitivity and, therefore, a high risk of radiation for children and the development of the fetus during pregnancy. To assess the effects of prenatal action of electromagnetic radiation we deem it expedient to follow the oxidant-antioxidant ratio in the blood of the animal organism in the early period of life. In the work, it has been studied the content of reduced glutathione in erythrocytes of rats 20 and 30 days of age born from mothers totally irradiated during pregnancy in order to assess the level of oxidative stress.

Material and Methods: Experiments were conducted on puberal rats with use of EMR 460 MHz. After pairing, pregnant female rats were exposed to whole body irradiation within a 20 min per day for 7 days in the cylinder metal chamber (power flux density - 30 µW/cm²). Control animals were also exposed “lying” radiation under the same conditions at switched-off source of radiation. Glutathione content was determined using Ellman reagent for 20 and 30-day old rats undergoing prenatal irradiation.

Results: Experiments have shown that the level of reduced glutathione in erythrocytes in 20-day rats exposed to prenatal exposure in the embryonic period is 0.17±0.02 µmol/l, whereas in control animals of the same age the level of glutathione is almost 1.5 times higher (mean value in the group is 0.26±0.04 µmol/l, the difference is reliable, p<0.01). As we grow older, the relationship of glutathione levels in the blood between the control and experimental groups has changed. In more adult 30-day-old rats of the control group, the mean value of glutathione concentration in erythrocytes was 0.20±0.04 µmol/l, and in the experimental group the mean value of this indicator was 3.8 times higher, i.e. reached the level of 0.75±0.18 µmol/l at the confidence level p<0.001.

Discussion: In previous study, measurements of total oxidant activity of blood plasma in 20-day animals exposed to electromagnetic radiation during embryonic development showed a 19% increase (p<0.05) in relation to control animals of the same age. Upon reaching the age of 30, the total antioxidant activity of experimental animals in relation to control animals is exceeded even more; it is about 73% (p<0.05). Thus, we observe shifts in the oxidant-antioxidant balance in young rats born from mothers exposed to non-ionizing electromagnetic radiation during pregnancy. The low level of erythrocyte glutathione, the main component of the antioxidant system, after birth, its growth in the further development of the body indicate the possibility of red blood cells to protect themselves from oxidative stress. On the other hand, our results give additional arguments in favor of free radical nature of biological effects of microwave range non-ionizing radiation.

Keywords: electromagnetic radiation, erythrocytes, glutathione, rats, prenatal development
The Occurrence of Sea Turtles in Trawl Operations Conducted in the Western Coasts of İskenderun Bay

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Introduction: International Union for Conservation of Nature (IUCN) declared that, the population density of green turtle (Chelonia mydas) and loggerhead sea turtle (Caretta caretta) in Mediterranean should be monitored regularly. On the other side, many of the researchers reported that these two species are caught by local fishing nets and they are highly injured. Therefore deep trawl operations were conducted in order to observe the effects of deep trawl fishing on sea turtles.

Material and Methods: 53 deep trawl operations were performed seasonally during the period from spring 2004 to winter 2017 in the stations marked in 10m and 20m depth ranges off Sugözü village-Yumurtalık, located in western coasts of İskenderun Bay. Sampling duration was restricted for one hour. The trawled material was sorted by species on the board, and weighing was done by using a conventional balance with the accuracy 1g.

Results: Throughout the years of 2004-2017, two (55kg) green turtles (Chelonia mydas) were caught in 10m depth layer in summer 2007, and one (17.5kg) individual (Chelonia mydas) was caught in 20m depth layer in summer 2008. Again, one (5kg) loggerhead sea turtle (Caretta caretta) was observed in winter 2008, and there were no sea turtles in all other tows.

Discussion: Although the knowing that injuring the sea turtles by deep trawling activities and by considering above given results, it can be claimed that deep trawl fishing has no significant effect on sea turtles in western coasts of İskenderun Bay; since Chelonia mydas have 3.8%, and Caretta caretta have only 1.9% frequency of occurrence in the region. So deep trawl fishing has no significant effect on loggerhead sea turtles and green turtles distributed in western coast of İskenderun Bay.

Keywords: Chelonia mydas, Caretta caretta, İskenderun Bay, Deep Trawl Fishing, Frequency of Occurrence
Hotspots Analysis of Hedgehog (Erinaceus concolor)-Vehicle Collisions on Ankara-Samsun Highway

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Introduction: Roads and traffic passing through wildlife areas have many negative ecological and environmental impacts. The most important of these effects is the death of wildlife as a result of vehicle collision. In recent researches about wildlife-vehicle collisions, hedgehog is one of mostly affected species due to road kill. In this study, the hotspots of hedgehog-vehicle collisions on Çankırı-Kırıkkale Highway between May-October 2014 are identified.

Material and Methods: The number of hedgehog that died as a result of accidents on Ankara-Samsun Highway was recorded between 15 March 2016-15 March 2018. The records were collected once in three days. Locations of hedgehog carcasses were determined by GPS. The hotspots of wildlife-vehicle collisions were analyzed using 400 m bandwidth with CrimeStat3 program and they were transferred to Geographical Information Systems and mapped.

Results: During the study period, a total of 32 hedgehogs were killed as a result of vehicle collision. In the first year of the work (March-October 2016), there were 20 deaths in total and the hedgehog-vehicle collision rate was 2.5 ind/km/year. In the last year of the study, a total of 12 deaths occurred and its rate increased to 4.2 ind/km/year. Although mortality rates on the road are low, it appears that three different fields of deaths are clustered.

Discussion: Planners have to take some measures especially like building ecological underpasses and overpasses, signalization, warning signs to diminish the negative effects of motorways or traffic flow on wildlife. Detecting the hotspots to take measures on the roads is a frequently used method, so that the locations where accidents occur most can be detected.

Acknowledgement: This study is supported by Çankırı Karatekin University Research Fund Project Number:OF090316B14.

Keywords: Wildlife, Vehicle, Collision, Hotspot, Ankara-Samsun Highway, Hedgehog
POSTER PRESENTATION

Three New Records of the Genus Culicoides (Diptera: Ceratopogonidae) for the Fauna of Samsun Province

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Introduction: The biting midges Culicoides Latreille, 1809 is the largest genus of the Ceratopogonidae (Insecta: Diptera) family in terms of number of species. Adult females of Culicoides are fed by sucking blood from people and animals. For this reason, female biting midges are vectors for many viruses, bacteria, protozoa and nematodes and play an important role in the spread of many diseases in animals. Their bites cause itching and redness in humans. A total of 61 Culicoides species are known in Turkey. 22 of these were reported from Samsun. In this study it was aimed to identify the new records species for the Samsun Culicoides fauna. Also other objective of this study is to obtain male individuals belonging to C. griseidorsum Kieffer, 1918 species that its females are reported only from Samsun in Turkey.

Material and Methods: This study was carried out between April and November of 2016 in Ataköy Neighborhood (İlkadım District-Samsun) where C. griseidorsum species was reported first time from there in Turkey. Samples were collected using 18 W 220 V black fluorescent light traps. The collected samples were stored in 70% ethyl alcohol. Culicoides specimens were mounted on microscope slides in phenol-Canada balsam.


Discussion: C. odiatus, C. pictipennis, C. simulator species are reported for the first time from Samsun. Thus, the number of known species belonging to Samsun Culicoides fauna reaches 25.

Keywords: Samsun, Fauna, Diptera, Ceratopogonidae, Culicoides, biting-midges

829
**Influence of Pseudomonas sp. Isolates on Pea Growth and Soil Enzyme Activities**

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**Introduction:** Modern agriculture is highly dependent on chemical pesticides for the control of plant pathogens. Pesticides commonly have drastic effects on the soil biota. The repeated use of such chemicals has encouraged the development of resistance among the target organisms. A number of *Pseudomonas* isolates have been intensively studied as possible biocontrol agents and growth promoting. At present, the use of biological approaches is becoming more popular as an integrated plant nutrient management systems. In this regard, the use of bacteria and fungi has found a potential role in developing sustainable systems in crop production. The aims of this study were (i) to isolate *Pseudomonas* sp. from the rhizosphere of pea plant Turkey; (ii) to screen of these isolates in vitro for effect plant growth.

**Material and Methods:** The soil samples were collected from the rhizosphere of healthy pea plants. The serial dilutions (10^{-1} and 10^{-7}) were made for isolation of *Pseudomonas* isolates. The identification of isolates relied on standard biochemical and physiological tests according to the classification of Bergey’s. The bacterial suspensions (10^{8} cfu/ml) were used to inoculate pea (*Pisum sativum*), at a ratio of one seed per ml, for 5h. The inoculation treatments were set up in a randomized design with five replicates. Pots were filled with 750 g soil. Ten seeds of pea were sown per pot. After germination, plants were thinned to obtain five plants per pot. Plants were grown in pots for 4 weeks. Four weeks after germination, shoots and roots were separated and dried at 65 °C before determining the root and shoot dry weight. The criteria for growth promotion were studied as root and shoot dry matter and N,P,K content of plants. The activities of two soil enzymes; alkaline phosphatase and β-glucosidase were determined in soils.

**Results:** Seven isolates of *Pseudomonas* spp. were isolated from rhizosphere soils. All of the isolates were motile and Gram negative. After Gram staining, *Pseudomonas* identification were confirmed by growing on King’s B medium. Green fluorescence of *Pseudomonas* spp. was very clear on King’s B medium. When biochemically characterized all the isolates were motile rods, testing positive for catalase, oxidase, reduction of nitrate. Based on these morphological and physiological characteristics, isolates closely resembled to *Pseudomonas* spp. Based on these observations, the soil enzyme activities were measured to determine impacts of the *Pseudomonas* isolates. The highest activities of B-glucosidase and alkaline phosphatase were observed in isolate BA15. BA15, M5 and B6 isolates showed increased seed germination and varied seedling vigor when compared to control. Seed inoculation with BA15 and B6 isolates showed significant increase fresh shoot weight (15 and 13.5 g/seedling) respectively.

**Discussion:** Our isolates are temperature resistance and salt tolerant and therefore able to survive in dry hot summer conditions. Our isolates (BA15, B6, M5) can play an essential role in helping plants establish.

**Acknowledgement:** We would like to thank the Harran University for the financial support.

**Keywords:** *Pseudomonas*, isolate, soil, pea
Posters presentation

Soil Microbial Biomass Carbon and Dehydrogenase Activity in Salt Effected Soil

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Introduction: The most important problem is salinity in irrigated areas. Plant biodiversity, land use and soil salinity have significant impact on soil microbial biomass and soil enzyme activities. Saline soils are widespread in arid and semi-arid regions of the World. This problem may be a result of due to diverse soil properties, poor drainage, high evaporation. Salinity is formed in the soil due to excessive application of irrigated agriculture in Harran Plain. This study was investigated the effects of secondary salinity on soil microbial biomass carbon and dehydrogenase activity.

Material and Methods: Soil collected from ten sites showed distinct variation in soil electrical conductivity. Soil samples were taken from selected locations at the depth of 0-15 cm during the wet season of 2012. The samples were analyzed for some physical and chemical properties. Microbial biomass carbon was was measured by absorption of the CO₂ produced during 4 hours at 25 °C. Microbial biomass carbon contents from the amount of CO₂ produced at the end of the incubation period were calculated using the equation 40.04 mg CO₂/g + 0.37. Dehydrogenase activity was evaluated following Liu et al. (2008). 3% TTC (2,3,5-triphenyl tetrazolium chloride) solution, distille water, glucose were added to of soil. Samples were incubated for 24 h at 25 °C. The formation of TPF (1,3,5 triphenylformazon) was observed spectrophotometrically at 485 nm.

Results: There were significant differences among samples for all physicochemical properties. Soil pH values ranged from 6.75 to 8.10. Soil samples showed distinct variation in soil EC values ranging from 9.10 to 38.6 dSm⁻¹. The microbial biomass carbon and dehydrogenase activity were the lowest in extreme saline soil.

Discussion: Salinity significantly effects soil chemical properties and some microbial properties such as microbial biomass carbon and dehydrogenase activity. Soil microbial biomass carbon and dehydrogenase activity may be related to microbial stress in salt affected soils.

Acknowledgement: We would like to thank the Harran University for the financial support.

Keywords: Microbial biomass carbon, dehydrogenase activity, salinity soil
Effects of Some Organic Materials on Soil Biological Properties and Barley Growth

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Introduction: Agricultural wastes do not pollute the environment with being an alternative to the use of inorganic fertilizers. The addition of agricultural wastes to the soil has gained importance in recent years. In addition to increasing the cost of energy required for chemical fertilizer production, increasing use of chemical fertilizers for higher yields leads to deterioration of the physical, chemical and biological structures of the soil and environmental pollution. The aim of the study is to investigate the effect of wheat stubble and pigeon manure on the growth of barley.

Material and Methods: The research was carried out in a pot experiment under laboratory conditions. Wheat stubble and pigeon manure as organic waste is used. Wheat stubble and pigeon manure were given into the soil. Also, urea is also added to the soil. Barley seeds are planted in each pot as 5 seeds. Catalase and glucosidase enzyme activities of soil samples were investigated at the end of 75 days incubation and the level of respiration in the soil was determined. Height lengths, root lengths and root weights of harvested barley plants were determined.

Results: When compared to control; in the pots where organic materials were applied, catalase, glucosidase and alkaline phosphatase enzyme activity values increased significantly. The lowest soil respiration was obtained from pots where no waste was applied. Organic wastes added to soil affected soil respiration at different rates. The highest respiration was determined in soil with pigeon fertilization + wheat straw. Organic wastes used have an effect on root length and root weight in the pod length compared to the control.

Discussion: Organic materials increased the plant height and root weight of barley. Treatments of wheat stubble and pigeon manure were found to be effective on soil.

Acknowledgement: We would like to thank the Harran University for the financial support.

Keywords: Biological activity, Barley, Wheat stubble and Pigeon manure
Effect of *Glomus mosseae* on Soil Microbiological Properties and Growth of *Vicia Sativa* Under Salt Stress

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**Introduction:** Mycorrhizal fungi are key component of soil microorganisms from symbiotic relations with the most plants improving the nutritional status and protecting against several soilborne plant pathogens. Mycorrhizal symbiosis can enhance stress resistance of field crops, thus protects plants against detrimental effects caused by environmental stress such as salinity, drought and low fertility. Mychorrhizal fungi have been attributed to enhanced nutrient uptake, increased growth of plants. This study was investigated the effects of mycorrhiza inoculation and salinity on *Vicia sativa*.

**Materials and methods:** A pot experiment was conducted under greenhouse conditions. The experimental design was a randomized design in factorial with three replicates. Treatments induded four levels of NaCl (non-saline (control), 1, 2, 3 %) and mycorrhizal symbiosis (without mycorrhiza inoculation and mycorrhizal inoculation), fertilizer (4 kg/da P₂O₅). After 6 mouth of growth, the plants were harvested. Shoots were oven dried at 70 °C for 48 h and weighed. Roots were washed with top water and then washed distilled water, removed for determination of root mycorrhizal colonization. The remaining roots were dried and weighed. Soil respiration, Catalase activity, Alkaline phosphate activity were measured.

**Results:** Increased salinity decreased shoot dry weight in inoculated and non-inoculated plants with mycorrhiza. Our experiment, 2 % salt and mycorrhiza inoculation had significant effect the root height as compared to the other treatment. Rate of root colonization was higher at inoculation treatments. Root colonization by inoculum decreased at increased salt doses. Mycorrhizal inoculation significantly increased dry matter of plants. Catalase and alkaline phosphatase activity in soil were enhanced by mycorrhizal inoculation.

**Discussion:** This study that mycorrhizal inoculation has an important influence and thus, this effect is related to microbial processes. It could be concluded that mycorrhizal inoculation increased plant growth under saline stress.

**Acknowledgement:** We would like to thank the Harran University for the financial support.

**Keywords:** Mycorrhiza, salinity, soil enzyme, *Vicia sativa*
Introduction: Gustavioid mites comprise 377 species and 10 subspecies, 47 genera and 6 subgenera in 8 families with nearly cosmopolitan distribution except for the Antarctic Region. So far, 8 species of this superfamily have been recorded from Turkey. The superfamily Gustavioidea can be characterized by the thin cerotegument, usually shiny and smooth bodies; chelate-dentate chelicerae, prodorsum with lamellae, minute notogaster setae except the posterior setae, 5-6 pairs of genital setae. Aim of the study, the oribatid mites inhabiting in the Çat Forest are evaluated from the taxonomic point of view with the aim of contributing to the oribatid fauna of Turkey.

Material and Methods: The soil, litter, moss, and lichen samples were randomly taken from different habitats of study area in between April 2014 and November 2014. Mites were extracted with the help of a Berlese-Tullgren funnel extractor. Extracted mites were killed, fixed and stored in 70% ethanol. The light and scanning electron microscopes (SEM) were used to examine mites. The compound microscopic examinations of specimens were made in lactic acid, mounted in temporary cavity slides.

Results: As a result of the assessment, 4 species belonging to the families Ceratoppiidae Liacaridae and Xenillidae were determined. These were Ceratoppia quadridentata (Haller, 1882), Xenillus tegeocranus (Hermann, 1804), Liacarus brevilamellatus Mihelčič, 1955 and Parapyroppia cornuta (Berlese, 1910). These species were previously determined from Turkey.

Discussion: The photographs of determined taxa were taken using a LEO 440 model scanning electron microscope. Their morphological features, distributions and ecology were reviewed on the basis of our samples, and their taxonomic problems were discussed.

Keywords: Acari, Oribatida, Gustavioidea, Çat Forest, Sivas.
Introduction: Horse-flies are true flies in the family Tabanidae. The females of these flies are blood suckers, feeding on mammalian blood. The males feed on nectar. In this study, histological and morphological structure of the male reproductive system in T. bromius was described with light microscope and scanning electron microscope (SEM).

Material and Methods: Adult flies were collected from Eskişehir in September 2017. They were anesthetized with ethyl acetate fumes and dissected in alcohol. The gross morphology of the reproductive system of the males were examined and photographed with a Lecia EZ4D stereomicroscope. For the histological analysis, the male reproductive system of five males were fixed in Formaldehit for 24h. and washed, dehydrated in a grade series of ethanol solutions, embedded in paraffin. Sections were cut into 6-7 µm thick slides and stained with Hematoxylin-Eozin and Mallory’s Triple, photographed. For SEM examinations, samples were cleaned, dried with Hexamethyldisilazane, coated with gold. The observations were carried out using a JEOL JSM 6060 LV SEM.

Results: The male reproductive system in Tabanus bromius consists of pair of testes, each with a vas deferens, a pair of accessory glands, two seminal duct, a median ejaculatory bulb. The testes are ellipse-shaped, milk-whitish colored. The testes have a lot of testicular follicles. There are three zones (growth, maturation, differentiation zones) within the testicular follicles of T. bromius. The growth zone, a lot of spermatogonia are collected into groups to form cysts. This zone, a lot of spermatogonia differentate by mitosis division to form spermatocytes. In the maturation zone, meiotic division occurs in the cells of these groups and these cells become spermatids. The head and tail of the sperms can be distinguished in this zone. Resolutions start at this zone. Spermatozoa occurs in the differentiation zone where spermatids develop and change. The first two zone, the sperm heads were round-shaped. In differentiation zone, turned into shuttle shape the sperm heads. The spermatozoa migrate to the vas deferens, pass into the vas deferens, and are transfered to seminal vesicle. The seminal vesicle opens into the ejaculatory bulb which is reverse-triangular shape. It has epithelial and muscle layers. Testes covered with single-layer epithelium.

Discussion: The male reproductive system of Tabanus bromius were first time examined with light and SEM microscope. Observations on male reproductive system can be used as an aid in confirming identifications made by taxonomic and morphological

Keywords: Reproduction, testes, histology, microscope, SEM.
Introduction: The spermatheca is an accessory female reproductive organ that occurs in orders of insects. It is a complex organ and varies greatly shape in the insect female reproductive system. The spermatheca opens into the anterior tract of the common oviduct which is plays a significant role in many functions such as sperm storage, nourishment of the spermatozoa, fertilization and oviposition. In this study, spermatheca morphology and histology of *T. glaucopis* was described with light microscope and scanning electron microscope (SEM).

Material and Methods: Adult females were collected from Eskişehir in August 2017. They were dissected in alcohol and examined under the Lecia EZ4D stereomicroscope. For the light microscopy examinations; samples were fixed in Formaldehyd for 24h. and washed, dehydrated in a grade series of ethanol solutions, embedded in paraffin. Sections were cut into 6-7 µm thick slides and stained with Hematoxylin-Eozin and Mallory’s Triple. For the SEM examinations, samples were cleaned, dried with Hexamethyldisilazane, coated with gold. The observations were carried out using a JEOL JSM 6060 LV SEM.

Results: *T. glaucopis* females have three spermatheca which are consist of the slender duct, reservoir (terminal capsule), muscular pump, and spermathecal gland. Each spermatheca arise from a common duct which enters the genital chamber ventrally between the posterior arms of the genital fork. Each reservoir is round-shuttle-shape, nearly perfectly with a dark brown colour due to the thick cuticle lining of their lumens. The spermathecal duct connects the spermathecal reservoir with the proximal portion of the female reproductive tract, allowing the transit of sperm in both directions. The glandular portion of the spermathecae consist of a secretory cells. The secretory cells release substances into a glandular duct that directs the secretions into the lumen of the reservoir. Spermathecal duct, pump and reservoir has muscle layers under the sheath for sperm transfer. There are bundles of sperm in the spermathecal duct, reservoir and pump. Spermathecal ducts are covered by a single layer epithelium. The reservoir is heavily sclerotized with the surrounding sheath comprised of large columnar epithelial cells and muscularis.

Discussion: In most Diptera, the structures of the spermatheca show a varied and often highly complex diversity and has been found to exhibit many important characters used in taxonomy and phylogeny.

Keywords: Morphology, histology, spermatheca, SEM.
Introduction: Nanotechnology applications have changed basic scientific theories and production technologies in all areas, as nanotechnology has enabled the creation of new designed products at the atomic level on organic and inorganic materials. The building block of nanotechnology is nanoparticles. Nanoparticles have properties such as unique physicochemical properties, high penetration ability, large surface area and chemical activity. Nanoparticles can cause secondary contamination or other environmental effects by collapsing onto soil and water bodies. The nanoparticles carried by the clouds are likely to be affected by the honey bees that provide the resultant pollination of plants.

Materials and Methods: In order to shelter the bees for 96 hours in vitro, 20x5 cm long and 8 cm wide self-covered plastic containers were utilized. Randomly selected 50 bees were put into each container. The test conditions was conducted at 25±2 °C temperature and in the dark. The relative humidity which was normally 50-70% was recorded throughout the test. No behavioural disorder or mortality was observed in the control groups all through the test. The dead bees in the test groups were counted at the 24, 48, 72 and 96 hours. This study was carried out in triplicate, independent of each other.

Results: In this study, the lethal concentration for *Apis mellifera* (honey bee) against various nanoparticles was determined. Nano boron is highly toxic in 96 hours in honey bees. In general, it has been noted that the toxic effects of all treatment groups (0.001, 0.01, 0.1 ve 1 mg/L) are increased when the exposure duration of nano and micro boron particles is prolonged. Toxic effects of TiO$_2$, ZnO-TiO$_2$ and Ag-TiO$_2$ nanoparticles increased with exposure to exposure and duration of exposure. The highest toxicity was also in the case of Ag-TiO$_2$, then in ZnO-TiO$_2$ the least toxicity was TiO$_2$.

Discussion: At present, there are few studies evaluating the effect of nanoparticles on honey bees and there are studies in which the effect of titanium dioxide, palladium, platinum and boron nanoparticles on honey honey is evaluated.

Keywords: *Apis mellifera*, nanoparticles, nanotoxicology
Micromorphological and Anatomical Properties of *Platyspermum* Section Species of *Gagea* (Liliaceae) in Turkey

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Introduction: *Gagea* is represented by 300 in the world and 31 species in Turkey. It is aimed to investigate in detail the characters which are overlooked in *Platyspermum* section species of *Gagea* genus. In this research, *Gagea alexeenkoana*, *G. commutata* ve *G. reticulata* species of *Platyspermum* section belongs to *Gagea* genus which are collected from different localization of Turkey was examined with regard to morphological, seed and leaf surface, pollen micromorphology, anatomical and geographical distribution of the species are given.

Material and Methods: Seed samples were obtained from capsules collected during mature fruity period of *Platyspermum* section species. Surface micrographs of the seeds and leaves were taken with a Jeol JSM 6490LV model scanning electron microscope (SEM) and examined through these microphotographs. The pollen preparations prepared according to the Wodehouse method were examined with light microscopy. SEM microphotographs were taken to determine their palynological properties. All samples were taken directly from live materials that had been collected during field studies and fixed in 70% ethanol and were stained sartur reagent. For basal leaves and peduncle anatomy, cross sections from mature plants were taken, examined, and photographed.

Results: Seed surface muries are regularly in the *G. alexeenkoana* and *G. commutata*, but in *G. reticulata* were irregular. The smallest seeds belong to *G. commutata*. Basal and cauline leaf surface ornamentations may be micropapillate in the *G. reticulata*, and it can be granulate in *G. alexeenkoana* and *G. commutata*. The pollen surface ornamentations are microreticulate-granulate, rugulate in *G. alexeenkoana*, rugulate, psilate in *G. commutata* and microreticulate-rugulate, granulate in *G. reticulata*. Although the anatomical characteristics are typical of the *Platyspermum* section characteristics are important characters in distinction of species within the section and in distinction with the other sections.

Discussion: In this study, seed and leaf surface, pollen micromorphology and anatomical features characteristics of *Platyspermum* section species of *Gagea* genus in Turkey were examined and described in detail with photographs and microphotographs. Systematic problems between species of *Platyspermum* have been supported with micromorphological and anatomical data and compared.

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Keywords: *Gagea*, *Platyspermum*, Micromorphology, Anatomy
Influence of Bee Venom Production on *Apis mellifera* L. Behaviour

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Introduction: Bee venom production has increased in recent years in the world and in our country. Although much work has been done on the medical effects of bee venom on humans, almost no study has been done on how bee venom production affects honey bees. With this work, it was aimed to remove this shortage.

Material and method: Bee venom was collected during the production season for 3 months, 1 day a week and 4 times a day. Electro shock was applied to the devices every 20 minutes. A maximum-minimum thermo-hygrometer is used to determine the daily maximum and minimum temperature and humidity levels in the beehive and apiary. The temperature and humidity recorders were placed in a box selected by chance from each group, and the maximum and minimum temperature and humidity values were measured and recorded daily at the same time. A black suede oval ball measuring 4x5 cm was used to determine the tendency of resistance. Suede top, swayed in front of the flight hole for a minute. This process was repeated 7 times from 10 June to 15 June. At the end of each application, the number of needles that the bee put on the ball was determined and evaluated as the measure of the tendency of the group to be irritable. In order to determine the tendency to loot, flour was sprinkled on the bees that accumulated in front of the looted hive, and the method based on determining which of these bears went to which hive. The colonies were checked 7 times a week during the natural swarming period, during which the open and closed queen bee thimble were destroyed. Thimble numbers were considered a measure of the tendency to swarming.

Results: A total of 5 gr bee venom was collected during the trial. Maximum temperature (°C) 37.82 ± 3.1, Minimum temperature (°C) 20.48 ± 2.12, Maximum humidity (%) 66.42 ± 8.71, Minimum humidity (%) 26.35 ± 4.77. Maximum temperature 37.82 ± 3.1, Minimum temperature (°C) 20.48 ± 2.12, Maximum humidity (%) 66.42 ± 8.71, Minimum humidity (%) 26.35 ± 4.77 it has been identified in the beehive.

The highest mean temperature value of the bee yard was 29.86°C, the lowest mean temperature value was 12.24°C, the highest mean humidity value was 81.10%, the lowest mean humidity value was 28.12% respectively. The number of sting for the experimental groups was determined as maximum 280 and minimum 56. During the season, it was determined that 11.3 ± 4.21 of trial hives and 3.13 ± 1.37 of control hives tended to loot. was checked seven times at weekly intervals during the swarm season. During the inspections, no open or closed queen thimbles were made by the bees.

Conclusion and Discussion: Producing bee poison creates stress on the bees, which leads to negativity for all beekeeping activities.

Keywords: Bee venom, *Apis mellifera*, Honeybee
Introduction: The artificial reefs, which provide new and attractive areas for divers, have been used around the world, especially in North America to promote diving tourism. The artificial reefs provide new shelters for marine organisms as well as increasing the profitability of diving areas. In 2006, sinking ships and other similar items as artificial reefs began in our country. These activities are regulated by the General Directorate of Fisheries and Aquaculture department under the Ministry of Food, Agriculture and Livestock in our country. However, the national guide does not offer a guide or procedures for the cleaning and sinking of vessels like ships and planes as artificial reefs. To make up this deficiency, we presented a project and it’s accepted by TÜBİTAK (The Scientific and Technological Research Council of Turkey). Investigations of the project will last two years. The aims of this project are to reveal the effects on diving tourism and the marine environment of ships and planes sunk deliberately as artificial reefs in the last decade in Turkey.

Material and Methods: Two ships, namely Alaybey and 9 Eylül which sank off Karaburun Peninsula, Izmir Bay, in April 2016 are the field of the project. An assessment of fish populations and environmental impacts caused by the wrecks will be determined through samplings on wrecks and control stations. Rapid visual census will be practiced monthly in order to determine fish community on wrecks and control stations during two years. Divers will estimate the average total length and individual numbers of every fish species under the sea. Biomass around the wrecks will be calculated for each fish species by the total length groups and length-weight relationship parameters ($W=aL^b$) in the literature. Chemicals and particulate matters caused by wrecks tend to accumulate more where the ship lays on the seafloor (the sediment interface). In this project, changes over time of chemical leakage from the wrecks will be analyzed seasonally. In this context, simultaneous analyses will be used to determine heavy metals (As, Cd, Cu, Hg, Mn, Pb, Sn ve Zn) in sediments, seawater and bioata and PCB analyses in sediments.

Results: When the Project would finish, we will: a) be contribute scientific data by executing the first study of precleaned sunk wrecks’ environmental impacts, b) be create and contribure an essential part in The Guide of Artificial Reef Application Project published by Ministry of Food, Agriculture and Livestock; relevant to the Project content, c) to enlighten future studies by the determining the impacts of the artificial reefs to diving tourism and the area itself.

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Keywords: Diving tourism, Wrecks, Artificial reefs, Karaburun, Aegean Sea
Some Kudoid Parasites (Cnidaria: Myxozoa) of Fish and Their Impacts on Fisheries and Human Health

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Introduction: Species of the genus *Kudoa* Meglitsch, 1947 are important myxozoan parasites with about 100 nominal species infecting a large range of fish hosts with a wide geographical distribution. Parasites having four or more polar capsules and sutural valves are microscopic and spore-forming organisms are found either in small cysts or free in tissues of commonly marine fish. Some of these parasites attract great concern due to their negative impacts on fisheries and human health problems in some countries. There is an increasing interest on myxozoan parasites of fish in Turkey and this tempted us to provide some details to increase awareness on such significant parasites in Turkey as well.

Methods: Details of pathogenic *Kudoa* species and their impacts on fish and human health were gathered from published records worldwide.

Results and Discussion: Host and tissue specificity is a known issue in myxozoan parasites and the majority of *Kudoa* species are located in skeletal muscle, but also the gills, brain, heart, kidney, spleen, ovary, gall bladder, urinary bladder, oesophagus, intestine, mesentery, and smooth muscle are other target tissues of fish. Some of these parasites are of significant concern to marine aquaculture through their production of post-mortem myoliquefaction, encephalomyelitis, and obvious cysts in the musculature. Some species causing post-mortem liquefaction of the host muscle and the production of macroscopic pseudocysts reduces the market value of the fish, having a direct negative impact in fisheries and aquaculture. The costs of pathogenic parasites on fisheries and aquaculture have been reported to be very high and changes according to both parasite and fish species. In addition, a number of *Kudoa* species have been related with human illnesses such as allergic symptoms and recent studies reported it to be the causative agent of novel food poisoning outbreaks by consumption of infected raw fish in Japan and Korea. These parasites have been reported the cause vomiting and diarrhoea in human in the recent years. In Turkey, a recent study discovered two novel *Kudoa* species *K. niluferi* from musculature of *Neogobius melanostomus* and *K anatolica* from musculature, kidney tubules and urinary bladder of *Atherina hepsetus*. However, it is currently not known whether these species have any negative impacts on their hosts and pose any human health problems, and this study discuss possible negative effects of these parasites on its host’s tissues as well as other significant pathogenic parasites.

Keywords: Myxozoa, Kudoa, Fish, Health
Introduction: Heavy metals should be reduced, or removed from environment due to their ability to accumulate in foods, living cells, non-degradability in nature, and carcinogenic effect. Many methods have been developed (precipitation, membrane filtration, reverse osmosis, coagulation, reduction and ion exchange) for heavy metal removal from waters. However, new methods are needed due to their disadvantages such as not being very effective at low heavy metal concentrations, requiring too much reagent and energy, and producing toxic waste. Biosorption is a new method performed using dead or living biomass to remove heavy metals from aqueous solutions. Biomaterials such as fungi, yeasts, bacteria, and algae are used as biosorbents. Algae, that fall into bioindicator species, are found abundantly in many parts of the world, seawater and freshwater and they have ability to be reused as wet or dry, high sorption capacity, low-cost. The purpose of this study is to give information about advantages and disadvantages of using algae as biosorbent.

Material and Methods: The algae used in the studies are macro algae and micro algae as wet and dried powder forms in both batch type and column type biosorption. The collected algae samples are cleaned, washed, and pre-treated such as drying, granulation, chemical modification to increase the biosorption capacity. The biosorption capacity of macro algae and microalgae is evaluated by Freundlich and Langmuir isotherm in the batch method; Thomson, Bohart-Adams, Yoon-Nelson models in the column method. The remaining metal concentrations are quantified by AAS, ICP-MS or ICP-OES.

Results: Algae have cell walls containing polysaccharides with high sorption capacity, rich in functional groups such as hydroxyl, carboxyl, amine, sulfate, phosphate, sulfate and organic ligands, which play an important role in the removal of heavy metals (Cd, Ni, Zn, Cu, Pb). It has been reported that algae have higher biosorption capacity than fungi and bacteria species because of their functional cell walls.

Discussion: Factors affecting biosorption are pH, temperature, initial concentration, amount of biomass, shaking time, type of biomass. When the temperature and pH changes are examined, generally, biosorption is not affected by temperatures such as 25-30 °C; but in some cases biosorption increases at high temperatures (such as 50 °C). While the temperature can damage the living organism, it can reduce metal sorption since sorption mechanism is an exothermic. pH which varies by the activity of functional groups and negatively or positively charged structures affects on biosorption capacity.

Keywords: Algae, Biosorption, Heavy Metal
Mollusca Species Distributed in Shallow Waters of Foça Coast (Izmir, Turkey)
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Introduction: Because of its location, geomorphological structure, and hydrographical and ecological characteristics, the Aegean Sea comprises an important part of the Mediterranean ecosystem. Mollusca play important roles in the ecosystem structure and biodiversity maintenance. Also, information on the spatial and temporal distribution of species is important for understanding biotic and abiotic interactions in marine sediments. The present study was performed with the aim to determine Mollusca (Gastropoda, Bivalvia) species that distributed in the shallow waters of Foça coast.

Material and Methods: Mollusc specimens were obtained by sampling during February 2016 and September 2016. A total of 4 stations was chosen from the coastal zone located in the inner harbor of the Foça coast. Samplings were performed at depth of 0-5m by using sampling equipments such as quadrat and hand dredge for seasonally. Materials were fixed in formalin of 4% to be examined in the laboratory. Also, physicochemical parameters were measured in-situ by using a WTW Multi-3420 water quality meter probe.

Results: As a result of this study, 27 mollusca species, belonging to 13 Gastropoda and 14 Bivalvia classis were identified. In the study area, Mytilus galloprovincialis was the highest dominance value with upto 171 specimens (% 22), followed by Patella caerulea with 101 specimens (% 13), Phorcus turbinatus with 59 specimens (% 8) and Nucula nucleus with 41 specimens (% 5).

Discussion: In shallow waters of the marine ecosystem, knowledge about the spatial and temporal distribution of species is quite important for understanding biotic and abiotic mutual effect. Especially in terms of Mollusca species, no discernible negative effect of the inner harbor was determined in sampling sites. Also, frequency index values of the species, % 48 of total species was common, % 37 was continuous and % 15 was rare (C. Gibba, N. Nucleus) species. When considering Mollusca diversity, it can be said that the region is still clean. Also, the monitoring activities at intervals are of great importance for the marine ecosystem.

Keywords: Mollusca, Bivalvia, Gastropoda, Seasonal variation, Foça Bay
Socio-Economic Situation of Inland Water Fisheries Cooperatives Partners and Views on the Problems of Cooperatives

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Introduction: The most suitable structures for the revitalization of fishing areas, the socio-economic development of low-income sections, and the implementation of alternative strategies are fisheries co-operative which are organized horizontally. Cooperatives ensure professional sustainability and sectoral competitiveness by organizing under the name of fisheries cooperatives as a means of implementing this policy, by creating a dynamic policy that ensures the continuation of traditional co-operation, resolving their problems, carrying the fisheries to future as well as improvement of the welfare level of fishermen, improvement of living standard and production. The number of co-operatives related to inland water fisheries remained at a lower level due to limited production areas in the inland regions and more individual fishing. For this purpose, in this study, it was aimed to determine the problems of cooperatives established by fishermen in Sinop inland waters and the socio-economic status of their partners.

Materials and Methods: Survey data were obtained through questionnaires, document reviews and face-to-face interviews from the partners of Fisheries Cooperatives operating in the inland waters of Sinop province between February 2017 and July 2017. SPSS and Office programs were used for evaluating the collected data.

Results: In the survey, all of the cooperative partners engaged by inland waters fishing were male and 74% were over 40 years old and 93% were primary school graduates. 53% of the partners own their own boats, and 91% of boat owners own a boat that was 1 to 8 meters long. It was determined that 79% of the cooperative partners had no other income except from fishery, and 93% of them rated their financial situation as "low income". They also reported that 60% of them were more than 21 years cooperative partner. Inland water fishermen are small-scale fishermen and usually live on the edge of poverty. In addition to the common problems of cooperatives such as competitiveness in the market, legislation and technical support, minority of partnership, dominance of invasive species with low-economic value in the domestic waters is the most important problems affecting their unit gain.

Conclusion: Fishing is an important source of income, although it is not usually an ancient occupation and culture. It should be supported by cooperatives that will support economic, social and cultural development by being managed within the integrated management understanding of these areas. Strong cooperatives from inside to out, i.e. from local to national, are thought to contribute to the sustainable fisheries sector as well as economic, democratic and human development.

Acknowledgement: This study was supported by Sinop University Scientific Research Coordination Unit. Project Number: SÜF-1901-16-32.

Keywords: Inland water fisheries, cooperatives, fisheries cooperatives, fisheries organizations
Enteric Red Mouth Disease in a Fish Farm at Keban Dam Lake

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Introduction: Enteric Red Mouth Disease (ERM) is a serious disease which causes economic losses on especially rainbow trout, *Oncorhynchus mykiss* in the World. *Yersinia ruckeri* which is an etiologic agent of ERM has been isolated from a variety fish species such as *Salmo trutta*, *Salmo salar* and *Salvelinus namaycus* but it has been mainly affected on *Oncorhynchus mykiss*.

Materials and Methods This study was carried out to investigate the disease doubt which was reported from a net cage fish farm in Keban Dam Lake in Elazığ, Turkey. Fishes suspected disease was brought by live-transported in water to the microbiology laboratory of Elazığ Fisheries Research sampled Institute. For isolation of *Yersinia ruckeri* from the fish, firstly the body surface of fish was disinfected with 70% ethyl alcohol. Then they was done autopsy and the samples of tissue was got from kidney, liver, spleen and intestine by extracting inoculation loop and planted into Tryptic Soy Agar (TSA) then incubated for 48 hours, 24⁰C. After incubation, there were some colonies of bacteria in agar and we have obtained pure cultures from these bacteria colonies. Gram negative identification card which was determined by gram staining for Gram (-) and rod-shaped bacteria was placed in Vitek-2 system. Data entry was made and incubated at 37 °C for 18-24 hours. Then, this young colonies put into plastic tubes (12x75 mm) which has 3 ml sterile buffer salt solution (%0.45-0.50 NaCl, pH 4.5-7.0) and prepared to homogenous bacterial suspensions at 0.65-0.85 Mc farland concentrations.

Results: We investigated some symptoms such as swimming on the side and around itself, darkening of color, some hemorrhages on inside and outside of both mouth and body, exophthalmos and fluid accumulation in the eyes. Isolated bacteria were formed colonies as smooth, slightly curved, puffy, round, bright color, cream-white colony in the medium. Using the Vitek 2 compact system, bacterial identification has been carried out both at the species and the genus.

Discussion: In recent years studies have shown increases in resistance development. Disease controls need to be evaluated effectively. It is only possible with the right diagnosis for drug use, application of drugs and preventive strategies when necessary. The importance of practical applications development of standard practice is once again at the forefront. It has been reported that ERM disease most affects about 7.5 cm length of rainbow trout, peaking at 15-18 °C, and decreasing the severity of infection when the water temperature was dropped to 10 °C (Austin and Austin, 1987). Although the water temperature was measured less than 10 °C (8.7 °C), the symptoms of the disease and deaths were seen in fish. It has been reported that clinically healthy fish may be carriers of *Y. ruckeri*, then, in the event of stress, leave a large number of bacteria excrete and thus infect other fish. However, it was reported that the effect of feeding on the protection against *Yersiniosis* is important, especially the addition of vitamins C and E to the feeds strengthens the immunity system, and the vaccination of fishes over 2-4 gr in contaminating farms using different methods greatly reduces the deaths.

Keywords: Enteric Red Mouth Disease, *Yersinia ruckeri*, Keban Dam Lake, Fish farm
Determination of Antibiotic Resistance Sensitivity of *Yersinia ruckeri* Isolated from a Trout Farm in Keban Dam Lake

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**Introduction:** Enteric Redmouth Diseases (ERM) which causes economic losses worldwide is a serious disease of the rainbow trout (*Oncorhynchus mykiss*). This study was carried out on a trout farm in the Keban Dam Lake. Gram staining was performed on bacteria cultivated from pure culture obtained from the trout samples taken. It was seen that the bacterium was Gr (-) and rod-shaped. Antibiotic susceptibility profiles were determined and the causative agent was identified.

**Materials and Methods:** It was determined that bacterial strains obtained from rainbow trout were gram negative rods. Vitek 2 compact system is used for its definition. It was diagnosed that the cause of the disease was *Y. ruckeri*. Antimicrobial activity against 13 different antimicrobial agents of *Y. ruckeri* isolates was determined by disk diffusion method. In the test, antibiotic discs containing amoxicillin (25 μg), ampicillin (10 μg), cephalexin (30 μg), cephapirin (30 μg), enrofloxacin (5 μg), erythromycin (15 μg), ceftazidime (30 μg), oxytetracycline (30 μg), streptomycin (10 μg), trimethoprim sulfamethoxazole (25 μg), cephalothin (30 μg), lincomycin (2 μg) and penicillin (10 μg) were used. Isolates were determined against 13 different antibiotic resistance profiles. For this purpose prepared according to the obtained bacteria subculture 0.5 McFarland standard suspensions and cultivation were carried out in Mueller-Hinton agar spread style by taking 0.1 ml of each. Antibiotic discs were placed on the substrate with a sterile clamp and left at 24 °C for 24-48 hours. The inhibition zone diameters around the post-incubation discs were measured and compared with the zone table suggested by the results (NCCLS).

**Results:** Symptoms such as swimming on the side and side, blurring of color, bleeding on the inside and outside of the mouth and on the outside of the body, single or double sided exophthalmos in the eyes, fluid accumulation in the abdomen and bloating are seen in the diseased fish. The isolated bacteria formed colonies in the medium with smooth, slightly curved, raised, round, bright color, cream-white color. The bacterium was identified as gram-negative and rod-shaped *Y. ruckeri*. The antibiotic inhibition zone diameters at 37 °C for 18-24 hours of incubation were measured in millimeters by placing antibiotic discs on the Mueller-Hinton medium. When *Y. ruckeri*‘s antibiotic susceptibility was evaluated, it was found that penicillin, oxytetracycline, cefaprin, lincomycin, cephalothine resistance, moderate sensitivity to erythromycin.

**Discussion:** According to the results of an antibiogram test made with *Y. ruckeri* strains in a survey, they were reported to be resistant to cephalosporin, meslocillin, trimethoprim+sulfamethoxazole and gentamicin-sensitive, linkomycin, erythromycin, stertomycin, rifamycin, nitrofurantoin. Some strains susceptible to oxytetracycline have been reported to have developed resistance. According to antimicrobial test results on 12 different *Y. ruckeri* strains in a different study, they were resistant to oxytetracycline, erymycin and ampicillin, whereas they were sensitive to chloramphenicol and norfloxacine against trimetoprim+ sulfamethoxazole, nitrofurantoin and gentamycin have reported that some strains have acquired resistance. As a result, the use of antibiotics in the treatment of Yersiniosis causes residual and bacterial resistance problems and it is thought that vaccination will be beneficial for human and environmental health.

**Keywords:** Enteric Redmouth Diseases, *Yersinia ruckeri*, Antibiotic Resistance
Introduction: Climate change due to global warming and demanding water in all sectors increase, the groundwater is running out and water ecosystems becoming polluted and poor quality and the development of new water resources becomes more expensive day by day. One of the most important consequences of climate change perhaps the most important, is the negative effects on water resources. In our country, about 75% of the water resources are used in agriculture and agriculture is an activity that depends on nature. Demand for water resources, which are becoming increasingly limited, is increasing rapidly and the amount of water used in agriculture is limited and world food safety is being in dangerous. The aim of this study is to reveal generally the impacts of climate change on agriculture.

Material and Method: It is predicted that the adverse effects of climate change will primarily be on water resources, meteorological disasters, agriculture and food security, public health, land and marine ecosystems and coastal areas. This, in turn, leads to the issue of adaptation to the effects of climate change as well as reduction of emissions to prevent climate change. Adaptation to climate change is the actions and measures taken to help communities and ecosystems cope with changing climate conditions. In this context, this study aims to determine the risks that climate change poses in terms of agriculture and aquaculture. To this end, negotiations were held with all sector stakeholders and the current situation was tried to be revealed.

Conclusion and Discussion: Determination of the level of impact from industrial activities in unexpected changes in the world climate is important because of the measures that can be taken with regard to climate change and the understanding of this process. WWF-Turkey Turkey's tomorrow that perform the main effects of climate change, according to Project Final Report will be as follows:

• The temperature increase will be limited until the end of the 2030s, after which a rapid increase will be observed,

• It is expected that the temperature increase will reach 4°C in the winter and 6°C in the summer while showing seasonal and regional differences

• Turkey in winter rainfall decline observed in the overall increase to be seen in a single rainfall in the eastern half of North Anatolia.

Keywords: Global Warming, Agriculture, Climate Change, Food
Intraspecific Diversity of *Philaenus spumarius* (Hemiptera: Aphrophoridae) in and around Kastamonu

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**Introduction:** *Philaenus spumarius* (L.), known as grasshopper beetle, is a common species in the family of Aphrophoridae (Hemiptera), which is distributed in the hot regions of both halves and also attracts attention with its color polymorphism. Adults of *P. spumarius* have both dorsal and ventral color and pattern polymorphism. Up to now, 16 different dorsal phenotypes have been identified from Europe, North America and New Zealand populations. Although it is known that there are 16 phenotypes worldwide, 12 of these phenotypes are more common. Dorsal phenotypes are divided into two groups, melanic and non-melanic. Non-melanic phenotypes; POP (populi), TYP (typicus), TRI (trilineatus) VIT (vittatus); melanic ones are named MAR (marginellus), LAT (lateralis), FLA (flavicollis), GIB (gibbus), LCE (leucophthalmus), QUA (quadrimaculatus), ALB (albomaculatus) and LOP (leucophthalmus). The color polymorphism seen in adults is under genetic control.

**Material and Methods:** *P. spumarius* adults were collected from May to October, 2017, at regular intervals over the natural vegetation from Kastamonu province. Coordinates, host plant, height, aspect and date were recorded. Samples were collected by sweeping net and put into insect killing jars. Then, they were labeled, and brought to the laboratory under appropriate conditions. the standard insect preparation method was used for preperation. They were examined under stereomicroscope, diagnosed and classified according to the phenotypes.

**Results:** A total of 780 *P. spumarius* adults were collected from different localities in Kastamonu province. 9 phenotypes in populations were determined as to color and pattern. These phenotypes are non-melanic forms; POP, TYP, TRI, VIT and melanic forms are QUA, MAR, LAT, FLA, and LCE. It was established that diversity and frequency of phenotypes differed according to localities.

**Conclusion and Discussion:** 9 phenotypes of *P. spumarius* have been identified from Kastamonu province. It is seen that the POP and TYP phenotypes were more common than others, and melanic forms were limited to females, as reported in other populations from Turkey. These results correspond with the other studies carried out in different regions of Turkey.

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**Keywords:** *Philaenus spumarius*, Kastamonu, Polymorphism, Diversity
Gene Transfer in Insects and Transgenetically Improved Biological Control Agents

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Introduction: Developments in molecular biology and biotechnology have made significant advances in the field of entomology and biological control. Especially; the production of insects used in the biological control has enabled the development of new strategies to avoid the use of environmentally advers effects of chemicals. Gene transfer technology has enabled the generation of more compatible biocontrol agents around the environment. When gene transfer is performed; the carrier (vector) system that can transfer to the genome of the broad target beneficial individual to be transferred. Insect gene transfer studies are also carried out in eggs. The transgenic insect that completes its development can be separated by marker genes from other insects. The most preferred insect species in transgenic insect production are parasitoids. Often it is necessary to use insecticides alongside parasitoids and predator insects in combating agricultural pests. In the case of chemical management, it is very important that parasitoids and predators are not affected by the insecticides. Insecticide resistance genes isolated by conventional genetic methods can be transferred to biological control agents by transgenic methods. This method can be used together with pests insects in combating chemical management and biological control. The model organism Galleria mellonella can be used in transgenic insect studies.

Material and Methods: Artificial diet containing an old dark honey pellet (broodstock) ground to grow the larvae of G. mellonella under laboratory conditions can be used. This diet, utilized for the continuation of the G. mellonella culture, can also be used as a control diet in experiments conducted to investigate transgenic insects’ studies.

Results: These studies have shown that G. mellonella can be used as model transgenic insect in biological control and chemical management. Additionally, it can be used for developing new strategies for gene studies.

Discussion: It is thought that gene transfer studies to insects will not cause any damage to the environment due to the fact that they have a specific effect to be transferred. Transgenic insect production is also very important to prevent damage to insecticides and to prevent the use of intensive agrochemicals. However, it is not known whether viral and bacterial vectors used in gene transfer studies will pass through other organisms. Gene-transferred biological control agents need to be investigated by assessing their current risks before they are released into the environment. As a result, when the current risks are elucidated, insects with gene transfer can be used as an alternative method of combating agriculture pest. Thus, the advers effects of chemicals on the environment will be reduced.

Keywords: Transgenetics, Parasitoids, Biotechnology, Biological control
Introduction: The genus Barbarea includes 19 taxa in Turkey and 11 of them are endemic. It was aimed to determine the ecological, morphological, anatomical characteristics and the distributions of endemic two Barbarea auriculata varieties (var. auriculata and var. paludosa).

Material and Methods: Anatomical research materials have been collected from their natural habitats when they are mature and have preserved in 70% ethanol or 4% formaldehyde. In anatomical investigations of two varieties were taken section from root, stem, and leaves by hand. After that, the cross sections were photographed with Olympus BX-50 microscope. In morphological studies of these varieties, parts of stem, leaves, flower and fruit were measured and given as tables. In addition, the habitat features of two varieties were determined in fieldwork.

Findings: Although both varieties are spreading in the same geographical region, but their habitat preferences similar. Barbarea auriculata var. auriculata grows riversides and slightly humid habitat in the Eastern Anatolia, between 1500 and 1600 meters, and var. paludosa grows in meadow, wetland, and humid places in the Eastern Anatolia and Eastern Blacksea Region, between 1500 and 2600 meters. For this reason, both anatomical features and morphological characteristics are different.

Results: In this study, the features of root, stem and leaf structures of two closely related varieties were identified. The ecological and morphologic characteristics and distributions were also determined.

Acknowledgement: This research was financially supported by TUBITAK, (Project no: TBAG-106T179)

Keywords: Brassicaceae, Barbarea auriculata, ecology, morphology, distribution
Investigation of Graphene Oxide on Removal of Heavy Metal in Industrial Wastewater

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Introduction: Many natural or artificial adsorbents are used in the removal of industrial wastewater by heavy metal adsorption method. When the absorption capacity is compared to high activated carbon and other materials, the graphene has a very high adsorbing capacity and a high surface area. The use of graphene oxide, which is the water-soluble form of the graphene in heavy metal removal, is the purpose of this work.

Material and Methods: In the study, the treatment of the metal coating industry for the adsorption of nickel in wastewater is investigated. The initial nickel concentration of 25.96 mg/L was obtained from an industrial facility which is the metal plating plant located in the Fatsa district center. The graphene oxide solution to be used as an adsorbent is commercially produced.

Results: The studies are still going on. The batch system to which added 1,2,4,8,16 ml (8 mg / L) graphene oxide was investigated in a reactor depending on pH, temperature, mixing speed and retention times. The nickel removal during the 90 minute treatment period from the start with low graphene oxide addition (1 mL) varied between 6% and 17%. Addition of more graphene oxide increases treatment efficiency. More graphene oxide addition and alteration of the treatment conditions are carried out.

Discussion: The first findings of the study are that grafic oxide can be used as a good adsorbent. But, adsorption conditions and optimum isotherms have to be determined. In addition, detailed analyzes such as SEM, TEM, Raman Spectrophotometer, XRD, etc. are needed in detail about the structural change of the graphene oxide after treatment.

Acknowledgement: We would like to express our appreciation to the Ondokuz Mayıs University Scientific Research Project Commission, which supported this study (PYO.MUH.1904.17.023).

Keywords: Nickel, wastewater, graphen oxide, adsorption, removal
Web Structure and Morphology of Spinnerets of Maimuna vestita (C. L. Koch, 1841) (Arenae: Agelenidae)

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Introduction: In our daily lives we can find spider webs almost everywhere. Each of the spider webs is a work of art. Every spider does not make a web. However, all spiders make cocoon (egg sac) around their eggs from web. The reason for the construction of the spider web is to make trap in a sense. Some of them use the spinneret to affix the leaves, to hang up the inside of their web, to close the hole they open.

Material and Methods: Fifteen individuals belonging to the Maimuna vestita (C. L. Koch, 1841) used in this study were collected in a field study in Bursa on September, 2016. The spinnerets of the spiders were dissected under stereo microscope (Nikon SMZ800, Japan) and prepared by routine methods. Then stereo microscope and Jeol JSM 5600 (Japanese) were examined in SEM. Micrographs are recorded. The web samples to be examined in the scanning electron microscope (SEM) were taken directly on the copper stubs. The web samples were coated with gold using Polaron SC-500 model coater. The examinations were made with Jeol JSM 5600 SEM and the images were recorded directly in computer environment and electron micrographs were taken from the printer.

Results: M. vestita (C. L. Koch, 1841) is a spider that is spreading widely in the world. In this study, the detailed morphology the web structure, spinneret and spigots of M. vestita recorded from Bursa was studied using stereo microscope and scanning electron microscope (SEM). It has been observed that M. vestita especially has web containing 2-3 holes between the branches of the pine trees and they are waiting in one of these holes. It has been determined that the web observed in the SEM is composed of dense silk fibers and these fibers are in thicknesses ranging from 220 nm to 820 nm. M. vestita's spinnerets are three pairs on the last part of the abdomen. The first pair is the posterior spinnerets, which are quite long compared to the body. Median and anterior spinneret are shorter than posterior spinneret. Each spinneret is cylindrical in shape and has a varying number of capillary channels called spigot at the tip.

Discussion: In M. vestita, the web structure and the general arrangement of spinneret are suitable general architect in other funnel web spiders. However, spigot morphology, number of spigots, settlement varies.

Keywords: Spider, Maimuna vestita, spinneret, spigot, morphology, SEM.
Using of Carbon Nano Tube in Electrocoagulation Treatment of Chemical Oxygen Demand (COD) in Leachate

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Introduction: It has been shown to be useful in wastewater treatment for carbon nanotubes have a high absorbing capacity. Leachate is a major pollutant with a high concentration of pollutants. Electrocoagulation is a successful method for the treatment of heavy metals, leachate and some inorganic pollutants. In this study, the focus of the electrocoagulation has been on taking into account the knowledge of the literature as it provides maximum 60-70% efficiency in COD treatment. In order to increase the efficiency of this treatment, the effect of the single walled carbon nanotube (SWCNT) and the multiwalled carbon nanotube (MWCNT), which have been widely used in recent years and have a high adsorption capacity on the treatment efficiency has been investigated.

Material and Methods: By examining different conditions in the electrocoagulation (pH, plate distance, plate type, current, conductivity, mixing, temperature, concentration, etc . .); changes in the yield of the treatments were investigated by the addition of SWCNT and MWCNT in different amounts under optimum operating conditions. MWCNT was purchased commercially from Sigma-Aldrich. The commercially produced SWCNT and MWCNT nanomaterials were used in the treatment.

Results: COD removal was found to be low (% 10-15) in the optimum pH range (5-6). Optimum mixing conditions for the dissolution of MWCNT in wastewater have been investigated in the sonicator.

Discussion: The general difficulties of COD elimination and the difficulty of dissolving MWCNT have not resulted in high treatment. However, efforts are still being made to increase the efficiency of the treatment.

Acknowledgement: We would like to express our appreciation to the Ondokuz Mayis University Scientific Research Project Commission, which supported this study (PYO.MUH.1904.17.022).

Keywords: COD, wastewater, CNT, electrocoagulation, nano materials
The Status of *Lernaea cyprinacea* (Linnaeus, 1758) Infestation in Endemic Species: Anatolian Minnow (*Pseudophoxinus anatolicus*, Hanko 1925)

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**Introduction:** *Lernaea* spp. (Copepoda: Lernaeidae) is known as a common ecto-parasite for freshwater fish species. In this study, it was aimed to determine the infestation status of *Lernaea cyprinacea* (Linnaeus, 1758) in an endemic species Anatolian minnow (*Pseudophoxinus anatolicus*) in Kızılca Reservoir (Seydişehir, Konya).

**Material Method:** Anatolian minnows were captured by monoflamentlon-line nets from Kızılca Reservoir on 4-25 April 2017 and transferred to the hatchery of Eğirdir Fisheries Research Institute by oxygenated tanks. After anesthesia with phenoxyethalone, the female and male ratio (F/M), weights (W) and total lengths (TL) of the fish were determined. Ecto-parasitic examination (locations and presence rates of parasites in the fish body were determined), diagnosis and calculations were performed. Parasites were isolated and fixed in 70% ethyl alcohol.

**Results:** In this study, 98 Anatolian minnow (F/M: 53/45, TL: 17.59±1.08 cm and W: 62.37 ± 13.99 g) were examined. 27 fish were found to be parasitized (F/M: 15/12, TL: 17.78±1.27 cm, W: 65.77±18.09 g) and 71 fish were found to be un-parasitized (F/M: 39/32, TL: 17.52±0.98 cm, W: 61.08±11.76 g). The presence of parasites on the dorsal fin was found to be 8.3% and 5.6% on the ventral fin, 13.9% pectoral fin, 2.8% anal fin, 13.9% caudal fin, 11.1% on the lateral region and 11.1% on the anal region, 5.4% eye region, 22.2% maxilla or mandibular region and were found as 5.62% on operculum region. The prevalence (P) and mean intensity (MI) values were found as P: 27.6% and MI: 1.33±0.67 (for female fish MI: 1.33±0.47, for male: 1.33±0.85).

**Discussion:** This study, is the first record of the occurrence and status of *Lernaea cyprinacea* infestation of Anatolian minnow, which is being studied on adaptation to culture conditions and potency. This study will be the basis for the further work on fish health in the future with regard to Anatolian minnow.

**Acknowledgement:** The samples used in this study were obtained from TAGEM/HAYSUD/2016/A11/P-01/1 project of GTHB Eğirdir Fisheries Research Institute.

**Keywords:** Anatolian minnow, endemic fish, parasite, *Lernaea*, infestation
Leaflet Anatomy of Astragalus Belonging Section Macrophyllum (Fabaceae) of Turkey

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Introduction: The species of sect. Macrophyllum possess the largest leaves and inflorescences within the tragacanthic Astragalus species. Turkey, with 6 species, is the main diversification centre of the section. The taxa of this section form more or less loose subcushions, and in contrast to many other tragacanthic species, they do not form dense populations. A. isauricus Hub.-Mor. & V.A.Matthews and Astragalus yukselii Karaman & Aytaç are endemic to Turkey. Leaflet petiole and leaf transverse section, upper and lower epidermis have been investigated.

Material and Methods: Plant materials were collected in the flowering season from various locations in Turkey. First, leaflets were waited in warmish water, and then all transverse sections were cut by hand from the leaflets. Samples were investigated in Sartur reagent (a compound reagent of lactic acid, Sudan III, aniline, iodine, potassium iodide, alcohol, and water). Photographs were taken with a Leica DM500 microscope.

Results: The leaflet is isolateral (monofacial) in transverse section. Leaflets are amphistatic with stomata on the both upper and lower epidermis. The stoma cells are just below the epidermis cell level. In the middle vein where the bundle of collateral conduction is located, xylem elements take up considerable space. There are large parenchyma cells around the middle vein. Small bundles of transmission are buried in mesophyllum. Leafy superficial cross sections have amaryllis-type stomata compared to guard cells and anamositic type in terms of neighboring cells. The palisade parenchyma cells in the leaflet upper and lower superficial sections are oval and round shaped. The petiole shape is semi-circular in A. cephalotes and A. isauricus while in other species belonging to the section is circular. In addition, there are 3 large and several small transmission bundles in A. yukselii, A. cephalotes, A. isauricus and A. longifolius species, while in other species the number of large transmission bundles varies between 4-5.

Discussion: As a result of the anatomical examinations, there were no significant differences in leaf transverse and superficial sections between species, but there were differences between petiole shape, and size and number of transmission bundles in petiole anatomy.

Acknowledgement: This study was founded by TUBITAK with project TBAG-110 T 911 numbered project.

Keywords: Macrophyllum, Astragalus, Fabaceae, Leaflet anatomy
Introduction: *Liquidambar orientalis* are deciduous and aromatic trees up to 20 m in the genus Liquidambar (Altingiaceae). It is endemic to Turkey and grows in Tukey and Rhodes Island, native to the eastern Mediterranean region, commonly known as oriental sweetgum or Turkish sweetgum, because of contains balsamic sap. The aim of this study: Using General Directorate of Forestry, Department of Non-wood Products and Services between 1989-2016, it is aimed to reveal the amount of hardwood production and the income earned, at the same time emphasizing the importance of the materials it contains and its usage areas.

Material and Methods: In order to find the amount of the harvest of sweetgum oil; this data have been taken from General Directorate of Forestry, the Department of Non-Wood Products and Services is the material of this study. According to the year; how much sweetgum oil was collected (kg) in Regional Directorate of Forestry and the income data were presented in tables in order to reveal the amount harvested sweetgum oil.

Results: Sweetgum oil is one of the most important non-wood forest products in Turkey. Sweetgums are endemic to Turkey and only growed in the territory of The Forest Regional Directorate Muğla. *Styrax liquidus* contains volatile oil, resin, cinnamic acid and benzoic acid. It is used in perfumery, soap, cosmetics and medicine industry. It has antiseptic, wound healing, antiparasitic and expectorant effects. It is used in insomnia, stomach ulcer, gonorrhea, asthma, bronchitis, cough and lung diseases, as insecticide and parasiticide, in pain of insect bites, skin diseases like scabies and fungi. Perfumeries used as a fixative, tobacco and chewing fragrance. In addition, the remaining shells are made from mud and mabedes, and then they are used as incense.

Discussion: According to the data received from General Directorate of Forestry, Department of Non-wood Products and Services first record belongs to year 1989 in the period of 1989-2016. In 1989, for the first time, 4.246 kg sweetgum oil collected and gained 158.535 TL incomes. When analyzed 28 years of data; in total, 41.093 kg of sweetgum oil harvested and was earned as revenue 1.468.845 TL. Maximum amount of sweetgum oil harvested (5.284 kg) in the year 2001 and minimum amount (47 kg) in 2004.

Keywords: *Liquidambar orientalis*, Sweetgum, Harvest, Ethnobotanical uses, Turkey
First Record of *Micrasema morosum* (McLachlan, 1876) in Turkey (Trichoptera Brachycentridae) and A List of The Trichoptera Fauna in Araç Creek

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**Introduction:** The genus *Micrasema* McLachlan 1876 (Trichoptera Brachycentridae) consists by only twenty-three species in the West Palearctic Region fauna. Up to now, the Trichoptera fauna of Turkey was represented by 482 taxa (450 species and 32 subspecies). According to literature, a total of 69 taxa that belongs to Trichoptera order were recorded up to now from Kastamonu. Numerous studies on mature caddisflies have been conducted by various authors in Turkey. However, systematic studies on the larvae are very limited, and especially the larval stage of endemic species remains unknown. The aim of this study was to determine the Trichoptera fauna of Araç Creek, which will contribute to knowledge of the Trichoptera fauna of Turkey.

**Material and Methods:** This research was carried out in Araç Creek between April and October 2013. Benthic macroinvertebrates were collected from between the stones, pebbles and plants on the ground using a standard dip net. Samples were fixed in 80% ethanol immediately after collection, and they were taken to the laboratory. Trichopteran species separated from other benthic macroinvertebrates were kept in 80% ethanol. For the identification of samples, Leica APO S8 binocular stereomicroscope was used. The collection is deposited at the Laboratory of Zoology of the Faculty of Sciences and Arts, University of Kastamonu, Turkey.

**Results:** In this study identified the distribution of the caddisflies taxa in Araç Creek. A total of 1223 larvae belonging to Trichoptera were collected from the Araç Creek. After the identification of the samples, 14 taxa belonging to 9 genera of 8 different families (Brachycentridae, Hydropsychidae, Hydroptilidae, Lepidostomatidae, Leptoceridae, Limnephilidae, Psychomyiidae and Rhyacophilidae) were identified. The systematic list of identified caddisflies with this study will given in the text.

**Discussion and Conclusion:** It is the first study aiming to determine the Trichoptera fauna in the Araç Creek. Fourteen trichopteran taxa were identified from the Araç Creek. Four of these taxa from the Araç Creek were previously recorded. Eight other taxa are the new records for the Araç Creek. Additionally, 1 of these 8 taxa (Setodes viridis) was recorded for the first time for the caddisflies fauna in Kastamonu, and one of them (M. morosum) was recorded for the first time in Turkey. As a result of the study, the number of trichopteran taxa in Kastamonu increased from 69 to 71, and with one new record, the number of trichopteran taxa in Turkey increased to 483.

**Acknowledgement:** This study was supported within the scope of project number KÜ-BAP-01/2012-10 by Scientific Research Projects Coordination Department of Kastamonu University.

**Keywords:** Trichoptera, Araç Creek, new record, larvae
Introduction: Niche-based hypotheses have been proposed to explain processes and mechanisms of success in the establishment of non-native species into native communities. In this study, we examined potential trophic interactions and isotopic niche of two exotic fishes: common carp \((Cyprinus carpio)\) and goldfish \((Carassius spp.)\), and the native cyprinids \((Capoeta banarescui\) and \(Squalius sp.)\) in a dimictic-eutrophic lake, Lake Zinav, Turkey.

Methods: We sampled invertebrates, fishes and potential primary producers from littoral and pelagic zones of the lake in 2013 for stable isotopes (\(\delta^{13}C\) and \(\delta^{15}N\)) analysis. In order to compare isotopic niches of the fish species, we used the recently developed Layman metrics (Layman et al. 2007) and SIBER metrics (Stable Isotope Bayesian Ellipses using R; Jackson et al. 2011).

Results: Two native species probably has the ability to exploit a wider array of resources, indicated by the higher values calculated with Layman’s metrics relative to exotics. Larger variance of isotopic composition (CR: carbon range and NR; nitrogen range) of native species suggested a greater complexity in primary production sources, a higher level of dietary and/or habitat specialization, and/or high intraspecific competition. All four species appeared to inhabit same trophic level \((TP:2.42-3.12)\), indicating that this may be more likely related to intra and interspecific variation. A high percentage of niche overlap occurred between native and exotic fishes \((Squalius sp. and Carassius spp.)\), indicating an interspecific competition for food resources. Isotopic niche width (TA and SEAc) was highly variable native species, \(Squalius sp. (5.27\%^2)\) and \(C. banarescui (9.11\%^2)\), had the broadest while the exotics, \(Carassius spp.\) and \(C. carpio\) had the narrowest isotopic niches width \((1.02\%^2\) and \(0.21\%^2\), respectively).

Discussion: Evidences that the exotic species explores a narrower range of resources and that the native species has a greater isotopic niche and possibly suffers less intraspecific competition, indicates that the native species can tolerate habitat quality changes and the presence of the exotic species and promote survival and maintenance of its population even under possible competition effects imposed by the exotic species.

Keywords: niche breath, stable isotopes analysis, competition, exotic fishes
First Evidence of Relationship between Ostracod and Green Hydra

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Introduction: Ostracods are small crustaceans ranged between 0.3 mm and 5 mm in length which are composed with two calcareous valves and soft body parts inside. Their carapace completely covering the soft body parts bring themselves to much more durable position against external threats. They are widely found in many different aquatic habitat types and they can share common living area with Green Hydra (Hydra viridissima) in fresh waters. The Green Hydra is a common organism found in pool parts of freshwater. According to literature, it is known that hydras feed on all micro crustaceans including ostracods. For this process, Hydra uses their toxic fluid named nematocyte. This secretion produced by hydras paralyzes their praise. However, the prey-predation relationship between Hydra and ostracods has not been observed in detail before. Therefore, the main aim of the study is to provide deep knowledge about prey-predation relationship between these two species.

Material and Methods: Both ostracod (Cyclocypris ovum) and Green Hydra (Hydra viridissima) samples were collected from a tufa stream in Pennickental (Jena, Thüringia, Germany). The samples taken from the water source were also added to the samples with pure water to keep the water in fresh. All recordings were taken at the Geoscience Institute of Friedrich-Schiller University, Germany.

Results: Within the scope of this study, under the light of about eleven hours microscope recordings, all the predation attempts of the green hydras were failed. Because of the deterioration of water quality at the end of our video recordings, ostracod began to feed on the bleeding parts of Hydra.

Discussion: Because of only a preliminary study, the present data and recordings was not enough to obtain a clear conclusion. However, it has also been shown that the predation relationship between Hydra and ostracods, known to date, may be incorrect or vice versa depending on water quality because ostracods are more durable than Hydra under the unfavorable conditions. As a result, it is seen that this study should further investigate the known information in the literature of these two classes in terms of prey and predator relations later on.

Keywords: Ostracoda, Hydra, Predation, Behavior.
Importance of Swimming Setae and Reproductive Modes on the Stream Ostracoda (Crustacea)

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Introduction: This study aims to understand the relationship between Ostracod species with or without swimming setae and their reproductive modes in a flowing water in Sinop. Although few studies considered the function of A2 setae, there is no study focusing on the relationships between ecological importance of A2 setae and reproductive modes of non-marine ostracods.

Material and Methods: All materials collected with a hand net in situ from 6 stations at Sırakaraağaçlar stream (Sinop) from May 2011 to April 2012. Samples were fixed in 70% ethanol and were filtered in the laboratory and subsequently sorted from sediment. Species description was done under Olympus BX-51 microscope by following the taxonomic key provided in Meisch (2000). Water samples were collected in sterilized containers from each of 6 stations to quality measurements.

Results: Water quality measurements indicate relatively high water hardness, nitrate and ammonia levels within about relatively cold and warm waters. In total, 19 taxa were collected during the present study. We found significant difference between numbers of taxa with (12) and without (7) A2 swimming setae. Total numbers of parthenogenetic taxa (11) with setae was slightly higher than numbers of sexuals (8). Our findings show a significant variance in the means of dissolved oxygen levels between first and sixth stations (p<0.001, F-crit=1.99). Similar differences were also found for electrical conductivity and others. In general, salinity levels were lower and relatively constant at the four stations than the two stations. Also, we found that species diversity and abundance tend to increase from first to sixth stations.

Discussion: Our findings correspond that numbers of parthenogenetic species with A2 setae are better than species without setae. This is probably because the species with setae in lentic habitats would have better chance of active dispersion than those of species without setae on A2. Abundance (numbers of individuals) of taxa tolerant to salinity levels (referring to electrical conductivity) increased towards first two stations nearby the Black Sea coasts. This corresponds to an increase in salinity levels. Numbers of species with sexual mode seem to be smaller than the parthenogenetic species. In reverse, more parthenogenetic taxa with A2 setae were found than without setae. Results suggest that species in lentic habitats with parthenogenetic reproduction and with setae may have better survival chances.

Acknowledgements: We would like to thank to Dr. Elif Tezel Ersanlı (Sinop University) and Ceren Oral for sampling and providing the materials.

Keywords: Sexual, Parthenogenetics, Geographical Distribution, Ecology
Introduction: Since the beginning of the industrial age, rising use of the fossil fuels has caused many of environmental disasters. This negative situation has forced the scientific community to find eco-friendly solutions. Hence, hydroelectric, wind, solar, geothermal and biomass-based biofuel technologies have been rapidly developed as renewable energy sources. Recently biofuels, especially derived from non-food biomass sources, have been considered as the most promising and safer energy sources for the future. In this manner, the present study was designed for isolation of wild-type fungal strains with ethanol production potential as an eco-friendly renewable energy source and their identification.

Material and Methods: Decaying lignocellulosic materials were collected from the forests near Erzurum, and aseptically transferred to the laboratory. Isolation studies were done according to the general microbiology procedures. After lignocellulolytic activity determination tests, the ethanol production determination for each active isolate was done by cultivation in modified BMC media and ethanol levels were determined by gas chromatography. Molecular identification of the active isolates was done by using PCR with universal ITS primers, sequencing of amplicons and the BLAST analysis of NCBI database.

Results: Three of fungal isolates showed both lignocellulolytic activity and ethanol-producing potential. MG18, MG27 and MG28 were produced ethanol in MBMC medium at 6.54 g/L, 7.98 g/L and 6.97 g/L concentrations, respectively. According to the ITS-PCR results, they were identified as *Fusarium verticillioides* (MG18 and MG27) and *Trichothecium roseum* (MG28).

Discussion: In conclusion, three fungal strains with a potential for the bioethanol production from lignocellulosic sources were isolated, cultured and identified. The present data is valuable for the development of next-generation biofuel production technologies using lignocellulosic compounds as non-food based raw materials.

Acknowledgement: This study was supported by Republic of Turkey – Ministry of Food, Agriculture and Livestock: TAGEM-13/ARGE/17.

Keywords: Bioethanol, Fungi, Internal transcribed spacer (ITS), Lignocellulose
Introduction: Lycosidae is one of the most prevalent species in all around the world and Turkey. In our study, there are drawings of genital organs on species belonging to Lycosidae family in Nevşehir province.

Material and Methods: In this study, species collected from Nevşehir province were stored in 70% ethanol and genital organs were sketched by determining SZX16 Olympus binocular stereomicroscope species.

Results: The following genotypes of the specimens were used when the following types were identified. Alopecosa cuneata (Clerck, 1757), Alopecosa cursor (Hahn, 1831), Alopecosa fabrilis (Clerk, 1757), Alopecosa farinosa (Herman, 1879), Alopecosa striatipes (C. L. Koch, 1839), Arctosa perita (Latreille, 1799), Geolycosa vultuosa (C. L. Koch, 1838), Hogna radiata (Latreille, 1817), Lycosa praegrandis C. L. Koch, Lycosa singoriensis (Laxmann, 1770), Lycosa tarantula (Linnaeus, 1758), Pardosa agrestis (Westring, 1861), Pardosa hortensis (Thorell, 1872), Pardosa nebulosa (Thorell, 1872), Pardosa proxima (C. L. Koch, 1847), Trochosa hispanica Simon, 1870, Trochosa ruricola (De Geer, 1778), Trochosa spinipalpis (F.O.P.-Cambridge, 1895).

Discussion: Epigyne and pedipalp drawings of all the spiders were made. It's all shown on one sheet. The differences were made more obvious.

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Keywords: Araneae, Fauna, Epigyne, Pedipalp, Lycosidae, Nevşehir, Turkey.
Introduction: Turkey represents a considerable range of biodiversity due to its location and complex topographic diversity. Phenology of vegetation varies across temporal and spatial scales due to diverse geographical conditions of Turkey. The distribution of the different vegetation formations is controlled largely by climate and topography. While forests, shrubs and grassland plants compose the main plant formations in Turkey, many other vegetative formations can be found in many parts of the country. However, forest areas, maquis and grassland formation areas have been severely damaged due to the pressure created by human activities. The ecological characteristics of plants in natural or semi-natural areas should be evaluated and the effects of changes in land use over time should be assessed.

Material and Methods: Remotely sensed data, which have obtained from several satellite systems, have proven to be an effective tool for monitoring vegetation using digital or analog techniques. In this study, phenologic and other characteristics of vegetation have been examined. The main objective of the study is to examine the utility of SPOT VEGETATION (SPOT VGT) data (which were collected for the years of 1998 to 2013) for monitoring vegetation conditions in Turkey. The 10-day MVC NDVI was calculated and the data are composited for selected temporal periods to evaluate vegetation state.

Results: Phenologic and other characteristics of vegetation formations (such as maximum and minimum activity level, growing season length) were determined. Different formations represent diverse phenologic characteristics during the study period. Both the quality of the vegetation and the elevation factor were found to be influential on plant activity in analyzes performed on different test sites. In Cukurova, agricultural plant activity, characterized by two peak periods per year until 2000, started to show a single peak per year after 2007 due to the change in agricultural activities. Meadow areas at different altitudes also differed between both phenologic times and vegetative activity start times. This shows the change in biomass and canopy characteristics of plants as the elevation change. Also in humid years, the vegetation cover in Turkey showed much stronger biological activity compared to normal and dry years. Especially in the inner regions, during the humid years, the vegetative development starts and ends early compare to the normal and dry years.

Discussion: Rapid response of vegetation to natural environmental changes and human induced activities has clearly revealed in this study. Thus, frequent vegetation monitoring is vital in guiding planning of those valuable resources in the future.

Keywords: Eastern Mediterranean, NDVI, SPOT VGT, Vegetation
A Quantitative Analysis of Ephemeroptera Fauna of Turkey by Geographical Regions and Provinces

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Introduction: Although the first study related with the Ephemeroptera fauna of Turkey was carried out by Ulmer in 1920, the detailed faunistic studies began in 1980. As a result of studies conducted to date, 158 species have been reported from Turkey. In this study, it is aimed to identify areas that need to be studied and prepare a guide for these studies, with evaluated of Ephemeroptera species of Turkey in terms of the distribution.

Material and Methods: In the study, by examining all of the papers on Ephemeroptera fauna of Turkey, the number of species were determined according to cities where species are reported, and geographic region classification made.

Results: According to the data, the largest number of species was reported from the Black Sea region with 96 species. It is followed by the Eastern Anatolia with 69 species, Central Anatolia with 66 species, Marmara with 62 species and the Aegean region with 55 species. And the regions having the fewest species are the Mediterranean with 27 species and Southeastern Anatolia with 24 species. In these regions, there are no species reported from 4 provinces in the South Eastern Anatolia, 3 in Central Anatolia, 2 in Mediterranean and 1 in Eastern Anatolia.

Discussion: Considering the number of species in the regions, it is seen that the number of projects and faunistic studies have been conducted further. In 30 provinces of our country, the reported number of species is below 10 and a large majority of them have been determined as a result of local or non-faunistic studies. There are no mayfly records from Adana, Aksaray, Batman, Burdur, Gaziantep, Iğdır, Karaman, Kilis, Mardin and Niğde provinces in studies conducted up to todays. The most important detail here most of these provinces, which have not been studied, are the first entrance places to Anatolia or a refuge area features for faunal elements. As a result, in order to determine Ephemeroptera fauna of Turkey exactly, specific and detailed studies are required in these non-studied and less studied areas.

Keywords: Ephemeroptera, Fauna, Species diversity, Turkey
Introduction: It is used as a biological indicator in determining the clean water resources the water mites distributed in inland waters and seas. It has been determined that water mites can be used as an indicator organism for non-domestic organic pollution. Water mites are grouped into 8 super families and more than 50 families that defined over 400 genera and about 6000 species. In the light of the information, the Palearctic region where our country is located is one of the well-researched areas and the species number reported from the region is 1642. In our country, 239 species have been identified up to this day. In this study, it was aimed to qualitatively examine water mite species of Eğirdir Lake and contribute to the fauna of our country.

Material and Method: This study was conducted in five different localities representing Eğirdir Lake. (Hoyran, Kayaağzı, Barla, Eğirdir-Köprü hunting and Gelendost-Yeşilköy) in seasonal (February, April, July and October) during 2016-2017. Benthic mud samples were drawn with Ekman-Grab from an average of 1.25 km offshore and 7.2 meters deep in each station. The samples were passed through 1.4, 0.8 and 0.4 mm mesh sieves. In the study conducted with the aim of investigating the benthic organisms, the water mites caught in the study was kept in Acetic Acid + Glycerin + Water solution. The diagnosis of Arachnida specimens was made under stereomicroscope and the diagnosis was made.

Result: In Lake Eğirdir, 5 water mites species belonging to 4 families (Limnesia undulata, Neumania deltoideis, Arrenurus sinuator, Unionicola crassipes, Hygrobates longipalpis) in 2016 and 4 species belonging to 4 families (L. undulata, Arrenurus sp., U. crassipes , H. longipalpis) in 2017 were determined.

Discussion: This is the first report from the pelagic area of Eğirdir Lake. The A. sinuator and L. undulata identified in the study area were previously identified. In different localities with lake and lake connection, 25 species were reported by Boyacı et al., (2010). When the number and density of water mite species are evaluated, it is suggested that Eğirdir lake is not polluted as a research area. Because water mites are living groups that are most affected by pollution and whose first competition is lost. They are also represented with a few tolerance species in moderately polluted waters.

Acknowledgement: This study was produced from a project funded by the Republic of Turkey Ministry of Food, Agriculture and Livestock General Directorate of Agricultural Research and Policy (Tagem/Haysüd/2016/A11/P-02/2).

Keywords: Acari, fauna, Lake Eğirdir, Hydrachnidae, Freshwater
Introduction: Carbon (C) and nitrogen (N) are of increasing interest in transition zone especially in semiarid ecosystems. The transition zone includes the adjacent plant communities, therefore, C and N patterns often vary among the vegetation patch types. In addition, C and N patterns are expected to differ depending on litter input in forest and steppe. There is a strong need to assess the changes carbon and nitrogen dynamics in these ecosystems and apply this knowledge to sustainable ecosystem management. The objectives of the present study is to describe the changes litter carbon and nitrogen dynamics along with the vegetation gradient from forest to steppe transition zone.

Material and Methods: The forest-steppe transition is located in northern Çankırı/Turkey forming between 900 and 1400 m asl. The parent rocks consist of serpentine and limestone. The climate of the study area classified as semi-arid with mean annual precipitation 228 mm and mean annual temperature ranges from -24°C in February and 42°C in July. Three transects were selected in a south-north direction. Litter C and N were measured at each site from three 4mx4 m plots per site. The surface organic matter was collected within a 25 cm x 25 cm quadrat. Total C and N were measured by dry combustion using a LECO CN 2000 analyzer.

Results: The C and N concentration of litter varied from forest to steppe. The C concentration of litter layer varied between 37.84% (steppe), 39.87% (transition) and 42.86% (forest). The higher C mass was found in forest litter (17.856 kg.ha⁻¹) and lowest in steppe (1.071 kg.ha⁻¹). Similarly, N concentration of steppe, transition and forest litter were 0.67%, 0.96%, and 0.85%, respectively. The higher N mass was found in forest litter (375 kg.ha⁻¹), than transition (58 kg.ha⁻¹) and steppe (19 kg.ha⁻¹).

Discussion: The amount of litter layer is closely related to the plant cover. As expected, high amounts of carbon and nitrogen were found in the forest due to high needle litter inputs. However, there was no differences carbon amount in step and transition. On the contrary, the amount of nitrogen was statistically different in all sites. Although data is only applicable to this transition zone, it suggests interesting implications for carbon and nitrogen storage. Furthermore, the carbon and nitrogen content of the soil and above- and belowground biomass must be studied in the transition zone.

Keywords: Pine, needle, litter, carbon, nitrogen
Introduction: Some heavy metals, e.g. Mn, Fe, Cu, Zn, Mo and Ni, are essential or beneficial micronutrients for microorganisms, plants and animals others. But all heavy metals at high concentrations have strong toxic effects and are an environmental threat. Contaminants heavy metals and organic pollutants as well as their mixtures are threatening human health by their impact on water and food quality and ecosystems. Decontamination of soils is a priority topic in environmental legislation. Two approaches have been applied to enhance decontamination of soils: (1) ex situ, i.e. removal of the polluted soil, transport to and cleaning in a technical plant procedure; (2) in situ, i.e. clean-up at the site itself. Plant-based environmental remediation technology, or phytoremediation, has been widely pursued in recent years as an in situ, cost-effective potential strategy for the clean-up of trace metals from contaminated sites. Phytoremediation is an in situ, cost-effective potential strategy for clean-up of sites contaminated with trace metals. Heavily contaminated soils can only be revegetated using highly metal-resistant plants. Establishment of a vegetation cover is essential to stabilize the bare area and to minimize the pollution problem. In addition to remediate the adverse physical and chemical properties of the sites, the choice of appropriate vegetation will be important. Selection of plant materials is an important factor for successful field phytoremediation. The success of phytoremediation can be ensured when these naturally selected and highly adapted plant species can be used economically. The aim of this work was to screen the hyperaccumulating higher plants for the decontamination of metal polluted soils, were explored.

Material and Methods: For this study, studies related to the subject were screened. By identifying plant species considered as superaccumulators, among these species, the species found in the Artvin flora have been identified. When the plants were given, a table containing information such as family names, Turkish name, heavy metal that can be taken, heavy metal parts, medicinal-aromatic-landscape value, endemic state were created.

Results: Soils with a high degree of metal pollution can be revegetated by metal resistant plants. At the same time, by revegetation of the bare sites a further dispersal of metals by water and wind erosion and a percolation of the metals to the groundwater can be prevented. In this study have been reported on approximately 114 plants from 45 families with metallically hyperaccumulation in Artvin flora. The families dominating these members are Poaceae (25 taxa), Asteraceae (12 taxa), Fabaceae (6 taxa), Caryophyllaceae (5 taxa). 49 of them have medicinal aromatic character, 16 taxa according to IUCN lc category, 17 taxa invaders. Various grass species such as Bromus racemosus, Bromus squarrosus, Agrostis capillaris, var., A. stolonifera and Festuca pratensis Huds. Can evolve high degrees of metal resistance. In Artvin famous hyperaccumulators are the cruciferous herbs Cardaminopsis halleri, Thlaspi caerulescens and T. cepaeifolium, and Alyssum species and the Caryophyllaceae Silene vulgaris and Minuartia verna.

Discussion: The evolution of metal-hyperaccumulating plant species opens the possibility for their use in decontamination of metal-polluted soils. The morphological structure of most of these hyperaccumulators is not yet sufficient for their practical application on large areas. The techniques of plant molecular biology and biochemistry have to be applied to these hyperaccumulators so that the improvement of their biomass production can finally result in an effective, low-cost technology to clean-up metal-contaminated soils.

Keywords: Heavy Metal, Metal-Hyperaccumulating Plant Species, Metal-Polluted Soils, Phytoremediation, Artvin
Introduction: Studies on fish movements and behaviors are primarily carried out through the tracking of individuals with acoustic tags, which are usually surgically implanted to anesthetized individuals at the surface. The fish to be used in this research with as little damage as possible is very important for the success of the tracking studies. Fish commonly suffers barotrauma caused by rapid decompression as they were hauled to the surface by conventional fishing techniques. These problems more serious for fish caught at greater depths and especially for physoclistous fishes with closed swim bladders. The aim of this study is to reduce barotrauma effects by developing a new method for the live use for tagging studies on physoclistous fishes.

Material and Methods: We demonstrate this method for the brown meagre (Sciaena umbra), species which are particularly vulnerable to barotrauma when transported to and handled at the surface. To test our method, we tagged 10 individuals inhabiting artificial reefs in the Gülbahçe Bay, Aegean Sea in January of 2013. S. umbra individuals were caught with trammel nets in the artificial reefs at a depth of about 25 m and they were brought to the surface two different methods. In the control group, 5 individuals (average total length is 26.7 ± 3.8 cm) were brought to the surface without any stops in the underwater. Alternatively, other 5 fish (average total length is 27.7 ± 4.6 cm) captured from artificial reefs they were kept in a cage, starting from 25 meters, to be 10 minutes at every 5 meters. The fish were anesthetized by immersion in 0.5 ml l⁻¹ of 2-phenoxyethanol and their biometric measurements were taken. Fish caught by both methods were tagged with dummy tags, which were similar size to Vemco-V9 series acoustic transmitters. Each acoustic tag was as surgically implanted into the peritoneal cavity through a dorso-ventral incision and sutured using non-absorbable sutures (Surgisorb3/0, UK). Tagged fish were then placed in the aerated tank to recover until normal behavior was observed. The Survival time of tagged fish and the barotrauma deformations in the deceased fishes were compared with Mann Whitney-U test.

Results and Discussion: In this study, we developed techniques on caught fish from artificial reefs at depth to reduce barotrauma and temperature stress associated with bringing fish to the surface. A similar protocol to the decompression stops in the scuba was applied to bring the surface of the caught fish. The average survival time of the fish in the control group was found to be 17.2 ± 4.8 h; it was calculated as 100.8 ± 63.1 h in the experiment group. In the fish where this method was applied, it was seen that the barotrauma symptoms decreased and some fishes could swim properly in the tank (p ≤ 0.05). This research has provided some insight into the pathways of injury among Sciaena umbra exposed to rapid decompression. It is expected that this study will contribute to the capture of live fish in the physoclistous property such as meagre, groupers.

Acknowledgements: We would like to thanks Ali Ulaş for participation as diver in this study. This research was supported by Turkish Scientific and Technological Research Council, Turkey (TOVAG-1120383).

Keywords: Barotrauma, Physoclistous, Sciaena umbra, Decompression, Surgery, Tagging
Assessment of Metal Concentrations in Some Human Teeth Samples Living in Rize Province, Turkey

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Introduction: People are exposed to toxic metals by air, water, food and environmental factors. In this way, the heavy metals entering the body are absorbed by the blood and accumulate in all tissues including the brain. In general, serum, urine, hair, nails, teeth and tissue specimens are used for the measurement and monitoring of metal levels in tissues of individuals exposed to heavy metals. The studies on heavy metal content levels in human tooth samples in Turkey are very limited. Therefore, the aim of this study is to determine some heavy metals (Fe, Cu, Zn, Cd and Pb) levels in human tooth samples collected from different age and sex groups in Rize province.

Material and Methods: 42 unfilled permanent human teeth samples were collected from people with an age range from 10 to 49 years. The collected tooth samples were air dried and dried at 85 °C to keep the mass constant. Later, 0.3 g of tooth samples were weighed and then microwave digestion was done with the help of the necessary acids. After digestion, the solutions were cooled and poured into 50 ml volumetric flasks. After filtration, the solutions were completed with ultrapure water to a volume of 50 ml. Then, the content of some heavy metals in tooth samples were determined by ICP-OES spectrometry.

Results: The ranges of heavy metal concentrations detected in male and female tooth samples were found to be 26.40-91.75, 1.20-3.96, 1.50-7.66, 144.59-265.93, 0.50-2.22, 6.06-27.54 for Fe, Ni, Cu, Zn, Cd and Pb, respectively. In males aged 10-19 years, all metals except zinc and copper were found to be higher than males in other age groups. Female teeth samples of the same age group were found to have higher values of other metals than Zn and Cd.

Discussion: The determined metal concentrations were compared with previous studies and found to be similar to those in the literature. Zn was found to be high in all tooth samples. This is probably due to the fact that people feed on foods high in protein, such as cereal, cookies, legumes and meat. There was no statistically significant difference between Cu, Zn, Cd and Pb concentrations and age groups (p> 0.05), although there was a statistically significant difference between Fe and Ni concentration values and age groups in female teeth samples (p <0.05).

Acknowledgement: This work was supported by the Coordinator of the Scientific Research Projects of Recep Tayyip Erdoğan University (RTEU-BAP, Project No: 2015.53001.102.01.02).

Keywords: Heavy metal, Human teeth, Rize.
Chromosome Counts of *Vincetoxicum* (Apocynaceae: Asclepiadoideae) Taxa from Turkey

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**Introduction:** The aim of the present study is to report mitotic chromosome numbers of Turkish *Vincetoxicum* Wolf taxa in the view of taxonomical aspect.

**Materials and Methods:** The plant materials used in cytological studies were collected from Turkey in 2012-2015 and stored at herbarium of Recep Tayyip Erdogan University, Biology Department (RUB). Somatic chromosome numbers were counted using squash preparations of actively root tips. The root tips were pretreated in α-monobromonaphthalene at +4°C for 16 hours, fixed in Carnoy’s solution for 24 hours at +4°C and stained with 2% aceto orcein for 24 hours at room temperature. The best metaphase plates in the permanent slides were photographed with Olympus BX51 microscope and also drawn.

**Results:** Somatic chromosome numbers are 2n=4x=44 (tetraploid) in two subspecies of *V. fuscatum* Reichb. fil. and 2n=2x=22 (diploid) in the remaining eight taxa.

**Discussion:** The chromosome numbers of 10 *Vincetoxicum* taxa are reported for the first time from Turkish accessions. The chromosome counts of *V. fuscatum* subsp. *boissieri* (Kusn.) Browicz (2n=44) and *V. canescens* (Willd.) Decne subsp. *pedunculata* Browicz, *V. funebre* Boiss. & Kotschy, *V. parviflorum* Decne and *V. tmoleum* Boiss (2n=22) are new to science to our knowledge. It is also determined that there is no significant difference in terms of somatic chromosome number at species level among the examined taxa.

**Keywords:** Chromosome number, Turkey, *Vincetoxicum*.

**Acknowledgement:** The authors extend their thanks to RTEUBAP (Project number: 2013.102.03.1 and Project number: 2015.53007.102.03.06) for the financial support.
POSTER PRESENTATION

Morphology and Histology of the Malpighian Tubules in *Pseudochorthippus parallelus* (Orthoptera, Acrididae)

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**Introduction:** In insects, the Malpighian tubules are responsible for excretion and osmoregulation. The main functions of the Malpighian tubules are absorbing water and solutes from the haemolymph and transferring them to the lumen of alimentary canal. Thus, they provide the osmoregulation. In this study, the Malpighian tubules structure of *Pseudochorthippus parallelus* (Zetterstedt, 1821) (Orthoptera, Acrididae) which is a widespread species and lives in Europe and West Asia was observed with using light microscope and scanning electron microscope (SEM).

**Material and Methods:** The male and female individuals of *P. parallelus parallelus* were collected from the terrains around Akyurt-Çankırı road in June, 2017 and the Malpighian tubules were dissected under stereomicroscope. Dissected tissues were fixed in 5% glutaraldehyde and prepared separately for the light microscope and SEM. For the light microscopic examinations, the fixed tissues were washed, dehydrated in a grade series of ethanol solutions and finally embedded in paraffin. Paraffin sections were cut and stained. For SEM examinations, after fixation with 5% glutaraldehyde, the specimens were washed, dehydrated and dried with Polaron, CPD 7501 critical point dryer. Then, dried specimens were mounted on the stubs and were coated with gold in a Polaron SC 502 sputter coater and examined with JEOL JSM 6060 SEM.

**Results:** The Malpighian tubules of *P. parallelus parallelus* are long, blind tubules extending from midgut-hindgut junction and they are scattered all over the haemocoel. Malpighian tubule lumen opens into the gut lumen. In cross sections of Malpighian tubules, monolayered epithelium was observed in the photographs.

**Discussion:** In this study, we aimed to reveal the histology and ultrastructure of Malpighian tubules of *P. parallelus parallelus*. Thus, we believed that we provided more data about the biology of *P. parallelus parallelus* which can be used as the basis of the further similar studies.

**Keywords:** Insect, Malpighian tubules, Orthoptera, light microscope, electron microscope.
Harvest Amounts and Ethnobotanical Uses of the Oleander (Nerium oleander) in Turkey

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Introduction: Nerium genus has 3 species in the world and one of them is naturally grows in Turkey. Nerium oleander L. is an evergreen shrub to 6 m high, with latex. Whole plant is extremely poisonous enough to cause death. Commonly known as oleander or rosebay, naturally grows in Mediterranean area, banks of streams and seasonally dry beds. Also, cultivated prevalently as an ornamental plants because of its showy and large red or pink (rarely white) flowers. The aim of this study Using General Directorate of Forestry, Department of Non-wood Products and Services between 1989-2016, it is aimed to reveal the amount of hardwood production and the income earned, at the same time emphasizing the importance of the materials it contains and its usage areas.

Material and Methods: In order to find the amount of the harvest of oleander; General Directorate of Forestry, data from the Department of Non-Wood Products and Services is the material of this study. According to the year; how much oleander was collected (kg) in Regional Directorate of Forestry and the income data were presented in tables in order to reveal the amount harvested oleander.

Results: Its composition contains resin, tannin, glucose, vitamin C and cardiotonic glycosides (oleandrin, nerine). It has diuretic and cardiopulmonary effects, but its use should be done at the physician's supervision because the excess dose causes poisoning. It is used against internal cancer and fungal disease, and against skin diseases, scabies, eczema, boils, rheumatism treatment and scorpion. Cancer, scorpion bite, antipruritic, abscess, rheumatism, antifungal, diarrhea, cardiovascular disease, respiratory disease, skin diseases.

Discussion: According to the data received from General Directorate of Forestry, Department of Non-wood Products and Services, harvest records belongs to year 2002 and 2003 in the period of 1989-2016. In 2002, for the first time, 10.160 kg oleander collected and gained 101.600 TL incomes in the territory of The Forest Regional Directorate Mersin. Oleanders were harvested from The Forest Regional Directorate Mersin and Adana, oleander flowers were harvested from Muğla till now. When analyzed 28 years of data; in total, 10.910 kg of oleander harvested and was earned as revenue 112.600 TL; 1000 kg oleander flowers harvested in 2013 and was earned as revenue 345 TL.

Keywords: Nerium oleander, Oleander, Harvest, Ethnobotanical uses, Turkey
Characterization of sHsp Proteins in Jujube Plant (Ziziphus jujube Mill.)

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Introduction: Heat Shock Proteins (Hsp) are expressed in all living organisms and required for cell growth and viability. The expression levels of these highly conserved proteins are increased under stresses like high temperature, oxygen deprivation. The primary function of these proteins is to manage folding mechanism of denatured proteins exposed to the stress conditions. Hsps also play role in various cellular processes, such protein aggregation, translocation and deterioration. Small heat-shock proteins (sHsp) are a group of chaperones that play an important role in maintaining quality control of proteins in the cell. One of the most characteristic features of sHPSs is their ability to organize as large oligomeric constructs. sHsps bind denaturated proteins and prevent their irreversible aggregation.

Material and Methods: Protein sequences from jujube were obtained from the NCBI. Domains of the sHsps were screened using the PFAM. To determine the exon-intron structure of sequences, the GSDS (Gene Structure Display Server) was used. Conserved motifs in ZjusHsp were identified with MEME-SUITE. Determination of possible three-dimensional structures of ZjusHsp proteins was performed with PHYRE2. The Blast2GO program was adopted for gene ontology analyzes such as the biological functions, cellular localization and molecular functions of ZjusHsp genes. psRNATarget Server database was utilized to detect miRNAs targeting ZjusHsp transcripts. To reveal the evolutionary relationship between the ZjusHsp genes, sequence alignment was firstly performed with ClustalW and then a phylogenetic tree was drawn by MEGA7.

Results: 72 ZjusHsp genes belonging to jujube genome were detected. ZjusHsp genes were distributed among chromosomes 1-12. It was found that 5 genes were located in the scaffold regions. Our results were specified the proteins which had 130-518 aa in length and 1.4-56 kDa molecular weights. The predicted three-dimensional structures of ZjusHsp proteins showed that alpha helix motif was predominant, consistent with the literature. Additionally, it was revealed that ZjusHsp genes were targeted by 189 different miRNAs. Over 20 different motif patterns were found in the proteins. It was observed that 21 genes had no intron region. The phylogenetic tree of ZjusHsp proteins was divided into 5 regions. ZjusHsp genes were involved in biological regulation of metabolic and cellular processes. The cellular locus was involved in the different parts of organelles and cell and molecular function which was linked to the nucleic acid.

Discussion: Our study presents new perception for researchers who deal with the role of sHsps under abiotic stress in jujube.

Keywords: sHsp, Jujube, Bioinformatics Analysis.
**Introduction:** Jujube (*Ziziphus jujuba* Mill.) is a native plant to China and has been cultivated for 4000 years. It is also grown in the West and South regions of Turkey. Jujube fruit production has been increased in the recent years and it has a high nutritional value. Heat shock proteins (Hsps) take part in growth and survival of the cell. Hsp90 proteins which are the most abundant in the endoplasmic reticulum compared to other Hsp proteins, are also found in the cytoplasm. Hsp90 proteins bind to polypeptide chain and regulate both folding and activation of proteins. In this study, *ZjuHsp* genes of jujube were identified and characterized by using bioinformatics tools.

**Material and Methods:** By using NCBI database, protein sequences of jujube were determined. The domains of Hsps were searched by using PFAM database. Exon and intron regions of the genes were obtained using GSDS (Gene Structure Display Server) tool. Conserved motifs of Hsp90 proteins were identified by MEME-SUITE software. Three-dimensional structure modelling of the proteins was achieved by PHYRE2 program. miRNAs targeting Hsp90 transcripts of jujube were identified using the psRNATarget Server database. Gene ontology analysis were presented by Blast2Go program. In order to define the evolutionary relationships of determined jujube Hsp90 proteins, sequence alignment was applied with ClustalW software and the phylogenetic tree of these proteins was constructed by MEGA7 program.

**Results:** Six jujube *Hsp90* (*ZjuHsp90*) genes in the jujube genome were identified and these genes were distributed on the 1., 4., 6., 10. and 11. chromosomes. It was determined that the 11th chromosome was the chromosome containing the two *ZjuHSP90* genes. Amino acids length of *ZjuHsp90* proteins were differed from 470 and 817 and all *ZjuHsp90* genes contain intron regions. Alpha helix structure has been identified as a predominant in the predicted model of *ZjuHsp90* proteins. Twenty-three different miRNAs targeted to *ZjuHsp90* genes were found. When preserved motifs were searched, it was determined that three different motifs were formed in the *ZjuHsp90* proteins. *ZjuHsp90* proteins mostly get role in response to stimulus and cellular processes by binding activity. According to the MEGA7 program, *ZjuHSP90* proteins grouped into 3 different clusters.

**Discussion:** There have been a few studies to detect of Hsps in jujube genome. Therefore, this study will help the researchers who would like to perform functional and comparative genomic studies.

**Keywords:** *Ziziphus jujuba*, Heat shock protein, *Hsp90* Gene, Molecular Characterization
Temporal Variations of Microbial Parameters of Forest Floor in Black Pine (Pinus nigra Arnold.) Forests in Çankırı

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Introduction: Microbial organisms, consisting of bacteria and fungi, are located at the lowest trophic level of the food web and utilize nutrients in the litter. In general, changes in microbial biomass carbon, microbial respiration, metabolic quotient (qCO₂) may account for most of the ecological processes in the soil and the litter. Microbial populations and activities are essential for the continuity of soil quality with its role in organic matter and nutrient cycling processes. The aim of this study is to reveal the temporal variation of microbial parameters in black pine areas in the semi-arid region in Çankırı province.

Material and Methods: In the study, 4 stands were selected in the age of ab development class where DBHs were up to 19.9 cm. Sampling was carried out four times a year to determine seasonal variation. Litter samples were collected from random three different locations in each area (25 m x 25 m). To determine the amount of microbial respiration and microbial biomass carbon in litter was used to incubation method. Metabolic quotient (qCO₂) was calculated as microbial respiration / microbial biomass-C ratio.

Results: As a result of the study, microbial respiration and microbial biomass-C amount showed a temporally parallel change. Especially, these parameters were increased in spring and autumn. In addition, the metabolic quotient was showed temporally more fluctuating than the other parameters. On the other hand, all microbial parameters differed significantly in terms of temporal change (p <0.05).

Discussion: The results of this study showed that the increase in microbial respiration and microbial biomass-C in the spring and autumn may be due to the fact that the environmental variables (temperature, humidity, etc.) correspond to the appropriate conditions in terms of microorganisms activity. In addition, the temporal change in the metabolic quotient (qCO₂) can give information about the availability and quality of the substrate. Determination of microbial parameters provides important information about the ecosystem process such as litter decomposition, carbon and nutrient cycles in forest areas.

Acknowledgement: We would like to express our appreciation to the TÜBİTAK, which supported this study (TÜBİTAK-COST-215O572).

Keywords: Microbial respiration, qCO₂, Microbial biomass-C, Pinus nigra Arnold.
**Determining Effects of Habitat Variation on Length-Weight Relationship of Squalius cephalus Along Lower Part of Yeşilırmak River**

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**Introduction:** The length-weight relationship study is an approach that is widely applied in fisheries management since to compare the average associated parameters between fish groups spatially or temporally and to indicate body condition or robustness of fish in a stock. This study aims to examine effects of dam on length - weight and length-length variables of individuals of Squalius cephalus.

**Material and Methods:** A total of 125 specimens of S.cephalus were collected using an electroshocker during daytime between May and June 2015 along lower Yeşilırmak River basin at 5 different sites (upstream site 4 and 5 above the reservoirs, site 3 between two dams, and downstream site 1 and 2 below the reservoirs). Total length and weight were measured to the nearest 1 mm and 0.01 g, respectively. Length-weight relation was calculated using the equation “W = aLb”. We used regression to analyze the length-weight and length-length associations. We also used analysis of variance (ANOVA) to compare length and weight among habitats using SPSS version 20.

**Results:** Mean total length and weight of S.cephalus from site 3 (between two dams), site 1 and 5 (further downstream site and upstream site, respectively) were found to be highest (range from 11.17-11.71 cm, and 34.25-35.56 g, respectively), lowest at site 2 and 4 (sites just below and above the reservoirs) (range from 7.45-7.91 cm, and 10.34-11.29 g, respectively). There are strong relationships between the lengths and weights of the fish (r² >0.96, P<0.001). The values of parameter b in this study were within the range of 2.7 to 3.3, this indicated that this species showed to undergo negative allometric growth at site 1 and 3 while positive allometric growth at site 2, 4 and 5. Length-length relationship were determined as TL=0,9179+0,0647 FL; FL=0,9294-0,1283 SL; SL=0,85-0,0793TL.

**Discussion:** The higher b value of S.cephalus at site 5 showed that it provided a more favourable environment for this species which has better growth as compared to individuals with similar total length at site 1 and 3. Individuals of fish from just above and below the reservoirs exhibited a trend of positive growth, suggesting these habitats could provide a favourable environment and suitable habitat for the growth of those fishes. However, the parameter b unlikely may vary seasonally, and even daily, and can be attributed to the combination of one or more factors such as: number of specimens examined; seasonal effect; degree of stomach fullness; gonadal maturity; sex; growth phase, health and general condition of fish and appetite.

**Keywords:** length - weight relationship, length – length relationship, Squalius cephalus, Yeşilırmak River
Evaluation of Ahern- Sustainable Ecological Planning Model

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Introduction: According to IUCN, landscape planning is a plan which aims to protect natural and cultural resources by using the land efficiently and appropriately. Landscape planning is dealt with by different landscape architects and various methods are introduced. Ian McHarg studied on natural processes and their implications. To Steiner, ecological plans make it suitable for limiting the use of the landscape or for the proposed uses by using biophysical and socio-cultural data. Steinitz approaches the landscape planning methodically.

Material and Methods: In this study, Ahern's sustainable ecological landscape planning model was examined. This model compare with other landscape plannings model and the differences of this model were revealed

Results: Ahern's sustainable ecological landscape planning model was examined. Ahern's sustainable landscape ecological planning method clearly addresses a large number of abiotic-biotic cultural destinations and resources. They are listed as; water resources planning, geosystem planning, landscape planning, reconstruction planning, urban planning, transportation planning, watershed planning and management, ecosystem management, conservation plans, ecological landscape planning and green road planning. This model is presented as a linear process; however it is linear, cyclic and repetitive and can be entered at any point in the process.

Discussion: The global focus on sustainability affects planning theories in a variety of ways. Within the scope of the sustainability paradigm, single-sectoral sectoral planning is being replaced by multipurpose planning, which explicitly recognizes the integrated objectives of abiotic, biotic and cultural resources.

Keywords: Ahern, Evaluation of landscapes plan, Landscape planning, Sustainable model
Comparison to Pathways of Lipid Metabolism between Model Organism *Drosophila melanogaster* with Mammals

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**Introduction:** *Drosophila melanogaster* has homolog tissues, cell types and also similar lipid metabolism compared to mammals compared the mammalians. *Drosophila* and mammals stores lipids in the form of triacylglycerol and accumulate in the fat body which is equivalent the mammalian adipose tissue. Also, linoleic, linolenic and arachidonic acids, which serves as a precursor for the eicosanoids that are members of cellular immune response, are essential lipids for both mammalian and *Drosophila*.

**Material and Methods:** *Drosophila* larvae are reared on an artificial diet at 25 ± 2 °C, 60-70% of relative humidity and in a photoperiod of 12 h daylight for stock culture. *Drosophila* first instar larvae obtained from stock culture are reared on artificial diet containing different concentrations of various chemicals. MDA contents as an indicator of lipid peroxidation were determined after incubation at 95 °C with thiobarbituric acid. The absorbance was measured at 532 nm to determine MDA content.

**Results:** First instar larvae of *Drosophila* obtained from stock culture are reared on artificial diet containing different concentrations of various chemicals. The MDA content in diet with high concentrations of chemicals significantly increased when compared to control.

**Discussion:** In mammalian studies have been found similar results on various chemical applications, its suggesting similarities in metabolic activities between the mammalian and *Drosophila*.

**Keywords:** *Drosophila melanogaster*, lipid metabolism, novel drug discovery
Introduction: *Vitis vinifera* subsp. *vinifera* (grapes) is one of the most frequently consumed fruits worldwide with nutritional value and health benefits. Both the leaves and the fruits have been used for the treatment of various diseases due to its content of diverse compounds such as flavonoids, polyphenols, anthocyanins, proanthocyanidins, procyanidins. Many studies have shown that grape seed extracts exert several biological activities including antioxidative, antimicrobial, as well as cardioprotective, hepatoprotective, and neuroprotective activities. Furthermore, it was reported that *Vitis vinifera* exhibits cytotoxicity towards breast, prostate, skin and colorectal cancer cells. In this study, we aimed to screen cytotoxicity of six different *Vitis vinifera* subsp. *vinifera* cultivars (Kalecik karası, Syrah, Malbec, Viognier, Öküzgözü, Sauvignon blanc) on Huh7 human liver cancer cells.

Materials and methods: Samples of *Vitis vinifera* subsp. *vinifera* were collected from Kırşehir-Toklumen vineyard of Kavaklıdere Company. The plant material of each sample was extracted with ethanol and distilled water. Cell cytotoxicity was measured by MTT assay. Huh7 cells were treated with extracts dissolved in PBS at different concentrations (0.1, 1, 10, 100, 1000 μg/ml) and incubated for 24, 48, and 72 hours.

Results: All tested *Vitis vinifera* extracts have slightly inhibited Huh7 cell growth (approximately 20% decrease). The most efficient growth inhibition was detected with Kalecik karası and Sauvignon blanc (40% decrease) after 72 hours of treatment. Generally, highest concentration (1mg/ml) of tested extracts had killed the cancer cells most. In addition, longer incubation time resulted in more reduction in cell survival.

Discussion: In this study, we have analyzed the cytotoxicity of six different *Vitis vinifera* subsp. *vinifera* cultivars. Our results demonstrated that all tested extracts have slight inhibitory effect against Huh7 cells. Most concentrated extracts and longer incubation time gives the best cancer growth inhibitory results. Kalecik karası and Sauvignon blanc were found as good candidates for cancer therapy. These extracts should be further studied in terms of mode of cell death and related molecular mechanisms.

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Keywords: *Vitis vinifera* subsp. *vinifera*, Cell culture, Cytotoxicity, Cancer
A Preliminary Bryophyte List of Artvin Province, Turkey

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Introduction: A preliminary bryophyte list of Artvin province was compiled based on the published literature. For this, all the published bryophyte literature including the province has been surveyed. The main aim of the work is to list the bryophyte taxa for Artvin with their probable correct names.

Material and Methods: The data were evaluated on the basis of the published bryophyte papers relating to Artvin. The list is alphabetically ordered by scientific names. After each taxon name, family is given. For nomenclature of the liverworts and mosses, related articles and literatures were considered.

Results: This catalogue includes 6 liverworts and 306 mosses, 312 bryophytes in total. Four of the 44 families belong to liverworts. These are Anastrophyllaceae, Geocalycaceae, Jungermanniaceae, and Ricciaceae. The number of moss genera is 114 whereas liverworts are 5.

Discussion: The highest number of moss records is in the family Brachytheciaceae. Pottiaceae is the second, and Amblystegiaceae is the third. Jungermanniaceae is also the first in liverworts. Among the frequently recorded taxa are Calliergonella cuspidata, Plagiomnium undulatum, Dicranium scoparium, Tortella tortuosa, Atrichum undulatum, Brachythecium rutabulum, Rhytidiadelphus triquetrus, and Sanionia uncinata. The records of five liverworts (Barbilophozia hatcheri, Harpanthus scutatus, Lophozia bicrenata, Lophozia sudetica, Nardia scalaris, and Riccia sorocarpa) were given once from Artvin province based on literature data.

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Keywords: Artvin, Black Sea Region, Bryophyte, Checklist, Turkey
Ethnoherpetological View of Snake Conservation

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Introduction: Ethnical based medical and biological studies bring close old disciplines together and help to understand the links between the history of humanity and nature. This interdisciplinary area is growing because of specialization in science. For instance, Ethnobiology contains Ethnozoology and it contains Ethnoherpetology. Here we underline ethnoherpetological view of the relationship between snakes and human through history. This view will help us to protect snakes and to find new conservation solutions.

Material and Methods: This notice is a rewiev and structured by a literature check on Ethnoherpetological researches.

Results: Snakes are known as harmful and “malicious” for centuries. The reasons for this belief are mythological stories and the morphologic features of a snake. In myths snake is always very powerful and pernicious. Morphologically snake is a long, thin animal without extremities that has a scaly, stiff and shiny skin and lidless eyes. These publically uncommon features frighten people. And the wrong believes like all the snakes are poisonous; they chase people or attack causeless make the snakes dreaded and therefore killed.

Discussion: Humans are involved in an interaction with all nature directly or indirectly. Threfore the decisions that we make everyday, effects all the environment that surrounds us. Among other animals, snakes have an important place to interact with; because they are considered evil and killed at every turn. This is threat that should be stopped in order to inhibit an extinction. Education is the first thing to save snakes; people should learn the facts and the wrong believes so that they can understand a reptile nature readily. This facts must include to understand the difference between mythological and real features of snakes. This way harming and killing of all kinds of a worldwide distributed, various and stupendus classis, would stop.

Keywords: Ethnobiology, Ethnoherpetology, Snake, Conservation
Population Parameters of the Pontic Shad, *Alosa immaculata*, in the Fatsa Coast of Black Sea

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**Introduction:** Shad, *Alosa immaculata*, is a fish species that live scattered in mid-August until December, Turkey's Black Sea waters. They are usually fished by gillnets. The meat has a high fat content and is a good source of nutrients. Therefore, consumption is particularly recommended. Its meat has excessively bony. But it is cooked on the grill, the meat is quite tasty. This is an important fish species for small-scale fisheries in the Turkish Black Sea coast. However, there is a few study on its population in this sea. In this study, the growth and mortality parameters of pontic shad caught from the Fatsa shores of the south-eastern Black Sea were investigated.

**Materials and Methods:** The study was carried out in the Fatsa shores in the Black Sea coast. Pontic shad samples were collected monthly with 32, 34, 36 and 38 mm mesh-sized in 2013. Total length (L) of each sample was measured. Von Bertalanffy Growth Parameters (L∞, K and t₀) Growth Performance Index (Φ'), total mortality (Z), natural mortality (M) and fishing mortality (F) coefficients and exploitation rate (E ) were estimated.

**Results:** The L∞, K and t₀ were estimated as 43.05 cm, 0.430 yr⁻¹ and -0.451 yr, respectively, using FISAT software. The Φ' was calculated as 2.88 from L∞, K and mean annual water temperature (17.7°C). In the study, the L₂₅, L₅₀ and L₇₅ were found 26.93, 29.53 cm and 32.13 cm, respectively. The Z, M and F values were found as 1.33, 0.73 and 0.60 yr⁻¹, respectively. The E rate was 0.45.

**Discussion:** The results of this research showed that the pontic shad in the south-eastern Black Sea had a rapid growth performance. Mortality coefficients and exploitation rate have shown that there is no fishing pressure on this species.

**Keywords:** Black Sea, Pontic shad, *Alosa immaculata*, growth, mortality rates.
POSTER PRESENTATION

The Scientific Conceptual Framework of the Land Degradation Neutrality and Interpretation of the Process on behalf of Turkey

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Introduction: Land degradation is the reduction or loss of the biological and economic productivity capacity of the land. This process can occur as a result of the natural factors or human activities. It is clear that the land degradation is commonly seen the agricultural lands. As a result, the preservation and development of soil and soil quality have become a valuable strategy for food safety and security in the world. Within the scope of United Nations Convention to Combat Desertification (UNCCD), the concept of Land Degradation Neutrality (LDN) is defined as the amount and quality of terrestrial resources required to support ecosystem functions and services and increase food safety. Given the increasing world population, it is also important to provide food demand that has been damaged but has a tendency to increase the improvement of agricultural land potential. In this context, the LDN approach is based on avoidance of the land degradation, reducing or reversing destruction, conservation and improvement of ecosystem services. The main objective of this study is to address scientific conceptual framework of the LDN approach and give practical and actionable policy recommendations about LDN and Sustainable Land Management (SLM) for Turkey.

Material and Methods: On the purpose of showing the current situation of the LDN process and necessities for Turkey, the scientific conceptual framework of the LDN was detailed to explain, focused on the pending issues, regulations and policy documents reviewed during the study. Finally, policy recommendations were proposed for LDN approach and SLM in Turkey.

Results: The land degradation significantly limits the sustainability of ecosystem services and it is now a major problem for the world. But the LDN and the scientific conceptual framework of the LDN still were not sufficiently understood in Turkey, also at a global scale. In this study, the essential issues for this purpose was tried to summarize. It was seen that the studies currently being carried out are based on the main three indicators of the LDN. Thus, the need for a clear formulation of the necessity of the approach and how it will be adapted to national policies continues.

Keywords: Degradation, Land, Land Degradation Neutrality, Sustainable Land Management, Ecosystem Services.
(Nematoda: Paramicrolaimidae)

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**Introduction:** Paramicrolaimidae is a rare group of marine free-living nematodes. *Paramicrolaimus* Wieser, 1954 currently has four valid species: *P. damodarani* Jacob, Jaleel&Vijayan, 2015; *P. mirus* Tchesunov, 1988; *P. primus* Wieser, 1954 and *P. spirulifer* Wieser, 1959. During a meiobenthos survey, focusing on free-living marine nematodes on the Black Sea coast of Turkey (Sinop), several specimens of *Paramicrolaimus* were encountered for the first time in the Black Sea.

**Material and Methods:** Sediment samples were collected monthly between August 2009 and July 2010 at eight stations located on four transects (3 m and 10 m depth). Three replicates of samples were obtained at each station using a metal push corer (diam. 4 cm) and they were fixed onboard with 75% ethanol. Material was washed through a set of sieves (1 mm, 500 µm, 63 µm) in the laboratory and stained with rose Bengal solution. Nematodes were counted under a stereomicroscope and their permanent slides were prepared using slow evaporation method. A research microscope (Leica) equipped with an imaging software was used for the measurements.

**Results and Discussion:** This is the first record of Paramicrolaimidae and the genus *Paramicrolaimus* in the Black Sea. Specimens are found at three different stations (all with 3 m water depth) The morphometrics and the photos of the specimens are provided. The species is found to be very similar to *P. mirus* Tchesunov, 1988, found in the White Sea (Kandalaksha Bay, Russia). However, the value of De Man ratio “a” is higher. Each species of *Paramicrolaimus* has been described from only a few individuals worldwide. Therefore, this study makes a contribution to the known individuals of the genus.

**Acknowledgement:** This work is part of a PhD dissertation and dedicated to the memory of Prof. Dr. Murat Sezgin, the deceased advisor of the author and the coordinator of the TÜBİTAK project (No: 108Y340).

**Keywords:** Free-living marine nematodes, Meioinbenthos, Paramicrolaimidae, Black Sea, Turkey.
Morphological Development and Temporal Variations of Mediterranean Sand Eel Larvae, (*Gymnammodytes cicerelus*) in Gokceada Island, Turkey

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**Introduction:** Mediterranean sand eel, *Gymnammodytes cicerelus* (Rafinesque, 1810) is a demersal subtropical fish species belonging to the family Ammodytidae which has 23 species all around the world. The information about early life of this species is very rare. Some authors were detected rare abundance of the larvae of this species in the Aegean Sea. The detailed information on morphological development of *G.cicerelus*, which larvae rarely seen in Turkish waters, may contribute to identification of this species. The aim of this study is to make a contribution of early life history of Mediterranean sand eel.

**Material and Methods:** Ichthyoplankton samples were collected from northern part of the Gökçeada Island, North Aegean Sea, Turkey. Sampling was carried out weekly between May 2015 and February 2016. Samples were collected by horizontal tows, using a WP-2 plankton net (57 cm frame diameter, 3 m total length).

**Results:** A total of twenty-eight Mediterranean sand eel larvae were identified. Larvae of this species were identified in samples collected between November and February. Larvae abundance peaked in December when sea surface temperature decreased below the 16 °C. It was observed that the gut of larvae were elongated and anus situated about 75% of the total length through the backward. Myomers of the larvae were counted 64-66. In point of early life stages, a total of twenty-six flexion, one yolk sac and one flexion larvae were identified. It was determined that the 2.73 mm SL yolk sac larvae, which had 5 melanophore on dorsal side and 2 melanophore on post anal ventral. After the 4.24 SL, it was observed that the upper jaw germinated through the frontward. Just after the 6.24 mm SL, primordial fin disappeared. At the 7.91 SL, flexion larvae had 9 melanophore on the dorsal side and one of these located on the head.

**Discussion:** *Gymnammodytes cicerelus* larvae spawned between November and February in the area of investigation, similar to observations of other authors. It was observed that the pigmentation and head morphology show an alteration with development of the body. Consequently, detailed morphological development studies facilitate species identification of rarely seen fish larvae as *G.cicerelus*. However, the determination of net spawning dates and physico-chemical requirement of related species contributes to a better understanding of the species biology.

**Acknowledgment:** Thanks are extended to Kamil Çakır and Captain Yılmaz Tokoğlu who helped with the field samplings.

**Keywords:** *Gymnammodytes cicerelus*, larvae, development, variation.
Some Properties of the Product Formed By Composting Of Cattle and Sheep Manures by Windrow Method

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Introduction: The amounts of plant and animal wastes are increasing day by day and there are inaccuracies in information and application errors about correct use of these wastes. Some efforts are spent to reuse these wastes in agriculture. Composting is one of the most important efforts. Compost is obtained from partially decomposed and fermented organic wastes. Composting is actually an ongoing process in nature, and it is a nutrient recycling in the ecosystem. Products obtained from composting improves soil properties, and they have high fertilizer value.

Material and Methods: In order to make composting, two different organic manures consisting of cattle and sheep manures, have been composted about four months. Composting was carried out by windrow method on aerobic conditions. During composting, the windrows were aerated using compost turner machine and the changes in temperature and C/N ratios were monitored at different times.

Results: At the end of composting, the C/N ratios of the cattle compost (CC) and sheep compost (SC) were found 14.51 and 15.35, respectively. When the properties of the materials obtained from composting were examined, the amount of organic matter in the CC and SC was 41.97% and 40.42%, respectively. It was determined that the total NPK amounts decreased from 4.71% to 3.52% for CC and 6.85% to 5.96% for SC, respectively compared to the initial values. When the pH and EC values of the composted materials were examined, the pH values were 7.22 for CC and 8.23 for SC. EC values were 7.71 and 3.96 dS/m, respectively. It was determined that the free carbonate levels were high and the values were 15.05% and 17.28% respectively. The germination index value, which is one of the indicators of compost maturity, are 97% for both materials. When the contents of water soluble nutrients were examined, it was determined that the sheep compost was especially high in phosphorus (244 ppm) and potassium (8557 ppm) and the cattle compost was high in sodium (614 ppm). The maximum water retention capacities of the compost materials were 81.94% and 88.57%, respectively, and it was determined that the materials release more than 50% of the water in saturation as they reach to the field capacity. It has been also determined that the heavy metal contents of both compost materials are below the limit values determined by the Ministry of Food, Agriculture and Livestock.

Discussion: It is noted that the initial C / N ratios and moisture contents in the windrows and then ensuring appropriate moisture levels in windrows especially in the thermophilic period are important factors that affect the quality of the product and the time of composting.

Keywords: Composting, organic waste, windrow method, soil quality
Introduction: Accurate species identification is a necessity used by many disciplines under biology and it mostly requires an experienced taxonomist and hard work. Traditionally, biological specimens are identified by morphological features. Recently, “DNA barcoding” has been proposed to identify species without being an expert taxonomist. DNA barcoding simply uses a short sequence from a standard region of the genome, mostly cytochrome c oxidase 1 gene (CO1) which is proved to be efficient in identifying many animal groups. There are several databases storing these “barcode” data, such as BOLD (Barcode of Life Database) and GenBank. Many research groups are studying to barcode the biodiversity of their countries and/or particular regions of the world. There are also barcoding studies of Turkish biodiversity in some animal groups, but Turkish leaf beetles, an agriculturally important herbivore family of Coleoptera, have only been studied merely by foreign research groups. The main aim of this study is to determine the barcoded leaf beetle species in these databases which are originated from Turkey in order to know the current barcoding status of the group.

Material and Methods: The databases that store the sequence data of barcoded species are searched and all leaf beetle specimens originated from Turkey are determined. Main searched databases are BOLD and GenBank. Some data are taken from C-BAR (Chrysomelidae Barcoding) project site which intends to create sequences database for the Leaf Beetles of the Mediterranean region (MEDLB).

Results and Discussion: The Chrysomelidae (s. lat.) of Turkey includes nearly 913 species, including both leaf beetles (793 species) and seed beetles (120 species). As a result of searching for the chrysomelid species originated from Turkey in the databases mentioned above, there are approximately 50 specimen results of sequencing which belong to only 19 species so far. Of these species, 16 are barcoded (COI is sequenced) and other parts of genome are sequenced for 3 species. The COI barcoded species constitutes only 2% of all Turkish chrysomelid diversity and none of the barcoding is done by Turkish researchers. Molecular barcoding of Turkish leaf beetles in future studies will contribute the biodiversity knowledge of Turkey. This will also help non-expert taxonomists and researchers in other disciplines including agriculture, forestry and environmental sciences.

Keywords: DNA Barcoding, Chrysomelidae, leaf beetles, Turkey.
Application of Bacteriophages against Food Pathogens

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Introduction: The purpose of this study, investigation of the use of bacteriophages as bioprotective agent against foodborne pathogens and it is the submission of studies made in this subject. The aim of food preservation methods, inhibiting microbial growth, to reduce enzymatic degradation and oxidation. Methods of food preservation used by food industry, such as drying, smoking, filtration, dehydration and freeze drying, refrigeration, vacuum packing, pasteurisation, microbial product–based inhibition, irradiation, organic acids as preservatives, Inorganic compounds as preservatives and other organic compounds. Biological protection or biological control refers to the use of natural or controlled microbiota or antibacterial products to extend the shelf life and to increase the safety of food. If we want to shape microbial ecosystems in food, or in the gut, we can look to the natural biological agents used by the existing microbiota, such as bacteriocins and bacteriophage (phage) as antimicrobial tools with potential biotechnological applications. Bacteriocins are gene-encoded antimicrobial peptides produced by bacteria, and phage are viruses which infect and can kill bacterial cells. Bacteriophage, also called phage or bacterial–specific virus, any of a group of viruses that infects bacteria and must replicates within bacteria in order to reproduce. The vast majority of bacteriophages are used in animal products such as carcass, meat, and also in agriculture and food products. The reason for the treatment with specific phages in the food industry prevents the degradation of products and the spread of bacterial diseases. In the production of animal and vegetable food, the use of bacteriophage during processing leads to the establishment of safe environment. The reason why phages are considered to be among the best as food bioprotective agent is to report that the host is lysed at low temperatures such as 1 °C.

Material and Methods: In our review, we have presented about last knowledges about bacteriophages.

Results: Summarizing briefly the results described recently: (i) phage therapy is able to reduce foodborne pathogen levels in animals and consequently control the pathogen load on entry at the slaughterhouses; (ii) the strategies applied for phage biocontrol of pathogens in foods reduce significantly the levels in a variety of products and seem to be a promising alternative to traditional food safety and preservation measures.

Discussion: Recently, studies on Enterobacter, Salmonella, Campylobacter, Escherichia coli O157:H7, Listeria, Pseudomonas, Brochothrix from foodborne bacteria have been carried out. Commercially available phage preparations are sold.

Keywords: Foodborne pathogens, Bacteriophages, Biopreservation
Infraciliature Patterns of Ophryoscolecid Rumen Ciliates, Diplodinium quinquespinosum (Dogiel, 1927) and Metadinium tauricum (Dogiel and Fedorowa, 1925)

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Introduction: The ciliates belonging to the family Ophryoscolecidae in the suborder Entodiniomorphina and order Entodiniomorphida inhabit the rumen of various ruminants. Ophryoscolecid ciliates have complicated and specialized bodies which seem to have evolved with the evolution of their hosts. Ophryoscolecid rumen ciliates, Diplodinium quinquespinosum (Dogiel, 1927) and Metadinium tauricum (Dogiel and Fedorowa, 1925) have rare distribution in ruminants and their infraciliature patterns have not been studied. The aim of this study was to determine the infraciliature patterns of ophryoscolecid rumen ciliates, D. quinquespinosum, and M. tauricum.

Material and Methods: Rumen samples were obtained from 15 domestic sheep (Ovis aries) at slaughterhouses in Kastamonu, Turkey, between September 2015 and October 2016. A well-mixed rumen sample was fixed with 18.5% formalin immediately. A portion of each sample was also immediately fixed and stained with methyl green formalin saline solution (MFS) for light microscope examinations. The pyridinated silver carbonate impregnation was used to detect the infraciliature patterns of Diplodinium quinquespinosum and Metadinium tauricum. Some samples were used for scanning electron microscope examinations.

Results: The buccal infraciliature of D. quinquespinosum is composed of two polybrachykineties. The adoral polybrachykinety surrounds the vestibular opening, and the vestibular polybrachykinety extends along the vestibulum. The dorsal polybrachykinety extends laterally along the dorsal side of the body. Paralabial kineties, which are composed of short transverse kineties, extends along the ventral side of adoral polybrachykinety. Kinetids of the paralabial kineties are slightly larger than kinetids in the other polybrachykineties. The buccal infraciliature of M. tauricum is composed of three polybrachykineties, a kinety loop, and paralabial kineties. The adoral and dorso-adoral polybrachykineties surrounds the vestibular opening, a kinety loop connects them, and the vestibular polybrachykinety extends inside the vestibulum. Paralabial kineties are observed along the ventral side of the adoral polybrachykinety. Kinetids in the paralabial kineties are slightly larger than the kinetids in the other polybrachykineties. The dorsal polybrachykinety extends laterally along the dorsal side of the body.

Discussion: In this study, the infraciliature patterns of D. quinquespinosum and M. tauricum were studied and detected for the first time. D. quinquespinosum has Diplodinium-type buccal infraciliature and M. tauricum has Metadium medium-type buccal infraciliature. There are thirteen buccal infraciliature patterns and the buccal infraciliature patterns reveal the evolutionary relationship in ophryoscolecid ciliates.

Acknowledgement: We would like to express our appreciation to the Kastamonu University Scientific Research Project Commission, which supported this study (KUBAP-01/2015-11) and to the Research and Application Center of Kastamonu University for the SEM images.

Keywords: Infraciliature, Rumen, Ciliate, Diplodinium quinquespinosum, Metadinium tauricum
Introduction: *Chlamydomonas reinhardtii* P.A.Dangeard 1888 is a unicellular green algae with two flagella and an eyespot. It has a wide application area as a model organism in chloroplast dynamics, photosynthesis, flagellar motility and mitochondrial function studies. Histidine Kinase Rhodopsin (HKR1) gene has possible role in light activated channel as UV light sensor. Because of this it is thought to be related to regulation of photosynthesis in different conditions. The aim of this study is to determine the HKR1 gene expression changes during *C. reinhardtii*’s life cycle.

Material and Methods: The 137C+ strain of *C. reinhardtii* was used in this study. Cells were grown in TAP liquid and agar media under 18:6 hour (light:dark) periods. Four different sampling were conducted during the experiment according to dark period durations: Light, T0, T4 and T8. Total RNA was isolated by TRIzol reagent and cDNA synthesized with cDNA synthesis kit (SuperScript™ III First-Strand Synthesis System for RT-PCR, Invitrogen) according to manufacturer’s instructions. The expression of the HKR1 gene was quantified using semi-quantitative RT-PCR (AriaMx, Agilent Technologies). 18S rRNA gene was used as a housekeeping gene. Each Primer set was amplified using an optimised number of PCR cycles to ensure the linearity requirement for semi-quantitative RT-PCR analysis.

Results: Relative gene expression levels of HKR1 were analysed in *C. reinhardtii* depending on different durations. Changes in gene expression pattern was observed from the begining to the end of the dark period.

Discussion: According to our results illumination doesn’t effect the HRK1 gene expression while HKR1 gene expression levels changed depending on duration in the dark period. Thus we might think the HKR1 gene is related with eyespot assembly and localization. Our results supports the idea of HRK1’s possible role in light activated channel.

Keywords: Histidine Kinase Rhodopsin, HKR1, *Chlamydomonas reinhardtii*, green algae
Introduction: Aquaponics is the combination of aquaculture and hydroponics that grows fish and plants together in one integrated system that consists of the fish tank and a soil-free plant bed. There are three basic aquaponic methods; raft, NFT and media-filled beds. The aim of this study is to make a guide for aquaponic system designers and scientists.

Material and Methods: Scientific peer reviewed literature was used for evaluating the different aquaponic systems. Advantages and disadvantages of these methods were discussed according to scientific and management perspectives.

Results: Raft system has advantage of utilizing maximum floor space which is crucial in a commercial greenhouse setting. The extra volume of water in the raft tank provides a buffer for the fish, reducing stress and potential water quality problems. Once a raft is harvested, it can be replanted with seedlings and set into place on the opposite end. This method is most appropriate for growing salad greens and other fast growing, relatively low-nutrient plants. It is also most commonly used in larger commercial-scale systems.

NFT (Nutrient Film Technique) is a method in which the plants are grown in long narrow channels. A thin film of water continuously flows down each channel, providing the plant roots with water, nutrients and oxygen. This method of growing works very well for plants that need little support, such as strawberries and other herbs. NFT is also a great way to utilize unused space because they can be hung from ceilings above other growing areas. The NFT method requires constant maintenance including cleaning the piping on a consistent basis and only a small set of plants can be placed in this system.

A media-filled bed system uses a tank or container that is filled with gravel, perlite or another media for the plant bed. This bed is periodically flooded with water from the fish tank. The water then drains back to the fish tank. The system is the cheapest and easiest one to operate since uses the fewest components and no additional filtration. The media-filled bed is often used for hobby applications. A wide variety of crops can be grown with this system.

Discussion: Differences between aquaponic systems should take into account by Aquaponic system designers when designing hydroponic components within aquaponic systems. Choice the right aquaponic system is crucial to how well the rest of your aquaponics system is run.

Keywords: Aquaponic, Hydroponic, Sustainability, Biological system, Ecoagriculture
**First Record of Natural Infection of Xerolenta obvia (Mollusca: Pulmonata) by Dicrocoeliidae (Digenea) Larval Stages in Turkey**

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**Introduction:** The class Trematoda, which includes flukes, is a group of parasitic flatworms that most likely evolved from free-living forms millions of years ago. Flukes usually parasitize snails as intermediate hosts (in which they reproduce asexually) and humans or other vertebrates as definitive hosts (in which the worms mate and lay eggs). Liver flukes inhabit the bile duct and gall bladder of ruminants as well as other animal species including humans, and they infect two intermediate hosts. Family Dicrocoeliidae is a group of liver flukes that uses land snails as the first intermediate host. The hygromiid snail *Xerolenta obvia* (Mollusca: Pulmonata) (Menke, 1828) is a land snail species that can be naturally found in Anatolia, the Balkans, the Carpathians, along the Baltic coast, Mediterranean region, and southeast France. Thus far, to our knowledge, no report regarding the larval trematodes of this land snail has been presented from Turkey. We aimed to determine the prevalence of Dicrocoelid larval stages in *X. obvia* (Menke, 1828) found in Kastamonu and investigate the morphological features of the parasite (sporocysts and cercariae).

**Material and Methods:** *X. obvia* (Menke, 1828) samples were collected following rainfall in areas surrounding the Kastamonu province in April, May (spring), October and November (autumn) in 2016. They were dissected alive, and their hepatopancreata were removed and placed in clean small glass tubes containing 0.6% NaCl solution. The hepatopancreas was dissected using a needle and liquid was spread as a thin layer on a slide for investigation of the live larval stages of parasites. Dicrocoelid larval stages (sporocysts and cercariae) were observed under a compound microscope, fixed in 5% formalin and stained with Semichon’s acetocarmine. Samples were also prepared for scanning electron microscope examinations.

**Results:** *X. obvia* was recorded for the first time as an intermediate host in the life cycle of the family Dicrocoeliidae in Turkey. The prevalence of the infection in Kastamonu was 0.78%, with the highest occurrence in April.

**Discussion:** *X. obvia* were gathered near farms and villages because of the presence of herbivores that were grazing on these sites; the larval stage at this particular time could be of *Dicrocoelium dendriticum*. The risk of transmission of infection to other animals could be high if this is indeed the case. In conclusion, *X. obvia* is a noteworthy first intermediate host for transmission of Dicrocoelid species to second intermediate hosts in Turkey and in Europe because of its widespread distribution.

**Acknowledgement:** We would like to express our appreciation to the Research and Application Center of Kastamonu University for the SEM images.

**Keywords:** Xerolenta obvia, Land snail, Dicrocoeliidae, Dicrocoelium dendriticum, Larval stage, Kastamonu, Turkey
Cytological Features of *Raabena bella* Wolska, 1967 (Blepharocorythidae, Entodiniomorphida) from Asian Elephants in Gaziantep Zoo, Turkey

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**Introduction:** Endocommensal ciliates belonging to the order Entodiniomorphida subdivide three suborders, Arcistomatina, Blepharocorythina, and Entodiniomorphina. The suborder Blepharocorythina contains only one family Blepharocorythidae. The genus *Raabena* is in the family Blepharocorythidae and was reported from the hindgut of elephants by Wolska (1967). The aim of this study was to determine the cytological features of hindgut ciliate *Raabena bella* Wolska, 1967 from Asian elephants (*Elephas maximus*) living in Gaziantep Zoo, Gaziantep, Turkey.

**Material and Methods:** Two fecal samples were collected from two Asian elephants (*Elephas maximus*) living in Gaziantep Zoo, Turkey, in December 2013. Fecal samples were immediately fixed in three volumes of formalin solution (10% aq.) within 5 min after defecation to prevent the destruction of intestinal ciliates. A portion of each sample was also immediately fixed and stained with methyl green formalin saline solution (MFS) for light microscope examinations. The infraciliary bands were stained using the pyridinated silver carbonate impregnation (PSCI) method. Some samples were used for scanning electron microscope examinations.

**Results:** The buccal infraciliature of *R. bella* is non-retractable and composed of adoral polybrachykinety and dorsal polybrachykinety. Dorsal polybrachykinety is ribbon-shaped, begins right anterodorsal part of the body, passes over to the left side of the frontal lobe, directs to the right wall of the vestibulum, broadens at the beginning of the vestibulum and extends as longitudinal kineties in the triangular shaped vestibulum. Ribbon-shaped part of the adoral polybrachykinety is composed of short oblique kineties. The kineties are elongated at the beginning of the vestibulum and extends longitudinally on the right wall of triangular shaped vestibulum. The infraciliature of vestibulum is a continuation of dorsal polybrachykinety. Adoral polybrachykinety is ribbon-shaped and composed of oblique kineties and, surrounds the right, ventral, and left sides of the vestibular opening. Ventral and dorsal posterior polybrachykineties are ribbon-shaped and composed of oblique kineties and extends obliquely from right to left. Paralabial kineties are in the anteroventral part of the body and near the adoral polybrachykinety. Dorsal and adoral polybrachykineties are supported with fibers.

**Discussion:** The genus *Raabena* is in the family Blepharocorythidae because it has ovoid and flattened laterally body shape, a prominent frontal lobe, limited tufts somatic ciliation and non-retractable cilia. The unique feature of this genus is the vestibular polybrachykinety composed of continuation of dorsal polybrachykinety. Vestibular polybrachykinety of other genera in this family have no connection with the somatic polybrachykinety. So, it is considered that the genus *Raabena* is the most primitive in the family Blepharocorythidae and other genera could be evolved from it.

**Acknowledgement:** I would like to express my appreciation to the Research and Application Center of Kastamonu University for the SEM images.

**Keywords:** *Raabena bella*, Asian elephant, Ciliate, Gaziantep, Turkey
DNA Protection Activity of Different Quinoline Derivatives

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Introduction: DNA damage induced by ROS (Reactive Oxygen Species) causes many human diseases, including cancer and those related with aging. Most of natural compounds and chemicals are responsible for protection of DNA against oxidative stress, acid, alkaline, UV, and metals. It was mentioned in a study that quinolines can chelate Fe(II) and Fe(III) and inhibit free radical production in the Fenton reaction. In this study, it was aimed to detect the DNA protective effect of quinoline derivatives against Fenton reaction-mediated oxidative stress.

Material and Methods: 2,4-dihydroxyquinoline derived from disazo dyes were synthesized by the reaction of 5-amino-4-phenylazo-3-methyl-1H-pyrazole derivatives with 2,4-dihydroxyquinoline. DNA protection activity of 13 quinoline derivatives were examined. DNA protection activity assay was carried out by using pUC19 plasmid DNA. pDNA isolation was performed by Thermo Fisher Scientific GeneJET Plasmid Miniprep Kit. Fenton’s reagent used for DNA damage was comprised of 30 mM H₂O₂, 50 mM ascorbic acid, and 80 mM FeCl₃. Reaction mixture including pDNA, Fenton’s reagent and 5 and 10 mg concentration of compounds was completed to 20 µl with double distilled water. Negative control was included only plasmid and water. Positive control was included plasmid, Fenton’s reagent and water. After mixtures were incubated at 37°C, samples were then run on 0.8% agarose gel and visualized under UV light.

Results: DNA protective activity of two concentrations of 13 compounds against highly deleterious Fenton’s reagent was discovered. A total of four compounds had no protective effects on plasmid DNA. However, the other compounds protected the supercoiled form of pDNA against Fenton’s reagent. Compound (I) 3-(3’-methyl-4’-(3-chlorophenylazo-1’-H-5-ylazo) pyrazole-2,4-dihydroxyquinoline) and compound (II) 3-(3’-methyl-4’-(2-nitrophenylazo-1’-H-5-ylazo) pyrazole-2,4-dihydroxyquinoline) showed the most protective activity among them. The DNA protective activity of these compounds can be explained by their binding affinity to the negatively charged DNA due to their high positive charge.

Discussion: Compound (II) contains a nitro group, attracts electrons from the ring via a resonance effect, while compound (I), which contains chlorine, attracts electrons from the ring by an inductive effect. The nitrogen bonded ring possesses more positive charge than the chlorinated ring. Thus, compound (II) had a higher positive electric charge than compound (I), which can explain the much higher protective activity of compound (II) at a concentration of 10 mg/ml. Many studies report the use of compounds that can increase the rate of neutralization of the molecular binding affinity to DNA.

Keywords: DNA Protection, 2,4-Dihydroxyquinoline Dyes, Fenton’s reagent
Comparison of Plant Cover and Diversity Indices in the Grassland of Velikoy, Bicakcilar and Kilickaya Sub-Basins, Artvin

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Introduction: This study was conducted to determine the current vegetation conditions in the grassland areas by selected sub-basins (Velikoy, Bicakcilar and Kilickaya) under the “Coruh River Basin Rehabilitation Project”.

Material and Methods: For this purpose, a total of 94 sampling sites were selected (38 from Velikoy, 25 from Bicakcilar and 31 from Kilickaya sub-basins) according to layered random sampling method. In each of the selected sampling areas, the number of species, the number of individuals and the amount of covering percentage were measured by using of transect methods (100 cm in length and 1 cm diameter transducer bar). Biodiversity Index, Simpson Index and Shannon Weaver Index values were calculated by using these measured values in the field.

Results: According to the our results; the percentage of plant cover of Velikoy, Bicakcilar and Kilickaya sub-basins were 83.1%, 44.5% and 45.6%, respectively. The Biodiversity Index were calculated in Velikoy and Kilickaya sub-basins (0.30) and Bicakcilar sub-basin (0.31). In terms of the Simpson Index values, the highest values was found in Velikoy sub-basin (0.74) and lowest values was calculated in Bicakcilar sub-basins (0.64). The highest Shanon Weaver Index was calculated in Kilickaya sub-basin (5.2) and the lowest was calculated in Bicakcilar sub-basin (3.1). The number of species in the grassland of Velikoy, Bicakcilar and Kilickaya were 5.3, 4.0 and 7.1/transect, respectively. The number of individuals were found in Velikoy (22.1), Bicakcilar (22.2) and Kilickaya (37.2).

Discussion: Our results showed that, average plant cover percentage, the number of species and the number of individuals were increased with increasing precipitation and decreasing with temperature. It was determined that the amount of plant cover were exactly proportional to the amount of rainfall and elevation. There was an inversely proportional relationship between the plant cover percentage and biodiversity.

Acknowledgement: This study was partially supported by the Coruh River Watershed Rehabilitation Project (2012–2019).

Keywords: Biodiversity, Grassland, Shannon Weaver, Simpson, Coruh River.
Aquaponics: Sustainable and Environmental Friendly Solution for Water Pollution Problems Related with Aquaculture In Turkey

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Introduction: Discharges from flow-through aquaculture systems such as raceways, tanks contain organic matter, nutrients, and suspended solids which directly impacts on oxygen depletion, eutrophication, and turbidity in inland waters. Such effluents may have a serious negative impact on the quality of the receiving inland waters when discharged untreated. In 2016, the total amount of aquaculture feed production in Turkey was 150132 tonnes and in this amount roughly 12761 tons of phosphorus and nitrogen (1502 tons of phosphorus, 11259 tons of nitrogen). The amount of phosphorus and nitrogen left in the environment was 9842 tons (1084 tons of phosphorus, 8758 tons of nitrogen). In Turkey, aquaponics the practice of combining aquaculture with hydroponics, could contribute to solving these problems. The aim of this study is to evaluate aquaponics as an alternative method to aquaculture in Turkey.

Material and Methods: Scientific peer reviewed literature and Turkish Statistical Institute Fishery Statistics were used for evaluating the impact of aquaculture on water resources. Aquaponics as an alternative method were evaluated based on SWOT analysis.

Results: Strengths: Water sustainability through waste re-use in closed hydraulic systems, significant reduction in water use, zero effluent from system to inland waters, no need to dispose of fish waste or provide an artificial filtration system. The knowledge you gain in running a small system can be directly transferred to full sized aquaculture systems.

Weaknesses: challenge to keep system in balance, algae problem, system biological balance problems, lack of education to the public of technological availability, constantly monitoring of water.

Opportunities: New and developing technology, Obtaining European Union funding, Enabling customers to customize the design of product.

Threats: Product unacceptance on the market. Market and gain acceptance specially from international markets in the already saturated and highly competitive aquaculture industry.

Discussion: Aquaponics not only improves the water quality of aquaculture effluent, but also maximises the use of the resources involved in both fish and vegetable production. Aquaponics is still at relatively early stages of research and development in Turkey but it has a great potential to improve the way that aquaculture is managed, to increase the value of aquaculture businesses, and to increase the amount of sustainably produced food.

Keywords: Aquaponic, Aquaculture, Turkey, Sustainability, SWOT
Introduction: Plant strategy is the grouping similar or analogous genetic traits that are repeated among species or populations. Grime distinguishes three types of plant strategies as competitor, stress tolerant and ruderal which are occurred under tree selective pressure, competition, stress and disturbance. Same life strategies have similar traits.

Material and Methods: The objective of the study was to determine and evaluate the life strategies of quince (Cydonia vulgaris) and persimmon (Diospyros kaki) according to Grime’s C, S, R Strategies. The fully expended and fully hydrated leaves of the two species were collected from Amasya, Turkey. Canopy height, leaf dry weight, dry matter content, specific leaf area, flowering period and flowering start were determined for each species. Plant strategies of the species were calculated by the special spreadsheet.

Results and Discussion: At the end of the study, it was determined that both Quince and Persimmon were competitor species (C) which were characterized by high and dense leaf cover, large lateral spread and low seed production. Selective traits for these species as competitors were explained in the light of literature by this study. Competitor strategy is resulted from low stress and low disturbance situation. According to Grime’s C, S, R, strategy model, the intensity of the competition increases as the amount of resources, productivity and biomass. Being a competitor for plants provide several advantage in terms of resource gain and growth. When considering that quince and persimmon are economically important agricultural crop it is very important to determine life strategies.

Keywords: Grime strategies, Persimmon, Diospyros kaki, Quince, Cydonia vulgaris
Parathion-Methyl, Chlorpyrifos-Ethyl, Endosulfan and Methamidophos Existence in Groundwater in Göksu Delta and Its Human Health Risk Assessment

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Introduction: Pesticides are chemicals that are used to increase the production efficiency in agricultural crops by destroying the living organisms called as pests for meeting the human needs. Its usage causes surface and groundwater contamination with discharge, runoff and/or infiltration. In addition to that, these chemicals are toxic and have non-biodegradable feature so that they have negative effects on human health such as causing asthma, allergies, cancer, hormone disruption and fetal development problems. In Göksu River Basin which is known as pollution struggling basin in Turkey, Parathion-Methyl, Chlorpyrifos-Ethyl, Endosulfan and Methamidophos are the pesticides that have more potential to leach to groundwater among the utilized pesticides for crop protection. In this study the human health risk assessment of these pesticides in groundwater of Silifke District located in Göksu River Basin was studied.

Material and Methods: The SCI-GROW model is used to determine the pesticide concentration in groundwater. The needs for this model are Degradation half-life, Soil organic carbon partition (KOC), Use rate and uses in worst case scenario of pesticides in the district. Intake Model for Ingestion of Drinking Water is also be used in order to analyze the degree of Parathion-Methyl, Chlorpyrifos-Ethyl, Endosulfan and Methamidophos exposure.

Results: The expected results of these pesticides were evaluated according to the Turkish legislation related to the drinking water quality and the risk assessment was made in terms of human health effects. According to results obtained by the comparison between the calculated concentrations and the oral reference doses, it is acquired that all the pesticides stay under threshold values and does not exceeds the oral reference doses.

Discussion: According to the results obtained by the comparison between the calculated concentrations and the oral reference doses, it is acquired that all the pesticides stay under threshold values and does not exceeds the oral reference doses. Since there are no dermal reference dose studies for the subjected pesticides, a comparison between the dermal exposure concentrations and dermal reference doses could not be done. However, it can be seen that the calculated dermal exposure concentrations are much lower than the calculated oral concentrations and since the oral exposure levels do not exceed the limit we may say that the there is no risk in respect to dermal exposure, too.

Keywords: Pesticides, Göksu River, Groundwater, SCI-GROW, Risk Assessment
Introduction: Cell culture is a process in removal from various tissues where one or several cell groups are located and their subsequent growth in a suitable artificial environment at in vitro. The most important advantage of cell culture can be examined independently of all the factors that can be affected. It is used in several research areas such as DNA and RNA replication studies, investigating protein synthesis and energy metabolism, drug effects, cell signalling, stem cells. Insect cell cultures are widely used in studies on insect cell physiology, developmental biology and microbial pathology. Also, insect cell culture is an especially indispensable tool for studies on insect viruses.

Material and methods: Cell lines have been obtained from a large number of insect species. The first constantly growing insect cell cultures were built from various Lepidoptera insects in 1960. Since then, over 600 insect cell lines have been identified. Among these, Drosophila S2, Spodoptera frugiperda Sf9, Sf21 and Trichoplusia ni High Five cell lines are most commonly used. Insect cell lines are isolated from different tissues and organs of insect and it can be successfully established. For maintaining cell culture used culture media, including amino acids, salts, vitamins, growth factors, carbohydrates, metabolic precursors, trace elements, and hormones. Insect cultures are usually maintained at 26–28 °C in containing culture media.

Results: The insect as a model organism widely prefer due to have a Toll-like Receptors found in mammalian immunity systems and important signalling system responsible for mediating insect cellular immune reactions to immune challenge. Insect cell lines are very important for these study areas. On the other hand, all insect cell lines are suitable for transfection, plaque purification, generating high titer stocks of virus, plaque formation and expression of recombinant proteins. And also, many vertebrate and plant viruses replicate in insect cell lines because of involve lines developed from the insect vector species which are permissive hosts during part of the virus transmission cycle.

Discussion: Insect cell cultures have been important tools in a variety of disciplines, ranging from basic biological research on developmental and physiological processes, to highly practical uses in the production of biopesticides and vaccines. The use of modern biotechnological tools provides a great opportunity for the development of insect cell cultures.

Keywords: Cell culture, insect, cell line
Acute and Chronic Toxicity Evaluation of Water Samples Taken From the Ergene River

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Introduction: According to Water Framework Directive (WFD2000) established by EC in 2000, the risk caused by priority pollutants should be evaluated by testing the surface water quality for ecotoxicity using min 3 species from different taxonomies starting from bacteria to fish. This study aimed to test acute and chronic toxicity of the water samples collected from the Ergene River which has been recorded to be intensively polluted by industrial and municipal discharges as well as diffuse sources that may contribute a vast range of prioritry pollutants.

Materials and Methods: Water samples were collected from 20 points which indicate critical hydraulic and pollution conditions along the Ergene River in July 2016. Collected samples were frozen without adding any conservative chemical into. Before ecotoxicity tests the samples were thawed for 48 h in refrigerator (+ 4°C). After that they were left in the room temperature for 2 h, and later their pH levels were adjusted to the required values of the standard toxicity test methods. Two freshwater specie, namely, unicellular green algae (72 h, chronic toxicity), Daphnia magna (48 h, acute toxicity) and Artemia salina (a marine species, 48 h- acute toxicity and 7 d-chronic toxicity) were exposed to the water samples. Algae and Daphnia magna were grown in the standard vivarium conditions in the laboratory while Artemia salina cists were obtained from an aquarium products company. Tests with crustaceae were performed in the dark at 20°C, as quadruplicate and 5 juvenile were tested in each replicate. Accordingly, toxicity was assessed by means of immobilization percentage determined by dividing the total number of immobilized organisms to total 20 number of test organisms for each day of exposure period. During chronic test with Artemia salina, the test samples were freshly changed for each day of the test period of 7 days. Unicellular green algae chronic test was run 3 replicates according to standart methods.

Results: Both D. magna and A. Salina specie did not result significantly acute toxic (<25 % immobilization) after 48 h exposure. In the case of chronic toxicity experiments, most of samples exhibited severe toxicity versus control experiment starting from 3 nd d of the test. According to algae growth inhibition test, most of the samples resulted severe toxic (<50% growth inhibition) when samples were filtered from 0.45 μm pore size filters whereas only two of the samples exhibited inhibition when the samples were tested after filtration from 0.2 μm pore size filters according to the sandart method. These results showed that some of toxic compounds were emoved by finer filtration that is important to influence the sensitivity of the species.

Discussion: The results evidenced severe chronic toxicity of some samples to algae and A. salina although it is a marine specie. Acute toxicity monitoring with D.magna and A.salina specie was not indicative for the river water quality samples.

Acknowledgement: We would like to acknowledge the grant (Project Number: 215O538) by Turkish Scientific and Technology Council.

Keywords: Ecotoxicity, Daphnia magna, Artemia salina, Unicellular green micro algae, the Ergene River
Change in Some Soil Properties with Land Use Type in Semi-Humid Climate Zone of Coruh River Basin, Turkey

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Introduction: The soil characteristics vary depending on the land use. In this study, it was aimed to determine whether some soil characteristics change with land use type in the semi-humid climate zone in Coruh River Basin.

Material and Methods: For this purpose; stratified random sampling method was performed to determine the current state of some soil characteristics in the degraded forest and grassland areas by selected sub-basins under the "Coruh River Basin Rehabilitation Project". A total of 180 sampling sites were selected, 120 of which were in degraded forest and 60 of which were in grassland areas in the semi-humid climate zone. A total of 341 soil samples were taken from the sampling areas at the depths of 0-15 cm (180) and 15-30 cm (161). In these soil samples; texture (sand, clay, silt (%)), soil pH, organic matter (OM) (%), lime (%), electrical conductivity (EC), dispersion ratio (DO), clay ratio (KO), soil erosion factor (K factor) were determined.

Results: According to the our results; the amount of sand, clay, silt, pH, OM, lime content, EC, DO, KO and K factor in the 0-15 cm soil depth were 69%, 11%, 19%, 7.32, 2.67%, 5.9%, 153 uS/cm, 51, 3, and 0.048 in the degraded forest and were 62%, 13%, 25%, 7.53, 2.90%, 7.6%, 171 uS/cm, 34, 1.9 and 0.052 in the grassland areas, respectively. Independent sample T-test analysis showed that sand, clay, silt, pH, OM, DO, KO and K factors were significantly different in terms of the different land use type (p <0.05) in the 0-15 cm soil depth.

The amount of sand, clay, silt, pH, OM, lime content, EC, DO, KO and K factor in the 15-30 cm soil depth were 66%, 13%, 21%, 7.4, 2.31%, 6.9%, 162 uS/cm, 42, 2.4, and 0.050 in the degraded forest and were 60%, 16%, 25%, 7.5, 2.37%, 8.4%, 143 uS/cm, 32, 1.7 and 0.054 in the grassland areas, respectively. Independent sample T-test analysis showed that sand, silt, OM, DO, KO and K factors were significantly different in terms of the different land use type (p <0.05) in the 15-30 cm soil depth.

Discussion: Our results indicated that; some soil characteristics had significant differences with land use type. Therefore, the land use and soil characteristics should be taken into consideration for the purpose of preserving or improving the existing situation of the degraded and grassland ecosystem of the study area.

Acknowledgement: This study was partially supported by the Coruh River Watershed Rehabilitation Project (2012–2019). The authors would like to thank the project funding agencies General Directorate of Forestry (OGM) and the Japanese International Cooperation Agency (JICA)

Keywords: Coruh, Landuse, Soil Properties, Semi-Humid Climate Zone
Introduction: *Juniperus drupacea* are dioecious and evergreen trees up to 40 m in the genus *Juniperus* (Cupressaceae), often known as a monotypic genus *Arceuthos*. Native around to Mediterranean region grows Taurus and Amanus in Turkey. Cones 1,5-2,5 cm, ovoid-subglobose, young cones are boiled for made molasses which was used as Non-wood Products. Each cone have 3 seeds inside (rare 1-6). The aim of this study: Using General Directorate of Forestry, Department of Non-wood Products and Services between 1989-2016, it is aimed to reveal the amount of *Juniperus drupacea* cones production and the income earned, at the same time emphasizing the importance of the materials it contains and its usage areas.

Material and Methods: In order to find the amount of the harvest of *J.drupacea* cones; General Directorate of Forestry, data from the Department of Non-Wood Products and Services is the material of this study. According to the year; how much cones was collected (kg) in Regional Directorate of Forestry and the income data were presented in tables in order to reveal the amount harvested *J.drupacea* cones.

Results: Samphire molasses is obtained by boiling the flesh parts of the cones. There are 11 different phenolic compounds in the molasses composition: sugars (glucose, sucrose and fructose), minerals, potassium, phosphorus, magnesium, calcium, iron, copper, zinc, manganese. Molasses: It is used in asthma treatment, ulcer treatment, bronchitis, cough cutter, hair loss prevention, jaundice, itching, eczema, blood maker, force transmitter and aphrodisiac. Cones are beaten and powdered, mixed with honey and used internally as a lowering intestinal worm agent.

Discussion: According to the data received from General Directorate of Forestry, Department of Non-wood Products and Services, first record belongs to year 1993 in the period of 1989-2016. In 1993, for the first time, 7.275 kg *J.drupacea* cones collected and gained 1.455 TL incomes in the territory of The Forest Regional Directorate Mersin. Cones were harvested from The Forest Regional Directorate Antalya, Kahramanmaraş, Konya and Mersin till now. When analyzed 28 years of data; in total, 371.831 kg of cone harvested and was earned as revenue 160.352 TL. Maximum amount of cone harvested while performing from The Forest Regional Directorate Mersin with 287.488 kg, minimum amount of harvest was carried out from The Forest Regional Directorate Konya as 1.000 kg.

Keywords: *Juniperus drupacea*, Harvest, Ethnobotanical uses, Turkey
Investigation of HKR1 Gene Expression Depend on Medium Differences in *Chlamydomonas reinhardtii* P.A.Dangeard 1888

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**Introduction:** Histidine Kinase Rhodopsin (HKR1) gene has a function as UV light sensor and a modular protein in *Chlamydomonas reinhardtii* P.A.Dangeard 1888. Due to its possible role in light activated channel, it is thought to be related to regulation of photosynthesis in different conditions.

**Material and Methods:** The 137C+ strain of *C. reinhardtii* was used for this study. Cells were grown in TAP liquid and agar media, M liquid and agar medium, R liquid and agar medium, under illuminated conditions. Total RNA was isolated by TRIzol reagent and cDNA synthesized with “Invitrogen SuperScript™ III First-Strand Synthesis System for RT-PCR” kit according to manufacturer’s instructions.

**Results:** Relative expression level of HKR1 was analysed in *C. reinhardtii* depending on different medium types. Differences between gene expression patterns were observed during experiment.

**Discussion:** Changes in HKR1 gene expression may be related to the differences in photosynthetic efficiency depending on the medium.

**Acknowledgement:** This study was supported by the grant TUBITAK 115Z184.

**Keywords:** Histidine Kinase Rhodopsin, *Chlamydomonas reinhardtii*, TAP medium, M medium, R Medium, green algae
Introduction: Larvas belong to trichoptera team, are used in an effective way in the study of defining the quality of habitat. But the rarity of yhe systematic studies related with trichopter larvas in Turkey prevent the understanding of relationship between the habitat quality and these groups of rivers. Diagnosis keys in which are used lower tacsonomic steps are needed to understand this relationship. Also especially larva phases aren’t known completely. In this study, the photos and the character explanations of trichoptera larvas, grown up in the laboratory, in the diagnosis of the lowest step are given. This study is a pre study for the forward systematic of trichoptera team.

Material and Methods: It is studied with larvas belong to trichoptera team which was collected with the methods of kick-net from Daday Brook, Karasu Stream of the Set Alabalık Facility and Kara Cehennem Stream of Ersizlerdere are between March-October in 2017. The daignosis charecters of larvas brought to the lab are examined by using stereo microskope. Outher morphologic features are used the diagnosis of species.

Result: With this study, the larvas of Rhyacophila nubila, Philomotamus montanus, Hydropsyche angustipennis, Hydropsyche bulbifera, Hydropsyche dinarica ve Hydropsyche instabilis are diagnosis and the characters used in diagnosis are defined with photos.

Conclusion and Discussing: In this study, the easier diagnosis of trichopter larvas are tried to be done with the prepared keys such as pictures and photos. Some useful tacsonomic profits are also obtained to define the larvas.

Keywords: The keys of familiy, the keys of species, diagnosis, trichoptera, larvas
Introduction: Zerconid mites (Zerconidae) are one of the important members in soil mesofauna. They colonize in various habitat types in forest ecosystems, especially in humus, soil, litter and mosses. Aim of this study is describe of male specimens of *Zercon montanus* which are not known before, and contribute to Turkish acarofauna.

Material and Methods: Mites belonging to genus *Zercon* were collected living in *Quercus pontica*, *Corylus avellana* and moss habitats from forestland of Çamlıhemşin and İkizdere counties (Rize province). Samples were labelled, transferred to acarology laboratory and placed in combined Berlese funnels. Mites were extracted after 5-7 days having regard to humidity of samples. Then, mites were separated under a stereo-microscope by using forceps and placed in 60% lactic acid for clearing. Olympus BX50 microscope with DP25 camera was used for examination and drawings of mites. The specimens examined were stored in 70% ethanol.

Results: As a result of collected samples from Rize provinces, 7 males, 1 protonymph and 26 larva were found for the first time from Turkey as well as 109 females. Definitions of *Z. montanus* specimens were reviewed, measurements and photos of various body parts were taken, and distributions in both Turkey and the world were discussed. Also, a key to the all known Turkish species of genus *Zercon* was arranged.

Discussion: Original definition of *Zercon montanus* was made in 1943 by German acarologist Carl Willmann, according to female specimens collected from Swedish Lappland. Female specimens of this species were recorded from Artvin province (Turkey) before. However, no male specimens of this species have been found in both Turkey and the world. Male specimens of this species were found for the first time in this study. Moreover, this event is first report of zerconid mites from Rize province.

Acknowledgement: We would like to thanks Musa Azmaz (M.Sc.) and YusufKateılmüş (Assoc.Prof.Dr.) from Pamukkale University, for collecting samples from Rize province.

Keywords: Mesostigmata, Zerconid mite, Male, Rize province, Turkey
Investigations on Phytochemistry and Radical Scavenging Activity of Fern, Golden Herb ($Asplenium ceterach$) Distributed in Different Altitudes

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Introduction: Plant chemical content depends on not only plant genetic and other biotic factors but also abiotic factors such as altitude, temperature, wind and light. $Asplenium ceterach$ L. (golden herb) is a fern belonging to Aspleniaceae family, which used as a folk medicine in different regions of the world. The aim of this study was to compare the effects of the different altitudes on antioxidant activity and phytochemistry of $Asplenium ceterach$ which we determined its antioxidant effects among some other plants in our previous study.

Materials and Methods: Plant samples were collected from their natural distribution areas in different altitudes in Burdur-Antalya regions, in April-May 2016. Air dried and powdered samples were extracted by different solvents and were used in the antioxidant activity tests (DPPH radical scavenging activity test, total phenolic and total flavonoid content tests) and HPLC analysis were done to determine some phenolic substances in plant extracts.

Results: The highest DPPH radical scavenging activity was determined in the plant extracts collected from 22nd station ($IC_{50}= 47.91 \mu g/ml$). The highest total phenolic content was determined in the plant extracts collected from 9th station ($110.62 \mu g$ GAE/ml) whereas the highest total flavonoid content was determined in the plant extracts collected from 20th station ($232.67 \mu g$ KE/ml). HPLC analysis show that the highest pterosin b, catechin and quersetin were found in the plant extracts collected from 21th station whereas the highest chlorogenic acid from 9th and caffeic acid from 13th station.

Discussion: It is shown that plant extracts from 22nd, 9th, 21st, 20th and 13th stations have the highest radical scavenging activity and phenolic contents. Only 13th station was placed in Antalya while others were in Burdur province. We found that altitude does not affect the phenolic and pterosin b content of the plants, therefore the soil properties and/or the structure of the rocks and the other ecological factors may have effects on these plant chemical contents.

Acknowledgement: We would like to express our appreciation to the Mehmet Akif Ersoy University Scientific Research Project Commission, which supported this study (0326-NAP-16).

Keywords: altitude, $Asplenium ceterach$, phenolic content, pterosin b, radical scavenging activity
Mussel’s Amino Acids and Umami Taste

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Introduction: People’s concern about healthy life is increased traditional food consumption and demand. Food safety is important for healthy and quality food. Therefore, food processing steps are affected not only quality but also consumers’ preferences. The aim of this study is to determine different fried techniques for the umami taste, proximate and amino acid composition on mussel quality.

Material and Methods: The study involves chemical analyzes and the study is run in parallel with group 2 and repeat 2. The group of mussels that were purchased for the study were divided into 6 groups (control: unprocessed mussel meat, group A: covered mussel fried in deep oil, group B: mussel fried in low fat, group C: uncoated fried mussel meat fried in deep fat, group D: uncoated mussel fried in low fat, and E: served in restaurants).

Results: Proximate composition and amino acid contents of all groups were determined. Crude protein, crude oil, crude ash and moisture results of raw mussel meat are respectively; 15.69, 1.58, 0.92 and 80.56 g / 100 g, respectively. In the study, 16 amino acids, 9 of which were essential, were examined. Essential amino acids detected in the mussels; histidine, arginine, threonine, valine, methionine, iso-leucine, leucine, phenylalanine and lysine. The essential amino acid content of the raw material is 7093 mg / 100g, and the maximum amino acid type detected in the total amino acids is glutamic acid.

Discussion: Glutamic acid is followed by lysine and aspartic acid. Glutamate, aspartame and some nucleotides are associated with umami taste, which is called the 5th taste. Mussel had a very high glutamic acid content. It can be said that the umami taste of the mussel was predominant and it was consumed with love for this reason. When the groups were compared with each other, the most loss of aspartic acid was detected in group B, which was fried in deep fat. It has been determined that the frying methods of the mussel ceiling affect the amino acid composition.

Acknowledgement: This research has been supported by Sinop University Scientific Research Projects Coordination Unit. Project Number: TOY 1901-16-44, 2016

Keywords: Mussel, amino acids, umami, aromatic amino acids
Evaluation of Mammalian Species in Area of Wind Power Plant in Mordoğan (İzmir)

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Introduction: One of the wind power plants that was established to contribute to our country's energy needs is the Mordoğan Wind Power Plant established in İzmir province. This area and its surroundings is the habitat for many mammalian species. The purpose of this work is to identify mammalian species and to investigate the effect of the plant on mammals. For this purpose, detailed field studies were carried out in the region and the species of mammals living here were determined and the possible effects of turbine and station works on mammals were evaluated.

Material and Methods: For this study, field and observational studies were conducted in 2015 (January) - 2017 (July), in different habitats in the area of the wind power plant in Aliağa. During the fieldwork, for two years, optical devices (cameras, telescopes) and global positioning system devices has been used. Live capture traps for capture small mammals and mist- net mechanism for capture bats has been used. Individuals captured were released back to nature after species identification. Moreover, determination of mammalian species has been used for animal tracks (footprint, feces etc.).

Results: This research resulted in the terrestrial and aquatic biotope at regions around the wind turbines, is likely to spread 22 mammal species were identified. This mammal species belong to the following orders; Chiroptera (8 species), Carnivora (4 species), Rodentia (7 species), Cetartiodactyla (1 species), Lagomorpha (1 species) and Erinaceomorpha (1 species). Mammalian fauna, area of wind power plant in Mordoğan, evaluated by IUCN category are determined endangered species. In this context, the four Chiroptera species (Rhinolophus euryale- Mediterranean Horseshoe Bat, Myotis capaccini- Long-fingered Bat, Miniopterus schreibersii-Common Bentwing Bat and Rhinolophus mehelyi- Mehely's Horseshoe Bat) are under threat in Çeşme District. Other mammal species in the LC (low risk, widely distributed) category. There are no endemic mammalian species in Çeşme district.

Discussion: When considering the energy needs of our country, it is necessary to minimize the damage that can be given to nature and wild life instead of giving up using energy resources because of its possible risks. Nighttime lighting of the central area must be avoided as nocturnal wildlife will prevent feeding and reproduction activity. It is extremely important to preserve the originality of water resources and wetlands in the immediate vicinity. Damage to aquatic ecosystems will affect all wild mammalian populations. Bat activities in the region should be observed. It should be checked frequently whether there is a dead bat on the field.

Acknowledgement: This work was supported by Republic of Turkey Ministry of Forestry and Water Affairs.

Keywords: Wildlife biodiversity, Wind power plant, Mordoğan, İzmir
Length-Weight and Length-Length Relationships of the Common carp, Cyprinus carpio Inhabiting Altınkaya Dam Lake and Bafra Fish Lake (Samsun, Turkey)

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Introduction: Length-weight relationships (LWRs) and length-length relationships (LLRs) are an important tool in fishery management. LWR parameters provide predicting the weight of the fish from its length, a comparison of the morphology and life cycle of the populations from different habitats. Also, LLRs are an important parameter of the comparison of growth studies using different length types. The aim of this study is to specify the LWRs and LLRs of Cyprinus carpio in Samsun Province.

Material and methods: C.carpio samples were collected from Altınkaya Dam Lake (ADL) and Bafra Fish Lake (BFL) in Samsun. All captured fish were measured (±0.1 cm) for total length (TL), fork length (FL), standard length (SL) and weighted (±0.01 g). W= a.L^b equation is used in the calculation of LWRs (L= Total Length). LLRs were calculated using linear regression model for TL, FL and SL. Length-weight and length-length relationships were determined for two localities separately. Excel, Minitab 15.0 and SPSS 20 were utilized in the evaluation of data.

Results: Minimum-maximum lengths and weights of individuals sampled from ADL were determined as 36.4-63.8 cm, 674.0-3937.9 g, respectively. For BFL, total lengths and weights were ranged from 17.8 to 69.3 cm, from 68.0 to 5412.0 g, respectively. The statistical analysis showed that there were differences in terms of TL and weight between localities (P<0.001). The statistical differences in regression slopes between localities were examined with the analysis of covariance (ANCOVA) (F=4.22, P<0.05). Overall, there were a strong correlation between length and weight relationships for two localities (r^2>0.933). LWR equations were calculated as W=0.027TL^{2.853} and W=0.011TL^{3.044} for ADL and BFL. The b values were 2.853 and 3.044 for ADL and BFL, respectively. LLRs show that all length values are very strong between each other (P<0.001) for two populations.

Discussion: LWRs and LLRs are important in effective management of fisheries. Geographic location and environmental conditions can also affect the value of b. It is hoped that this study will support investigators for ecological studies and reliable growth estimation in future.

Acknowledgement: This study was supported by Ondokuz Mayis University PYO.1901.17.003.

Keywords: Cyprinus carpio, Length-weight relationships, Length-length relationships, Samsun
Oncholaimids (Nematoda: Enoplida) at the Southern Black Sea with three new records for Turkey

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Introduction: The family Oncholaimidae Filipjev, 1916 is composed of more than 300 species worldwide. They generally prefer relatively less disturbed habitats. This study is part of a comprehensive research on free-living marine nematodes reporting new taxa for the marine fauna of Turkey.

Material and Methods: Meiobenthos samples were collected each month between August 2009 and July 2010 at eight stations located along the coast of Sinop Bay (3 m and 10 m depth). Three replicates of soft sediment were obtained at each station by Scuba diving and a metal sediment corer was used to take samples. Material was preserved in 75% ethanol. In the laboratory, nematodes were picked using needles and permanent paraffin slides were prepared using slow evaporation method. A research microscope (Nikon Eclipse Ni-U) equipped with Nomarski optics was used for the identifications.

Results: Specimens belonging to Oncholaimidae have been recorded during four seasons in the research area, but mostly in spring. The highest abundance value was found in April (28660 ind. m⁻²) at st. A2 (10 m) and the lowest was found in August (870 ind. m⁻²) at st. B1 (3 m). Oncholaimids were found to be represented by seven species in the area. The number of species ranged from 1 to 2 at each station. Each species occurred during maximum two seasons. Pontonema zernovi (Filipjev, 1916), Viscosia glabra (Bastian, 1865) and Viscosia cobbi Filipjev 1918 are new records for the Turkish fauna. The most abundant taxon in the field was Oncholaimus sp. (32330 ind. m⁻²) followed by V. glabra (17770 ind. m⁻²) and P. zernovi (10960 ind. m⁻²).

Discussion: Prior to this study, several species of oncholaimids have been reported from Turkey. Oncholaimus dujardini de Man, 1876 was found in the Sea of Marmara. Prooncholaimus banyulensis Inglis, 1962 and Viscosia minudonta Vitiello, 1970 were recorded in the Bosphorus. This study makes a contribution to the knowledge of oncholaimids, with three new records for the marine fauna of Turkey, also provides notes on their distribution and abundances.

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Keywords: Free-living marine nematodes, Meiobenthos, Oncholaimidae, Black Sea, Turkey
Determination of Length-Weight and Length-Length Relationships of Pike, *Esox lucius* Inhabiting Lakes Ladik and Simenlik (Samsun, Turkey)

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**Introduction:** *Esox lucius* is a fish species of high economic value in the inland waters of Turkey. They can tolerate a broad range of environmental conditions but are mesothermal 'cool water' fish best adapted to shallow, freshwater environments. Length-weight relationships (LWRs) and length-length relationships (LLRs) are very important for fisheries researches. The aim of this study is to determine the LWRs and LLRs of pike for two localities.

**Material and methods:** *E. lucius* samples were obtained from Lakes Ladik and Simenlik in Samsun. All captured fish were measured (±0.1 cm) for total length (TL), fork length (FL), standard length (SL) and weighted (±0.01 g). \( W = a L^b \) equation is used in the calculation of length-weight relations (\( L = \) Total Length). LLRs were calculated using linear regression model for TL, FL and SL. LWRs and LLRs were determined for two localities separately. Independent t test, regression equations, ANCOVA were used in the evaluation of data.

**Results:** The average TL and weights of the individuals sampled from Lakes Ladik and Simenlik determined as 42.776±0.936, 41.295±0.984 cm and 608.6±53.6 g, 594.9±43.8 g, respectively. LLRs reveal that all length values are very strong between each other (P˂0.001). According to the statistical analyses there is no differences in terms of TL and weight between localities (P>0.05). The statistical differences in regression slopes between localities were examined with the analysis of covariance (ANCOVA) (F=0.00, P>0.05). Overall, there is a strong correlation between TL and weight relationships both Lake Ladik and Lake Simenlik (\( r^2 >0.970 \)). LWRs were calculated as \( W = 0.005 TL^{3.079} \) and \( W = 0.005 TL^{3.088} \) for Lakes Ladik and Simenlik, respectively.

**Discussion:** Data on the lengths and weights of fish have commonly been analysed to yield biological information. Increase in length is sigmoidal and extremely variable, depending on habitat conditions. Growth is more strongly influenced by temperature than by time of spawning. This study has provided baseline data on LWRs and LLRs of *E. lucius* that would be useful for fishery biologists/managers to impose adequate regulations for sustainable fishery management in Lakes Ladik and Simenlik.

**Acknowledgement:** This study was supported by Ondokuz Mayis University PYO.FEN.1901.17.003.

**Keywords:** *Esox lucius*, Length-weight relationships, Length-length relationships, Fisheries, Samsun
Beauveria bassiana (Balsamo) Vuillemin Against Two Spotted Spider Mite [Tetranychus urticae Koch (Acarina:Tetranychidae)]

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Introduction: In the world and Turkey, Two Spotted Spider Mites (TSSM) [Tetranychus urticae Koch (Acari: Tetranychidae)] is a polyphagous species which is a major pest of ornamental plants and many plants, including weeds. It is most preferred chemical control with pest because cheap and easy although there are many natural enemies also, but the use of pesticides is affected negatively in the nature and harmful to human beings. Currently there are alternative or new methods to chemical pest control. One of these are entomopathogens. EPN which have no adverse effects to environment is used to control of pests. Until now, about 400-500 fungi have been reported to be pathogenic in insects. The objective of In this study is conducted determine effective of Beauveria bassiana (Balsamo) Vuillemin Samson against to TSSM.

Material and Methods: In this study was treated by spraying different suspensions (1x10⁶, 1x10⁷ and 1x10⁸ conidia ml⁻¹) of were prepared isolates at concentrations. The treatments were replicated four times.

Results: When the effect is examined, the first deaths on the 3rd day and the death rates of Bb. All tested fungal isolates were pathogenic to the T. urticae causing mortality between 11.66±1.6%, 13.33±2.1% and 16.66±2.1% respectively. And of the days of eleven, as a result in a high mortality 88.33±1.6. Death from day 3 to eleven (P <0.05) was found to be significant.

Discussion: This result shows that the entomopathogens can be used in biological control of T. urticae. However it is required that the entomopathogenic isolates with low mortality effects on natural enemies of the mite populations are selected to use in biological control applications. In addition, more studies are needed also.

Acknowledgement: In this study BAP Funder under the Project number of 2015/137 supported by GOP University (Tokat-Turkey).

Keywords: Entomopathogen, Beauveria bassiana, control, Tetranychidae, Tokat
Seed morphology of eight Alyssum L. (Brassicaceae) in Turkey

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Introduction: Brassicaceae is one of large angiosperm families. It contains 419 genera and almost 4130 species. In Türkiye, circa 113 Alyssum L. taxa which 56 of these are endemic distributed naturally (Yılmaz, 2012). Species is generally dispersed in the region of Iran-Turan, western North America and Mediterranean area. In this study, seed of 3 out of 8 taxa are endemic to Turkey.

Material and methods: At least 20 seed samples for each species were examined in stereomicroscope and micrographs were taken with Olympus SZ2-LGB digital imaging system. After the examination of each species, detected for seed shape, colour, and size. For SEM, seeds were directly mounted on stubs and covered with gold. The surface ornamentations of seeds were examined in detail with JeolTescan MAIA3 XMU model electron microscope in Bartın University Central Research Laboratory.

Result: In this investigation, morphological studies were broadly made with seeds of Alyssum murale Waldst. & Kit. subsp. murale var. alpinum Boiss. exNyár., Alyssum virgatum Nyár., Alyssum peltarioides Boiss. subsp. Virgatiforme (Nyár.) T.R.Dudley, Alyssum bulbotrichum Hausskn. &Bormm., Alyssum condensatum Boiss. &Hausskn. subsp. flexibile (Nyar) T.R.Dudley, Alyssum corsicum Duby, Alyssum caricum T.R.Dudley & Hub.-Mor., Alyssum lepidotum Boiss., Alyssum masmenaeum Boiss.distributed in Turkey. The used taxa in this study were collected from various phytogeographical regions of Turkey. In the morphological studies, figures, sizes and colour of the examined taxa were studied in detailed and given their specific features. Besides, micromorphological on the seeds surfaces of the examined taxa were illustrated with scanning electron microscope.

Discussion: By this study, similarities and differences between the species of Alyssum genus is revealed and contributed to taxonomic studies. This study is the first study where morphological features of seeds of six Alyssum species.

Keywords: Seed, Alyssum, Brassicaceae, Micromorphology, SEM.
Immunohistochemical Evaluation of Endocrine Cells in Alimentary Tract of the Roach
(Rutilus rutilus L., 1758), in Lake Uluabat

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Introduction: In the present study, the regional distribution and relative frequency of endocrine cells in the gastrointestinal tract was investigated by immunohistochemistry using glucagon and somatostatin raised against mammalian regulatory peptides. *Rutilus rutilus* is seen Europe, Black Sea and Azov Sea and Turkey in fresh waters. Roach species is more than other fish species in Lake Uluabat.

Material and Methods: Twenty-five adult Roach (*Rutilus rutilus* L., 1758) obtained from Uluabat Lake was used. Samples were taken from the stomach and anterior, middle and posterior intestine. All samples were fixed for 12 h in Bouin’s fluid. After dehydration by passing tissues through a series of alcohol solutions, the samples were vacuum-embedded in paraffin, and sagitally sectioned at 6-7 µm. One section of each specific tissue was mounted on an albuminized slide and dried overnight at 56°C. After dewaxing with xylol and subsequent rehydration by a series of alcohol solutions, sections were rinsed in 0.01M phosphate buffered saline (PBS, pH 7.2), and used for immunohistochemistry.

Results: In the stomach the presence of endocrine cells which were glucagon and somatostatin immunoreactive, were of a intensive frequency. Glucagon and somatostatin immunoreactive cells were also very strong staining in stomach. No glucagon and somatostatin immunoreactive cells were observed in the intestines. These cells were detected in the epithelial mucosa.

Discussion: Secretions of many endocrine cells coact in digestion process in fishes. The secretions, located in the gastrointestinal (GI) tract, are the chemicals regulating tracts structure and functions. These chemicals in GI tract, accepted as the largest endocrine organ, are mainly secreted by the endocrine cells. Classically, a chemical secreted by a particular affecting organs through blood is called a hormon. Recently these chemicals have been explained to be short chains of peptides, and aminoacide compositions have also been determined. Both peptides used in this study were intensely observed in the stomach area. But these cells were not determined in intestines.

Keywords: Alimentary Tract, Glucagon, Roach, Somatostatin
Is the Northern Banded Newt, *Ommatotriton ophryticus* (Berthold, 1846) active all year?

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**Introduction:** The Northern Banded Newt, *Ommatotriton ophryticus* (Berthold, 1846) is a hibernating newt. In the Caucasus, the individuals of the species come into hibernation in September - October. Hibernation ends in February - March at low elevations, and in April-May in the highlands. Although there are some reports in the literature showing its unusual winter activity in Russia, there is no report related to extraordinary activities of the species in Turkey. In the present study, the winter activity of *O. ophryticus* in the months December, January, February and March were recorded in Trabzon Province of Turkey.

**Material and Methods:** In total, 57 specimens (6 males and 1 female; 3 males and 9 females; 6 males and 8 females; 4 males and 2 females; 14 males and 4 females) of *O. ophryticus* were found during an excursion in Karadeniz Technical University Campus, Trabzon Province on 29th December 2017, 12th January 2018, 14th February 2018, 2nd March and 19th March 2018, respectively. The observation site was located at the 146 m a.s.l. The newts were observed in a canal which was covered with brownish faded leaves. The air temperatures in the locality were 13°C, 16°C, 11°C, 9°C and 16°C in the observation time, respectively.

**Results:** The newts were observed in December, January, February, and March months. We observed that the numbers of the male specimens are higher than female specimens. Moreover, some female specimens were gravid. The results of the present study bring to mind that this species is active during the winter months.

**Discussion:** In the current literature, there are some records showing that several specimens of *O. ophryticus* from Russia found active in the winter season. It was reported that if the temperature is moderate, individuals of the species may be active in the lowland areas. The Turkish specimens of *O. ophryticus* were firstly observed active in the winter season in the present study. We evaluated that individuals of *O. ophryticus* could be active throughout the year. The unexpected winter activity may be a result of global warming of the world in the Northern Hemisphere.

**Keywords:** hibernation, global warming, winter activity, Trabzon
Environmental and Biodiversity Management in Good Aquaculture Practices Certification: Benefits and Faced Challenges in Turkey

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Introduction: Aquaculture, farming of fish and aquatic organisms, is most rapidly growing food production sector worldwide. Aquaculture increased gradually and reached of 76,65 mt comprising 45% of fisheries production in 2015. Turkey has significant aquaculture potential owing to water sources, species that can be grown, suitable ecological conditions. In 2016 fisheries production of Turkey was estimated as 588.715 t and 253.395 t (43%) came from aquaculture. Aquaculture uses natural sources, energy, biotechnology, and outputs harvest and socio-economic values. It needs suitable ecosystems services, but causes environmental problems during construction and production. The commons are water pollution, habitat and biodiversity decrease in ecosystems, disease spreading, land use and water allocation conflicts among sectors, insufficient food safety, animal welfare, health and labor conditions. Problems by production intensification and harvest increase, emerge frequently. Therefore global scale regulations of aquaculture are needed. Certification of farms with Good Aquaculture Practices GAP is a new approach and framework to solve those problems, and make aquaculture sustainable. Certification covers every aspects of aquaculture, such as site production and health management. In this study, it is aimed to explore ecological basis of GAP’s control points and compliance criteria where in “Environmental and Biodiversity Management” sub module. Applications, benefits and faced challenges in Turkey will be evaluated and discussed.

Material and Methods: Global GAP Aqua V.5.1 legislation and related publications and national applications were reviewed. Personal observations were made on fish farms having Global GAP and their relations with protected areas. The challenges of farms in application and renewal of the certificate interviewed, comparisons were made with other countries.

Results: Presently, including Turkey, 35 countries have adopted Global GAP Aquaculture Certification covering 30 fish, crustaceans and mollusks species. The majority of Turkish farms are big and medium sized, and have certificate on rainbow trout, seabass and sea bream hatcheries or raising farms. In addition of All Farm AF, GAP Aqua module AQ is needed. The basic ecological aspect of GAP Aqua is “Environmental and Biodiversity Management AQ 9”. Due to their effects to environment and biodiversity, some other sub modules (site management, used chemicals, sampling, testing) are considered also. They have opportunities on supplying inputs; governmental subsidies, selling fingerlings, exporting harvest, consumer interest and satisfaction. During the certification process and after awarded it farms gain awareness on environmental management and biodiversity, became more careful on the issue, and want the renewal of certificate. They face some challenges in GAP certificating processes and its renewal, because of certification costs, accredited laboratory needs especially for biologic examinations, bureaucratic procedures, legislative and managerial difficulties, authority overlaps on water resources management.

Discussion: Global GAP certification of aquaculture a progressive and beneficial way to conserve nature. Its spreading with new adaptations and harmonizing with national legislation will be beneficial and effective. But having Global GAP certificate and renewal it, is difficult and costly. Global GAP aqua applications may be more cost effective, easy to do and inspect for establishment a sustainable aquaculture management, and useful tool for mitigating of environmental problems and saving biodiversity of Turkey.

Acknowledgement: I would like to thank to Fish Farms that make possible to visit, interview, observe and evaluate their Global GAP applications.

Keywords: Global GAP, Aquaculture, Control points, compliance criteria, Environment, Biodiversity
**Limoniidae (Diptera) Species Determined in Ihlara Valley with a New Record from West Palaearctic**

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**Introduction:** Adult Limoniids are long-winged and stilt-legged, thin and delicate bodied crane flies of small to moderate size (usually between 2 mm and 11 mm). This family includes 10,969 recognized taxa all over the world; 753 species and subspecies are known Westpalaearctic and 148 species and subspecies are from Turkey. Ihlara valley topography originated from the lava of Hasan Dağı. This valley was eroded, and later formed by Melendiz stream. The Ihlara valley is located in the north-east of Hasan Mountain. It has a 100-150 m depth and canyon form. It is starting from Ihlara town and reaching out to Northwest along the 14 km.

**Material and Methods:** In Ihlara valley, 67 sampling stations have been determined including shady parts of streams and lakes, forests and underbrushes, woody and grassland parts of streams, permanent water fountains where crane flies could be found. Field studies are performed between April 2015 and October 2016 at the sampling stations. Adults were collected by sweep net (40 cm Ø), killed by ethyl-acetate and brought to zoology laboratory and preserved either in 70% alcohol solution or by pinning and drying.

**Results:** From the research area, 4165 adult specimens, including 3161 males, were collected and 43 taxa were determined.

**Discussion:** Among these taxa, *Dicranomyia (Idiopyga) oosterbroekii* was recorded from the Eastpalaearctic region for the first time by Devyatkov (2013). Moreover, 43 limoniid species and subspecies are recorded from the research area for the first time. Consequently, the number of limoniid species known from Turkey has increased to 148.

**Acknowledgement:** The authors would like to thank to TÜBİTAK (Project No: 114Z501) for financial support.

**Keywords:** Diptera, Limoniidae, Turkey, Ihlara Valley, new record.
Determination of Antioxidant Capacity of Thyme Extracts

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Introduction: Antioxidants have been shown to have therapeutic, preventive and therapeutic roles against diseases such as autoimmune, neurological, old age and other diseases that are trying to destroy the body defence system. For such reasons, the study of the antioxidant capacity of many molecules naturally found has become important. Studies on the determination of antioxidant properties of plants, which are a natural antioxidant source, have gained a great impetus recently. In this study, it was aimed to detect the antioxidant activity of one of the most studied aromatic plants, Thymus praecox, in different solvents.

Material and Methods: We have performed antioxidant activity using Thymus praecox collected from Kastamonu region. Thyme was extracted with the soxhlet method using different solvents including pure water, ethanol, methanol, methanol-water and ethyl acetate. Antioxidant activities of the extracts were determined using the FRAP assay, DPPH free radical scavenging activity, metal-chelate activity, and \( \text{H}_2\text{O}_2 \) scavenging activity. Total phenolic and flavonoid contents of extracts were also calculated according to Folin-Ciocalteu and aluminium chloride colorimetric method, respectively.

Results: The antioxidant activity of thyme extracts was changed based on usage of different solvents. Differences in the content of phenolic substances obtained from different solvents influenced antioxidant properties of thyme extracts. In addition, antioxidant activity was also varied based on methods used.

Discussion: Antioxidant properties of thyme plant extracts have been shown in various studies. Through this study, our knowledge about antioxidant properties, phenolic and flavonoid contents of thyme plant in different extracts was expanded.

Acknowledgement: We would like to express our appreciation to the Kastamonu University Scientific Research Project Commission, which supported this study (KÜ-BAP03/2017-14).

Keywords: Thymus praecox, FRAP, DPPH, \( \text{H}_2\text{O}_2 \), Phenolic, Flavonoid.
Study on Determination Diversity of Species in Order Rodentia (Mammalia) and Carnivora (Mammalia) in Delta of Yeşilırmak (Samsun)

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Introduction: This study aimed to identify species diversity of Rodentia and Carnivora orders in Delta of Yeşilırmak. The working area is ‘Delta of Yeşilırmak’ wetland area located within the boundaries of Tekkeköy, Terme and Çarşamba districts of Samsun province. Determination of the Rodent and Carnivore orders diversity will enable the region to determine ecological importance.

Material and Methods: For this study, field and observational study was conducted in 2013-2016, in different habitats in the area of Delta of Yeşilırmak. During the fieldwork, for three years, optical devices (cameras, telescopes) and global positioning system (GPS) devices has been used. Live capture traps for capture rodents has been used. Individuals captured were released back to nature after species identification. Moreover, determination of species has been used for animal tracks (footprint, feces etc.).

Results: This research resulted in the terrestrial and aquatic biotope at regions around Delta of Yeşilırmak, 16 rodent species and 8 carnivore species were identified. This mammal species belong to the following family; Sciuridae (1 species), Gliridae (1 species), Cricetidae (5 species), Muridae (9 species), Canidae (3 species) and Mustelidae (5 species). These species evaluated by IUCN category are determined endangered species. In this context, one carnivore species Vormela peregusna- European Marbled Polecat, is under threat (vulnerable-VU category) in Delta of Yeşilırmak. Other mammal species in the LC (low risk, widely distributed) category.

Discussion: Delta of Yeşilırmak is especially home to a large number of domestic and migratory birds, particularly water birds. For this reason, Delta of Yeşilırmak is an interesting area for many other researchers and birdwatchers as well as for other tourists. It is important to know the faunal richness of this precious area is to emphasize the ecological importance of the region. Raise awareness of local people and visitors about rodent and carnivore species, protect the area, and prevent hunting activities.

Keywords: Rodentia, Carnivora, Delta of Yeşilırmak, Samsun
The Unusual Winter Activity of Some Amphibian and Reptile Species from Gümüşhane Province of Turkey

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Introduction: The current literature has shown that some species of reptilian and amphibian may have been active before the known periods, especially in the lowland areas. In the present study, the activity pattern of Lacerta media, Bufo bufo and Rana macrocnemis living highland area in Gümüşhane Province of Turkey were reported.

Material and Methods: The specimens were observed during day excursions. The air temperatures, coordinates, and altitude of the locality were recorded. The sexes of the individuals were diagnosed based on their sexual characters. All specimens were photographed. No specimens were caught to avoid the disturbing them.

Results: A male specimen of Lacerta media, a female Bufo bufo and a female individual of Rana macrocnemis were found during the day excursions in Zigana Village, Torul, Gümüşhane Province on 6th, 17th and 28th March 2018, respectively. The observation site was located at the 1400 m a.s.l. The air temperature in the locality was 15°C in the observation times when we found the specimens of L. media and B. bufo while it was 23°C when we observed the specimen of R. macrocnemis.

Discussion: Usually hibernation of B. bufo is finished in April-May while it was reported that R. macrocnemis finishes hibernation in February-May depends on altitude. Because we observed several active adult specimens of B. bufo, R. macrocnemis, and L. media, on March, it brings to mind that the individuals of these species are early awakening from hibernation. Although the known fact that the duration of hibernation is generally longer in the highland areas, we found that the specimens of these species may have a short hibernation period in a highland area (Torul, Gümüşhane). Effects of global warming on amphibians and reptiles are clearly seen, and they can be active during winter as long as temperatures allow.

Keywords: Zigana Village, highland, global warming, hibernation
Effects of Tree Species on Some Soil Properties and Litter Accumulation in Adjacent
Oak and Black Pine Forest in Western Black Sea Region of Turkey

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Introduction: There are many studies showing that stand type and plant composition can change both physical and chemical soil properties in same local climatic conditions. For example most of the studies show that rhododendron causes acidic conditions in soil when compared to adjacent environment without Rhododendron.

Material and Methods: The aim of this study is to determine effects of tree species and plant composition on soil chemical and physical properties in adjacent oak and black pine stands in Duzce located in Western Black Sea Region of Turkey. In this area vegetation period is approximately 6 months and mean annual precipitation is about 800 mm in this temperate forest ecosystem. Soil samples collected from the topsoil (0-10 and 10-20 cm depth) from 20 sampling area on each stand type, litter samples were collected from same sampling area from soil surface and they were used to determine the soil bulk density, texture, electrical conductivity (EC), soil organic matter (SOM), soil reaction (pH) and litter accumulation.

Results: According the results of this study although black pine is an ever-green species it has been calculated that the most litter accumulation was occurred in black pine stands where 176.7 g m⁻² litter was on forest floor and it was about 30% more than oak stand. Soil texture was clay loam for both stand types. Soil reaction was both acidic in oak and pine stands, but when 0-10 cm and 10-20 cm soil depths compared for two stand types, pH was 1.23 and 1.22 times less on oak stands than black pine stands, respectively. There were no salinity problems for both stands types where EC were 126, 86, 76 and 53 µS in 0-10 cm and 10-20 cm soil depths for pine and oak stands, respectively. Soil was more compacted on pine stands where 0-10 and 10-20 cm depth soil bulk density were 1.13 and 1.17 times more on pine stands than those on oak stands. Controversially SOM was less on black pine stands than those on oak stands. SOM contends were 1.2 and 1.2 less for 0-10 cm and 10-20 cm soil depths on black pine stands than oak stands.

Discussion: It has been shown that although the same climatic conditions occur on adjacent environments plant species can vary soil properties. From the results of this study both soil physical and chemical properties have varied between adjacent oak and black pine forests.

Keywords: Black pine, oak, litter, soil, organic matter.
Mutagenic and Antimutagenic Evaluation of *Ferula elaeochytris* Stem Methanol Extract

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**Introduction:** The genus *Ferula*, belonging to the family Apiaceae, comprises about 170 species. These are produced from central Asia westward to northern Africa. The plants of this genus are well documented as a good source of biologically active compounds such as derivatives, and sulfur containing compounds. Several species of this genus have been used in traditional medicine for the treatment of various organ disorders. The objective of this study was to evaluate mutagenic and antimutagenic properties of *Ferula elaeochytris* stem methanol extract by Ames test.

**Material and Methods:** Standard plaque incorporation method was carried out in assays. *Salmonella typhimurium* TA 98 and TA 100 strains were used in the experiments under conditions both in the presence and in the absence of metabolic activation enzymes (S9). Toxic doses of the extract were tested and nontoxic doses of the plant extracts were used in the assays (10,000, 5000, 2500, 1000, 100 µg/plate)

**Results:** *Ferula elaeochytris* stem extracts were found to have no mutagenic effect on the presence and absence of S9 on TA 98 strain. The number of revertant colonies were within normal limits and did not suggest any mutagenic activity dependent to dose. Similarly, stem extracts did not show a mutagenic effect on the presence and absence of S9 enzymes on TA 100 strain. *F. elaeochytris* stem extracts were found to be weakly antimutagenic at all test doses in presence and absence of S9 on TA 98 strain. While S9 enzymes increased the antimutagenicity ratios of 22-23%, these inhibitions did not exceed the moderate antimutagenic activity limit. After addition of metabolic activation enzymes stem extract manifested moderate antimutagenic activity, with a rate of 31% at the dose of 5000 µg/plate, 29% at the dose of 2500 µg/plate and 26% at the dose of 1000 µg/plate, despite the weak antimutagenic effect was observed on TA 100 strains in the absence of S9.

**Discussion:** *Ferula elaeochytris* stem methanol extract have a moderate antimutagenicity against well-known mutagens in Ames test.

**Acknowledgement:** We would like to express our appreciation to the Selcuk University Scientific Research Projects Coordination Unit, which supported this study (BAP-11401077).

**Keywords:** Ames test, Antimutagenicity, *Ferula elaeochytris*, *Salmonella typhimurium*
**Introduction:** Plants or plant products have been used for medicinal purposes since ancient times. In the 20th century, several adverse effects of synthetic drugs have been discovered and natural products have begun to gain popularity worldwide for designing new and safe drugs or food additives. The genus *Heracleum* L. contains more than 120 species and is one of the largest genera of the family Apiaceae (tribe Tordylieae). Most of the *Heracleum* species are used as medicinal plants and as herbs or spices in cooking in many areas of the world. Especially *H. persicum*, *Heracleum sphondylium*, and *Heracleum candicans* have a broad spectrum in terms of traditional uses. They are widely used for the treatment of flatulence, stomachache, and epilepsy, and as pain killer, carminative, antiseptic, digestive, analgesic, and anticonvulsant agents. In this study antimicrobial effects of *Heracleum sphondylium* L. subsp. *ternatum* extracts against pathogen microorganisms were determined.

**Material and Methods:** Broth microdilution method was employed according to CLSI criteria on 15 bacteria and two yeast. 25 mg/ml concentration of extracts were prepared and applied.

**Results:** According to the results obtained from test, water extracts of *Heracleum* have no antimicrobial activity against bacteria and yeasts. Ethyl acetate extracts manifested weak to moderate antimicrobial activity at concentrations of 0.39 to 1.56 mg/ml. *Streptococcus mutans* was affected from EA extract at a dose of 0.39 mg/ml. MIC value was determined as 0.78 mg/ml against *Enterococcus faecalis*. Except for two bacteria all strains were affected from this extract at a concentration of 1.56 mg/ml. When the methanol extract was evaluated it revealed moderate antifungal activity against two *Candida* species at a concentration of 0.39 mg/ml. MIC values were determined as 0.78 mg/ml against *P. aeruginosa*, *S. lutea* and *S. mutans*. Remaining bacteria were affected from methanol extract at a dose of 1.56 mg/ml.

**Discussion:** As a result *Heracleum sphondylium* subsp. *ternatum* ethyl acetate and methanol extracts have weak to moderate antimicrobial activities. Especially methanol extract showed moderate antifungal activity against *Candida albicans* and *Candida parasilopsis*.

**Acknowledgement:** We would like to express our appreciation to the Selcuk University Scientific Research Projects Coordination Unit, which supported this study (BAP-17401161).

**Keywords:** Antimicrobial activity, Broth microdilution, *Heracleum sphondylium* subsp. *ternatum*, Turkey
Introduction: The collecting of geophytes unconsciously and in large quantities from natural habitat bring with them the danger of extinction, especially in some species. Sustainable trade with Turkey, the economic value of bulbous plants seem to be able to produce their culturally. For this reason, it is very important to have an idea about the soil requirements of the cultivated species. This study was conducted in order to determine some of the physical and chemical properties of the soils on which 17 species of the spring-flowering Colchicum genus that are naturally grown in flora of Turkey.

Material and Methods: 109 soil samples were taken from 36 provinces in Turkey between 2007-2014 in order to determine the soil requirements of places where plants naturally grown. For this objective pH, salinity, CaCO₃, organic matter, available phosphorus and potassium of soil samples were detected.

Results: According to the results of the study; all of the taken soil samples were considered within non saline or slightly saline soil class. The soil pH was found to be between 5.06 to 8.77. Highly calcareous soils were also discovered although the amount of CaCO₃ were generally medium or low in soil samples. More than half of the soils were found very high levels of organic matters while the rest had different contents of organic matters. The available phosphorus values of the soils were found on average 14 mg kg⁻¹ and the potassium 316 mg kg⁻¹.

Discussion: As a result, it has been found that colchicum generally preferred soil with low salt content, neutral and slightly alkaline character and high organic matter content. They were also found to be resistant to high lime content.

Acknowledgement: We would like to express our appreciation to The Scientific and Technological Research Council of Turkey, which supported this study (TÜBİTAK 105G068 and 110G007).

Keywords: Colchicum, Spring-Flowering, Flora of Turkey, Soil
**Introduction:** Eggplant, a member of Solanaceae family, is grown both in greenhouses and open fields in Turkey. Gray mold and white mold diseases cause economical yield losses in eggplant cultivation. The fungi can survive a long time in soil and plant debris as sclerot, even after rotation to nonsusceptible crops. Today, researchers have established that a diverse community of microorganisms acts as natural antagonists to plant pathogens. *Trichoderma*-based commercial biofungicides which are of great importance as sources of antibiotics, enzymes, and plant growth promoters have been developed. *Trichoderma* strains inhibit the infections caused by plant pathogens using different biocontrol mechanisms like competition, antibiosis, and mycoparasitism. In this study, *in vitro* efficiency of *Trichoderma harzianum* has been determined against eggplant pathogens, gray mold (*Botrytis cinerea* Pers.) and white mold (*Sclerotinia sclerotiorum* (Lib.) De Bary) under greenhouse conditions.

**Material and Methods:** Effects of two strain of *T. harzianum* (T16 and T23) on *B. cinerea* and *S. sclerotiorum* were tested in Petri plates with dual dulture tests, in PDA medium. *B. cinerea*, *S. sclerotiorum* and *T. harzianum* strains were developed in Petri plates and *T. harzianum* plates were reversely closed onto pathogen plates to evaluate effects of volatile metabolites. Culture filtrates of *T. harzianum* isolates (1:10 (v/v)) in PDA medium were used to evaluate mycelial development of the pathogens. Effects of *T. harzianum* isolates on conidia germination of pathogens were evaluated by incubation of pathogen suspension on the glass slide containing culture filtrates. Mycelial dry weight of pathogens were measured to reveal effects of *T. harzianum* on the dry weight. Hyphal interactions were also evaluated on microscope slides.

**Results and Discussion:** Strain T16 of *T. harzianum* performed better then T23 in dual culture tests with an average inhibition rate of 30% for both pathogens. Non-volatile compounds of T16 and T23 suppressed colony development of *B. cinerea* and *S. sclerotiorum* significantly, compared to volatile compounds. Non-volatile antibiotics produced by T16 isolate inhibited mycelial development of *B. cinerea* and *S. sclerotiorum* at 44.17 and 81.94% rates, which were more successful then T23 isolate. Both of *T. harzianum* strains were inhibited conidia germination of *B. cinerea* at a rate of 60%. There were no hyperparasitic reactions like osmosis, hyphal fragmentation, leakage of cell contents, degeneration in cell organelles and lysis of hyphae, therefore its concluded that primary biocontrol mechanism most probably relies on antibiosis. Mycelial dry weight increase on pathogen microorganisms could be explained with no lytic activity on pathogen mycelia by antagonist strains. Studies indicate that various *Trichoderma* strains are effective biocontrol agents for phytopathogenic fungi. Hyperparasitic *Trichoderma* strains grow necrotrophically toward fungi and lyse cell walls with strong extracellular enzymes.

Successful application of antagonist *Trichoderma* species for biological control purposes requires to consider environmental conditions affecting the biological control agent within soil. Biotic and abiotic environmental conditions may greatly alter efficiency of antagonist organisms, therefore its critical to support *in vitro* findings with greenhouse and/or field experiments.

**Keywords:** *Trichoderma harzianum*, gray mold, white mold, eggplant, dual culture
Asteroma padi DC.; A New Record of Microfungi for Turkey

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Introduction: Asteroma DC. is common pathogens associated with about 14 species on different plants around the world. Immersed mycelium branched, septate, pale brown to hyaline. Conidiomata acervular subcuticular separate or confluent, pale brown to hyaline. Conidiophores absent. Conidia hyaline thin walled, eguttulate, smooth, straight or curved, cylindrical to fusiform. Before, Asteroma alneum (Pers.) B. Sutton on Alnus glutinosa (L.) Gaertn. and Asteroma inconspicuum (Cavara) B. Sutton on Ulmus minor Mill. were recorded from Turkey. The aim of this work was to add the fungal record microfungi for Turkey mycobita.

Material and Methods: Fungi samples were collected from were collected from were collected in 2013 and 2016 from Aladağlar and Bolkar mountains in Turkey. The host specimens were prepared according to established herbarium techniques. Host plants identified use the “Flora of Turkey and the East Aegean Islands”. For identification of the fungus both visual symptoms of infected plants and anatomical-morphological characteristics were used. For observations a Euromex light microscope was employed. ImageFocus 4.0 software used to measure. Identification was performed with the aid of literature. The current names of fungi are given according to www.indexfungorum.org. Names of host plants and families are given according to http://www.theplanlist.org. The collected material was deposited in the İnönü University Herbarium (INU).

Results: Asteroma padi DC., Fl. franç., Edn 3 (Paris) 5/6: 162 (1815). Conidiogeneus cells lageniform to cylindrical, up to 16 x 2.5-3.5 μm, wide. Conidia straight or slightly curved, fusiform, 11-15 x 2-4 μm, one celled, hyaline. Specimen examined: On Prunus domestica L. (Rosaceae) Kayseri: Yahyalı, Kapuzbaşı waterfall, 650-700 m, 18.09.2014, Ş. Kabaktepe 7794. Distribution: Czech Republic, Germany, Poland, Russia.

Discussion: As a results of this study, a microfungi taxa, Asteroma padi on Prunus domestica is reported for the first time from Kayseri for Turkey. So the number of Asteroma will increase to 3.

Acknowledgement: This study was supported by TUBITAK (Project no: 113Z093).

Keywords: Asteroma, New record, Kayseri, Turkey.
Introduction: *Laurus nobilis* L. is the member of the family Lauraceae which comprises 32 genera and about 2,000-2,500 species. The plant named as “Daphne” was defined as *Laurus nobilis* by Goodyer in 1655. The leaves of *L. nobilis* are short and thick. The fresh leaves of *L. nobilis* are in red tinged yellow color which turns into light green with light green veins. They also have little aromatic odor. The fresh shoots are green, while the following is red, black and hairless. Their maximum length is known as 2 cm. *L. nobilis*, commonly known as bay, sweet bay and laurel, is an evergreen tree native to the Mediterranean region especially in Turkey, Greece, Spain, Italy and France. Turkey is one of the main producers and suppliers of bay leaves.

Material and Methods: *Laurus nobilis* specimens were collected during the flowering stage in July from Black Sea region in Turkey. Air-dried aerial parts of the plant materials (100 g) were subjected to hydro distillation using a Clevenger-type apparatus for 3 h to yield. The essential oil was analyzed by using Gas Chromatography (GC) and Gas Chromatography-Mass Spectrometry (GC-MS).

Results: The major volatile components of the *Laurus nobilis* were 1,8-cineole (eucalyptol) (48.4%), β-pinene (14.4%), α-Terpiny1 acetate (8.1%), α-Pinene (5.9%). The results were discussed with the genus patterns in view of natural products and chemotaxonomy.

Discussion: *L. nobilis* is a plant of industrial importance, used in foods, drugs, and cosmetics. The dried leaves and essential oils are used extensively in the food industry for seasoning of meat products, soups and fishes. There are a variety of studies on chemical compositions of the essential oils obtained from the leaves of *L. nobilis* from different locations of the world. In different studies, the essential oils constituents of *L. nobilis* leaves from Turkey, eucalyptol (59.94, 44.72, 35.63%), α-terpinyl acetate (16.33, 12.95, 20.26%), sabinene (8.70, 12.82, 6.10%), α-pinene (2.61, 3.44, 8.02%) were reported to be the major compounds, respectively. In this study, *L. nobilis* leaves essential oils have similar chemical compositions with much lower concentration of the first major compound, eucalyptol (48.4%), followed by low or high concentrations of the other constituents.

Acknowledgement: This work was supported by Sinop University Scientific Research Coordination Unit. Project Number: 1901. 14-05, 2015.

Keywords: *Laurus nobilis*, Gas Chromatography-Mass Spectrometry (GC-MS), Essential oil, 1,8-cineole
Phylogenetic Relationships Between the Genera *Opopanax* and *Crenosciadium* Based on nrDNA ITS Sequences

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**Introduction:** The flowering plant family Apiaceae Lind. comprises approximately 450 genera and 3700 species. Apiaceae comprises 105 genera and approximately 493 species in Turkey and includes the following three monotypic endemic genera; *Aegokeras* Raf., *Crenosciadium*, and *Postiella* Kluykiv. The genus *Opopanax* is represented by three species, which is distributed in southern Europe, Mediterranean region and western Asia. The aim of this study was to determine the genetic relationships between *Opopanax* and *Crenosciadium* distributed in Turkey and to resolve their unclear and controversial status by using a DNA-based molecular marker system.

**Material and Methods:** Samples of the genus *Opopanax* and *Crenosciadium* were collected from different parts of Turkey. Total genomic DNA was extracted from fresh or silica-dried plant material using DNA isolation kit and ITS region of studied taxa were amplified using ITS4 and ITS5a primers. The amplified fragments were sequenced using the same primers used for amplification. ITS sequences of the studied taxa were aligned via Bioedit and were used to construct phylogenetic trees by using PAUP.

**Results and Discussion:** The phylogenetic relationships of *Opopanax* and outgroups investigated by Maximum Parsimony analyses of nrDNA ITS sequences. Our result presented in this study clearly show that the genus *Opopanax* is different from *Crenosciadium*. Finally, *Crenosciadium* should be accepted as a distinct genus rather than a synonym of *Opopanax siifuolium*; thus *Opopanax* has represented by three species in the world.

**Acknowledgement:** We would like to express our appreciation to the Selçuk University Scientific Research Project Commission, which supported this study (BAP-17401082).

**Keywords:** *Opopanax*, *Crenosciadium*, ITS, molecular phylogeny
Introduction: The typical zooplankton communities of aquatic ecosystems usually include protozoa, Rotifera and planktonic microcrustacea (Copepoda, Cladocera). Cladocera are tiny aquatic crustaceans and are known as water fleas. They are mostly filter-feeders, gathering phytoplankton or detritus from the water column. They are highly sensitive to pollutants and therefore serve as good biological indicators of water pollution. In the same way, Copepoda is known to be the most abundant zooplankton in freshwater ecosystems. Few Copepoda species adopted a predatory lifestyle by being carnivorous even in their immature stages (copepodites). Therefore, studies on planktonic microcrustacea (Cladocera and Copepoda) in aquatic ecosystems are very important. This study was conducted to identify the microcrustacea (Copepoda, Cladocera) fauna of Kadıköy reservoir located in Keşan District of Edirne province, Turkey and to reveal the species composition and richness.

Material and Methods: Samplings were carried out at monthly intervals from March 2010 to February 2011 in three different stations in the Kadıköy reservoir. Zooplankton samples were collected with a Hensen type plankton net. Samples were brought to the laboratory in 250 mL plastic bottles containing 4% formaldehyde. Some physicochemical parameters, such as water temperature, light permeability, conductivity, pH, dissolved oxygen were measured on site simultaneously with the sampling time. Water samples were taken to determine other physicochemical parameters and the values were measured in laboratories of Trakya University Technology Research Development Application and Research Center.

Results and Discussion: As a result of the qualitative evaluation of the samples, 19 Cladocera and 8 Copepoda species were found in Kadıköy reservoir during the study period. The most common species in Kadıköy reservoir were *Diaphanosoma brachyurum*, *Bosmina longirostris*, *Daphnia pulex*, *Daphnia longispina*, *Ceriodaphnia quadrangularis* and *Chydorus sphaericus* from Cladocera found in all sampling months. In addition, from Copepoda *Cyclops vicinus* and *Acanthocyclops robustus* were found to be the most extensive species for eight months with no species found all the months. The quantitative evaluation of the samples revealed an average value of 51463 ind/m³ in the reservoir. The annual average values according to the groups were 33766 ind/m³ for Cladocera and 17697 ind/m³ for Copepoda. While the maximum organism was found in spring (58697 ind/m³) at 1st station (55681 ind/m³). The lowest value found in winter (42784 ind/m³), 3rd station (49266 ind/m³) and in February (45328 ind/m³). The minimum and maximum values of the physical-chemical parameters measured in the Kadıköy Reservoir were as follows: water temperature 2,00-29,00 (°C); DO 3,40-15,73 (mg/l); pH 7,53-8,63; conductivity 388,00 -613,67 (µS/cm); NO₂-N 0,00-0,09 (mg/l); NO₃-N 0,00-9,89 (mg/l); PO₄-P 0,000- 0,068 (mg/l); SO₄ 0,43-1,60 (mg/l); Salinity 0,070- 0,100 (%); Chloride 18,99- 33,32 (mg/l); Total Hardness 11,00- 30,00 (FS); Ca 24,53- 61,70 (mg/l); Mg 9,93- 44,83 (mg/l).

Keywords: Cladocera, Copepoda, species diversity, water quality, reservoir.
The importance of Marine Protected Areas (MPAs) in the continuation of biologic diversity in the southern Black Sea

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Introduction: The Black Sea is a semi-closed sea with substantial native worth spite of its biodiversity is under big threatening due to a type of human activities e.g. environmental pollution, over-fishing, marine traffic & transport, marine litter & microplastics, bad usage of natural resources, invasive exotic species, climate change, touristic activities. The Black Sea states, via the Bucharest Convention, are making some progress into becoming better the bad environmental situation. Marine Protected Areas (MPAs) are areas in which anthropogenic activities have been set under some limitations in the attention of conserving the natural environment, its surrounding coastal waters and the inhabitant ecosystems, and any cultural or historical resources that may need protection or management. Our aim is to show propose some of the potentially marine protected areas in the Turkish coasts of the Black Sea. Additionally, to give scientific background information to the decision maker and stake holder for the save of the Black Sea marine biodiversity.

Material and Methods: In this review we will present to MPAs proposals in the Turkish Black Sea coasts in the light of available literatures.

Results: MPAs will bring insurance to fisheries and marine ecosystems can play an important role economically in the Black Sea whether its fishing, restoration or tourism. A large number of countries have set national goals, joined by action plans and applications. However, one important tool, the designation of MPAs, which is progressively being appealed for Western Europe and called for in the Marine Strategy Framework Directive (MSFD), is being yet insufficiently applied in the Black Sea region. European Union (EU) policy for marine biodiversity, including MPAs, is rising in the context of commitments at global, EU and regional levels. The strengthening of the eutrophication and pollution in the coastal areas of the Black Sea leads to development of the negative effects in the ecosystems, i.e. biodiversity degradation, decrease of productivity and self-purification capacity. MPAs are usually accepted as a prime means for protection of the marine environmental coasts and biodiversity. Now, more than 60 MPAs and sites are set up along the coastline of the Black Sea by riparian states, and additional 40 areas were proposed for further development. Till now, there is no any MPA from Turkish Black Sea.

Discussion: No MPAs designated in the Turkish Black Sea coasts and insufficient coverage of coastal protected areas. Turkey is behind the other Black Sea countries regarding the establishment of MPAs at the Black Sea, lack of proper scientific knowledge on habitats and species along the Turkish Black Sea coast. Lack of expertise by authorities on MPAs implementation. No enough access of environmentalists to key decision makers. This review will give information on the identification and suggestion of MPAs in the Turkish Black Sea under the light of the literature.

Keywords: Marine Protected Area (MPA), Black Sea, Marine Strategy Framework Directive (MSFD)
Introduction: The Black Sea is the most isolated sea in the world. It is linked to the Atlantic Ocean via the Mediterranean Sea through the Bosphorus and Dardanelle. Owing to a great catchment area compared to surface area the Black Sea is very susceptible to pollution stress from land based anthropogenic activity and its health is evenly dependent from the coastal and non-coastal countries of its basin. The aim of this review is to give current status of the Red Data List of the Turkish Black Sea coasts.

Material and Methods: This review will present checklist on the available literatures from the Turkish Black Sea coasts, as well as their current conservation status, enlisted in the International Union for Conservation of Nature (IUCN).

Results: There was no Red List publications available till 1999. However, the first regional the Black Sea data book including Turkish coast of the Black Sea was published in 1999, then Red Data Book Black Sea Turkey was published by Turkish Marine Research Foundation (TUDAV) in 2013. Finally, European Red List of Habitats including the Black Sea was published by European Union (EU) in 2016. Here, the highest proportion of threatened habitats in the Black Sea is reported as 13%. This review will give brief Red Data List of species in the Turkish Black Sea.

Discussion: Eutrophication, land based sources of pollution, the introduction of alien species, inadequate resources management and overfishing resulted in a whole decline of biological resources, the variety of species and of the recreational worth of the Black Sea. For that reason the Black Sea is presently the great natural anoxic water basin in the world. This means that 87 % of its capacity is almost with no marine life, apart from some forms of bacteria and meiothentos. However, it is even so comparatively rich in living resources.

Keywords: Red Data List, Black Sea, European Union (EU), International Union for Conservation of Nature (IUCN)
**Introduction:** Diatoms are a major group of phytobenthos and can be sampled at times of the year from almost all aquatic habitats. Diatoms are an extremely diverse group of algae with 100,000 species. Diatoms are distributed in a variety of environments from freshwater to marine water over the world, where environmental conditions in terms of some of the major factors (e.g., light, temperature, and chemical components) are suitable. The use of diatom assemblages as reliable indicators of changes in environmental conditions is deciphering integrated environmental information with species richness due to their presence or absence in ecosystems and linkage in biogeochemical cycles. The aim of the present study was to determine the diatom composition of different aquatic ecosystems in Şahinbey of Gaziantep (Turkey).

**Material and Methods:** Diatom samples were collected at seasonal intervals at various aquatic ecosystems from Şahinbey of Gaziantep (Turkey) at about 837 m elevation. The epilithic samples were collected in riffle areas from stones by scraping the upper surface of stones with a toothbrush in 100 mL of distilled water according to the European standard methods and fixed with Lugol-glycerol solution. The European standard methods were applied for the identification and enumeration of diatom taxa. The primary key books were used for diatom species identification.

**Results:** A total of 36 diatom species were identified during the study in the water bodies. *Amphora ovalis, Cymbella excisa, Cocconeis placentula, Gomphonema parvulum, Fragilaria capucina,* and *Ulnaria ulna* were commonly found during the study.

**Discussion:** A total of 36 diatom species were found in the running water systems of Şahinbey. Several taxa (e.g., *Cymbella excisa, Cocconeis placentula,* and *Fragilaria capucina*) commonly found in the present study distributed and were also commonly found in the world.

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**Keywords:** Diatom, Systematics, Gaziantep
Assessments of Aquatic Ecosystem in Şahinbey of Gaziantep by Using Diatoms Indices

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Introduction: Diatoms are algae with distinctive, transparent cell walls made of silicon dioxide hydrated with a small amount of water. Diatom is one of the five biological quality elements as ecological indicator recommended by the EU Water Framework Directive for the assessment of ecological status running waters. These organisms are being integrity of running waters around the world. This study designed to assess ecological quality of freshwater bodies in the Şahinbey of Gaziantep (Turkey) using the trophic index Turkey (TIT) and evaluate the ecological preferences of the diatom assemblages by multivariate approaches.

Material and Methods: Data collected from October 2013 to October 2014 in the Şahinbey of Gaziantep according to standard methods. Epilithic samples were collected in riffle areas from at least 5 stones by scraping the upper surface with a toothbrush and fixed with Lugol-glycerol’s. Besides the samples examined using DIC-attached Olympus BX53 light Microscope. Canonical correspondence analysis (CCA) was used to relate diatom assemblages with the environmental variables to explore their relationships. Weighted averaging regression was used to estimate diatom species optima and tolerance levels for the environmental variables.

Results: Sampling stations had slightly basic waters; mean pH values ranged between 9.1 in Zülfikar exit and 7.1 in Karpuzatan stream. At Kıratlı Stream, the highest mean value of PO4 was 76.6 µg/L, whereas the lowest mean value was 58.1 µg/L at stations of Zülfikar Lake. Environmental variables seasonally changed in these ecosystems. CCA confirmed that diatom species were sensitive to environmental variability. According to the Monte Carlo permutation test results, the relationship between diatom assemblages and environmental variables was found 94.2%. Most effective explanatory factors (e.g., DO, water temperature, NO3, Pb2+, etc.) played the significant role (p=0.006) in the seasonality of species. Changes in environmental gradients significantly influenced the ecological preferences of species and diatom abundance in the water bodies.

Discussion: Anthropogenic activities, geology, and climate could affect physico-chemical variables of water bodies. Some diatom species such as Amphora ovalis, Cymbella excisa, Cocconeis placentula, Gomphonema parvulum, Fragilaria capucina, and Ulnaria ulna were found during study period, supported by CCA. These taxa are widespread on the Earth. TIT values ranged between 1.71 in Lake Burç and 3.09 in Yeniyazı Stream.

Acknowledgment: This research was supported by TUBITAK (The Scientific and Technical Research Council of Turkey) with the project No: 112Y054. Authors thank to Gaziantep water and sewage management (GASKI) and Scientific Research Projects Executive Council of University of Gaziantep.

Keywords: CCA, Diatoms, Physio-chemical, Ecological Status, TIT, Gaziantep
Morphological, Anatomical and Micromorphological Studies on Turkish Endemic
Trinia scabra (Apiaceae)

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Introduction: The Apiaceae family consists of 105 genera and around 493 species in Turkey. Trinia Hoffm. comprises about 10 species and the genus is distributed Europe and SW Asia. Trinia was revised by Hedge and Lamond for the Flora of Turkey and the East Aegean Islands in which two species, Trinia glauca (L.) Dum. and T. scabra Boiss. & Noé, were accepted. In the present study, morphological, micromorphological, and anatomical characteristics of Trinia scabra were reviewed.

Material and Methods: Trinia scabra samples were collected from different localities in Turkey. The fruit was directly mounted on the prepared stubs and coated with gold for SEM studies. Photographs were taken with a Zeiss LS-10 after coating with a Polaron SC7620 sputter coater for SEM studies. For anatomical study, each mericarp was rehydrated and placed in formalin-acetic acid-alcohol (1:1:8) for a minimum of 24 h. Rehydrated materials were embedded into paraffin blocks following the traditional paraffin section method. A transverse section about 5-10 µm thick was cut using a microtome and stained with safranin solution. Micrographs were taken using a light microscope.

Results and Discussion: An expanded description of Trinia scabra was presented. The fruit micromorphology was examined using scanning electron microscopy (SEM). Cross-sections of mature fruits was examined and a detailed anatomical description was presented. The fruit of Trinia scabra is broadly oblong. It is composed of two equal mericarps which easily split open at maturity. Mericarps are oblong-elliptic and 2.8-3.2 x 1.2-1.8 mm, somewhat laterally compressed. Each mericarp has five strongly projecting primary ribs, all ribs nearly equidistant each other, with four deep valleculae. The ornamentation of fruit surface is striate.

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Keywords: Trinia, endemic, SEM, morphology, Turkey
Home-Made Canned Produce Using Traditional Methods From The Atlantic Bonito

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Introduction: The Atlantic bonito (Sarda sarda, Bloch 1793) belongs to the important marine fish species with a wide geographical distribution covering the Atlantic Ocean, the Mediterranean and the Black Sea. Canning, method of preserving food from spoilage by storing it in containers that are hermetically sealed or home-made and then sterilized by heat. The aim of this study is to ensure that the bonito is caught abundantly but is not always freshly consumed and stored in a delicious and healthy manner.

Material and Methods: To prepare a brine, used 5 kg grated tomatoes and 100 gr rosemary and cooked for half an hour. The skin and boneheads are removed from the fishes and cut into 5 cm to cooked in oven at 160 degrees 25 minutes. 375 ml boiled and cooled jars were used for canning. 150 gr fish and 200 ml brine added jars and after closing the jars boiled for half an hours.

Results: During the storage period sensory analyses determined. Canned bonito were evaluated in terms of appearance, smell, taste and consistency. Sensorial analysis indicated that, by the 465th day of storage, canned bonito found 2nd class products.

Discussion: Freshly caught fish spoil easily and need to be properly preserved. The four most popular methods of fish preservation are freezing, canning, smoking, and pickling. Preparing a home made bonito provides both an easy and healthy product.

Keywords: Atlantic bonito (Sarda sarda), home made, canning
Worldwide Population Genetic Structure and Colonization of Mediterranean Fruit Fly
*Ceratitis capitata* (Diptera : Tephritidae)

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**Introduction:** Considered among the economically important agricultural pests the Tephritid fruit flies (Diptera: Tephritidae) are a significant worldwide problem. Among the members of Tephritidae, the genus *Ceratitis* MacLeay includes several highly polyphagous species which are known as invasive or potentially invasive. Of these species, *Ceratitis capitata* (Wiedemann), the Mediterranean fruit fly or medfly, is considered as one of the most destructive and economically important agricultural pests worldwide. In Turkey, *C. capitata* is particularly damaging in citrus, peach, apricot, fig and nectarines and the damage is severe, estimated at 5-75%. Despite the widespread presence and economic importance of *C. capitata* little or no information has been available from populations in far eastern Mediterranean basin because of the low sample size used from very limited localities from this region. Knowledge of the genetic structure of medfly populations is a necessary requisite to better understand the contemporary genetic structure of worldwide medfly populations and to trace the route of its colonization. The main aim of the present study is to provide detailed information about the worldwide population genetic structure and the possible dispersal patterns of medfly populations. The analyses of medfly genetic variability in the species range is a necessary prerequisite for the success of any control and/or management programs.

**Material and Methods:** The literature published since 1980’s for the Mediterranean fruit fly worldwide range, basically from Africa, Mediterranean basin, Australia, south and central America, were comparatively analysed and reviewed in this study.

**Results and Discussion:** All the markers were consistent in showing that the amount of genetic variation was not homogenously distributed in the species range. Southeast African flies are the most polymorphic and have the highest level of genetic variability which support the assertion that this region is the area of origin for the species. From its home range, the med fruit fly seems to travelled with man to the primary introduction area in northern Mediterranean basin then followed by a spread to other coastal, northern and eastern Mediterranean locations. It was introduced into Australia from Europe as a secondary colonization event. However, the expansion of med fruit fly into Latin America and Pacific reported to be the product of independent and repeated geographically separated colonization events from different geographical source areas or from areas with high population substructure. Eastern Mediterranean populations, including Turkish samples, seems to be one of the possible origin of Latin and Central American and Australian medfly populations.

**Keywords:** *Ceratitis capitata*, Colonization, Agricultural pest, Fruit fly
Does the erythrocyte morphology of Western Caspian Turtle (Mauremys rivulata) change depend on longitude?

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Introduction: Reptiles are cold-blooded vertebrates represented by approximately 9,766 extant species. Their peripheral blood cells consist of erythrocytes, leukocytes, and thrombocytes. The erythrocytes of reptiles can vary in size under different conditions like altitude, sex, habitat etc. Among turtles, the largest erythrocytes were observed in aquatic species and the smallest erythrocytes were observed in terrestrial species. The purpose of the present study was to obtain data on erythrocyte morphology of Mauremys rivulata and compare its morphology depend on two different longitudes.

Material and Methods: Field surveys were conducted in April and May 2011 to 2013 at Dalaman (Muğla, 29E), Silifke (Mersin, 33E) and Samandağ (Hatay, 36E). The blood samples were obtained from caudal vein using heparinized glass capillaries in 5 individuals (3 males, 2 females) from Dalaman, 7 individuals (3 males, 7 females) from Samandağ and 5 individuals (1 male, 4 females) from Silifke. The blood smears prepared were stained with Wright’s stain. The erythrocytes were measured under a light microscope. From each blood smear, the randomly chosen 40 erythrocytes (erythrocytes lengths, widths, volume, nuclear lengths, widths, and volume) were measured. The variation of erythrocyte morphology between localities was compared via student t-test.

Results: The erythrocytes or red blood cells of M. rivulata are nucleated, oval cells as is the case with other reptile species. Their nuclei are also oval and centrally located. The nucleus is stained dark purple, the cytoplasm is stained light red. The average erythrocyte volume was 1456.86-1105.4-1125.58 µm³, nucleus volume 75.44-55.76-63.28 µm³ for Dalaman, Silifke and Samandağ respectively. The Dalaman (29E) population has bigger erythrocytes than that of Samandağ (36E) and Samandağ population has bigger bigger erythrocytes than that of Silifke (33E). Besides, these differences are not statistically significant depending on longitude.

Discussion: These results show that longitude could an effective variable on erythrocyte and nucleus morphology. But longitude by itself is not an indicator for erythrocyte volume. Therefore, the variable should be considered and compared with other effective environmental and physiologic changes like climate, habitat, altitude, sex etc.

Keywords: erythrocyte morphology, longitude, physiology, Mauremys rivulata, Turkey
Introduction: Medical wastes are wastes which are persistent in the air, water and soil outside the domestic solid wastes and which can destroy the ecological balance. It is also true that the great risks associated with medical waste originate from the wrong management systems. Risks arising from medical waste do not arise only through direct contact with wastes. In addition, infected organisms can be distributed in different ways and spread to the general population, creating public health risks.

Material and Method: The study area was selected as the city center of Sinop, which is located in the most northern point of Turkey on a peninsula and exhibit natural harbor characteristics having particular importance with its unique structure. Sinop is located in the Central Black Sea Region. It that becomes sharpest point towards the north along the coastline, and located between 41° 12’ and 42° 06’ north latitude and 34° 14’ and 35° 26’ east longitude and it was founded on Boztepe Cape and Peninsula. Now, there are 124 people per km² in the most densely populated central town of Sinop. Sinop has been one of the city preferred by especially domestic tourists in recent years.

The aim of this study is to analyze the technical and operational aspects of the Sinop Medical Waste Management model, which is managed by the Sinop Municipality and is currently being carried out on a regular basis. Medical waste management in Sinop province has been examined in comparison with past semester data. In the context of the study, Sinop Atatürk State Hospital, which performs both in-patient and outpatient treatment on the basis of general information on the medical waste management of Sinop Province as well as the amount of medical waste and management, is evaluated as comparison between the past years medical waste data.

Results: As a result of this study, it is determined that the average amount of medical waste per person in Sinop Atatürk State Hospital, which has the maximum bed capacity in Sinop, is 0.97 kg.bed⁻¹.day⁻¹ for 2015 and 1.25 kg.bed⁻¹.day⁻¹ for 2016. It has been determined that the average daily amount of medical waste per bed calculated is even higher than the 0.50 kg.bed⁻¹.day⁻¹ value for the WHO designated developing countries.

Discussion: Looking at the changes in the amount of medical waste in the year 2016 of the examined hospital, it is observed that the amount of medical waste increased in 16.5% of the winter season, especially in this season due to the increase in the number of summer tourism in Sinop Province, 40% increase over the previous year. This situation is attributed to the decrease in the number of citizens coming to Sinop province center for the holidays in 2016 and 2017 compared to 2015.

Keywords: medical waste, medical waste management, Sinop, public health
Evaluation of the Amphibian Fauna in Amasya Province, Turkey with New Locality Records

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Introduction: Turkey has a rich biodiversity potential due to its zoogeographical position as a “bridge” among Europe, Middle East and Caucasus. In addition to that, Turkey’s land can be considered as a host for three of world’s thirty-four biodiversity hotspots. Unfortunately, our knowledge about the detailed distribution of amphibian species is not clear. Here, we report an evaluation data for amphibians from Amasya province and discuss the major threats on them. Up to this study, except for a previous report that recorded some herptile species from few localities in Amasya, there has been no record for evaluating the amphibian fauna of Amasya province in primary focus. So our aim is to determine the amphibian species of Amasya province in detail and to make a zoogeographical assessment by determining the distributions of these species.

Material and Methods: Within the scope of projects “Biodiversity Monitoring of Terrestrial and Aquatic Ecosystems in Amasya province”, more than 250 locations were visited between 2016 and 2017 for assessing the whole province perspective. Visual encounter survey methodology was used for diagnosing the amphibian species. Observed species were identified and photographed. In addition to that, the location data were recorded by GPS for understanding the distribution of species. Moreover, we also interviewed with locals and surveyed to determining major threats on species. Zoogeographical assessment was also carried out in which the chorotypes and the IUCN criteria of the species were added.

Results: A total of 8 amphibian species were identified, consisting of six anurans, two urodelas. Five amphibian species were recorded for the first time in Amasya province. At least 7 major chorotypes have been classified in that region.

Discussion: This chorotype data represent that even though Amasya province has a relatively low surface area, it can be regarded as an ecotone between important eco-regions in terms of its location. On the other hand the main threats about this richness has been detected as habitat loss and degradation, environmental pollution, agricultural activities.

Acknowledgement: This study was conducted as a part of “The Ministry of Forestry and Water Affairs, General Directorate of Nature Conservation and National Parks National Biodiversity Inventory and Monitoring Project“. The authors are grateful for their support.

Keywords: Amphibia, Black Sea region, chorotype, zoogeography, threat
**Introduction:** *Emys orbicularis* is one of the most common turtle species showing the biggest range distribution throughout Northwest Africa to the former Aral Sea, in the northern part from Moscow ranging to the Turkey-Syria border. Many populations are threatened by various factors, mainly habitat loss and habitat destruction. The species is distributed in suitable biotopes almost all regions of our country. The aim of this study is providing information on the morphology of *E. orbicularis* specimens captured from Lake Mogan (Ankara).

**Materials and Method:** Five male and three female specimens examined in the study were caught by hand and dip net. The sex was determined according to the secondary sexual characters. The color-pattern characteristics of the captured samples were noted, their photographs were taken, and morphometric measurements were taken and the specimens were released where they were captured. Twelve morphological characters were measured by a caliper with precision of 0.1 mm.

**Results:** For females, the smallest straight carapace length (SCL) measured was 167 mm, the largest SCL was 183 mm, mean value was 177.67 mm; For males the smallest straight carapace length was 134 mm, the largest straight carapace length was 166 mm, and the mean value was 156 mm. Dark plastron coloration was observed in males, on the other hand, plastron coloration observed in females was lighter. Yellow radial pattern elements are present on the dark color of carapace.

**Discussion:** The largest SCL for males was measured as 155 mm in Lake Akşehir, The smallest SCL was measured as 100 mm in Pazarağaç; The largest SCL for females was measured as 181 mm in Lake Kovada, the smallest sample measured in Aegean region was 102 mm. The largest SCL in Thrace region was 153 mm. In one sample from the Lake Karamık (Afyonkarahisar), SCL length was given as 20.6 cm and Seydişehir (Konya) as 187 mm. In the present study, morphometric measurements, color and pattern characteristics of the turtles measured from Lake Mogan are similar to those given in the literature for the nominat subspecies.

**Keywords:** *Emys orbicularis*, morphology, Lake Mogan
Morphological Abnormalities in *Galleria mellonella* Force-fed with Aluminium chloride

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**Introduction:** Aluminium (Al) is the most abundant and a highly reactive metal. Al compounds are widely used for many utensils and materials. In recent years, results from some scientific studies showed that Al might have neurotoxic effects and may cause some diseases. However it is not clear that Al is a toxic metal for animals. The aim of this study is to investigate the effects of Aluminium chloride (AlCl$_3$.6H$_2$O) on the morphology of *Galleria mellonella* (Lepidoptera: Pyralidae). *G. mellonella* is an excellent model organism for toxicological studies.

**Materials and Methods:** Experiments and cultivation of *Galleria mellonella* were conducted in a laboratory at 27 ± 1°C, 60 ± 5% relative humidity and dark conditions. Different doses of aluminium chloride (AlCl$_3$.6H$_2$O Aluminium chloride hexahydrate, Merck) (10.000, 25.000 and 50.000 ppm) were given to last instar *G. mellonella* larvae by force-feeding method. To determine the morphological differences due to Al application, individuals were checked daily.

**Results:** As a result, we found that there were some morphological abnormalities at pupal and adult stage. These abnormalities were changes in imaginal size, integumental darkening and morphological wing anomalies. Al treated larvae mostly produced miniature pupae and adults.

**Discussion:** Modifications of body features and coloration are generally mediated by neuroendocrine system. Morphological changes in response to Al exposure might due to some physiological stress reactions. Results showed that high doses of aluminium chloride might have adverse effects on the development of *G. mellonella*.

**Keywords:** Adverse effects, Aluminium chloride, *Galleria mellonella*, Morphology
Introduction: In the Mediterranean coasts of Turkey, there are 21 important nesting grounds for both loggerhead and green turtles. Five of these nesting beaches (Anamur, Göksu Delta, Alata, Davultepe 100. Yıl, Kazanlı) are located in Mersin. Kazanlı beach is one of the most important sites for green turtles in the Mediterranean. Besides small amount of loggerhead turtle nests regularly and this beach is designated as a Natural SIT area.

Material and Methods: All field observations were conducted between July and October by daily patrols of the beach (without interruption). Daytime (05:00–10:00 and 16:00-19:30 hrs) and nighttime (22:00–01:00 hrs) beach surveys and collection of data were done by teams of 5 or 6 persons. These nests were protected with wire cages against predation. After the sea turtles had completed their nesting process, nests were marked and their coordinates were taken by means of Global Positioning System (GPS). The nests were excavated one week after the first emergence of hatchlings. The total number of eggs was calculated by counting unhatched eggs and hatched shell fragment. Hatching success was ascertained by counting hatched eggshells.

Results: In this study, the population of Chelonia mydas and Caretta caretta nesting on Kazanlı Beach (Mersin) was investigated for the 2016 nesting season. A total of 1676 C. mydas nests and 29 C. caretta nests were recorded during our study. The density rank of nests, the average clutch size, the hatching success rate, the success rate of hatchlings reached the sea, The rate of hatchlings reached the sea to total clutch size was calculated for both species on the 4.5 km beach. The nest density of Ch. mydas (356,60 Nest / km) and C. caretta (6,17 Nests / km) was calculated. In addition, stranded 67 C. caretta and 3 Trionyx triunguis and 2 undetermined sea turtle were founded on Kazanlı beach.

Discussion: When the total numbers of nests, determined in the studies between 1988 and 2017 in Kazanlı beach, are compared, the highest number of Chelonia mydas nests has been determined in 2016 nesting season with 1676 nests considering the 4.7 km-beach.

Keywords: Kazanlı Beach, Mersin, Chelonia mydas, Caretta caretta, 2016 nesting season.
Highly Efficient Adsorption of Congo Red Dye by Acid Activated Walnut Shells
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Introduction: The discharge of dyestuffs into the surface water not only deteriorate aesthetics by changing the colors of large water bodies but also cause serious adverse effects on aquatic life and ecological environment by reducing light permeability and photosynthesis even if they are at low concentrations. In addition, most of dyes are either toxic or mutagenic and carcinogenic. For these reasons, the removal of dyes from waste effluents is so important. Adsorption is considered an attractive treatment option in treating such wastewater in terms of initial cost, simplicity of design, ease of operation and insensitive to toxic substances. In this study, walnut shell as a natural and low-cost agricultural by-product has been used its raw and acid modified form to determine its potential application as an adsorbent in color removal from water.

Material and Methods: Walnut shells used in the experiments were rinsed with water, and dried in an oven at 70 °C for 24 hours to remove moisture content. After, they were ground and sieved for a particle size of 0.2–2.0mm. Acid activated walnut shell was prepared by mixing 10 g of raw walnut shell powder with 100 mL of 0.1M HCl solution. The experiments were conducted by the batch technique in 250 mL flasks containing 50 mL of distilled water containing Congo red at certain concentrations. The effects of the contact time (1–480 min), adsorbent amount (1.25–40 g/L), initial dye concentration (30–800 mg/L) and pH (2–9) were investigated. Dye removal was calculated from the decrease of absorption at the 497 nm wavelength.

Results: Langmuir and Freundlich isotherm models were used to evaluate the isotherm performance for Congo Red adsorption. It was found that Freundlich isotherm was the best isotherm for the adsorption process of Congo Red by walnut shells. Three common kinetic models such as pseudo-first-order, pseudo-second-order and intra-particle diffusion were applied to the results. The experimental data were fitted better by the pseudo-second order model with $R^2$ of 0.998.

Discussion: The maximum adsorption capacities of the natural and acid activated walnut shells were found to be 46.72 and 106.38 mg/g, respectively. The experimental data were well fitted to the Freundlich equation, with good correlation coefficients. These result showed that acid activated walnut shells could be used as a low-cost biosorbents for the removal of congo red from aqueous solution.

Keywords: Adsorption, congo red, dye, walnut Shell
Introduction: Pomegranate is classified as a functional food because of its antioxidant, polyphenolic ingredients and vitamin C content. Because of these aspects its production and consumption rate has increased nowadays. While the total production of pomegranate in Turkey was 59,000 tons in 2000, its amount increased 290% and reached 170,963 tons in 2009. Many fungi have been found as fruit rot agents by various researchers. The frequently quoted ones among them are *Botrytis cinerea*, *Alternaria alternata*, *Penicillium* spp., *Aspergillus* spp. and *Pilidiella granati*. In this study, fungal storage rot agents were investigated by using necrotic and rotted fruits collected from various sources.

Material and Methods: Sixty seven rotted fruits having various symptoms were first examined, classified, dissected into two and small pieces taken from different signs were plated on PDA. The growing cultures were first examined with a stereomicroscope and the ones having different growth were identified by observing under a compound microscope.

Results: In the study, fungi obtained from 67 fruits were identified. The ratios of the fungi causing fruit rot in storage as following; *Botrytis cinerea*, 18%, *Alternaria alternata*, 15%, *Penicillium* spp., 18%, *Pilidiella granati* 11%, *Botrytis cinerea* + *Pilidiella granati* 3%, *Botrytis cinerea* + *Alternaria alternata* 3%. *Botrytis cinerea* was the most frequently isolated fungus and mostly caused infection from calyx and produced a slight fade discoloration on the skin and a grey mould inside. *Pilidiella granati* generally caused a greyish discoloration around the stipe of the fruit and a rot starting from this part. *Alternaria* fruit rot usually was not distinguished from outside but the whole fruit rotted inside starting from calyx.

Discussion: The frequently occurring storage fruit rot agents of *Botrytis cinerea*, *Alternaria alternata* and *Pilidiella granati* usually infects the fruit during flowering stage in the orchard and rotting continues in the storage. Except *Alternaria alternata* fruit rot, the symptoms of other agents can be visually differentiated however there is nothing anything to do after this stage. In order to reduce storage fruit rots, the necessary precautions to prevent infections in the orchard should be taken. For instance; destroying the diseased plant material, treatment of the plants during flowering period with a registered fungicide, preventing the wound formation during plant growth and harvest, disinfection of the stores and fruits before taken to storage.

Keywords: *Pilidiella granati*, *Alternaria alternata*, *Botrytis cinerea*, fruit rot
Introduction: Zinc oxide nanoparticles (ZnO NPs) are widely utilized in different industrial sectors and added to many materials. The results of previous studies showed that ZnO NPs have cytotoxic effect. Recently, studies on the effects of ZnO NPs on insects as model organisms have gained importance. The greater wax moth, *Galleria mellonella* L. (Lepidoptera: Pyralidae) is preferred as model organism at laboratories for different kinds of investigations.

Materials and Methods: The experiments and the cultivation of *G. mellonella* were conducted in a laboratory at 27 ± 1°C, 60 ± 5% RH and dark conditions by feeding of the Bronskill’s semisynthetic diet. Different doses of 70 nanometer sized ZnO NPs (100, 500, 1000, 3000, 5000 ppm) were added to the diet of first instar *G. mellonella* larvae and allowed to development till last instar. Effects of ZnO NPs on development of *G. mellonella* larvae were determined.

Results: It was found that, there were no differences in the duration of larval development and weight of last instar larvae between control groups and experiment groups that exposed to ZnO NPs.

Discussion: Results showed that different doses of ZnO NPs have no adverse effects on the development of *G. mellonella* larvae.

Acknowledgement: We would like to express our appreciation to the Marmara University Scientific Research Project Commission, which supported this study (BAPKO FEN-C-DRP-100713-0334).

Keywords: Adverse effects, *Galleria mellonella*, Larval development, Zinc oxide nanoparticles
Introduction: In recent years, investigations on the adverse effects of nanoparticles on living organisms are one of the intensively exploring issues. Silver nanoparticles (Ag NPs) have an important role in nanoscience and are widely used in nanotechnology. In this study, we determined the effects of Ag NPs on the encapsulation response of the greater wax moth Galleria mellonella L. (Lepidoptera: Pyralidae) which is an excellent model organism for toxicological studies.

Materials and Methods: The mass cultivation of G. mellonella and the treatments were conducted in a laboratory at 27 ± 1°C, 60 ± 5% RH and dark conditions by feeding the Bronskill’s semi-synthetic diet. Different doses of 20-40 nm sized Ag NPs (100, 500, 1000, 3000, 5000 ppm) were added to the diet of first instar G. mellonella larvae and allowed to development till last instar. The pre-dyed Sephadex Chromatography beads were injected into hemolymph of each larva. Larvae were dissected at 4 and 24h after injection and the level of the encapsulation response around the beads were determined under microscopy.

Results: It was found that, there were no differences between control groups and experimental groups that exposed to different doses of Ag NPs. Results of the encapsulation reaction at all levels were similar.

Discussion: Results showed that different doses of Ag NPs did not affect the encapsulation response of G. mellonella larvae. We may consider that Ag NPs have no adverse effect on the cellular immune system of G. mellonella, but we still need more details.

Acknowledgement: We would like to express our appreciation to the Marmara University Scientific Research Project Commission, which supported this study (BAPKO FEN-C-FRP-100713-0334).

Keywords: Adverse effects, Encapsulation, Galleria mellonella, Silver nanoparticles
Comparison of Egg Properties of Rainbow Trout *Oncorhynchus mykiss* (Walbaum, 1792) Farmed Under Photoperiod-Controlled and Natural Conditions in Different Fish Farms of Muğla

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**Introduction:** Rainbow trout *Oncorhynchus mykiss* (Walbaum, 1792) is one of the most cultured species in Turkey. Its farming has an important economic value for the country and especially for Muğla. Given the increasing economic value of this sector, for a long-term success of this thriving activity, the biological and ecological properties of rainbow trout have to be well known and constantly monitored. Photoperiod is known to be one of the key factors affecting sexual maturation and reproduction of fish. Thus, it is regularly applied in fish farms to increase the yield of aquaculture. The aim of this study was to investigate the main reproductive traits of rainbow trout farmed under photoperiod and natural conditions in fish farms of Muğla.

**Material and Methods:** Length-weight measurements and total weight of eggs produced by each female rainbow trout were collected from different fish farms located in Fethiye district during the natural reproduction period (winter) and during the photoperiod-controlled (16:8 D:L) reproduction period (summer). For each of the examined females, the total weight of eggs was weighted and a sub sample of eggs was taken and put into fixative for sequential laboratory analyses. Here, all the egg samples were counted by a camera-microscope system, and analysed with the Image J program to measure their diameter. Fecundity, relative fecundity and mean egg diameter were estimated and the values obtained from different fish farms and different reproduction periods were compared by Analysis of Variance and Analysis of Covariance.

**Results:** Data from 209 fish from 3 different fish farms were examined. No significant differences in the reproductive parameters occurred comparing the samples collected from the different fish farms. However, comparing the data of the two reproduction periods, both total and relative fecundity were highly more abundant during the photoperiod-controlled reproduction, while the diameter of eggs was highly bigger during the natural reproduction period in each of the examined fish farms and also in the pooled data.

**Discussion:** The obtained results confirmed that, as reported in previous studies, photoperiod greatly influences the reproduction parameters of farmed rainbow trout and it can modify the survival strategies of the species. More specifically, the use of photoperiod during the summer season could result in a greater production of eggs which is one of the main benefits in animal breeding and fish farm. However, as also reported by previous studies, despite the abundance, the small eggs obtained during the photoperiod-controlled reproduction can lead to a decrease in the survival rate of the fry: smaller eggs have less quantities of yolk that results in smaller size of the fry at birth and, therefore, a less chance to survive.

**Acknowledgement:** This study reports the results of Miss Ezgi AŞKIN’s Master thesis. We would like to thanks Muğla Sıtkı Koçman University Scientific Research Project Commission for the financial supported to this study (BAP 17/052).

**Keywords:** rainbow trout, photoperiod, fecundity, egg diameter, Muğla.
The Comparison of Morphometric Analysis and Meat Yield of Freshwater Crayfish, *Pontastacus leptodactylus* (Eschscoltz, 1823) caught from Apolyont, İznik, Manyas, Terkos and Küçükçekmece Lakes

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Introduction: Freshwater crayfish is a heavily demanded aquaculture product by the European countries and the United States. The production of freshwater crayfish is rapidly increasing by fisheries and aquaculture due to increased demand. Food and Agriculture Organization (FAO) reported that freshwater crayfish are globally produced over a total of 800000 tons, 15426 tons by fisheries and 787400 tons by aquaculture. This research was carried out to determine the length-weight relationships and meat yield of freshwater crayfish *Pontastacus leptodactylus* in different five lakes in Marmara Region, Turkey (Apolyont Lake, İznik Lake, Manyas Lake, Terkos Lake and Küçükçekmece Lake).

Material and Methods: The length-weight relationships and meat yields of freshwater crayfish were investigated in Apolyont Lake, İznik Lake, Manyas Lake, Terkos Lake, and Küçükçekmece Lake between July and September 2010. To achieve this aim, 62 individuals (34 ♀♀ - 28 ♂♂) from Apolyont Lake, 103 individuals (45 ♀♀ - 58 ♂♂) from İznik Lake, 129 individuals (85 ♀♀ - 44 ♂♂) from Manyas Lake, 156 individuals (89 ♀♀ - 67 ♂♂) from Terkos Lake and 63 individuals (41 ♀♀ - 22 ♂♂) from Küçükçekmece Lake were sampled.

Results and Discussion: The female/male ratios were computed as 1.21/1.00 for Apolyont Lake, 0.78/1.00 for İznik Lake, 1.93/1.00 for Manyas Lake, 1.33/1.00 for Terkos Lake and 1.86/1.00 for Küçükçekmece Lake. The highest values for both carapace length and total weight were found in Manyas Lake (52.34 mm, 34.16 g) for females and in Apolyont Lake for males (56.75 mm, 43.25 g). Regression analysis results indicated that negative allometric growth was found for both male and female individuals from Manyas Lake, Terkos Lake and Küçükçekmece Lake while positive allometric growth was found for male individuals from Apolyont Lake and İznik Lake with regard to the carapace length-total weight relationship. For female individuals, the highest values for total meat yield and abdominal meat yield were computed in İznik Lake (19.76%) and Apolyont Lake, respectively. Moreover, the highest values were computed for both total meat yield and abdominal meat yield in Apolyont Lake (18.47%, 13.66%, respectively) for male individuals.

Acknowledgement: This study was supported by the Research Fund of Recep Tayyip Erdoğan University (Project ID: 2009.103.02.1)

Keywords: Crayfish, *Pontastacus leptodactylus*, Apolyont, İznik, Manyas, Terkos, Küçükçekmece Lakes, length-weight relationships, meat yield
Determination of Antimicrobial Effect of Schiff Bases Derived from Different Pyrazole Chemicals

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Introduction: Schiff bases are occurred from primary amines and carbonyl compounds. They are considered as the most important medical reagent and also have a broad range of different biological activities. In this study, it was aimed to measure antimicrobial activity of Schiff bases derived from five different pyrazole compounds.

Material and Methods: Schiff bases derived from five pyrazole compounds were dissolved in DMSO (dimethyl sulfoxide) at three different (1mM, 10mM and 25mM) concentrations. Five gram positive and five gram negative bacteria were used for antimicrobial test for this study. Selected Gram positive bacteria were Staphylococcus aureus ATCC 25923, Staphylococcus epidermis, Alfa Streptococcus haemolyticus, Enterococcus faecium and Listeri monocytogenes ATCC 7644. Gram negative bacteria were Pseudomonas aeroginosa, Enterobacter aerogenes ATCC 13048, Salmonella kentucky, Escherichia coli and Serratia marrescen. Firstly, bacteria were cultured in Müller Hinton agar at plates. Then, discs were moisturized with compounds and dried. The discs were put on the plates (3 times repeated). After, the plates were incubated overnight at 37 °C. Finally, inhibition zone was measured of discs in the plates.

Results: After application of 1 mM, 10 mM and 25 mM concentrations of compounds, bacteria were differently affected from all compounds and showed dissimilar inhibition zone. E. coli bacteria indicated 1.75 mm inhibition zone for 1 mM concentration compound (I). Enterococcus faecium was affected from 1mM compound (I), (III) and (IV), with 3.75, 4.5 and 4.75 mm inhibition zone, respectively. E. coli different inhibition zones such as 2, 2.6, 2.33, 2 mm for 10 mM concentration were obtained from compound (II), (III), (IV) and (V), respectively. Pseudomonas aeruginosa was influenced from compound (III) at 1mM and 10 mM concentrations with small inhibition zone. Compound (I), (II), and (III) exhibited 3, 2 and 4 mm inhibition zone at 10 mM concentration for Staphylococcus epidermis. There was no result for 25 mM concentration for all selected bacteria.

Discussion: 1mM and 10 mM concentrations of compounds had antimicrobial effect on selected bacteria whereas 25 mM concentration did not show any antibacterial activity for five compounds. It was realized that effect of these compounds on selected bacteria was considered as dose dependent. Also, the antimicrobial activity of compounds on selected bacteria decreased as the concentration increased.

Keywords: Antimicrobial test, Bacteria, Schiff Bases, Pyrazole Chemicals
Meat yield and length-weight relationship of Freshwater Crayfish, Pontastacus leptodactylus (Eschscholtz, 1823) in Some Dam Lakes (Altınayazı, Karpuzlu, Kadıköy) from Edirne

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Introduction: The freshwater crayfishes, the largest forms among decapod crustaceans living in freshwaters, are economically important species and represented by 737 species and subspecies on Earth. Life cycle, the catch composition, and the length-weight relationship of economically-operated populations need to be identified for ensuring ideal fisheries management of crayfish stocks. The regression equations are commonly used to compare populations in different locations, and to determine population dynamics such as the growth and conditions.

Material and Methods: In this research, the length-weight relationships and meat yields of freshwater crayfish were investigated in three different dam lakes (Altınayazı, Karpuzlu and Kadıköy) in Edirne between July and September 2010. For this purpose, 110 individuals (31 ♀♀ - 79 ♂♂) were sampled from Altınayazı Dam Lake, 84 individuals (51 ♀♀ - 33 ♂♂) were sampled from Karpuzlu Lake and 27 individuals (14 ♀♀ - 13 ♂♂) were sampled from Kadıköy Dam Lake.

Results and Discussion: The female/male ratio was calculated as 0.39/1.00 for Altınayazı Dam Lake, 1.55/1.00 for Karpuzlu Lake and 1.08/1.00 for Kadıköy Dam Lake. The average carapace length of individuals from Kadıköy Dam Lake is found quite high for both male and female individuals compared from other localities. Average length was found 60.07 mm (min: 53.66 mm, max: 67.51 mm) for females and 66.25 mm (min: 54.13 mm, max: 75.9 mm) for males. The results of regression analysis designated that negative allometric growth was detected for both female and male individuals in all locations in point of carapace length-total weight relations. On the other hand, the highest value for meat yield was determined in Kadıköy Dam Lake for both female and male individuals (24.09%) and male individuals (20.95%). A statistically significant difference was found for cheliped meat yields between female and male individuals for all dam lakes (p <0.05).

Acknowledgement: The present work was supported by the Research Fund of Recep Tayyip Erdoğan University (Project ID: 2009.103.02.1)

Keywords: Crayfish, Altınayazı Dam Lake, Kadıköy Dam Lake, Karpuzlu Reservoir, length-weight relationships, meat yield
Ecological Assessment of Çağlayan Brook in the Eastern Black Sea Region of Turkey

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Introduction: Rivers are the most important freshwater resources used for drinking water, irrigation, hydroelectric power plant, industrial and municipal facilities and fishing. Domestic, industrial and agricultural activities pollutants are first released into rivers and reach the sea and lakes through rivers. Water Quality Assessments of nutrients compounds and metals have called for a change in the strategies for water quality surveys and monitoring. Therefore, the determination of water quality in coastal areas is important for the future estimation of the pollutant load of the rivers. In this study, we aimed to investigation some Physico-Chemical parameters and and dissolved and particulate metals in Çağlayan brook.

Material and Methods: Five stations were selected for to understand the seasonal changes between November 2013-August 2014 in the Çağlayan Brook. Seasonal Physico-Chemical parameters (Temperature, pH, Conductivity), Dissolved Oxygen, and Chlorophyll-a, Nutrients (Nitrate (NO₃-N), Nitrite (NO₂-N), o-Phosphate (o-PO₄)), Total Phosphorus (TP), Total Suspended Solid (TSS), Organic Matter, Detergent, Total Hardness and dissolved and particulate metals (Mn, Ni, Cu, Zn, As, Pb) were investigated. The results obtained were classified regarding the criteria’s of European Commission Directive (EC 1998), US EPA National Recommended Water Quality Criteria (EPA, 2009) and World Health Organization Guidelines for Drinking-Water Quality (WHO, 2004).

Results: Annual mean temperature, pH and conductivity were measured as 12.11°C, 7.63 and 31.68 µs/cm respectively. Dissolved oxygen, Chlorophyll-a, Nutrients (Nitrate (NO₃-N), Nitrite (NO₂-N), o-Phosphate (o-PO₄)) and Total Phosphorus (TP) were measured as 10.78 mg/L, 0.72 µg/L, 0.72 mg/L, 0.006 mg/L, 0.13 mg/L and 0.22 mg/L respectively. Total Suspended Solid (TSS), Organic Matter, Detergent and Total Hardness were measured as 3.43 mg/L, 1.95 mg/L, 0.01 mg/L, 50.70 mg/L respectively. Dissolved and particulate metals were measured as Mn: 1.35-4.25; Ni: 0.29-0.37; Cu: 0.15-0.43; Zn: 1.10-1.86; As: 0.35-0.46 and Pb: 0.02-0.18 µg/L.

Discussion: As a result of this study, Temperature, dissolved oxygen and total suspended solid of all stations in the brook were directly related with seasons. According to the results of this study, the brook found not to be polluted yet in terms of nutrients and metals. Summary of seasonal data were classified with regarding the criteria’s of European Commission Directive, National Recommended Water Quality Criteria, and World Health Organization. The results of the nutrient analysis were found in Class I water quality except nitrite.

Acknowledgement: This work has been funded by EU Blacksea crossborder Project TR11C1.01-02/339

Keywords: Çağlayan brook, Physico-Chemical parameters, nutrients, metals
Allelopathic Mechanisms in the Fire-Prone Ecosystems

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Introduction: There is a complex relationship between allelopathic metabolites and fires in the process of succession of desert and maquis vegetation in arid regions. Fire plays a critical role in the development of the succession of many plant communities such as maquis, savannah, and forest. Evergreen maquis vegetation is one of the most studied fire ecosystems in the majority. Fire in maquis vegetation; interacts with secondary compounds or allelopathic compounds produced by plants to form a region-specific climax cycle. Allelopathy is defined as a live response to the inhibition of another living organism by secreting toxic compounds. These secretions are usually referred to as allelopathic substances (allelochemical). It has been shown that allelopathic chemicals extracted from plant roots or leaves directly inhibit the germination, growth, and development of other plants. Taking these effects into consideration, it can be said that allelopathic plants have the potential to change the mosaic structure of the plant community by changing individual plant characteristics. Recent studies have shown that allelochemical phenolic compounds, especially monoterpenes, play an important role in the creation of the fire, and the effects on flammability have begun to be studied. The aim of this review is to reveal the relationship between allelopathy and fire, and to show the effects of this interaction on the process of plant succession and to discuss the key points for further research.

Material and Method: In the preparation of this review study, information on the adaptation processes of fire-prone ecosystems and allelopathic mechanisms was provided by scanning the most current sources.

Conclusion: Aromatic shrub species play a critical role in the eclipses of the fire. These species prevent the development of herbaceous plant species near the volatile terpenes they secrete out. Some aromatic plant species develop an area covered with annual plants and inhibiting the development of these plants by secreting biochemical inhibitors, and also occupying their habitats. Volatile toxins are produced in the leaves of these plants and accumulate in the soil during the dry season. This situation affects the fire regime and determines which species will follow each other in the process of succession in a plant community.

Keywords: Allelopathy, Succession, Fire ecology, Fire regime
Molecular Characterization of Hsp40 Gene in Ziziphus jujuba

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Introduction: Hsp40 family of heat shock proteins are the crucial drivers for Hsp70 function. They play main roles in gene expression and translational initiation, folding and unfolding as well as translocation and degradation of proteins. Z. jujuba is a conventional plant with a prolonged history of use for nutrition and the treatment of a wide spectrum of diseases. It belongs to the Rhamnaceae family and is one of the most important Ziziphus species. In this study, it was aimed to bring out Hsp40 gene family members in Ziziphus jujuba genome.

Methods Material and: Protein sequences of Z. jujuba Hsp40 were acquired from NCBI database and domains of ZjuHsp40 were filtered by PFAM database. Proteins carrying Hsp40 domains were incorporated into the study. The exon-intron structure of Z. jujuba Hsp40 genes were investigated using GSDS (Gene Structure Display Server) online database. To identify conserved motifs of the Hsp40s, MEME-SUITE software was applied. The PHYRE2 program was used to determine the predicted three-dimensional structures of Z. jujuba Hsp40 proteins. Gene ontology such as biological and molecular function and cellular emplacement of Z. jujuba Hsp40s was determined through Blast2GO analysis. psRNA Server Target database was utilized for determination of miRNAs that targeting Z. Jujuba HSP40 transcripts. Sequence alignments were performed with ClustalW software before revealing the evolutionary relationships of Hsp40s. Afterwards, phylogenetic tree was drawn by MEGA7 program.

Results: A total of 174 of Z. jujuba Hsp40 genes were classified according to BLASTP and PFAM results. The 1st chromosome of Z. jujuba contained the highest number of Hsp40 genes with the number of 21. Gene structure analysis was revealed that 16 ZjuHsp40 genes had no introns. When the protected motifs were screened, 20 different motif patterns were determined in the ZjuHsp40. The predicted three-dimensional structure of ZjuHsp40s as consistent with the literature had shown that the alpha helix structural motif was predominant. This group of proteins had function in biologic regulation processes. In addition, ZjuHsp40 transcripts were targeted by 531 different miRNAs.

Discussion: Determination of ZjuHsp40s could offer new opportunities for the researcher to understand the effect of these proteins in heat shock tolerance in Z. jujuba.

Keywords: Jujube, Hsp40, Bioinformatics.
Influence of Transposable Elements on Sesame Fertility

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Introduction: Sesame (Sesamum indicum L.) is an ancient and important oilseed crop. Having 60% oil, sesame has one of the highest oil contents with seeds. Therefore, the seed are greatly used in food and medicine. Since sesame shows very strong hybrid vigor, cytoplasmic male sterility (CMS) or genic male sterility (GMS) take advantage of this character.

Transposons are sequences of DNA that move (or jump) from one location in the genome to another. They are regulatory elements playing important roles in several biological functions.

In this project, transposons have been determined in two sesame (Solanum commersonii) transcriptome libraries with bioinformatics tools. The differentially expressed transposons have been identified. The effects of transposons on sesame fertility have been evaluated.

Material and Methods: For this purpose, two transcriptome libraries of sesame have been used. One library was prepared from sterile buds, while the other one generated from fertile buds. To assemble the sequences, they were mapped to the sesame genome via Bowtie software. At the second step, EpiCenter program have been used to identify differential expressed regions. Using homology-based analysis, the identified regions have been annotated via Blast analysis against known transposon sequences.

Results and Discussion: The differential expressed transposons have been identified within the two libraries. A number of transposons have been found to be regulated upon fertility. The obtained results will be discussed.

Keywords: Bioinformatics, fertility, transposon, sesame
Impact of Conventional Wastewater Treatment Plants on Dissemination of Sulfonamide Resistance Genes

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Introduction: Antibiotic resistance is becoming a serious threat to healthcare globally. Although resistance has been viewed as a clinical problem, non-clinical environments are also important in the dissemination of the antibiotic resistance genes (ARGs), due to horizontal gene transfer. Wastewater treatment plants (WWTPs), therefore, are considered to be hotspots for the development of ARGs. Conventional WWTPs are one of the most common WWTP type in worldwide and they are primarily designed to remove nutrients from water. However, studies about the impact of conventional WWTP on the removal of antibiotic resistance genes are scarce. In this study, therefore, removal of the sulfonamide resistance genes was investigated in a conventional WWTP.

Material and Methods: Water samples from influents and effluents were seasonally collected from conventional type WWTP. Collected water samples were transported to laboratory within 2 hours. After that, water samples were fixed in 50% ethanol-water solution. Then, total DNA isolation of collected water samples were performed with alkaline lysis method. For the quantification of sulfonamide resistance genes with quantitative polymerase chain reaction (qPCR), special primers targeting sul1 gene were used. For the qPCR standards, purified PCR products of bacteria that shows resistance to sulfonamide was used. After the qPCR experiments, data were evaluated.

Results: The results showed that conventional type WWTP removed sul1 gene with 10-98% efficiencies. The impact of the conventional WWTP on the removal of sulfonamide resistance genes were high in spring and summer times.

Discussion: Ability of the conventional wastewater treatment process to remove ARGs was better in summer than in winter. A reasonable explanation is that low temperatures lead to enzyme deactivation in microorganisms. Since temperature drops down in autumn and winter, treatment process cannot effectively remove sulfonamide resistance genes.

Keywords: Sulfonamide resistance, sul1 gene, conventional wastewater treatment plant
Introduction: Wastewater treatment plants (WWTPs) are considered as important hotspots for the spread of the antibiotic resistance genes (ARGs). The dissemination of ARGs is one of the most significant threat to public health. This also causes a danger for water quality in surface waters and groundwater. These waters can easily be included in human life by their use in places such as agriculture, livestock and drinking waters. The bacterial gene is important to analyze the quantity of the total bacterial load and to normalize the abundance of ARGs in the collected samples. While WWTP design has been mastered for the removal of solids, organic matter, and nutrients, they have not been intentionally designed for removal of micropollutants and pathogenic microorganisms. Therefore, in this study, removal efficiencies of these bacterial genes was investigated through UV treatment units in WWTP.

Material and Methods: Wastewater samples were taken before and after UV treatment unit. Then, these samples were fixed in 50% ethanol-water solution. After that, total DNA isolation of collected water samples were performed with alkaline lysis method. The universal 16S rRNA primers were used in order to determine the copy number of the bacterial gene by using quantitative polymerase chain reaction (qPCR).

Results: Primary qPCR results showed that the bacterial gene could not be effectively removed through the UV treatment unit and many copies of the gene were discharged into the receiving bodies.

Discussion: The inactivating effects of UV are because of DNA modifications resulting in an inhibition of replication. However, microbes possess several mechanisms to protect themselves from UV exposure to a certain extent. DNA damage can be tolerated by the cell until repair occurs. This protection mechanism is photoreactivation. There are also numerous light-independent repair mechanisms. These mechanisms are regulated by the expression of the single-strand DNA binding protein RecA. Therefore, the bacterial gene could not be effectively removed through the UV treatment unit.

Keywords: Bacterial genes, ARGs, WWTPs, UV treatment
Introduction: Some of protozoa types in contaminated water can lead to severe waterborne diseases. Giardia is one of the most common protozoan parasites that cause gastrointestinal illness. The most common way to get giardiasis is to use water that contains the genus Giardia. Nowadays, providing reuse of water is an important to satisfy the increasing water demand of society. Depending on the removal efficiency of the wastewater treatment at plants (WWTPs), cysts of protozoan parasites may pass through the treatment processes and enter surface waters. This may lead to potential infection of humans. Therefore, evaluation of wastewater treatment removal efficiencies of protozoan pathogens is essential for public health. Unfortunately, removal of parasitic protozoa in wastewater treatment plants has not well-studied yet in Turkey. For this reason, there is not enough data about the fate of Giardia sp. in WWTPs. In this study, removal efficiency of Giardia through UV treatment in WWTPs will be analyzed by using real time polymerase chain reaction (qPCR).

Material and Methods: Seasonal water samples were collected in triplicate from inlet and outlet of UV treatment unit. Fixation was applied to samples to make them ready for later usage, and samples are stored at -20°C. The DNA of the Giardia cysts will be extracted by using conventional phenol/chloroform/isoamyl alcohol method after pretreatment is applied. Detection and quantification of Giardia will be performed by using real-time PCR (qPCR).

Results: Seasonally collected samples have been already used for total DNA extractions. The use of extracted DNA for Giardia quantification via qPCR is still under progress. After quantification of Giardia, for both inlet and outlet effluents, removal efficiency of the UV treatment will be evaluated.

Discussion: Giardiasis is a major diarrheal disease found throughout the world. The flagellate protozoan Giardia intestinalis (previously known as G. lamblia) is the most commonly identified intestinal parasite. The result of current study will reveal the removal efficiency of UV treatment on this intestinal parasite. The study is currently in progress. We will share our results during the conference.

Keywords: Giardia, WWTPs, UV treatment
Introduction: Pastures are the foremost source of feedstuffs for which animals need roughage. In addition to the pastures and meadows, they keep the soil in place, preventing wind and water erosion. Pastures is the most important nutritional source of animals. In our country, it is not grazed in accordance with the principles of grazing. Because of this, grass yield and grass quality are low. For the improvement of yield and quality, the properties of the vegetation cover in the pastures must be known. A vegetation study is conducted for the characteristics of vegetation-covered species.

Material and Methods: This research was conducted to determine botanical compositions of the native pasture in the Kodallı village of district Kırıkhan, Hatay, in the year of 2010. Vegetation of the pasture was studied by the Loop Method. In pasture 1200 loop measurements in 12 lines were made, plant-covered area rate, botanical composition in the plant covered area.

Results: 17 plant species of 17 genera from 8 plant families were determined on the vegetation of the pasture. Plant cover percentage 99.0 and percentages of grasses, legumes and other family plants in the total plant cover varied 53.8%, and 20.6 %, 25.6 % respectively, as depending on the pastures.

Discussion: According to the quality scores, the pasture studied was in poor conditions. It was concluded that because of poor conditions of the pasture, the research on the determination of proper improvement methods for the pasture must be conducted.

Acknowledgement: We would like to express our appreciation to the TÜBİTAK-TOVAG supported this study (106G017).

Keywords: Pasture, vegetation survey, loop method, botanical composition
The Amounts of Litter and Soil Carbon in Bolu Fir Forests

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Introduction: Carbon dioxide accumulating in the atmosphere is one of the most important greenhouse gases that causes global warming. Forests ecosystems are the most important carbon sink among the terrestrial ecosystems. Forests sequester considerable amounts of carbon in dead organic matter and soil pools in addition to biomass carbon pools. The primary objective of this research endeavor is to determine the amount of carbon in litterfall and soil carbon pools per unit area in Turkish Fir (Abies nordmanniana subsp. bornmulleriana Mattf.) ecosystems, which is one of the important forest tree species of our country.

Material and Methods: The study was conducted in pure fir stands in Bolu Aladağ forests, between 1000-1600 meters in elevations (in 5 elevation classes). The study was carried out in 60 sampling points representing the altitude classes. Litter fall samples were collected in 4 replicates from 20 x 20 cm area from each sampling point. Soil samples were taken from soil pedons from ground soil depth up to a depth of one meter or absolute soil depth according to soil horizons. The amount of carbon was determined by wet burning for soil samples and dry burning for litterfall samples.

Results: As a result of the study, the amount of litterfall showed a wide variation and there is no significant difference among the elevation classes. The average amount of carbon in the litterfall is 1360 g/m², so the amount of its carbon contents is not different. The carbon content in the soil horizons decreases along with the soil depth. For this reason, the highest carbon ratio is found in the Ah horizon. From the soil horizons only the thickness of the Ah horizon varied depending on the elevation classes. The thinnest (7 cm) horizon was determined at 1200 m in elevation and the thickest (16 cm) is located at the elevation class of 1550 m. The average amount of carbon in the soil is 13400 g / m³. In general, neither soil nor litterfall carbon content has been found to show significant variations due to changes in elevation classes.

Discussion: The results once again highlighted the importance of forests for carbon storage. Despite the decomposition processes that continue at all times in the soil and the litterfall, it has been determined that significant amounts of carbon are stored in litterfall and soil carbon pools in the fir forests of our study areas. Forest litterfall and soil store more carbon than other terrestrial ecosystems. Degradation and destruction of forest ecosystems due to disturbances such as wildfires will definitely affect carbon sequestration adversely. Deforestation will lead to the loss of carbon in the biomass, causing to the release of carbon first from the litterfall pool and later gradually from all the soil layers. Therefore, deforestation has global effects rather than a local effect on the carbon dynamics.

Acknowledgement: This study was supported by the research project of the General Directorate of Forestry (08.6301 / 2007-2010-2012-2014).

Keywords: Forest ecosystem, soil horizon, carbon pool, carbon sequestration
Occurrence of the Alien Spider *Mermessus denticulatus* (Banks, 1898) (Araneae: Linyphiidae) in Turkey

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**Introduction:** Genus *Mermessus* O.P.-Cambridge, 1899 includes 81 species, mainly recorded from North and Central America. *Mermessus denticulatus* (Banks, 1898) and genus *Mermessus* O.P.-Cambridge, 1899 of family Linyphiidae are recorded from Turkey for the first time. It was probably imported to Europe from North America together with potted plants at the end of 1980’s.

**Material and Methods:** The main materials in this study were collected from Muğla province in 2017. Specimens were photographed using a Leica DC160 camera attached to a Leica S8AP0 stereomicroscope. Images were montaged using “CombineZM” image stacking software and “Photoshop CS5” image editing software. SEM photographs were made with a JEOL JSM-5600 at the University of Kırıkkale. Specimens were deposited in the collection of the Arachnological Museum of Kırıkkale University (KUAM).

**Results:** The linyphiid spider species *Mermessus denticulatus* (Banks, 1898) is recorded for the first time from Turkey. This new record increases Turkish linyphiid fauna to 128 species of 67 genera.

**Discussion:** Its Turkish presence represents the easternmost boundary of this species in Europe.

**Keywords:** Araneae, Linyphiidae, Alien spider, *Mermessus denticulatus*, Turkey.
The Removal of Cu (II) ions from Aqueous Solutions by Adsorption

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Introduction: Chromium (VI) and Cu (II) ions are highly toxic, carcinogenic and mutagenic. Due to these properties, for example, Cu (II) ions are used in the composition of antifouling dyes, algicides, fungicides, and molluscicides. These metal-based contaminations are mainly released into the environment from the working areas including electroplating, leather tanning, wood and wood preservation, paper and paint production, casting, mining, steel production, fertilizers and pesticides. If these metals are not treated with appropriate methods, they cause serious problems in the environment that lead to damage to ecological balance. Many methods such as electrocoagulation, ion exchange, solvent extraction, membrane filtration, oxidation and adsorption are widely used in the removal of heavy metals. Among these methods, adsorption method is mostly used owing to both cheap and easy to use and effective. In the light of this information, it was aimed to remove Cu (II) ions from aqueous solutions by using batch adsorption method using sepiolite, a natural clay species.

Material and Methods: Crude sepiolite supplied from Madkim Maden and Kimya Ltd. Sti. Company was weighed 10 g and added to 1 L of distilled water and then stirred in a magnetic stirrer for 24 hours. Crude sepiolite was then passed through filter paper (blue band filter with a pore diameter of 45 µm) and dried at 105°C for 24 hours. The surface area of the purified sepiolite was determined by surface area meter (BET). Adsorption experiments were performed according to the batch adsorption method and adsorption isotherms (Langmuir and Freundlich) and kinetics (pseudo first and second order equations) were calculated by the obtained findings.

Results: According to the results of BET analysis and adsorption studies, the surface area of purified sepiolite, the amount of sepiolite, Cu (II) concentration, shaking speed, pH and temperature were measured 315.972 m²/g, 0.1 g, 50 mg/L, 300 rpm, 4 and 25°C, respectively. The adsorption capacity and efficiency of purified sepiolite were determined 28.49 mg/g and 98.26%, respectively. Furthermore, it was observed that adsorption isotherms and kinetics were accordance with Freundlich isotherm and pseudo first order equations.

Discussion: As a result, adsorption isotherm fitted Freundlich model more than Langmuir. based on regression coefficient ($R^2=0.99$). Therefore, Cu (II) adsorption onto sepiolite can be classified multilayer adsorption. $K_f$ and $n$ are Freundlich constants and related to the adsorption capacity and adsorption intensity and found $1.41 \times 10^{10}$, 0.146 respectively.

Keywords: Sepiolite, Cu, adsorption
A New Species of the Genus *Zodarion* Walckenaer, 1826 from Turkey (Araneae: Zodariidae)

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**Introduction:** The spider genus *Zodarion* Walckenaer, 1826 includes 160 species, which are distributed Eurasian, North African and Mediterranean countries. A new species, *Zodarion izmirensis* sp. n. is described from the Aegean region of Turkey. This species is a member of the *germanicum* group and is closely related to *Z. tireboluensis*. Differences between the new species and related species are discussed.

**Material and Methods:** The main specimens in this study were collected from İzmir province in 2017. Spiders were photographed using a Leica DC160 camera attached to a Leica S8AP0 stereomicroscope. Images were montaged using “CombineZM” image stacking software and “Photoshop CS5” image editing software. SEM photographs were made with a JEOL JSM-5600 at the University of Kırıkkale. Specimens were deposited in the collection of the Arachnological Museum of Kırıkkale University (KUAM).

**Results:** The fauna of Turkey now contains 21 species of genus *Zodarion*. It is quite likely that the inventory is still not complete in Zodariinae. According to the palp and epigyne conformation, this species clearly belongs to the genus *Zodarion* Walckenaer, 1826. *Z. izmirensis* sp. nov. is located in the *germanicum* group and is similar to the *Z. tireboluensis*.

**Discussion:** The male of *Z. izmirensis* sp. n. differs in having an seahorse head shaped palpal median apophysis.

**Keywords:** Araneae, Zodariidae, New species, Turkey.
Contributions the Jumping Spider Fauna of Turkey (Araneae: Salticidae)

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Introduction: Family Salticidae is represented by 633 genera and 6066 species in the world. Within Turkish spider fauna, with a total of 52 families and 1117 species, it is represented by 143 species of 42 genera. In this paper, we add one jumping spider species to the spider fauna of Turkey. This species is Salticus propinquus Lucas, 1846.

Material and Methods: This study is based on the materials collected with by means of hand aspirators under stones and on plants from different areas of Turkey between 2012 and 2015. Identifications were made by use of Leica S8APO Stereomicroscope. Pictures were taken, using a Leica S8APO microscope by means of a Leica DC 160 camera. Specimens were preserved in 70% ethanol. The main materials in this study are deposited in the collection of the Arachnological Museum of Kırıkkale University (KUAM).

Results: In this study salticid spider species Salticus propinquus Lucas, 1846 is recorded for the first time from Turkey and new local localities are presented for twelve species. These; Attulus avocator (O. Pickard-Cambridge, 1885), Bianor albobimaculatus (Lucas, 1846), Euophrys rufibarbis (Simon, 1868), Heliophanus dunini Rakov & Logunov, 1997, Heliophanus edentulus Simon, 1871, Heliophanus feltoni Logunov, 2009, Pellenes geniculatus (Simon, 1868), Plexippoides flavescens (O. Pickard-Cambridge, 1872), Pseudeuophrys vafra (Blackwall, 1867), Pseudicius encarpatus (Walckenaer, 1802), Pseudicius palaestinensis Strand, 1915 and Talavera aequipes (O. Pickard-Cambridge, 1871). This new record bring the total number of salticid recorded in Turkey to 144 species.

Discussion: The morphometric measurements and other characteristic features of Salticus propinquus Lucas, 1846 are not different from Greece specimens.

Keywords: Araneae, Salticidae, New record, Salticus propinquus, Turkey.
Two New Records of Little-known Spiders from Turkey (Araneae: Clubionidae, Agelenidae)

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Introduction: Spiders (Order Araneae), under Class Arachnida, form the largest group of this class with 116 families, 4086 genera and 47491 species in the world. Within this large group, while Clubionidae spider family is represented by 15 genera and 616 species, Agelenidae family is represented by 77 genera and 1274 species. Within Turkish spider fauna, with a total of 52 families and 1117 species, Clubionidae is represented by 10 species of 1 genera and Agelenidae is represented by 61 species of 12 genera. This study, we add two spider species to the spider fauna of Turkey. These species are Clubiona similis L. Koch, 1867 and Inermocoelotes falciger (Kulczyński, 1897).

Material and Methods: This study is based on the materials collected from two different province of Turkey in 2009 and 2015. Specimens were collected by means of hand aspirators under stones and on plants. Identifications were made by use of Leica S8APO Stereomicroscope. Specimens were photographed using a Leica DC160 camera attached to a Leica S8AP0 stereomicroscope. Images were montaged using “CombineZM” image stacking software and “Photoshop CS5” image editing software. Species are deposited in the collection of the Arachnological Museum of Kırıkkale University (KUAM).

Results: Two spider species; Clubiona similis L. Koch, 1867 and Inermocoelotes falciger (Kulczyński, 1897) are recorded for the first time from Turkey. This record bring the total number of spider recorded in Turkey to 1119 species.

Discussion: The morphometric measurements of this two species are a little different from European specimens.

Keywords: Araneae, New record, Clubiona similis, Inermocoelotes falciger, Turkey.
The Effects of Zinc, Boron and Sulphur Applications on the Development, Mineral Element Concentrations and Some Quality Criteria of the Garlic Genotypes Collected From Different Regions

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Introduction: Garlic is primarily produced in the Mediterranean countries, India, China and Far East countries and the US. Our country ranks 7th among the garlic producing countries with its share of approximately 4%. The total cultivation area of growing garlic in our country is 22,207 da and a total of 25,978 tons of garlic production has been realized. The common lack of plant nutrition elements in our soils and in this way the gradually increasing unconscious fertilization is a significant plant nutrition and fertilization problem in garlic production as it is the case in other plant products. The realistic and long term solution of this problem is giving the plant nutrition elements to garlic whose deficiency in the soil is determined by making plant analyses. In this study, it is aimed to determine the effects of zinc, boron and sulphur applications on the development, mineral element concentrations and some quality criteria of the garlic genotypes collected from different regions.

Materials and Methods: In the experiment, the soil sample taken from the Kastamonu- Taşköprü- Ağciğişi village is used that represents the areas where garlic is grown. The seeds used in the experiments conducted on the garlic plants under the greenhouse conditions are obtained from the cities of Kastamonu, Kırklareli, Balıkesir, Muğla, Antalya, Kahramanmaraş and Hatay. In the experiments that were conducted according to the random parcel experimental design in 3 repeats, the soils have been applied with 4 mg Zn kg⁻¹ (ZnSO₄.7H₂O), 2 mg B kg⁻¹ (agricultural boron that includes 18% boron) and 40 mg S kg⁻¹ (elemental sulphur). In the wet decomposed plant samples, the total zinc, boron and sulphur is determined by the ICP-OES device. In the plant samples, the bulb weight and the effects of fertilizer use are also determined.

Result and Discussion: In the consequence of the conducted experiment, the zinc, boron and sulphur applications had a significant impact on the bulb and stem development of the garlic plant grown under the greenhouse conditions and the application has increased the bulb and the stem weight of the garlic plants. Related to the zinc, boron and sulphur application, the zinc, boron and sulphur concentration of the bulbs and stems of the garlic plants and their intake of Zn, B and S have increased significantly.

Acknowledgement: This study has been prepared using the project data of TUBITAK “104O506”.

Keywords: Garlic, Zinc, Boron, Sulphur
Meat quality of beard-horse mussel (*Modiolus barbatus*, Linnaeus 1758) from Ayvalık Bay, Balıkesir -Turkey

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Introduction: Beard-horse mussel species (*Modiolus barbatus*) of Mytilidae are widely distributed in the world and they occur in the coastal waters of Japan, Iceland, Europe, North Western Africa and the Mediterranean Sea. In aquaculture and fisheries, the meat yield and condition index are important parameters for determining meat quality, best period of harvesting, and consumption strategies of Mollusca species. The aim of this study is to determine the seasonal change in meat yield and condition index of commercially important beard mussel from Bandırma Bay.

Material and Methods:
In the study, beard-horse mussel individuals were collected between April 2016 and March 2017 from Kumru Cove (N 39°18'07.6" and E 026°38'01.1") in Ayvalık Bay, Balıkesir. Environmental parameters were recorded at each sampling time. Collected individuals were transported to the laboratory and cleaned to remove from biofouling and other adherences. Total weight, wet meat weight, meat dry weight and shell dry weight of samples were measured. Then, monthly values of meat yield and condition index were calculated for all sampled individuals.

Results: Meat yield value showed irregularly variation and it reached to maximum value in October. Low values of the condition index were recorded from June to August, and the lowest mean value was observed in June (4.8) when temperature was the highest value (27°C). High values were observed from October to March while temperature changed between 3°C and 17°C. Monthly changes in condition index and meat yield were found statistically significant (p≤ 0.05). Both these parameters were influenced by environmental parameters.

Discussion: Meat quality in bivalve species is primarily affect by food, environmental parameters- mainly temperature and reproductive activities. In this study, beard-horse mussel has a good meat quality from October to March. Therefore, it can be suggested as human consumption for this period in the study area.

Acknowledgement: This study is a part of MSc thesis of Senay Karakoç from Graduate School of Natural and Applied Sciences, Department of Aquaculture, at Çanakkale Onsekiz Mart University.

Keywords: horse-beard mussel, *Modiolus barbatus*, condition index
Introduction: In northern Tunisia, Sclerophrys mauritanica (the Berber toad), emerges from hibernation in spring, and begins its migration towards the breeding site (from the forest of Djabal el Houaria to the hilly lake of Sidi Ameur). In a degraded semi-agricultural habitat where the implementation of mountainous roads has fragmented amphibian habitat as well as disrupting movement through the migration patch, each annual migration, to the call site just before the courtship display is accompanied by individual losses of local toad population. We will discuss the inter-annual variability of road its effect (between 2013 and 2017) on the success of the breeding season over the years of our studies as well as the size of the population.

Material and Methods: Our follow up consisted to locate the male calls, all physical presence of the Berber toad, road trainings coinciding with the migration patch (the distance separating the GPs point from the road-killed toads, to the road formations was calculated), and road-killed individuals were preserved to determine parasitism rate, sex and necessary measurements. Many Close relations were established between the collected parameters, using statistical tools (Double-hurdle model, General linearized negative binomial regression), with R v.3.4.4 software.

Results: During our study, 154 toads were localized in the site, among these toads, 127 (82.46%) were infected with different species of helminth, and we located 72 road-killed toads, 34 Amplexus and 16 clutches of eggs. There was a decrease in population size, observed amplexus, and male calls, an increase in the parasitism rate, and the road mortality rate.

Discussion: We used a comparative framework to analyze annual changes in demographics and breeding season parameters, and we suggest that no single trait could explain the loss noticed in the local population of the berber toad, but it is rather a combination of all the parameters bypassing an abundant species of amphibians but which are characterized by a sparse population. Migration is the mainstay of reproduction in amphibians and much more important in toads because they disperse at greater distances than other amphibians, the destruction of the migration patch or the implementation of obstacles on them, causes enormous damage, which affects both the size of the population and the bases of the breeding season, which is the triggering of the courtship display by the male calls.

Acknowledgement: This research was financially supported by the Faculty of Sciences of Tunis, Research Unit Biodiversity and Population Biology, Tunisia.

Keywords: Road mortality, Berber Toad, male calls, breeding season.
**Determination of Microbiological and Chemical Status of Sardines (Sardina pilchardus) in Different Sales Areas (Market and Bazaar) of İzmir**

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**Introduction:** Sardine (Sardina pilchardus) is one of the most common caught species of Aegean Sea. The quality of sardines is in relation with the quality of Sea. After catching, sardines can be contaminated from vessels, fisheries, boxes, fish sellers etc. The contamination increases from catch to consume in every stages. The microbiological and chemical values increases according to transportation, sale, storage conditions etc. Environmental factors; such as temperature, moisture, etc. are also responsible for the spoilage of sardines. Consumers can buy sardines from fish markets and bazaar, where the microbiological and chemical qualities of sardines are also very important for them. In the opposite case, sardines can be risk for consumption. For this purpose, the aim of this study was to determine microbiological and chemical status of sardines in different sales areas (market and bazaar) of İzmir.

**Material and Methods:** In this study; A total of 50 sardine samples were taken from different sales areas (market and bazaar) of İzmir in December and determined microbiological (total mesophilic and psychrotrophic bacteria count) and chemical (total volatile basic nitrogen (TVB-N), thiobarbituric acid value (TBA) qualities. Total mesophilic bacteria counts were done by using (Harrigan and McCance, 1976), while pschrotrophic bacteria counts were determined according to (Ariyapitun et al., 1999). TVB-N analyses were done according to (Vyncke, 1996) and TBA analyses were done by using (Tarladgis et al., 1960).

**Discussion:** The microbiological and chemical contents of sardines are very important in sales areas. For this reason, the hygienic conditions of sardines must be obtained in market and bazaar. The application of hygienic rules from catching to selling must be applied. It is essential to control the qualities of sardines frequently in fish market and bazaar for human health.

**Results:** TVB-N values of sardines taken from market and bazaar were determined as (23.94 mg 100g⁻¹ – 30.15 mg 100g⁻¹) and (26.60 mg 100g⁻¹ – 35.91 mg 100g⁻¹), respectively. Total mesophilic bacteria counts of sardines taken from market and bazaar determined as (1.1x10⁴ cfu/g - 9.2x10⁶ cfu/g) and (2.2x10⁴ - 3.8x10⁶ cfu/g), respectively. Total mesophilic, psychrotrophic bacteria counts and TBA values of sardines were not exceeded the limit of consumption in any of the examined samples taken from different areas (market and bazaar) of İzmir. However, TVB-N values of sardines were exceeded the limit of consumption in only two samples taken from bazaar in İzmir. According to TVB-N and TBA values, there were significant (p<0.05) differences, but by microbiological values no any difference (p>0.05) was found in sardines taken from different areas (market and bazaar) of İzmir.

**Acknowledgement:** This study was supported by Ege University Scientific Research Project Commission (2016/SÜF/011).

**Keywords:** Sardine, sardina pilchardus, fish sold, sales areas, market, bazaar
Introduction: Organic farming gained a commercial value in the 1980s as an alternative to the conventional system in Turkey. Since then, organic production and consumption in Turkey have increased each year. Today there are more than 200 kinds of agricultural products produced organically in Turkey. The organic farming in Turkey is still in progress and Turkey has important advantages in organic farming in terms of unpolluted soils, favorable ecological and climatic conditions. The first organic production was performed in the Aegean Region with dried figs and raisins. Raisin is the first organically grown crop in Turkey. The aim of this study is to evaluate the developments of organic raisin marketing in Turkey. Therefore, some recommendations are made to improve the organic raisin market in Turkey.

Material and Methods: In this study all needed materials have been derived from some sources such as FIBL-IFOAM, FAO, Ministry of Food, Agriculture and Livestock, IGEME (Export Promotion Center of Turkey), Aegean Exporters Union. The data set on organic production covers the period of 2007-2016. The data have been analyzed with the use of percentages.

Results: Domestic consumption of organic raisin is very limited in Turkey. This is mainly due to high price of organic raisins. On the other hand the domestic market is developing, with organic raisin appearing in markets and hypermarkets. Exports of organic raisin grew slowly until 2014, reaching from 2.6 million $ to 13.6 million $, they were relatively down from that year on, reaching 12.5 million $ in 2016. Organic raisins in Turkey are mainly destined for export. European Union countries (such as Germany, France, Netherlands and United Kingdom) and USA are the most important markets.

Discussion: In Turkey organic products are not in high demand yet. Turkey has some advantage for organic agriculture. For example, the use of fertilizer and pesticides per area unit is several times lower than in the EU countries, ecological conditions is very suitable for production, cost of labour is very low in rural areas etc. There are many farmers who would like to shift from conventional system to the organic farming, but they are afraid to risk their tiny capital. The volume of organic raisin export is increasing year by year. Main problems in organic raisin markets have the consumer price of organic raisin is high; the income of the producers is low. Transition costs to organic raisin production are high due to reduced yields at the beginning. Government support for producers should be expanded and a better coordination between public and private organizations and a long-term planning for the organic sector. The establishment of a network or an organization of organic farmers, traders, consumers etc. will be useful for the development of organic raisin market.

Keywords: Organic raisins, Marketing, organic raisins export
Introduction: Oilseed crops have been grown all over the World because of their economic importance. As a globally valuable oilseed crop Sesame (Sesamum indicum L.) has the highest oil content among the cultivated oil crops and is rich in natural antioxidants like sesamin and sesamol. Though its medicinal and economical importance, the seed yield of sesame is unstable and relatively low in comparison other seed oil plants. The small diploid genome (~350 Mb) makes sesame an attractive species for genomic and transcriptomic studies. MicroRNAs (miRNAs) are endogenously encoded small RNAs that regulate gene expression post-transcriptionally and play an essential role in numerous developmental and physiological processes. To reveal the mechanism of male sterility a transcriptomic study was performed, previously. Currently, no study has been made to identify the miRNAs associated with fertility in sesame. The aim of this study is to computationally identify differentially expressed miRNAs and their target genes playing role in fertility in sesame.

Material and Methods: RNA-seq libraries were downloaded from NCBI GenBank. Reads were compared with non-coding sRNAs deposited in NCBI GenBank and RNA family (Rfam) databases. Ribosomal RNAs (rRNAs), transfer RNAs (tRNAs), small nucleolar RNAs (snoRNAs), and small nuclear RNAs (snRNAs), encoding sequences were filtered and removed. The remaining reads were used for analyses. Sequence reads were aligned with known miRNA sequences from other plant species and sesame deposited in miRBase for miRNA identification.

Results: Two transcriptome libraries from fertile and sterile male sesame were analyzed. Through bioinformatics analyses, miRNA transcripts were identified and classified in to families. The potential targets of the identified miRNAs were predicted based on sequence homology.

Discussion: Based on the next generation sequencing, our research firstly identified the miRNAs in fertile and sterile flower buds of a dominant genic male sterile line in sesame. These results will be helpful to elucidate the molecular mechanism for DGMS, and assist the breeding of sesame hybrid variety..

Keywords: Fertile, miRNA, Sesamum indicum L, Sterile, Transcriptome
Introduction: As anthropogenic activities and environmental deterioration have broken large, continuous plant populations into small and isolated ones, fragmented populations have become great concerns to conservation geneticists. Populations in fragmented habitats are considered more vulnerable to demographic, environmental and genetic stochasticity, and therefore face a higher risk of local extinction, which is the fate of most of the rare and relict endemic plant species.

Material and Methods: The literature reported for the population genetics in fragmented populations of plant species, especially for rare and relict endemic species, were comparatively analyzed and reviewed in this study.

Results: Experimental and field investigations have demonstrated that fragmented populations may lose allelic richness or genetic diversity, and have increased population differentiation due to genetic drift and inbreeding depression. However, many studies based on allozymes have shown that even narrowly restricted species may maintain high levels of diversity. This is generally opposite to the findings of the studies based on DNA marker systems. In some researches increased levels of gene flow among fragmented populations were reported. In some studies, it is suggested that isolated populations might exhibit high heterozygosity due to strong selection pressures. Such genetic structures were also detected in fragmented populations of endemic plant species.

Discussion: Unfortunately, it is impossible to prevent the destructive effects of human being on nature. Therefore, conservation genetics gains increasing importance with each passing day. However, the genetic consequences caused by habitat fragmentation of the populations are not yet well understood and further investigations are needed.

Keywords: Fragmented population, genetic diversity, conservation genetics, relict endemic plant, genetic marker.
Removal of Total and Volatile Solids in Ozone Pretreated Anaerobic Digesters

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Introduction: Anaerobic digestion is a sludge stabilization process used for the conversion of organic materials in the sludge into methane rich biogas by anaerobic microorganisms. In order to improve anaerobic digestion, pretreatment methods that result in higher degradation rates, removal efficiencies and biogas production are applied. When compared to other pretreatment methods, ozone pretreatment is more advantageous because it is a strong oxidant, disinfectant and also cost-effective when used in small amounts. Typical control parameters for anaerobic digestion are total and volatile solids that denote organic and inorganic content of the sludge. Thus, removal of those solids is an important indicator for the performance of anaerobic digestion with ozone pretreatment. In this study, therefore, the effect of different ozone dosages in an anaerobic digester on the removal efficiencies of total and volatile solids was examined.

Material and Methods: Seed sludge was obtained from ASKİ Tatlar Central Wastewater Treatment Plant and the feed sludge was obtained ODTÜ Vacuum Rotating Membrane. Four anaerobic reactors were operated as three reactors pretreated with varying ozone dosages (0.03, 0.06 and 0.09 g O₃/g TSS) and one for control without pretreatment. During the operation, total and volatile solids (TS and VS) of the sludge samples were measured daily by using standard method.

Results: For control and 0.03, 0.06, 0.09 g O₃/g TSS ozone dosages; 15.7%, 41.3%, 59.8% and 0% TS removal and 4.8%, 28.8%, 59.3% and 0% VS removal were obtained, respectively. Accordingly, removal of both TS and VS were the highest at 0.06 g O₃/g TSS ozone dosage.

Discussion: Ozone pretreatment was more effective on TS and VS removals than those without pretreatment. Although optimum ozone dosage for the highest TS and VS removal is at 0.06 g O₃/g TSS ozone dosage, 0.09 g O₃/g TSS ozone dosage showed an adverse effect.

Acknowledgement: This study was supported by TÜBİTAK 1001-Scientific and Technological Research Projects Funding Program (116Y181).

Keywords: Ozone pretreatment, anaerobic digestion, total solids, volatile solids
Civil Liability of Polluter Person under the Environmental Act

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Introduction: Article 28 of the Environmental Act regulates the legal liability of polluting the environment. According to this article, the person who pollutes or harms the environment is liable for the damages that occur. Liability arises regardless of the fault of the person that pollutes or harms the environment. In this case, the liability may also arise from the general provisions of liability of Turkish Code of Obligations and Turkish Civil Code. In particular, the liability of the building owner (Turkish Code of Obligations Article 69), the general risk liability (Turkish Code of Obligations Article 71), the liability of the owner of estate (Turkish Civil Code Article 730). According to Article 28, statute of limitations is 5 years.

Material and Methods: This study will examine the decisions of the Turkish Court of Cassation (Yargıtay) concerning the civil liability of polluter under the Environmental Act.

Results: According to the Article 28 of Environmental Act, the person who pollutes or harms the environment is liable.

Discussion: Environmental Act Article 28 regulates the liability of the people who pollutes the environment. In this article, only compensation for damages is arranged. However, the absence of other measures for environmental pollution is a great lack. The demands of stopping attack and reinstating should be regulated in the provision.

Keywords: Civil Liability of Polluter Person, Article 28 of Environmental Act, Other Measures For Environmental Pollution.
Marine Litter Pollution of the Black Sea Coasts: A Review

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**Introduction:** Marine litter is any persistent, manufactured or processed solid materials that have been emptied, thrown away or left in coastal or marine environment and originates from many marine and terrestrial sources. Marine litter is found in all the world’s oceans, from the poles to the equator, from continental coastlines to small distant islands. In recent studies, the presence of marine litter was reported from all over the world’s beaches, sea floor and sea water and even freshwater.

**Material and Methods:** The studies on marine litter in our country and in the entire Black Sea Region are quite new and have gained momentum in recent years. It is considered that there is not enough information about the present situation and it is an important subject to be investigated when considering the ecological, economic and social damages it creates. In this review, the situation of marine litter in the Black Sea region was examined in the light of available literature data.

**Results:** The total population of the Black Sea basin is more than 170 million and the daily activities of all people in some way affect the Black Sea marine litter pollution. When the scientific studies on the Black Sea countries are categorized according to the region, it is divided to: beach litter, floating litter, seafloor litter and microplastics. The literatures on beach litter were reported that the marine litter were mainly composed of land-based sources and the majority of the litter were made of plastics. Similar results have been reported for seafloor litter. It was reported that there were large amount of litter on the seafloor and beach. The number of studies of floating litter is relatively low and the results of the studies show that the general pollutant type on the sea surface is plastics and is mostly composed of beverage bottles. In addition to all these, there were also foreign origins litter commonly originated from neighbouring countries. The studies on microplastics are very few and the amount of microplastic in the studies conducted on the surface of the water and in the coastal sediments and the results showed that microplastic quantities are quite high.

**Discussion:** As a result, considering that there is a large amount of marine litter in the data obtained from the studies conducted in the Black Sea. Scientific studies on marine litter in the Black Sea region are still scarce especially on microlitter and effects on biota. It is need further examination on these issues for the Black Sea.

**Keywords:** Marine litter, plastic, microplastic, Black Sea
Introduction: Developing world economy brought rapid consumption together; this has led to a shortening of the product life cycle and products which are still available have left their places to new products in a short time. The life cycle of a product does not consist only of the production process. A product; from the design phase, through the completion of the life cycle to the destruction of the life, and even to the recycling, and each product creates different environmental influences at different stages of life. In order to reduce the environmental impact of any product, a holistic and proactive approach to the entire life cycle of the product has to be adopted. This will be possible with "Green Design" (GD), which integrates product and process design and environmental issues.

Material and Method: In this study, clean production and eco-design issues are discussed under the design for environment. It is emphasized that a product does not cause problems for the environment and that it can be designed from the production stage to waste generation in order not to negatively affect the living life.

Results and Discussion: Reducing the environmental impact of products throughout their lifetime is a process that begins with design. All kinds of activities, from the raw materials and materials to be used in production to all the processes that will be passed even after completing the life, become clear when the product is in the design phase. Considering the entire life cycle of the product, green design, which envisages designing by integrating the environment and design issues, enables the reduction or entirely elimination of the various environmental effects that occur at each stage of the product life cycle. Green design leads engineers to evaluate the environmental impact of the entire lifetime of the products. As a result, the amount of waste is reduced, the use of energy and materials is optimized, and the waste generated at the end of the process can be input for another process. This modern design practice sets out alternative production approaches that will enable the process to be restructured.

Keywords: Clean production, eco-design, eco-efficiency, green design
The Relation Between Head Rot Disease and The European Sunflower Moth Causing Damage in Sunflower

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Introduction: The European sunflower moth (ESM), Homoeosoma nebulellum (Den.&Schiff) is an important pest affecting the quality and quantity of sunflower production. The larvae of the ESM, a Palearctic species, are particularly harmful by feeding on the sunflower heads first in the flower part and in later stages in the matured seed. Head rot disease (HRD) is caused Rhizopus spp. that reduces yield and quality of sunflower seeds. Mechanical or physical damage that occurs in the sunflower platelets leads to the spread of HRD and causes the plums to be completely destroyed, significantly reducing seed yield. Studies have been carried out to determine the relationship between the pest and the disease for sunflower plant which has an important place in the production of vegetable oil in our country.

Material and Methods: The main materials of the study were Sunflower plants in Ankara province and sunflower heads in which ESM and HRD were detected. The surveys were carried out in July-August 2013 and 2014. As a result of controlling the the tables where the moth damage was seen in the field and the tables where the disease was observed, regression line estimation method was applied to the obtained data.

Results: The studies are carried out in the years of 2013 and 2014 in the areas of Ayaş, Bala, Kalecik and Beypazarı in the sunflower fields by counting and sampling. In the sampling, it was observed that if the sunflower heads invaded by ESM also damaged by HRD or not. Similarly, the tables bearing the HRD sign were checked to determine whether there was a moth damage. Assessment of the obtained data was made on a regression curve showing the relationship between the harmful larvae of the sunflower plants and the disease.

Discussion: As a result, it has been determined that the HRD was caused by the injuries in the sunflower heads by the pest feeding. While harmful infestations have been reported in sunflower derived wounds, infection has not been detected in other harmful wounds. No disease infections have been detected in some of the tables damaged by sunflower moth. The relationship between ESM and HRD, which causes loss of yield by affecting sunflower plant in the negative direction has been determined. In particular, it was concluded that management with the pest would also be effective against the disease of the HRD and provide a secondary benefit.

Keywords: Sunflower, European sunflower moth, Head rot disease, Damage, Ankara
Introduction: Trees protect urban surfaces by reducing the impact of rainwater, while their roots remove nutrients that can be harmful to the water in urban soils, hence improving urban hydrology and controlling erosion. In addition, trees in urban settings mechanic comfort and foster citizens’ wellbeing (e.g., affecting physical and mental health, aesthetic and socio-economic values, common heritage, recreation benefits, etc). In this study, some environmental factors causing to the overthrow of the trees in the Karadeniz Technical University campus in January 2015 were evaluated.

Material and Methods: A total of 6 profiles were excavated in windthrow areas. A total of 18 soil samples was gained undisturbed soil sample from 0-10, 10-20 and 20-50 cm depths. Some properties (sand, silt, clay, permeability, pH) on soil samples were determined. It was realized stem analysis on some windthrow trees and it were revealed diameter increments of trees according to years. Also, some meteorological parameters (max. wind speed etc.) were gained from Meteorology 11th Regional Directorate (Trabzon)

Results: According to soil analysis, the sand ratios of soils are between 32 - 51%, the silt ratios between 13 - 18, and the clay ratios between 36 - 51%. Soil species are silty clay and heavy clay. The pH ranges from 6.5 to 7.4. Soil permeability is determined to be highly impermeable. Also, according to the stem analysis, the diameter increments of stone pine (Pinus pinea) trees were evaluated according to different sites. Particularly, it has been observed that the diameter increments have fallen rapidly from early ages (5-6 year). The maximum wind speeds in the field range from 20.0 to 70.9 km/h. The winds are in the strong wind and storm class.

Discussion: Previously conducted studies in forestation areas have partially damaged the root systems of trees. The snow has put pressure on the tree crown and the snow has already caused the increase in water saturation in the soil which is impermeable. The increase in water saturation of soil provided that the roots of trees became free. Due to strong winds and storms, there have also been windthrow events. Trees in urban areas that have had their root systems interfered with are more likely to be stressed and prematurely senescent. They are also more likely to suffer windthrow. Even if the canopies of tree appear to be healthy and intact, root systems may be stressed and their structures compromised. If roots are severed on the prevailing windward side of the tree, then a significant reduction of root mass will indicate that the risk of windthrow is heightened (Moore 2014).

Keywords: Stone pine, Pinus pinea, urban areas, windthrow, soil properties, diameter increment.
Biosurfactants Enhanced Kerosene Degradation Approved Through Microbial Adhesion to Hydrocarbon

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Introduction: Kerosene known as lamp oil and airplane’s jet fuel, is a hydrocarbon used in industry and households causing serious environmental effects due to its toxic properties. The extensive demands and consumption cause serious environmental pollution. Biodegradation is an efficient method for removal of hydrocarbons performed by bacteria. The efficiency of this process depends on their biosurfactant production. Biosurfactants enhance biodegradation activity either by reducing the surface and interfacial tension of hydrocarbons or by increasing the hydrophobicity of bacterial cell wall leading to microbial adhesion. Therefore, this study aimed investigating surface, interfacial reduction and cell adhesion capabilities of the biosurfactants produced by kerosene degraders.

Material and Methods: Previously, in our laboratory, 22 different bacterial strains were isolated from hydrocarbon contaminated river water and among them, 7 isolates showed 69-84% kerosene degradation ability. In this study, the efficiency of the biosurfactants from the isolates were measured by surface and interfacial tension reduction and microbial adhesion to hydrocarbon (MATH) tests. For that purpose, 21 day-old cultures were centrifuged and surface and interfacial tension reduction of cell free supernatants were measured using a digital tensiometer. Chemical surfactants were used as positive controls. Cell pellets were assessed for MATH test in order to evaluate the adhesion properties of cells towards kerosene.

Results: Surface tension of the samples were compared to medium without biosurfactant and reduction percentages were between 1-10. Among all, the biosurfactant from Pseudomonas koreensis Hg11 performed better than a chemical surfactant. For interfacial tension measurements, reduction percentages varied between 1 to 28. The biosurfactant of Acinetobacter johnsonii Sb01 reduced the interfacial tension of the medium almost 28% while the chemical surfactant reduced almost 23%. The MATH test results showed that, among 7 isolates, 6 had high adhesion (up to 81%) towards kerosene.

Discussion: The biosurfactants from the efficient kerosene degraders were not succesfull in reducing the surface or interfacial tensions. However, changes in surface and interfacial tension is not always related with degradation directly. Therefore, the bacterial isolates used in this study thought to degrade kerosene by increasing the adhesion properties of the cells.

Acknowledgement: The authors would like to thank Middle East Technical University (METU) Central Laboratory for their assistance in surface and interfacial tension measurements. This study was financially supported by METU Research Fund (BAP-03-11-2017-001).

Keywords: Kerosene, biosurfactant, MATH, adhesion, biodegradation
Molecular Characterization of *Dactylogyrus* spp. (Monogenea) in *Capoeta tinca* (Heckel, 1843) from the Northeast Turkey

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Introduction: *Capoeta tinca* lives in the fresh waters of the Central, Western and Northern Black Sea Region is an endemic species in Turkey. Gill monogeneans of the highly diversified genus *Dactylogyrus* are species-specific to their cyprinid host species. To date, only 2 species of *Dactylogyrus* have been morphologically found from *C. tinca* in Turkey. However, to date, there is no molecular identification of *Dactylogyrus* species in cyprinid host from Turkey. The aims of the present work are to molecular identification of *Dactylogyrus* species in *C. tinca* from the Northeast Turkey.

Material and Methods: A total of 12 specimens of *C. tinca* were collected from Samsun province. Standard procedures were used for parasitological examination. Presence of monogeneans in the gills, skin and fins were also examined under a stereo microscope. Monogeneans were collected from gills for morphological and molecular analysis. DNA was extracted from individual parasite using a standard kit. The amplification of partial rDNA and the ITS-1 was performed by using specific primers.

Results: Monogenean infection was found in 3 (25 %) of 12 *Capoeta tinca*. The morphology of our monogeneans agrees well with the description of *Dactylogyrus* spp. PCR amplifications of the rDNA and ITS region was successful in five *Dactylogyrus* samples. Furthermore, molecular identification and characterizations of *Dactylogyrus* spp. are still going on within the present study.

Discussion: Monogeneans are highly host specific and many species are restricted to one host species. Recently, molecular markers as a new tool for identification of *Dactylogyrus* species have been widely accepted. There is no study about molecular characterization of *Dactylogyrus* spp. in fish species from Turkey. The present study represents the first findings of a comprehensive study of *Dactylogyrus* spp. from *C. tinca*. Moreover, molecular characterizations of *Dactylogyrus* species will be revealed in *C. tinca* and phylogenetic relationships of this monogenean will be detected in the future.

Acknowledgements: *Capoeta tinca* samples captured at TUBITAK project number 215O373 were examined.

Keywords: *Dactylogyrus* spp., Molecular characterization, *Capoeta tinca*, Samsun
Physiological Interactions of *Pimpla turionellae* (Hymenoptera: Ichneumonidae) and *Galleria mellonella* (Lepidoptera: Pyralidae) in Biological Control Studies

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**Introduction:** The search for alternative methods of combating agricultural pests in biological control has been increasing in recent years. Research has been directed towards the development of new chemicals and the use of chemical and biological agents together. In the classic sense, the Biological control is based on the principle of using the beneficial organisms to reduce or suppress the effects of the adverse effects. In this study; endoparasitoid *Pimpla turionellae* L. was used as host *Galleria mellonella* L. model insect and its aim was to investigate the physiological interaction between the parasitoid and host and the mass production in laboratory conditions of the parasitoids

**Material and Methods:** Artificial diet containing an old dark honey pellet (broodstock) ground to grow the larvae of *G. mellonella* under laboratory conditions can be used. The larvae (first stage larvae) for *G. mellonella* stock culture were maintained in a semi-synthetic diet at 28 ± 2 °C and 65 ± 5% relative humidity in an incubator (Nube, EN 500) and kept in constant darkness throughout the day. For the continuation of insect cultures, larvae (first stage) emerged from the eggs were grown in artificial feed in glass jars (80x 180 mm). Approximately 25 to 30 days later in the artificial diet, another jar with folded pearl paper pieces was transferred to provide a dry environment for pups of the maturing 7th stage larvae to complete their development. *P. turionellae* L. individuals were grown using *G. mellonella* L. pups in the natural host waxy test at laboratory conditions of 16 hours photoperiod application at 28 ± 1°C temperature and 75 ± 5% relative humidity.

**Results:** In this study; it has been emphasized that the temperature, the duration of the parasitism, the ambient light and the average weight of the host are important for the *P. turionellae* to be used in the biological control by mass production. Also, preventing diet contamination of *G.mellonella* is important for the production of endoparasitoids under laboratory conditions.

**Discussion:** Species generally belonging to the family Ichneumonidae from the Hymenopter are commonly used in combat against insects that damage agricultural areas. Due to the preference of *P. turionellae* as a large host, mass production and its use against agronomic pests are important for biological control.

**Keywords:** *Galleria mellonella*, Parasitoids, Biotechnology, Biological control
Aminoglycoside Resistance Genes Monitored in Hospital Wastewaters

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Introduction: Antibiotic resistance is considered one of the major threat to the public health since antibiotics have widespread use in agriculture, animal husbandry and veterinary practices. There are four general mechanisms for antibiotic resistance: the inactivation or modification of the antibiotic, an alteration in the target site, the modification of metabolic pathway and reduced permeability or increased active efflux. Aminoglycosides have been an important broad-spectrum antibiotic class since the use of streptomycin in 1944. Resistance to aminoglycosides usually caused by decreased uptake of the drug or enzymatic modification of the drug. Aminoglycoside-modifying enzymes are often plasmid encoded which allows these genes spread via hospital wastewater discharges. One of the aminoglycoside modifying enzymes is O-nucleotidyltransferases and encoded by aadA gene. Therefore the aim of this study was to use aadA specific primers to monitor aminoglycoside resistance in the collected hospital water discharges.

Material and Methods: Wastewater samples were collected seasonally from six different hospitals and fixed for DNA extraction. Extracted sample DNA was used for aadA gene quantification through quantitative polymerase chain reaction (qPCR) method.

Results: Aminoglycoside resistance caused by aadA gene was detected in all hospital samples by standard PCR method. Quantification of these genes are stil in progress.

Discussion: Hospital wastewaters are suitable for proliferation of antibiotic resistant bacteria and antibiotic resistance genes. Due to its antimicrobial and toxic ingredients, hospital wastewaters creates a selective pressure on these bacteria. These makes hospital wastewaters suitable for dissemination of antibiotic resistance to the environment.

Acknowledgement: This study is funded by The Scientific and Technological Research Council of Turkey (TUBITAK project no. 117Y245).

Keywords: Hospital wastewaters, Aminoglycoside resistance, aadA
A Waste Lignocellulosic Material: Tree Barks

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Introduction: Tree barks are usually considered as a waste material and not intend to utilize much for industry rather than mulching or burning. However, depending on species and some other morphological variables, it has on the average about 10 percent of the volume of a tree. On the other hand, due to increasing demand on lignocellulosic sources and shortage on forest lands, studies are rapidly increasing in order to potential utilization of these waste materials (bark) on optimal level in different countries around the world.

The numerous literature on bark based products has already been reviewed and pointed by a number of researchers. Some valuable bibliographies provide a thorough index to the literature on that topic. It is important to note that because of strong competition from other lignocellulosic materials and cost considerations, markets for these products have not been in great demand. However, efficient chemical properties may create a new industry by making a valuable products.

Results: Barks could be supplied in commercial quantities in timber or forest products yards. Thereby, it has already been experimented some type of barks for their efficiency as raw materials for conversion to high quality products such as; as an adhesive alone or with others, as soil amendment or additives, herbal and phermeutical properties, as bedding material for poultry, as an industrial fuel source and as an membrane to clean sewage or industrial waste streams. However, for better utilization and conversion to high value products, the chemical and physical properties should be well established for each type of tree barks.

Some of the bark extracts (e.g pine bark extract) have been found to be healing properties for inflammatory diseases, wound healing, as a food supplement to overcome many degenerative disorders, as a neutraceutical agent and for cardiovascular health as well. In this study, the potential use of tree barks through general properties, to provide a basis for future applications have been reviewed. Some literature findings have been reviewed and important findings regarding their valuable properties are reported.

Keywords: Tree bark, Waste material, Extractives, Burning, Mulching, Phermeutical properties
Steppe Roadsides as Environmental Corridors of Expansion and Conservation of Zonal Species of Rodents (Rodentia) of Ukraine

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Introduction: Ukrainian highways total length is 150 thousand km, but flora and fauna of steppe or meadow roadsides located along them are not sufficiently explored. These insignificant and, at the same time, rather large zonal biotopes are the last refuge for survival and distribution not only for usual but also rare and disappearing animal species. Our work is devoted to the study of the role of these biotopes in the conservation and distribution of certain species of rodents in conditions of modern steppe zone of Ukraine.

Material and Methods: Materials of the research were collected in 1996-2017 in the conditions of the Right Bank and, in part, the Left Bank and the Crimean Steppe of Ukraine. Automobile and pedestrian records of animals and traces of their activities (burrows, mounds, throw-outs) were carried out, dead individuals were recorded, bears were carried by pressure of Hero and 0.5 l cups. All data were applied to topographic maps (scale 1: 200 000).

Results: Distribution, number and conditions of existence of 7 species of rodents Spermophilus odessanus, S. pygmaeus, Marmota bobac, Nannospalax leucodon, Spalax zemni, Mus spicilegus, Ellobius talpinus have been most widely studied. Almost all species except Mus spicilegus are listed in the IUCN Red List. The maps of species areas have been developed. Historical changes have been analyzed.

The existence of Ellobius talpinus and Marmota bobac colonies considered to be extinct years ago in the Right-bank steppe of Ukraine, has been proved. The boundary of these species areas has been removed to the west - from the eastern districts of Luhansk region to 450-650 km westward.

Discussion: Rodents use of steppe roadsides as specific ecological corridors by which they settle into more massive nuclei of zonal landscapes (gullies, valleys of rivers, etc.) and where they find their shelter is discussed.

Keywords: Steppe roadsides, rodents, steppe, Ukraine.
The Sublethal Effects of Fluoxetine-HCl on Stress Parameters of *Danio rerio*

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**Introduction:** The aim of this study is to investigate sub-lethal disrupting effects of fluoxetine-HCl (FLX) on catalase (CAT) activity and malondialdehyde (MDA) levels of liver tissue and whole body in zebrafish (*Danio rerio*). FLX is the active compound of the antidepressant Prozac™ and acts as a selective serotonin reuptake inhibitor (SSRI) in humans. Zebrafish are well-characterized model organism especially for the antioxidant enzyme activities for humans. Our study was planned as a model to investigate the effects of daily intake doses of FLX, which adapted from human proportionally to weight, on liver tissue of zebrafish. CAT, MDA and total protein levels were detected using spectrophotometric methods.

**Material and Methods:** The six experiment study groups were composed as; 150 ng fluoxetine-HCl exposed to each aquarium tank and five zebrafish were studied at 15 min., 30 min., 60 min., 4 days and 8 days of exposure and the last group was composed as the control group.

**Result and Discussion:** In our study, it is determined that the activity of CAT increases in two experimental group after exposure FLX (15 min. and 30 min.) in liver tissue. Following one hour FLX treatment, it was observed that CAT activity decreased, whereas after four days treatment it was re-increased. Once for all, following 8 days treatment of FLX, it was observed that CAT activity significantly decreased. Likewise we found that the MDA levels decreases in all experimental groups after exposure FLX in liver tissue definitely. In whole body groups, MDA levels was firstly decreased after exposure FLX but MDA levels was increased subsequently compared to the control group in this study. In conclusion, building on the framework surrounding drug metabolism in fish, it is apparent that the capacity of fish liver to metabolize FLX in vitro is variable.

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**Keyword:** Zebrafish, Liver, Fluoxetine, Stress
The Lipid Peroxidation in the Gill Tissue of Rudd (\textit{Scardinius erythrophthalmus}, Linnaeus 1758) During Lake Sapanca Natural Condition

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**Introduction:** Sapanca Lake has an economical importance in terms of its aquatic product and water is taken from the Lake for domestic and industrial needs. Sapanca is one of the few lakes in Turkey, which provides drinking water, but it is exposed to heavy urbanization because of its natural beauty and its proximity to the metropolitan Istanbul. There is pollution from highways near the coast and also from waste water from settlement areas around the lake. Rudd, a model aquatic organism, was used as experimental animal. In this study, lipid peroxidation indicating oxidative stress in rudd (\textit{Scardinius erythrophthalmus}, Linnaeus 1758) gill tissue was used to investigate the effects of domestic and industrial pollution in Sapanca Lake.

**Material and Methods:** Fish samples were taken from the Lake with professional fisherman in every month of 2015 and the samples were brought to the laboratory in cold chain. After dissection, gill tissues of rudd were homogenized and used for determine malondialdehyde (MDA) level with spectrophotometric methods. MDA is one of the most frequently used indicators of lipid peroxidation. IBM SPSS Statistics 23, One Way Anova and T-student tests were used. A value of \(p<0.05\) was considered statistically significant.

**Results and Discussion:** The results show that MDA level increased in especially on December (0,253±0,06 nmol MDA/g), decreased in significantly on May (0,09±0,007 nmol MDA /g). High levels of MDA indicate lipid peroxidation. Lipid peroxidation is indicative of protective effects of oxidative enzymes that do not occur or that occur at low levels. Aquatic ecosystems can be considered as an indicator of health in both animals and humans.

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**Keywords:** Rudd, Gill, Lipid peroxidation, Sapanca Lake.
Determination of Oxidative Stress Parameters After Exposure to Tribenuron-Methyl in The Zebrafish (Danio rerio) Heart

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Introduction: Tribenuron methyl (TBM) is a member of the highly selective post-emergence sulfonylurea herbicide family, belongs to the acetyl lactic acid synthase inhibitors and is widely and effectively used in weed control also integrated pest management since the mid-1980s. It is very likely that this commonly used chemical influents seepage and it is better monitored frequently. The zebrafish (Danio rerio), recognized as a valuable biological model for research in a variety of biological disciplines, from basic developmental biology to applied (eco)-toxicology, both for its high practicality of storage and maintenance as the high physiological similarity to mammals. In addition, zebrafish gill is potentially useful in screening waterborne pollutants.

Material and Methods: Zebrafish were acclimatized for two weeks in experimental tanks which were used chlorine free tap water. During the acclimatization period, fish were fed twice a day. The experimental groups of fish; which size differ between 3-5 cm were divided into four groups (control group; 25 ppm; 50 ppm and 100 ppm). Each treatment was triplicated with aquariums of 6 fish, as the experiment duration of 96 hours. The heart tissues were removed, homogenized and used for determination of total protein and total glutation (GSH) levels, lipid-peroxidation in terms of malondialdehyde (MDA), also catalase (CAT) and AChE enzyme activities. IBM SPSS Statistics 23, One Way Anova and T-student tests were used. A value of p<0.05 was considered statistically significant.

Results and Discussion: The results show that total protein and MDA levels showed significant increase in the heart tissues of adult zebrafish. Also, CAT enzyme activity of 25 and 50 ppm showed significant increase but, 100 ppm group showed decrease compared to control group. AChE enzyme activities showed dose-dependent increase compared to control group. However, there was no significant change in GSH level. These results supported that, AChE and CAT enzyme activities and total protein, MDA and GSH levels thus oxidative stress parameters of zebrafish heart tissues were effected by different doses of tribenuron-methyl exposure. As a conclusion, this study showed that tribenuron-methyl exposure caused oxidative stress in the heart tissues of adult zebrafish.

Acknowledgement: This project has been supported by Marmara University, Scientific Research Commission (BAPKO) with FEN-A-120917-0536 Project number.

Keyword: Tribenuron-methyl, oxidative stress, zebrafish, heart.
**Introduction:** Water treatment has been essential problem for the environment. Commercial water treatments commonly use chemical agents. Scientists search for environmental friendly alternatives other than chemical biocides. Ultrasound usage is classified as a non-chemical strategy for water cleaning. In this study, for the first time, effects of ultrasonic irradiation on Goldfish’s (*Carassius auratus*) gill tissue in order to determine oxidative stress, examined.

**Material and Methods:** Ultrasound works by the phenomenon of acoustic cavitation which occurs after sound waves above the frequency of 20 kHz. In our study, ultrasound applied with a horn-type sonicator (UP100H; Hielscher GmbH, Teltow, Germany) operating at a fixed frequency of 30 kHz and a nominal power output up to 100 W was used in 20L aquarium. Ultrasound usage was investigated as the cleaning frequency of 30 kHz ultrasound on Goldfish’s (*Carassius auratus*) gill tissue. Goldfish were acclimatized for two weeks in stock tanks under laboratory conditions. Tap water free from chlorine was used. During the acclimatization period, fish were fed ad libitum with pellet twice a day. Ultrasound applied three experiment groups and a control group; each group contained 5 Goldfish which ultrasound applied one hour per day for seven days. The dissection of Goldfish gill tissues performed for the 1st, 4th and 7th day after exposed to ultrasound for one hour per day. The experiment was repeated 3 times. Oxidative stress determined by measuring total protein, malondialdehyde (MDA) and total glutation (GSH) levels, Catalase (CAT) and Acetylcholinesterase (AChE) enzyme activity with spectrophotometric methods.

**Results and Discussion:** The results showed us that, compared to the control group total protein levels were increased while MDA and GSH levels were decreased in all days. CAT enzyme activities for the 1st and 7th days were decreased but for the 4th day were increased. AChE enzyme activities for the 1st and 4th days were increased but for the 7th day were decreased. As a conclusion, our study point out that, ultrasonic irradiation is effective on Goldfish’s gill tissue.

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**Keywords:** Goldfish, Gill, Oxidative stress, Ultrasonic.
Introduction: The genus *Mauremys* is represented by 10 species, occurring in two disjunction distribution ranges. The Western Caspian turtle, *Mauremys rivulata* is a medium-sized freshwater turtle inhabiting various natural and artificial freshwater habitats. The species distribute in the Balkans of southeastern Europe and the eastern Mediterranean, including southern coastal Turkey and the western Middle East. It occurs in Thrace, western, northwestern, and southern Anatolia. Although many studies have been made on the biology and ecology of the species, we still have inadequate information about its breeding biology in Anatolia. Here, we report some observation on the breeding ecology of the Western Caspian turtle in Mediterranean region of Turkey.

Material and Methods: In our project about population status and conservation of *Emys orbicularis*, we also monitored *M. rivulata* for two consecutive years (2012 and 2013) in Mediterranean Turkey. We tried to determine breeding phenology of the species from February to September 2012 and 2013, and estimated clutch size. We also discussed the effect of nest predation on *M. rivulata*.

Results: We observed that individuals usually emerge from hibernation between the end of February and early March depending on elevation and latitude. Mating occurred between March and May, afterwards, females lay eggs between May and June. During the period of study, a total of 19 nests (5 nests from Muğla, 14 nests from Mersin) were detected in 2012. Average fecundity in females was 5 (4–9) eggs, and approximate incubation period was determined to last between 70 and 100 days. The habitat where nests detected was densely covered with rushes (e.g., *Carex* sp., *Juncus* sp., *Phragmites* sp., *Typha* sp.). The nests are away from water between 2 m and 10 m and they are pear-shaped. The average width of nests mouth was 6.6 cm, and the bottom was 10 cm, and the depth was 10 cm. We also observed the nests are destroyed by the Eurasian Otter (*Lutra lutra*), Fox (*Vulpes vulpes*), Golden Jackal (*Canis aureus*), and Eurasian Badger (*Meles meles*) by tracks and interviewing locals.

Discussion: Turtles from temperate zones generally lay their eggs in spring or summer, and hatchlings start to emerge in autumn. The mating season of *M. rivulata* extends from April to June and eggs are laid between mid-May and late June depending on the latitude. Nesting occurs in June and July, and two or three clutches including 4-6 eggs are laid each year. The incubation period lasts around 70 days, and hatchlings emerge after the rains at the end of summer. While *Mauremys caspica* has the clutch size of 4-6 eggs, *M. leprosa* lays slightly larger clutches (5-10 eggs). The average incubation period is 65-75 days at a medium-high humidity environment (75-90%) at 27-30 °C degree. One of the main threat to freshwater turtles is unnaturally high levels of nest predation. It also effects on *M. rivulata* populations in Mediterranean Turkey.

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Keywords: The Western Caspian turtle, *Mauremys rivulata*, breeding, Mediterranean region
Some Geophytes of Kocaaliler Town

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Introduction: Geophyte is perennial plant that propagates by means of buds or shoots (bulb, rhizome and tuber) below the soil surface. Turkey is very rich in terms of geophytes. Kocaaliler is a town in the district of Bucak, Burdur province. In this study, some geophytes distributed in Kocaaliler town were given.

Material and Methods: Kocaaliler town is located in C3 square according to Grid system. Plant samples that collected during the field studies conducted between 2015-2016 were diagnosed according to the Flora of Turkey. Its Latin name, Turkish name, family, endemism and phytogeographical region belonged of some geophytes distributed in Kocaaliler town were listed in table.

Results: As a result of this work, 40 plant taxa, belonging to 30 genera and 14 families were identified in the study area. This study, the families Amaryllidaceae, Araceae, Aristolochiaceae, Asparagaceae, Asteraceae, Caprifoliaceae, Colchicaceae, Geraniaceae, Iridaceae, Liliaceae, Orchidaceae, Ranunculaceae, Violaceae and Xanthorrhoeaceae were found. The distribution of these taxa according phytogeographic regions are as follows: 57.5 % Mediterranean, 5 % Irano-Turanian, 2.5 % Euro-Siberian and 35 % cosmopolitan and unknown. The number of endemic taxa are 7.

Discussion: In this study, the some geophytes distributing in Kocaaliler town were determined. Geophytes have been used as food, medicinal, ornamental, industrial and economic for many years. In order to be transmitted to future generations we need to define and protect our geophyte plants. For this reason, it should be stopped digging up the geophytes and made more studies on tissue culture. Endangered species should be protected at their natural habitat.

Keywords: Geophytes, Kocaaliler town, Turkey
Effects of Low Temperature on the Encapsulation Reaction in *Galleria mellonella* (Lepidoptera: Pyralidae) Larvae

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Introduction: The physiological response of insects to low temperature is important to understand the ecology and overwintering aspects of insects. Encapsulation is a type of immune reaction of insects occurred by aggregation of hemocytes around larger objects than bacteria. The aim of this study is to investigate the effects of low temperature exposure on the levels of encapsulation response in the greater wax moth, *Galleria mellonella*.

Materials and Methods: The cultivation of *G. mellonella* were conducted in a laboratory at 27 ± 1°C, 60 ± 5% RH and dark conditions by feeding of the semi-synthetic diet. The selected last instar larvae (0.16 ± 0.01g in weight) were individually exposed to 10°C and 60% RH for 3, 5 and 10 days in climate chamber. After low temperature application, pre-prepared Sephadex Chromatography beads were injected into each larva. Larvae were dissected at 4 and 24h after injection and the level of the encapsulation response was determined by microscopy.

Results: We divided the level of encapsulation reaction into three group; none, weak and strong. It was found that the level of strong encapsulation reaction of the larvae exposed to low temperature generally decreased. The most significant reduction in encapsulation capacity was belong to the group exposed to low temperature for five days at 4h after injection of the beads.

Discussion: Results showed that exposing to low temperature might negatively affect the cellular immune system of *G. mellonella* larvae. Especially, short-time cold shock caused unsufficient encapsulation levels. Insect parasitoids which are very important for biological control applications have to synchronize their life cycles with host availability. However overwintering strategies avoid the parasitization at winter time in their natural environment. Thus low temperature acclimations of host species might be useful for the mass rearing of their parasitoids at laboratory conditions. This study showed that cold shock might be an disadvantage for the host species while as an advantage for their parasitoids. Furthermore, we need more investigations on other immune system responses of the host to support this result.

Keywords: Encapsulation, *Galleria mellonella*, Immune system, Low temperature
Introduction: The notifications regulating commercial fishing are prepared by General Directorate of Fisheries and Aquaculture with using fishery law no 1380 and related regulations as base. In addition to taking scientific researches consideration, the opinions of relevant institutions are received; several meetings are hold at the preparation phase. Therefore, the notifications enter in force for every four years. At this presentation, we aimed to open some issues for discussion to share our ideas with the fishery sector in Turkey about some prohibitions and restrictions that are in the notification 4/1 still in force and to make a sustainable benefit from fishery resources.

Material and Methods: The protecting and controlling of the aquatic resources has been desired with the notifications that has still been widening the scope since 1971. The analysing of the notifications (formerly called as circular) that have been enforced until today within the scope of this presentation, their efficiency in practise and several discussions are the materials of this presentation. The authors that have dialogues with the several components of the fisheries sector want the share their ideas about the preparing of notifications with the contemporary scientific data and so much the more implementations from abroad and about more effective basis and procedures on implementations about protection and control with the science world.

Results and Discussion: The results of contemporary scientific researches on fish stocks should have taken in consideration as the developed countries in fishery at the preparation stage of notifications. Although the several information has been requested officially from the related research institutes and universities, the making of decisions not based the knowledge is known. Furthermore, there are several conflicts and competition between large scale fisheries and small scale fisheries. Although the implementation on protection and control has been better off in recent years, there are still gaps for some infringements. The prohibitions and restrictions in notification consist of three main groups as location, time and gear specifications. Beside these implementations, the new notions as the maximum economic yield, maximum sustainable yield, new harvest strategies and management strategy evaluation should have been taking into account. The management strategies based on precautionary approach will lend an assistance to aim goals such as the sustainable economic and social benefits from harvesting, conserving productivity of the fish stock, minimising direct and indirect impacts on wider ecosystem.

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Keywords: commercial fishing methods, fish stocks, protection and control, fishing notifications
**Introduction:** The forest roads allow the wood raw materials, personnel, materials and equipment to be transported, while meeting the road needs of the forest villagers and the recreational demands of the people. Forest roads in this way create economic, social, and even cultural benefits. Forest roads built in the countryside create a special ecosystem in areas where they pass, which inevitably affects the ecosystem that preceded the road construction. These adverse effects must be determined and the minimum need to be reduced in the planning phase.

**Material and Methods:** Local and foreign literature was searched and information about the subject was collected by conducting documentary analysis in order to reveal the studies aiming to prevent adverse ecological effects of forest roads.

**Results:** The most obvious ecological effects of roads; habitat losses due to road constructions, altered waterways and therefore changes in surface flows, sedimentation effects on soil erosion and rivers, changes in species pattern, transportation of people to remote areas (forests) and related damages (trafficking, hunting, grazing, etc.). In addition, it is the main factors that bring about the ecological effects of the ways of planning, designing and application of the road network, opening of the road route, construction works, infrastructure and infrastructure works, vehicle traffic, use of roads and roads for various purposes and maintenance-repair activities. Efforts to prevent adverse ecological effects of forest roads: Prior to the renewal of the road network plans of the forest management departments, the environmental impact assessment (EIA) map should be arranged primarily for the area and the areas where new environmental impacts may be expected for the new roads. Thus, the environmental impacts of forest road constructions, the most important infrastructure of forestry activities, will be minimized. It should be used in the road planning of remote sensing data. In this respect, the rolling domain of the filler material for forest roads to be constructed in the future will be determined before the planning stage. If there is more than the acceptable limit of the area damage during the forest road planning phase, a chance of a change of course will be obtained. The use of excavators instead of bulldozers in forest road constructions is a good practice to prevent adverse environmental effects. In the areas where the road route passes through rocky terrain, rock cracking and onsite crushing methods should be carried out in the areas where the rock throwing may cause great damage and the web should be stretched where necessary.

**Discussion:** Ecological (environmental) impact assessments and life cycle analyses are required, especially for roads constructed and to be constructed in protected areas. Thus, the ways in which the adverse ecological effects are too high can either be harmonized with the repairs or shut down. In areas where new roads are to be constructed, in determining road density, the function of the areas should be considered and the spatial pattern should be arranged accordingly. Environmentally sensitive best practices should be selected during the forest road construction phase.

**Keywords:** Forest roads, Ecological impacts, EIA
Introduction: Cancer is one of the most leading causes of death in Turkey as well as in the world. It is very critical to curing cancer via targeted therapy that is locally applied and shows minimum side effects for patient’s life quality. Carboplatin (CBDCA) is a platinum derivative used in various antineoplastic regimens for the treatment of certain types of solid tumors. Antioxidant levels of cancer patients have been reported to be important in terms of response to chemotherapy. Oleuropein (OLE) possesses beneficial pharmacological effects such as an antioxidant. The aim of the study was to evaluate the protective potential of OLE against the third instar larvae of fruit fly induced by CBDCA.

Material and Methods: In the toxicity assessment experiments, the Oregon R wild strain of Drosophila melanogaster was used. For this purpose, 0.04 and 0.4mM CBDCA, and 100µM OLE were prepared with Standart Drosophila Medium (SDM). 10 larvae of the same age (72±4 h) were exposed to 24, 48, 96 and 120 hours of CBDCA, OLE, and CBDCA+OLE for each experimental groups. After the application, all the petri plates were kept in suitable temperature cabinets. All experiments were repeated 3 times. The mortality rate of larvae, recovery of pupae, and the emergence of adults were noted regularly for each concentration and studied time period.

Results and Discussion: It was found that the increase of the CBDCA toxicity in parallel with the increase of the concentration and the exposure time. In 0.4mM CBDCA group at the 120h interval, larval mortality was determined increased to 60%. Similarly, the recovery of pupae and the emergence of adults of larvae with the mortality were also significantly reduced. On the other hand, in the CBDCA+OLE experimental groups, the rate of larval mortality decreased, pupal recovery and adult emergence were increased and close to control.

Conclusion: We believe that OLE, which has strong antioxidant properties plays a protective role against the toxicity of CBDCA antineoplastic agent observed in the toxicity assessment. In our opinion, it would be beneficial to add OLE to the diet of a patient who received chemotherapy.

Keywords: Drosophila melanogaster, Carboplatin, Oleuropein, Toxicity
Identification of Freshwater Fishes Species and Preliminary Study About Water Resources for 2017 in Balikesir

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Introduction: Alien, endemic and endangered species are important for the protection of biodiversity and genetic resources. Additionally important precautions must be taken in order to reduce the least populations of invasive species. Therefore, identification of Balikesir's freshwater fishes species and preliminary study about state of Balikesir's freshwater resources for year 2017 was aimed.

Material and Methods: Fishes were collected with 22 mm mesh of fishnets and electroshock device from 13 stream (Kocaçay, Madra Stream, Gönen Stream, Uzumcu Stream etc.), 27 dam lake (İkizçetepeler, Samlı, Antimon, Karapurcek etc) and 1 natural lake (Manyas Bird Lake). Besides in this study was used 90 mm and 100 mm mesh of trammel nets for 3 lagoon (Gonen, Gomec and Orjan). Some biological features, morphometric (total length, standard length, fork length, body weight, body depth, head length and eye diameter) and meristic characters (dorsal finrays, anal finrays, pectoral finrays, caudal finrays and line lateral) of fishes have been examined.

Conclusion and Discussion: It is seen that at least 50% of the freshwater resources have seasonal norms. But at least 50% of them can not be sampled because of heavy pollution from industrial and domestic wastes. In today's conditions, global warming and increasing human population cause more freshwater resources to be consumed. To manage our water resources correctly but it will be possible to find out basin-based management plans. 27% freshwater had too little water and 23% of freshwater resources had any water. 27 different bony fish species were obtained in the samples and their systematic, morphometric and meridians characteristics were examined and recorded. There are 3 endemic species and 2 species endemic from a total of 27 bony fish species. For the protection of biodiversity and genetic resources, endemic and endangered species must be monitored. Additionally important precautions must be taken in order to reduce the least populations of invasive species.

Acknowledgement: This study was carried out under the Project supported by Republic of Turkey, Ministry of Forestry and Water Affairs, General Directorate of Nature Conservation and National Parks.

Keywords: Balikesir, freshwater, bony fish species, endemic
Introduction: The drones in the group of unmanned aerial vehicles (UAV) are frequently preferred both in academic work and in practical application areas, because of the advantages offered by the ability to collect high-resolution data quickly in the last decade, the availability of affordable pricing. The drones are used on forestry activities such as mapping of forests, precision forestry studies, forest management, inventory detection, 3D mapping, land restoration, detect and manage diseases, measuring forest stockpiles, combating deforestation, manage and prevent forest fires.

Material and Methods: In this study is aimed to give some information about some approaches about the use of drones in forestry activities by briefly introducing forestry studies. Today, as software support grows and spreads rapidly, high-quality data obtained from drones can be processed through various programs and analyzed for the desired purpose.

Results: Thanks to the data that can be easily transferred to GIS and analyzed, databases can be established and can be a base for activities such as planning, supervising or managing.

Discussion: As a useful tool for planners and decision makers for more effective and rational planning, the drones are expected to progress further and move beyond their expectations.

Keywords: Unmanned aerial vehicle, drone, forestry activities, forest planning
An Insight into In Vitro Micropropagation of Aquatic Plants in Turkey

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Introduction: Aquatic plants are important part of water ecosystem as it provides food, shelter and oxygen to other living organism in water bodies. These aquatic plants can be divided as aquatic or semi-aquatic plants and live as submerged or floating plants in water. The potential of these plants are not exploited fully and these plants can be used as medicinal or alternative food plant. Furthermore, these plants can be used for phytoremediation of heavy metals or other pollutants in water, bio-indicator for assessing the toxic material and also as ornamental plants. In Turkey, these plants are either imported from Far East countries or vegetative propagated in Turkey. In this study, effort made to propagate aquatic plants under in vitro conditions has been highlighted. These aquatic plants were micropropagated for their use ornamental plants, or for further studies like phytoremediation studies and seocdary metabolites production.

Material and Methods: In this study, the micropropagation studies were highlighted under surface sterilization, use of explants for adventitious and axillary shoot regeneration, growth mediums like carbon source, solidifying agents, macro/micro nutireints, plant growth regulators, culture conditions like lighting sources, rooting and acclimatiization were discussed for aquatic plants.

Results and Discussion: Results revealed that surface sterilization is the most important and difficult stage in imcropropagation. However, other factors like explants, growth mediums and culture conditions vary with genotype and explants used in the studies. Results also revealed the use of these micropropagated plants for radical scavenging activities, phytoremediation, genetic transformation and as botanical insecticides.

Keywords: In vitro, Micropropagation, Aquatic plants
GABA Metabolism Under High Temperature Stress In Two Different Lichen

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Introduction: The most of lichen species have ability to tolerance against global warming and can live in the range 35-46 °C and survive even 70 °C temperatures, although some air-dried lichen species are being sensitive high temperature stress. Moreover, there is known that GABA shunt is in lichen, however, the role of this metabolic pathway under high temperature conditions is not clearly elucidated yet. In the present study, we try to understand the role of GABA shunt at high temperature.

Material and Methods: The lichen species, E. prunastri and Usnea sp. were collected unpolluted localities from Bilecik Center Forest, Turkey (N 40° 11.526', E 029° 57.962'). E. prunastri and Usnea sp. in petri dishes were kept for 24 and 48 h in an incubator 100 µmol m⁻² s⁻¹ light intensity and 16:8 light/dark cycle at 45 ± 2 °C. Chlorophyll content, lipid peroxidation, GAD and GDH enzymes activity were performed. GABA content was determined by HPLC.

Results: Our chlorophyll degradation and lipid peroxidation data indicated that E. prunastri thalli showed tolerance higher temperature while Usnea sp. thalli was sensitive. GABA content enhanced by high temperature stress in E. prunastri thalli, while GAD and GDH enzymes activity was decreased. These results indicated that GABA accumulation in lichen thalli could be occurring via different metabolic pathway.

Discussion: In lichen, GABA is one of the predominant amino acids in the lichen P. furfuracea. we can suggest that GABA could be synthesis by the activity of GAD via GABA pathway within 24 h heat stress treatment in Usnea sp. In E. prunastri thalli, GDH and GAD enzymes activities were not show any relation with GABA accumulation under high temperature stress. Our experimental results indicated that GABA could be mainly synthesis via GAD activity during normal conditions, but in stress condition, GABA biosynthesis pathway could also be occurring via polyamine accumulation. However, it could be speculated that polyamine metabolisms modulate at the GABA biosynthesis and enhances tolerance capacity under high temperature stress. Further research will be aimed on relation between polyamine metabolisms and GABA shunt in lichen.

Keywords: Lichen, GABA, heat stress
Use Of Water Mites As Bioindicators

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Introduction: Water mites are useful bioindicators in aquatic ecosystems. Various biomonitoring methods are used worldwide to evaluate water quality and the ecological integrity of freshwater habitats. Chemical and organic pollution increasingly threatens freshwater ecosystems. These threats cause a decrease of water quality and loss of aquatic biodiversity. There are two big groups in the water mite species. The first big aquatic group Hydrachnidia (Acari: Prostigmata) have more than 6000 mainly freshwater species. They are ecologically important group of aquatic arachnids. These mites can live in different environments such as wetlands, springs, marine habitats, ponds, streams and lakes. The second aquatic group are the Halacaroidea Murray, 1877 (Acari: Prostigmata), with about 60 freshwater species and more than 1000 marine. Several water mites lay eggs and transform from deutonymphs to tritonymphs among aquatic plants. Therefore, the presence of aquatic plants in aquatic ecosystems is probably influencing water mite diversity. Many studies have revealed that several abiotic factors such as pollution agents and variations in temperature, dissolved oxygen, conductivity and carbonate concentrations can affect water mite communities.

Material and Methods: Mite extraction and identification: Each sample consisted of 10 liters of water collected using a plastic tray (50 x 30 cm), and filtered through a net (mesh size 250 μm). The water mites caught in the net were transported to the laboratory in water gallons, and were later preserved in Koenike’s fluid. Specimens were identified to species using a phase-contrast light microscope with the help of identification keys.

Results: Influence of industrial sewage mainly containing iron and zinc including in freshwaters and therefore a significant reduction of the water mite populations. Hydrobates Fluvatili is the most resistant species to chemical pollutants in the water. There is a research that, Hydrachnatrilobata is a sensitive species to chlorinated hydrocarbons in the water mites. In general, water and stream fauna reflects the effect of mechanical deterioration and loss of natural habitats in rivers.

Discussion: Many efforts are being made to effectively employ mites as ecological indicators, including faunal monitoring programs. The conservation of native lakes is very important to preserve biodiversity. The abundance and diversity of water mites was significantly higher in unpollluted sites. In this study, information will be given regarding the use of water mites as bioindicators. Besides, it is aimed to give information about recognition of water mites and how they can be used effectively in ecotoxicological studies.

Keywords: Water mites, bioindicator, ecotoxicology
Introduction: The citrus mealybug, Planococcus citri (Risso) (Hemiptera: Pseudococcidae) is a highly polyphagous pest of citrus, grapevine, coffee and ornamental plants and is probably the most cosmopolitan and generally destructive species of the family Pseudococcidae. They feed by sucking plant sap from stem, branch, and leaf; resulting in wilted, distorted, and yellowed (chlorotic) leaves; premature leaf drop; stunted growth; and occasionally death of infested plants or plant parts. Control of mealybug commonly relies on the use of insecticides, but the mealybug can exhibit high levels of resistance. In addition, their control is difficult because of their localization in protected sites under the bark, where pesticide penetration is difficult. Repeated chemical treatments also affect natural enemies of mealybugs negatively. Entomopathogenic fungi offer a possible alternative method to suppress mealybug populations. The aim of this study is to investigate the entomopathogenic effect of Metarhizium anisopliae (Metschnikoff) Sorokin on citrus mealybug at various inoculum concentrations.

Material and Methods: Metarhizium anisopliae isolate was provided from the stock culture of the Plant Protection Department of the Bozok University. Planococcus citri is derived from the stock culture of the Department of Biological Control of Adana Biological Control Research Institute. The entomopathogenic fungi inoculated on Planococcus citri adults by spraying method. In the experiment, 1x10^6, 1x10^7 and 1x10^8 conidia ml^-1 concentrations were used. About 240 adults per concentration and 60 adults per recurrence were used within 4 recurrences. After the inoculation, mortality rates were calculated for day 1, 4 and 5 days. The mortality rate of adult mortality was calculated by the Abbott formula when the percentage mortality of entomopathogenic fungi was evaluated. The mortality responses across the whole assessment period were analyzed using analysis of variance test (ANOVA) for a completely randomized design and the means were compared using a Duncan test (p < 0.05). The test for statistical significance between appropriate LC values was failure of their 95% confidence limits to overlap.

Results: At 1st day, the mortality rates at 1x10^6, 1x10^7 and 1x10^8 conidia/ml doses were calculated as, 81%, 83%, 70% respectively. At 4th day, the mortality rates were calculated as 87%, 90%, 75% and; for 5th day 88%; 94%, 80% respectively. LC50 and LC90 values for Metarhizium anisopliae were 978.566x10^6 and 756.715x10^6 conidia adult^-1, respectively (df=2, x^2=186.193, P=0.000).

Discussion: The results suggest that Metarhizium anisopliae isolates (1x10^6 and 1x10^7 conidia ml^-1 doses) may be very successful as a biocontrol agent of the mealybugs in citrus plantations and indoor or greenhouse, and may be an alternative for chemical pest management.

Keywords: Biological control, Entomopathogenic fungus, Metarhizium anisopliae, Planococcus citri
**POSTER PRESENTATION**

**Implement of Steiner's Ecological Landscape Planning Method on the Example of Akçakoca**

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**Introduction:** Increasing urbanization that has been began the industrial revolution brought environmental problems together. The unconscious consumption of natural and cultural resources and the increase of environmental problems necessitated landscape planning. The concept of landscape planning has been addressed by many landscape architects and different landscape planning models have been developed. In this study, the ecological landscape planning method of Steiner was used in consideration of the historical and socio-cultural aspects of Akçakoca. The Steiner model allows biophysical and socio-cultural data to be used to limit the use of landscape or adapt to the proposed uses.

**Material and Methods:** In this study, Steiner's ecological landscape planning model was preferred as a planning model. Within this model, maps of natural processes are overlaid with ecological units method and optimum land use maps are created. As evaluating natural and socio-cultural data together, land protection usage maps was created. These data are obtained from Düzce ili environment plan, Akçakoca municipality and Düzce University from previous studies related to the district. These data are obtained from Düzce environment plan, Akçakoca municipality and previous studies, worked at Düzce University, related to the district.

**Results:** Considering the socio-cultural characteristics, Akçakoca is in an important position, since it is close to big cities like Bursa, İstanbul, Ankara and has a certain tourism capacity. Akçakoca that its economic infrastructure is based on hazelnut, the most developed and most populous district of Düzce. The mediterranean climate is dominant in the district. Akçakoca and its surroundings are outside the first degree earthquake region. Although mostly corrupted forest structure is seen in Akçakoca; endemic species are seen such as Pancratium maritimum, Centaurea kilaea, Polygonum maritimum. In the light of this and similar data, protected areas have been identified and land use protection plan decisions have been proposed by overlapping socio cultural data.

**Discussion:** While preparing the city plans of Akçakoca, erosion risk map, water process map and taking the bases of protection priority areas are very important in terms of city future. In additionally, he entry of socio-cultural data in the determination of the protection priority areas is important in terms of the use of protected lands.

**Keywords:** Akçakoca, Ecologic landscape planning, Land use
Introduction: *Lernaea cyprinacea*, known as anchor worms, is a parasitic copepod that causes infestation in freshwater fish. Parasites that can penetrate into deeply submerged tissues, when the water temperature exceeds 14-15 °C in spring and summer, copepod larvae hold onto the gills of fish and cause their deaths. *Lernaea cyprinacea* is usually reported as having a wide range of host susceptibility in North America, Asia, Africa, and Europe.

Material and Methods: Fish samples were caught in stream Karasu, out of flow Tahtaköprü Dam Lake (Gaziantep-Islahiye) with pulsed DC electro-fishing equipment, cast net and gill net in June 2014. Fish and parasite samples were fixed in 4% formalin and transferred to the laboratory for morphological investigation.

Results: Eight *Lernaea cyprinacea* were found from external surfaces of fishes 45 examined *Pseudophoxius zeregi* specimens. In previous studies, *Lernaea cyprinacea* was not found in any *Pseudophoxius* species. Therefore, *Lernaea cyprinacea* is a first record on *Pseudophoxius zeregi*.

Discussion: In previous studies; *Acanthocephala: Pomphorhynchus laevis, Platyhelminthes: Asymphylodora imitans, Bothriocephalus acheniognathi, Gyrodactylus latus, Dactylogyrus ergensi, D. sphyrna, Paradiplozoon homoion, Nematodes: Eustrongylides excisus*, parasite species report on the member of *Pseudophoxius* genus in Turkey.

*Pseudophoxinus*, small minnows are mostly found in cold springs, slow-flowing waters and clean lakes. *Pseudophoxinus* distributed in Balkans, Anatolia, Middle East, Caspian Sea Basin and North Africa. Despite its wide range distribution, any *Lernaea cyprinacea* has not reported on *Pseudophoxius* genus.

Acknowledgement: We, as authors, are very thankful to Cüneyt KAYA and Esra BAYÇELEBİ, who contributed to sampling the fishes.

Keywords: *Lernaea cyprinacea, Pseudophoxius zeregi, Tahtaköprü Dam Lake*
Introduction: The toxic effects of some pollutants cause imposex in sea snails. Female snails exposed to these pollutants develop male sex organ and vas deferens which are part of the male reproductive system of many vertebrates. Prior studies showed that Tributyltin (TBT) which can be active even in very low concentrations was known that the inducer of imposex. Recent studies reported that Triphenyltin and ethanol have also been to be inducer of imposex in marine gastropods.

Material and Methods: Web of Science and National ULAKBİM were searched using key words of imposex and marine gastropod. Related research articles were found and the results were evaluated.

Results: Today it is known that TBT affects females of more than 200 species of gastropods. Commonly used anti-fouling paints include TBT. Gastropod species living in areas where anti-fouling painted vessels are found, the rate of imposex is high. Murex trunculus, Murex brandaris, Nucella lapillus, Volula ebraea, Olivancillaria vesica, Stramonita haemastoma, Stramonita rustica, Leucozonia nassa, Cymathium parthenopeum, Olivancillaria vesical are the most common species which is imposex observed. Imposex females are infertile and cannot live longer. The sustainability of populations in gastropods, where imposexed females are present, is adversely affected.

Discussion: Imposex in marine gastropods has been widely used to monitor the contamination by organotin compounds all around the world. High level of imposex in gastropod females’ causes sterilization and blocks reproduction, and then death occurs due to the presence of aborted capsules in the capsule gland. Reproductive failure has been observed in populations of muricid Nucella lapillus in southern England during the 80’s and Nassarius reticulatus in Spain due to imposex effects.

Acknowledgement: This study was supported by The Scientific and Technological Research Council of Turkey (Project number: TÜBİTAK, 116O646).

Keywords: Gastropod, imposex, reproduction, Muricid
A new Myxomycetes record from Turkey

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Introduction: The myxomycetes are eukaryotic microorganisms that occur wherever conditions on the earth’s surface permit the growth of vegetation but are especially common in terrestrial forest areas. The life cycle of a myxomycetes includes two stages, one consisting of uninucleate amoebae, and the other consisting of plasmodium. Under favourable conditions, the plasmodium gives rise to fruiting bodies.

Material and Methods: With this study we are collected plant substrates samples from Hatay. *Didymium orthonemata* H.W. Keller & T.E. Brooks was grown with the moist chamber culture in laboratory. Moist chamber cultures were prepared as described by Stephenson and Stempen (1994). The chamber cultures were plastic containers lined with absorbent paper towel. The samples were placed on the paper towel and flooded with deionised water. After 24 hour the water was drained off. Moist chamber cultures were maintained at room temperature (20–25°C) in diffuse light, and examined frequently with a stereo microscope. Fruiting bodies and plasmodia were recorded whenever the chamber cultures were checked.

Results: Sporocarpous or usually plasmodiocarpous, pulvinate to depressed, broadly effused to branched, up to 2 cm long, pale grey. Peridium fragile, membranous, hyaline, either with a continuous lime layer or sparsely sprinkled with lime. Dehiscence by breaking around the base. Columella absent, the floor of the sporotheca slightly thickened, limeless, pale brown to purplish black. Capillitium scanty, consisting of ± straight, upright threads 1-4 µm diam., usually hyaline but sometimes pale to dark purplish brown with hyaline tips, simple to bifurcate, extending from the base to the upper peridium. Spore-mass dark brown. Spores dark violet-brown, uniformly echinulate with spines to 1 µm high, 12-15 µm diam.

Conclusion and Discussion: *Didymium orthonemata* H.W. Keller & T.E. Brooks is the first record from Turkey myxobiota. The sporophore structure is usually plasmodiocarp, and the compressed image in the flat structure from the top is in the form of a pillow. Peridium is covered with gentle fragile, membranous, hyaline, or a continuous layer of lime.

Keywords: *Didymium orthonemata*, Myxomycetes, new record, Turkey
**Introduction:** The quality protein need of increasing world population is trying to be provided by developments in animal production technologies. The aquaculture industry also continues to grow each year by increasing the production volume in the world and in Turkey. In 2016, aquaculture production of Turkey was 253,395 tons. It is observed that this increase in production has caused public concern and caused worries about environmental effects. In this sense, IMTA (integrated multi-trophic aquaculture) system comes out with a new approach. IMTA system takes its theory from nature which depends on culturing various species from different trophic levels at the same aquaculture site, like it is in the natural food chain. In the last decade IMTA (Integrated Multi-trophic Aquaculture) systems have started to be used in countries like Canada, UK, USA, China, Chile, Ireland and Norway.

**Material and Methods:** Academic articles about IMTA studies were searched by using keywords “IMTA”, “integrated aquaculture” on Web of Science, and fisheries statistics were obtained from TUIK (Turkish Statistical Institute) and FAO (Food and Agriculture Organization of the United Nations) Yearbook of fisheries and aquaculture statistics. Results of the studies were compared and evaluated.

**Results:** The amount of nutrients at the fish farming sites increases as a result of exogenous feeding activity. Mussels as filter feeding organisms which has a lower trophic level, reduces the nutrients which originates because fish farming. Due to its flexibility IMTA systems can be land-based, open-water systems, marine or freshwater systems and may include several species combinations. Species such as *Mytilus edulis*, *Mytilus galloprovincialis* and *Ostrea edulis* are being used as filter-feeders in open-water IMTA systems while *Tapes philippinarium* in land-based systems.

**Discussion:** For a sustainable and successful IMTA production the co-cultured species must be from different trophic levels like fish, filter-feeders and seaweed. Today fish/shellfish and fish/shellfish/seaweed combinations are mostly in use however shrimp/shellfish, fish/shrimp and seaweed/shrimp combination are also in use. The species in IMTA system should have mutual benefits and ideally biological and chemical parameters should be in balance. From both scientific and commercial point of view, the IMTA systems seem to be very good in terms of efficiency. Besides helping reduce of environmental impacts of monoculture it also creates economically valuable products at the same time.

**Acknowledges:** This study was funded by Scientific Project Coordination of Ege University (BAP-project numbered 17/SUF/025).

**Keywords:** IMTA, fish, mussel, integrated culture
Examining the Significance of Urban Landscape Ecology in Urban Design Competitions

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Introduction: Urban design, as an interdisciplinary field, plays an important role in urban development and in creating livable and sustainable cities. During the last two decades, urban design competitions have become prevailing tools in guiding urban form development for many local authorities in Turkey. This paper aims to investigate (i) how the concepts of urban ecology have been integrated into the design scheme, and (ii) whether juries give additional importance to ecological approaches in evaluation process in Turkish context.

Material and Methods: Design briefs, project reports of award winning projects (1st, 2nd and 3rd) and jury reports of selected urban design competitions that were held between 2002-2017 were used as the material of this study. Since there were a quite number of urban design competitions with different spatial contexts, only the competitions which focused on urban green space and waterfront areas were selected. Contents of all briefs and reports were analyzed with reference to the concepts of “landscape” and “ecology”. A critical approach was used to examine and analyze the findings.

Results: The design approaches were found to be mainly influenced by the structure of built environment and both traffic and pedestrian circulation patterns whereas ecological concerns were received relatively less, sometimes no attention from design teams and juries. The ecological concerns were found to be limited to increasing green space amount and native plant selections. Detailed ecological analyses were not reported in any of the project reports. Most importantly, both design briefs and most jury reports lacked of the importance or role of how ecological approaches should have been integrated in design schemes.

Discussion: Urban design competitions aim to select most appropriate alternatives for creating livable places and solving specific spatial problems. However, ecological sustainability seems to be underestimated during the urban design competition process in Turkish context. It is suggested that ecological considerations should be clearly stated and underlined in design briefs in order to force designers to integrate ecological approaches in their proposals. Moreover, disciplines represented in the jury should be selected carefully to ensure evaluations cover ecological aspects in urban design.

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Keywords: Urban landscape ecology, urban design, urban design competitions.
Evaluation Genotypic variation of \textit{Escherichia coli} with Pulse Field Gel Electrophoresis

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\textbf{Introduction:} Pulse Field Gel Electrophoresis (PFGE) has been used for differentiation and epidemiological characterization of \textit{Escherichia coli} isolated from different sources. However, the epidemiology of \textit{E. coli} strains are quite complex. Understanding the epidemiology of \textit{E. coli} is essential for identifying effective control strategies.

\textbf{Material and Method:} In this study, variation in genotypic structure of \textit{E. coli} isolates (n=75) obtained from entry and exit waters of 7 different rainbow trout farms located in Rize and Trabzon were evaluated based on resistance against erythromycin (ereA and ereB gene) and florphenicol (flor gene). Genomic template DNA were digested with \textit{XbaI} and \textit{ApaI} restriction enzymes and run on pulse field gel electrophoresis.

\textbf{Results and Discussion:} According to PFGE analysis, based on %93 similarity ratio of genomic DNA digested with \textit{XbaI} grouped in 4 clusters (X1-X4). According to this results similarity ratio among all of the isolates was found as %79.1, similarity ratio was found as %85.1 after excluding TASWG 0411, TASSC 0811, TASSC 0211, SURWG 1010 ve AASG 0810 strains. Genomic DNA digested with \textit{ApaI} grouped in 4 clusters (A1-X4). A1 was the biggest group containing %51 of the strains. ereB was the most abundant resistance gene in \textit{E. coli} strains. There was no relation between the presence of ereA, ereB, and fluorR genes and PFGE genotype.

\textbf{Keywords:} \textit{E. coli}, PFGE, Restriction enzyme, Antibiotic resistance gene
Establishment and Maintenance of Laboratory Colonies of *Aedes albopictus* (Diptera: Culicidae)

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**Introduction:** The Asian tiger mosquito *Aedes (Stegomyia) albopictus* (Skuse) (=*Stegomyia albopicta sensu* Reinert et al. 2004) was first documented in the United States in Texas in 1985 and a competent vector of many viruses including Dengue fever and Eastern equine encephalitis virus. It is extending its distribution range worldwide and it has already invaded large parts of the Mediterranean. Information collected from the Black Sea region has already revealed the presence of *Aedes albopictus* in western Turkey. Because of their vectorial importance, learning their behavioral and feeding preference so important. So, we establish a new colony of *Aedes albopictus* in Vector Control and Research Unit laboratory in Adnan Menderes University.

**Material and Methods:** To establish a new colony, eggs and larvae were collected from breeding habitats in Rize province between May-August of 2017. All environmental facilities inside the insectary were carefully maintained to better suit the *Aedes albopictus* mosquito colonization. The mean temperature of 27°C (± 0.5°C), and 75±5% relative humidity was constantly maintained inside the insectary. Lighting was using fluorescent light and regulated with 12:12 hour continuous dark and light period. Larvae were reared in 45*40*5 cm white plastic trays that contained dechlorinated water a density of 500 larvae per tray. They were fed on fish food (0.125g/ml). Pupae were individually picked from larval trays using a 1.5 ml pipette and transferred into colony cages. Once emerged, adult mosquitoes were provided with %10 sucrose solution and allowed to feed on the arms of a human volunteer or a artificial blood material. No forced mating was required. On day 3 post blood feeding, eggs were collected and stored in plastic desiccation containers.

**Results:** After this study, using the materials which obtained from the natural *Aedes albopictus* populations who spread in our country, we colonized a new *Aedes albopictus* laboratory colony who can freely mating and product new generations. Documentation for maintenance and data record was maintained and updated daily.

**Discussion:** The acquisition of knowledge concerning proper control of mosquitoes and mosquito borne diseases requires that studies be made of ecology of the insect. Insecticide resistance, biological, chemical and integrated control must be investigated. The use of mosquitoes as screening agents for pesticides or chemotherapeutic compounds requires large numbers of mosquitoes. All phases of mosquito research usually use individual or quantity rearing of mosquitoes.

**Acknowledgements:** The experimental protocol was approved by the Animal Care Use Committee (No:2015-116) of Adnan Menderes University, Aydın, Turkey.

**Keywords:** Colonisation, *Aedes albopictus*, Turkey
Introduction: Host selection is an adaptive feature for reproduction efficiency of mosquitoes. Differences about host selections are not only seen between different mosquito species but also seen among various populations of same species. According to researches, it is seen that blood sucking mosquitoes have no specific host preferences. However, detailed researches carried out in recent years showed that, quality of sucked blood effects reproduction rate of mosquitoes. Apart from this, it is also seen that, some illnesses carried by mosquitos are directly related to host specificity. The tiger mosquito \textit{Aedes albopictus} is extending its distribution range worldwide, and it has already invaded large parts of the Mediterranean. Nowadays, concern about dengue and other tropical arbovirus infections such as chikungunya is rising in the European region, the increase in the number of pathogen introductions by tourism and migration, the reports of local outbreaks, and predicted environmental changes including climate change. In this research, it is aimed to determine blood sucking preferences of \textit{Aedes albopictus}.

Material and Methods: Laboratory colony specimens of \textit{Aedes albopictus} used for determining their blood meal preferences with molecular methods (Multiplex PCR). Results of the multiplex PCR reactions are evaluated by observing agarose gel electrophoresis band magnitude. Horse, bird, human and dog blood that are obtained from Adnan Menderes University’s Veterinary and Medicine Faculty, are used in an artificial blood meal system for in this artificial blood sucking test. 20 blood sucking out of 100 female mosquitoes were selected randomly and their DNA’s were isolated. Their DNA’s are multiplex PCR reacted which is suitable for human, bird, horse and dog species and as a result, by observing band magnitude, their blood sucking preferences are seen. By doing so, feeding preferences and host selection preferences of laboratory colonies of \textit{Aedes albopictus} are revealed.

Results: A total of 100 females were analysed; these included 20 blood fed females and one unfed female that served as negative control. Single hosts were identified from 20 specimens using the host-specific primers for bird, human, dog and horse. Of the 14 individuals determined to have fed on bird blood, five individuals had feed on horse blood and one was found to had fed on human blood.

Discussion: Studies related to determination of host preference are important in terms of understanding host and vector relation and their enzootic transfer cycle. For this reason, analyze of the blood sucked by mosquitos is important in epidemiologic means because, their host and feeding preferences may be understood and more efficient control strategies can be developed. Knowing the reason of host preferences may lead that some epidemiologically important species who are identified by doing virus isolation method, can become direct target for control methods.

Acknowledgements: The experimental protocol was approved by the Animal Care Use Committee (No: 2015-116) of Adnan Menderes University, Aydn, Turkey.

Keywords: Vector, Artificial blood feeding, Turkey, Aedes
Introduction: Life cycles of myxozoan parasites have been a dilemma for many years as it was believed that the life cycle was direct involving only a fish host. Following a breakthrough experiment demonstrating a tubificid oligochaete infected with actinosporean individuals to be an essential participant in the life cycle of the salmonid whirling disease agent Myxobolus cerebralis in 1983, studies focused more on the idea that some other stages in other hosts could be involved in complete life cycles of any myxozoan fish parasites. Since then, some members of the several myxozoan genera infecting freshwater fishes have been demonstrated to have an alternate actinosporean stage in invertebrate oligochaete hosts to complete the whole life cycle. On the other hand, some marine myxozoan parasites had polychaetes as their alternate hosts in their life cycle. Another alternate mode of transmission, fish-to-fish direct transmission either natural or manipulation, has also been demonstrated for several marine fish parasites. These studies are very important especially for pathogenic myxozoan parasites causing significant economical losses in fisheries and aquaculture and this study aims to raise awareness for further myxozoan investigations.

Methods: Details of two-host life cycle stages involving actinosporean and myxosporean stages of fish infecting myxozoan parasites, some of which cause significant economical loses in fisheries and aquaculture, were gathered from published records worldwide.

Result and Discussion: A total of 45 myxozoan species from fish hosts have been reported to include actinosporean stages in invertebrate hosts in their life cycles as the results of experimental and/or molecular studies mainly in freshwater environment. Some members of the genera Ceratomyxa, Ceratonova, Chloromyxum, Ellipsomyxa, Gadimyxa, Henneguya, Hoferellus, Myxidium, Myxobolus, Parvicapsula, Sigmomyxa, Thelohanellus and Zschokkella have been proven to have actinosporean stages as Tetractinomyxon, Antonactinomyxon, Neoactinomyxum, Triactinomyxon, Raabei, Echinactinomyxon, Aurantiactinomyxon and Siedlickella in their alternate invertebrate oligochaete hosts such as Tubifex, Dero, Nais, Lumbriculus, Limnodrilus and Branchiura. Myxobolus parasites dominated these completed life cycles with 21 species and followed by Thelohanellus species (4), Chloromyxum and Henneguya species (3) and the rest were either 2 or 1 species. However, fish-to-fish direct transmission has also been proven to be a strategy in the members of genus Enteromyxum. Most of these results were obtained from information about complete life cycles of freshwater species that definitely need an alternate actinosporean stage in invertebrate hosts, however, completed life cycle of marine myxosporean species involving fish and invertebrate hosts are very limited and more studies are required in the light of current studies.

Keywords: Myxozoa, Life Cycle, Parasite, Fish, Invertebrate Host
Environmental Impacts of Nursery Industry and Related Regulations

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Introduction: Nurseries are organizations that produce and grow a variety of plant materials and have land and greenhouse facilities. The nursery industry plays an important role in the production of healthy and quality food and provides materials for green spaces. However, it can cause important environmental problems like groundwater pollution. In addition, many nurseries can use excessive amounts of water. Water availability and productivity may become increasingly strategic risk for nurseries in the future. In addition, the unconscious use of fertilizers and pesticides, which are used to increase quality, in excessive doses causes various environmental problems, mainly groundwater pollution.

Material and Methods: In this study, the legal regulations about nurseries were examined. National and international literature related to the possible effects of the nursery industry on the environment reviewed and the measures to be taken in this context evaluated.

Results: Nursery industry is primarily involved in the intensive use of resources, such as land, water, labor and inputs such as fertilizers and pesticides. The use of such resources in a concentrated space and time has the potential to negatively impact on the local environment and worker welfare. The use of greenhouse technologies, soil protection and conservation, optimal fertilizer use and Integrated Pest Management can mitigate the impact of nursery industry on the environment. On the other hand, national and international regulations which prepared for protecting the environment play a role in reducing the environmental impact of nurseries. The regulation published by the Ministry of Agriculture and Rural Affairs in Turkey in 2007 includes the principles regarding the licensing of nurseries, seedlings, ornamental plants and flower buds. Article 9 of this regulation states that practices such as maintenance and pest control dates and doses will be recorded by nursery owner and be monitored by the authorities. When the Regulations around the world investigated it is noted that In Western Australia, guidelines are intended to help nurseries for improving their management and productivity as well as protecting the environment. These guidelines aim to improve productivity while protecting the environment. In the united states, there are laws related to nurseries, such as erosion control management, irrigation water management, nutrient management and pesticide management. America Oregon Nursery Association has launched a comprehensive initiative which contains goals for sustainability for the nursery industry in Oregon. The environmental and agricultural production directives of the European Union limit the use of pesticide and they include the control of the pollution of lakes and rivers.

Discussion: In our country, the regulation on nurseries takes place to examine applications such as the doses of chemicals used for seedlings, but there is no legal sanctions for use in overdose. As in other countries like Australia and the United States, in our country sanctions should be applied with legal arrangements for the polluters in the nursery industry. By using water and nutrients efficiently and by controlling their movement both onsite and offsite, nurseries can become sustainable operations.

Keywords: Nursery industry, Nursery production, Sustainability, Environmental impacts
Cytotoxic Effects of Methanolic Extracts from Different Cladonia Species on Human Lung Carcinoma (A549) Cell Line

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Introduction: Lichens produce a large number of secondary metabolites of great interest due to antiviral, anti-microbacterial, antitumor, anti-allergic, inhibitory activities of plant growth and the like. It has been suggested that the extracts of Cladonia species, including Cladoniaceae family, were used for different medicines in the folk medicine. Lung cancer is the most common cancer. Therefore, in this study we aimed to investigate the effects of the extracts of Cladonia pyxidata (L.) Hoffm. and Cladonia coniocraea (L.) on human lung carcinoma (A549) with in vitro cytotoxicity assay.

Material and Methods: Within the scope of this study, 70% methanol extracts of Cladonia species, were prepared. Cytotoxic effects on A 549 cell line were studied with MTT assay.

Results: It has been elucidated that Cladonia coniocraea extract was found to be most cytotoxic extract with 314.678 µg/mL IC50 value on A 549 cell line. Cladonia pyxidata extract showed 13% inhibition effect on the cell viability even at 2mg/mL concentration.

Discussion: Among the two Cladonia species studied, C. coniocraea was found promising on A549 cell line. The inhibitory effect of C. coniocraea extract on lung cancer cell line at different concentrations for 48 and 72 h will be examined in our subsequent studies.

Acknowledgement: This study was financially supported by 6602b-BMYO/17-121 coded Bozok University project.

Keywords: Cladoniaceae, Cladonia pyxidata, Cladonia coniocraea, Cytotoxicity
Assessment of Global Climate Change Impacts in Urban and Environmental Conservation: The Case of Istanbul

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Introduction: Climate change effects; it is necessary to take precautions on a global scale, which will result in long-term impacts on the world. Climate change is accompanied by a hydrological cycle; water, forest, and land. In order to be able to adapt to these changes, to reduce the effects of change and to be prepared for disasters; environmental protection, economic development, equality and development of national / local harmonization strategies are necessary.

As a result of the research; Turkey's risk group in terms of the potential effects of observed between countries and climate change may cause in Turkey, where the importance of socio-economic and environmental impact is transferred.

Purpose of the study; to emphasize the importance of ensuring the protection-use balance of urban and environmental issues in terms of adaptation to climate change. It is evaluated on the subject planning scale with the researches made on the Istanbul example.

Material and Methods: In this study, the relationship with environmental pollution and resource management of urbanization in Turkey is evaluated. National and local politics are audited; urban environmental infrastructure policies, sustainable urban environmental policies, economic, social and cultural policies have been reexamined. Behind; The scope and targets of planning studies in our country are compared with the implementation and planning studies. In Istanbul, chosen as a sample area; strategies for adaptation to climate change have been developed in the light of studies on conservation and use of natural and cultural values.

Discussion: Of climate change in Turkey; water resources will decrease, floods will increase, forest fires, drought, desertification and ecological deterioration due to these will be adversely affected. The planning mechanisms in our country; it is necessary to make strategic studies on climate change and adapt to the new situation to be formed.

Results: Existing planning system in Turkey is to support sustainable urban development. Missing of existing planning system; the existence of more than one planning authority on the same scale, the lack of cooperation between institutions and the confusion of authority, the lack of national development planning and a spatial planning system, and the continuation of the traditional type of planning which can not respond to current developments.

Keywords: Planning, Conservation, Environment, Urban, Climate
Introduction: Some long-distance migrants which fly through the large ecological barriers that are not suitable for stopover to a few days and nights during all migration journeys. However, a few species can complete the entire migration journey with a single flight without a break. Most of the species have to divide their migration flight with periods of rest and refueling. The main reason for the stopover before and after the large scale ecological barriers is overcome is that the energy deposit accumulation takes longer than the consumption of these deposits during flight.

Material and Methods: The aim of this review is to try to explain the strategies of birds that divide their migration journey into migration flight and stopover stages.

Results: The main goal of the stopover strategies are to minimise the duration of the migration, flight cost and total energy cost. In line with these goals, the elements of the strategy are the stopover duration, fuel accumulation, selection and use of habitat. The duration of stopover is defined as the time spent on an area where a migratory bird accumulate fuel deposits and rest. It can be affected by factors such as habitat, weather conditions, molt strategy, geographical barriers, predation risk, age, sex, competition and distance to next stopover site.

Many migratory birds begin to accumulate their fat and protein reserves as fuel for migratory flight. The change in body weight during stopover is defined as "fuel deposition rate". This rate is calculated as the change per day during the stopover or the change in percent relative to the initial body weight in gram. The rate depends on the quality of the stover area, physiological limitations of the amount that can be accumulated, competition, risk of predation and atmospheric conditions. Fuel deposition rate directly influences the success of the migration as it determines the stopover duration, the present fuel deposition rate when leaving the area, and the total speed of migration.

Correct timing of stopover and refueling the necessary amount of energy deposits are directly related with the habitat preference. A suitable stopover area must be capable of meet the need of an exhausted migratory bird quickly and confidently with its energy reserves.

Discussion: Studying stopover strategies will provide a better understanding of migratory-habitat relationships as well as species and population ecologies during stopover. Identification of stopover habitats will identify high priority areas of protection and create comprehensive protection strategies and management plans.

Keywords: Bird, Migration, Stopover, Ecological Barrier
A Second Record for Turkish Lichen Flora: non-lichenized Opegrapha parasitica

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Introduction: Lichenological research in Turkey has improved remarkably in the last thirty years with many floristic studies published recently about several regions of Turkey. About 1800 lichen and lichenicolous fungi species are known from Turkey. We think that this number will exceed 2000 with ongoing studies.

Material and Methods: The species is deposited in Bozok University Herbarium Yozgat, Turkey. Sections were prepared by hand and examined in I [Lugol’s iodine (MERCK 9261) with (KI) and without (I) pre-treatment with 10% KOH], 10% KOH and water. The micro-macrophotographs were taken with Olympus BX 53 microscope and Olympus SZX 10 digital camera.

Results: Opegrapha parasitica was reported for the second time from the Turkey. It is a non-lichenized fungus on Aspicilia calcarea. O. parasitica species was examined in terms of its morphological, anatomical and ecological characters. It has black lirellate ascomata, 3-septate hyaline-light brown ascospores, ascus 8-spored.

Discussion:
The first record of O. parasitica was given by Vondrak and Kocourkova (2008) from Sinop province. It is not very common in the world. This species is known Italy and Ukraine. O. parasitica is parasitic on A. calcarea.

Keywords: Opegrapha, non-lichenized fungus, biodiversity.
First Molecular Characterization of *Posthodiplostomum cuticula* (Digenea, Diplostomidae) Metacercaria Infecting the Gills of Chubs (*Squalius cephalus*) from Turkey

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**Introduction:** Species of *Posthodiplostomum* Dubois, 1936, belonging to the family Diplostomidae are widespread digenean flukes around the world. *P. cuticola* and *P. brevicaudatum* have been reported from various fish species and localities from Europe. The metacercariae of *P. cuticola* cause ‘Black spot’ disease while *P. brevicaudatum* encysting in the eye lens cause ocular parasitosis in the fish host. Also, some species responsible for causing ‘white grub’ in fishes. In the present study, we aimed to reveal the genetic characterization of the isolates belonging to determined species based on ITS-2 and mt-COI gene regions.

**Material and Methods:** A total of 123 specimens of *Squalius cephalus* were caught by local fishermen from Central Anatolia Region of Turkey between October 2016 to October 2017. The observed metacercariae were recovered from the gills of infected fish specimens, transferred into the petri dishes with physiological saline and fixed in 70% ethanol. Genomic DNA (gDNA) from the individual trematodes was isolated using the DNA purification kit. PCR was carried out to amplify the ITS-2 and mt-COI regions. The determined amplicons were purified by using the commercial kit and sequenced in both directions with using the PCR primers. Sequences were compared with previously published data for identification by using the BLAST via GenBank.

**Results:** Totally 2 out of 123 fish specimens were found to be infected with metacercariae with prevalence of 1.6%. Totally 2 cysts including metacercariae were determined in the infected fishes. Trematodes was genetically identified as *Posthodiplostomum cuticula* by using sequence analyses of ITS-2 and mt-COI regions.

**Discussion:** *Posthodiplostomum cuticula* isolates from Central Anatolia Region of Turkey showed 100% and 98.9 to 99.1% identity with various geographical isolates of *P. cuticula* from GenBank according to the phylogenetic analyses of ITS-2 and mt-COI, respectively. Before the present study, there had been no reports of characterizing the *P. cuticula* from the Turkish waters using well-defined ITS region sequence. Therefore, *P. cuticula* was genetically identified for the first time by sequencing of ITS-2 and mt-COI regions in Turkish waters with the present study. Further researches using different host species from various geographical areas are necessary to understand population genetic structure of *Posthodiplostomum* species from Turkish waters.

**Keywords:** *Posthodiplostomum cuticula*, *Squalius cephalus*, molecular characterization, ITS-2 and mt-COI regions, Turkey.
The Oxidative Stress Parameters Of The Zebrafish (Danio rerio) Liver And Gill Tissues Exposed To Thiazolidine

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Introduction: Thiazolidine ((4S)-2-(4-hydroxy-3-methoxyphenyl) thiazolidine-4-carboxylic acid) is a newly synthesized substance and which is a class of heterocyclic organic compounds having a 5 membered saturated ring with a thio ether group at 1 position and an amine group in the 3 position. Thiazolidine involutions are commonly used compounds in biology and medicine as they have antimicrobial, anti-carcinogenic and anti-diabetic effects. In this study we aimed to investigate effects of thiazolidine on total protein levels and Acetylcholinesterase (AChE) enzyme activity on the liver and gill tissue of zebrafish.

Material and Methods: Zebrafish were acclimatized for two weeks in experimental tanks which was used chlorine free tap water. During the acclimatization period, fish were fed twice a day. The experimental groups of fish; which size differ between 3-5 cm were divided into three groups (control group; 5 ppm; 7,5 ppm). Each treatment was triplicated with aquariums of 10 fish, as the experiment duration of 96 hours. The liver and gill tissues were removed and homogenized and used for determination of total protein levels and AChE enzyme activity. IBM SPSS Statistics 23, One Way Anova and T-student tests were used. A value of p<0.05 was considered statistically significant.

Results and Discussion: The results show that total protein levels significantly decreased in the liver and gill tissues compared to control groups of adult zebrafish. Total protein levels were significantly decreased in the liver tissue whereas for the 5ppm group it was increased but for 7,5ppm group was decreased in gill tissue compared to control groups. These results supported that total protein levels are effected by Thiazolidine exposure; gill tissues are affected at different rates. Thus this study showed that thiazolidine exposure caused oxidative stress in the gill and liver tissues of adult zebrafish.

Acknowledgement: This project has been supported by Sakarya University, Scientific Research Commission (BAPKO) with 2014-02-20-002 Project number.

Keywords: Zebrafish, Liver, Gill, AChE, Total Protein, Thiazolidine.
Introduction: The field cricket *Gryllus campestris* used to be very common throughout Europe in farmland as Turkey. It prefers dry, sunny locations with short vegetation, like dry grasslands. The reproductive season of the univoltine species lasts from May to July. In this study, morphology and histology of male reproductive system of *Gryllus campestris* were examined by light and scanning electron microscope (SEM).

Material and Methods: Adult specimens of *G. campestris* were collected in Kazan in Ankara from June to August 2016. They were given anesthesia with ethyl acetate fumes, and the male reproductive organs were dissected in sodium phosphate buffer and fixed in Formaldehyde. After washing and the dehydration process, samples were embedded in paraffin. Subsequently, sections stained with hematoxylin and eosin were prepared and they were examined using light microscopy and were photographed digitally. Samples were then mounted with SEM stubs and coated with gold in a Polaron SC 502 sputter coater. They were examined with a JEOL JSM 6060 LV scanning electron microscope at an accelerating voltage of 5–10 kV and photos were taken.

Results and Discussion: Male reproductive system of *G. campestris* consists of a pair of testis, a pair of vas deferens, a pair of seminal vesicles, accessory glands, a bulbous ejaculatorius, a pair of ectodermal sacs, and a ductus ejaculatorius. The testicular follicles have three different development zones (growth zone, maturation zone, and differentiation zone). Spermatocytes were observed in the growth zone. Growth zone follows maturation zone and at this stage spermatids form. In the differentiation zone, the spermatids turned to the marked spermatozoa with head, neck and tail parts. The testes are surrounded by a white peritoneal membrane and attached to the seminal vesicle via a pair of vas deferens. At the end of the seminal vesicle were found accessory glands. Apart from these, the spermatophore structure was observed. *G.campestris* which has biological and economic value both in the world and in our country, therefore we have been studied in detail with light and SEM microscopy. This study is important both for the provision of biological fighting with this species and for the contribution to the work to be done thereafter.

Keywords: *G.campestris*, Male reproductive system, Ultrastructure, Electron microscopy.
The Mutagenicity and Antimutagenic Activity of *Centaurea babylonica* (L.) L. Ethanol and Chloroform Extracts

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**Introduction:** Extracts from *Centaurea babylonica* (L.) an Asteraceae member, are commonly used as a remedy for primary health care such as traditional medicine. Our purpose was to investigate the possible mutagenic and antimutagenic properties of *C. babylonica* ethanolic and chloroform extract.

**Material and Methods:** Samples of *C. babylonica* was collected on July 2016 from near Gölbaşı-Sürgü road, on serpentine soil, Gölbaşı district /Adıyaman province, Turkey. The extracts of this plant were obtained with soxhlet apparatus. The mutagenicity and antimutagenic activity of the extracts were studied with AMES/ *Salmonella* microsomal test system using the histidine dependent strains *Salmonella typhimurium* TA 98.

**Results:** The extracts have an important antimutagenic activities. The ethanolic extract, which was tested at three different concentrations (20, 4, and 1 μg/plate), did not exhibit any mutagenic effect in the mutagenicity assay performed with *S. typhimurium* TA98. In the antimutagenicity assay performed with TA98 strain, the ethanolic extract have strong antimutagenic activity at 20 μg/plate concentration (40.12%). The moderate antimutagenic activity of the chloroform extract was observed at 20 μg/ml concentration (34.44%).

**Discussion** The antimutagenic activity is an important topic in the medical field as well as in the pharmaceutical industry. New studies are being performed attempting to assess the antimutagenic mechanisms of the phytochemical components of these extracts.

**Acknowledgement:** The authors gratefully acknowledge Dr. Hasan Yıldırım (Ege University, Department of Biology/Botany, Faculty of Sciences, Izmir, Turkey). A voucher specimen has been deposited in the Herbarium of Ege University, Izmir, Turkey (EGE-42441).

**Keywords:** *Centaurea babylonica* (L.) L., AMES assay (*Salmonella* microsome assay), *Salmonella typhimurium* TA 98.
Toxic/Potentially Toxic Phytoplankton Species Composition of the Turkish Coast of the Black Sea

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Introduction: Phytoplankton is the best indicators for assessment of the state of eutrophication. Nutrient enrichment often gives rise to shifts in phytoplankton species composition and an increase in the frequency and/or magnitude and/or duration of phytoplankton (including nuisance/potentially toxic) blooms (Aktan&Sahin, 2008). In the present study one cruise have been organized during the period of July 2014-August 2014. The seasonal abundance, biomass and taxonomic composition of phytoplankton of Turkish Black Sea coasts were studied.

Material and Methods: Phytoplankton samples were collected using a Niskin sampler from twenty stations (0-50 m) located on coastal area. Water samples for phytoplankton taxonomy were placed in 1000-mL bottles and fixed with 2% Lugol’s iodine.

Results: Two diatoms and 16 dinoflagellates species were determined on August 2014 as toxic/potentially toxic. The abundance and biomass values of two harmful diatoms constitute lower than 10% of the total abundance and 1% of the total biomass values of diatoms. The abundance values of toxic/potentially toxic dinoflagellates dominated 62% of the total dinoflagellates abundances. The biomass values of 16 dinoflagellates species were dominated 47% of the total dinoflagellates biomass.

Discussion: The abundance of harmful phytoplankton species and their great dominance over biomass require the system to be under constant control. This is an indication that the first and negative reaction will be given by phytoplankton when the ambient conditions deteriorate.

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Keywords: Black Sea, toxic/potentially toxic phytoplankton, abundance, biomass
An Anatomical and Micromorphological Study on Colchic Relict Hypericum xylosteifolium (Hypericaceae) from Artvin

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Introduction: Hypericum L. (Hypericaceae) is represented by 470 species in the world, while 96 species (12 of them are woody) are present in Turkey. 43 species are endemic to our country. In the present investigation, Hypericum xylosteifolium (Spach) N.Robson, a Caucasian relict species, naturally distributed in Black Sea Region were examined in anatomical (leaf and stem) and micromorphological characteristics.

Material and Methods: The wood and leaf materials were sectioned in the usual way. In woods; tangential and radial vessel diameter, number of vessels per mm², length of vessel elements, fibres (lengths, widths, thickness of cell walls), number of rays per 1 mm, ray width and height such as quantitative characters; features of growth rings, vessel grouping, helical sculpture, type of perforation plate, presence of vasicentric and vascular tracheids, axial parenchyma, vesturing, crystals and perforated ray cells such as qualitative ones. In leaf sections, lengths and widths of abaxial epidermis, width of leaf midrib and lamina, and vascular bundles, number of stomata per mm² both on the epidermis of the leaf were determined. In micromorphological studies, epidermal surface of the leaf surface were examined.

Results: Anatomical and micromorphological characteristics of H. xylosteifolium which is naturally distributed in Caucaasia were presented here for the first time. The present study describes the anatomical and micromorphological properties of Hypericum xylosteifolium.

Discussion: All data of this species were presented here for the first time. There are some similarities among other Hypericum taxa but most of values differences were determined. Results obtained from this study were compared the data present in literature.

Acknowledgement: The research work was supported with the 2017.F10.02.04 code numbered project by the Artvin Çoruh University Scientific Research Projects Unit.

Keywords: Hypericum, Leaf Anatomy, Wood Anatomy, Micromorphology, Relict
Introduction: Variations of some taxa that are different from their definitions in flora of Turkey were determined in the flora of Göynük Township and surroundings. These variations result from collecting poor specimen, deficient material and making definitions without determining the ecologic tolerance limit of the specimen sufficiently. Introducing these types of variations in flora studies provides convenience to the diagnosticians and contributes to flora studies.

Material and Methods: Research material are gathered from Göynük Township and its surroundings (Karlıova, Bingöl). The materials are vascular plants that show difference from their definitions in the floras. The specimen that show difference examples are transformed into herbarium material and diagnosed utilizing initially Flora of Turkey (Flora of Turkey and the East Aegean Islands) and flora of neighboring countries. The aforementioned specimens are preserved in the Herbarium of the Biology Department in the Faculty of Science and Letters at Bingöl University (BIN).

Findings: 1298 plants were collected in the context of field studies regarding the flora of Göynük Township and its surroundings between 2012-2016. 470 species, 131 subspecies and 88 varieties that belong to 72 families and 314 genus, 689 taxa in total were determined as a result of diagnose of collected plant specimen. In 33 taxa some variations that are different from the definitions of the floras diagnosed were determined. The taxa that show variations are: Arenaria dianthoides, A. gypsophiloides var. gypsophiloides, Astragalus canescens, Bidens tripartita, Buglossoides incrassata, Bupleurum eginense, Calta polypetala, Campanula involucrata, Cuscuta campestris, Dianthus muschianus, Fritillaria minuta, Geranium pyrenaicum, Geum rivale, Helichrysum armenium subsp. armenium, Hypericum hyssopifolium subsp. elongatum var. microcalycinum, Legosia pentagonia, Lotus corniculatus var. tenuifolius, Lythrum salicaria, Neslia apiculata, Plantago major subsp. intermedia, Pimpinella saxifraga, Silene capitella, S. sclerophylla, Stachys spectabilis, Trifolium longidentatum, T. trichocephalum, Verbascum biscutellifolium, V. dumulosum, Ventenata dubia, Vicia sepium, Xanthogalum purpurascens and Xeranthemum annuum.

Result: It is important to consider the variations determined in this study in the future studies (especially in the study of “Illustrated Flora of Turkey” and to give place to the definitions of mentioned taxa in the floras in the light of more accurate data.

Acknowledgment: We would like to thank to the Unit of Coordination of Scientific Research Projects of Bingöl University (Project Number: BAP-506-136-2013) for their financial support.

Keywords: Göynük Township, Flora, Variation, Karlıova, Bingöl
Introduction: *Althenia* is a perennial stoloniferous aquatic genus which is represented by two species in the world. *Althenia* species are found mainly in brackish water lagoons and in salt lakes at 10-40 cm deep waters. The genus has only one species in Turkey, *Althenia orientalis* which has been recorded from Turkey in 1959. The species is still only known from this single locality. *Althenia* species are under collected due to several reasons: The colour of the plant is very similar to substrate color. The species has a sporadic occurrence which makes it sometimes unable to collect the plant from the same locality every year. Also, the species most of the time coexists with *Ruppia* spp. which are dominant. Therefore, *Althenia* species are difficult to distinguish among dense *Ruppia* vegetation. The presence of such dense *Ruppia* spp. populations also effects growth of *Althenia* species negatively.

Material and Methods: Field studies were performed in saline waters (lagoon lake) from Lake Tuzla, Adana, in May 2017 and June 2017. Eleven environmental variables were measured with a YSI Professional Plus. Measured environmental variables are: Dissolved oxygen concentration (mg/L), percent oxygen saturation (%DO), water temperature (Tw, °C), electrical conductivity (EC, μS/cm⁻¹), specific conductivity (SPC, μS/cm⁻¹), pH, atmospheric pressure (mmHg), total dissolved solid (g/L), salinity (ppt) and ammonium (mg/L-N). Geographical data (elevation and coordinates) were recorded by using Magellan eXplorist 610.

Results: *Althenia orientalis* (Tzvelev) García-Mur. & Talavera is a rare brackish water plant that has been collected in saline waters (lagoon lake) from Lake Tuzla in Adana, in June 2017 in 10 cm deep water. The species is known from only this locality in Turkey and the population size is quite small, covering approximately 500 m². Dense *Ruppia maritima* population accompanies the species. *Althenia orientalis* grows in slightly alkaline (pH=8.05), and warm waters (water temperature=34.3 °C).

Discussion: *A. orientalis* is a rare brackish-water macrophyte from Turkey. The plants future presence is threatened by several human activities (i.e. pollution due to construction waste deposits and dense agricultural activities). Precautions should be taken to protect the species and its habitat.

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Keywords: Potamogetonaceae, ecology, *Althenia*, Lake Tuzla, aquatic plants.
Introduction: Phytoplankton taxonomic composition globally includes about 4000-5000 species (Sournia et al., 1991). Species richness of vegetating in the Black Sea phytoplankton species in the last decade has grown more than twice (up to 1621 confirmed and 48 unconfirmed species on the list of the Black Sea Phytoplankton Checklist) compared to 80s (Petrova & Gerdzehikov, 2015). In the present study two cruise were organized during the period of March 2015 and August 2015. The seasonal abundance, biomass and taxonomic composition of phytoplankton of Turkish Black Sea coasts were studied.

Material and Methods: Phytoplankton samples were collected using a Niskin sampler from twenty stations (0-50 m) located on coastal area. Water samples for phytoplankton taxonomy were placed in 1000-mL bottles and fixed with 2% Lugol’s iodine.

Results: Species belonging to 12 classes of algae (Bacillariophyceae, Coscinodiscophyceae, Mediophyceae, Fragilariophyceae, Dinophyceae, Prymnesiophyceae, Cryptophyceae, Cyanophyceae, Dictyochophyceae, Ebriophyceae, Bicosecophyceae and Conjugatophyceae) have been recorded. A total of 118 taxa was determined in winter season sampling. Species belonging to 12 classes of algae (Bacillariophyceae, Coscinodiscophyceae, Mediophyceae, Fragilariophyceae, Dinophyceae, Prymnesiophyceae, Cryptophyceae, Cyanophyceae, Dictyochophyceae, Ebriophyceae, Euglenophyceae and Chlorophyceae) have been recorded and total of 92 taxa was determined in summer season sampling in 2015.

Discussion: The aim of indicating the status of qualitative and quantitative phytoplankton is not only determining the species distribution. Considering the most important fisheries activities take places in Black Sea, phytoplankton, a prey of zooplankton and larger organisms, need to be monitored in seasonal cycles as much as possible. Thus, determining of phytoplankton biomass in the system and of the effects to other trophic levels can be possible.

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Keywords: Black Sea, phytoplankton, abundance, biomass
Morphological and Micromorphological Characterizations of Two *Hypericum* (Hypericaceae) Species from NE Anatolia

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Introduction: *Hypericum* L. (Hypericaceae) is represented by 470 species in the World with worldwide distribution in warm temperate, subtropical and mountainous tropical regions except Antarctica, while 96 species (12 of them are woody) are present in Turkey. 43 species are endemic to our country. In this study, two species (*H. androsaemum* L., and *H. bupleuroides* Griseb.), naturally distributed in Northeastern Anatolia were examined comparatively for morphological and micromorphological characteristics.

Material and Methods: The aerial parts of 15 accessions of each species were collected at full flowering from area. Morphological characteristics of two *Hypericum* species were examined in the aspect of leaf, flower and fruit. In micromorphological studies, epidermal surface of the leaf surface were examined.

Results: Morphological characteristics of *H. bupleuroides* were detailed and micromorphological characteristics were compared. Morphological and micromorphological variability between *H. bupleuroides* and *H. androsaemum* were evaluated. Morphological variations between species were measured in the flower length, plant size, leaf types and plant habit. The morphological characters show similar trends. The present study describes and compares the morphological and micromorphological properties of two *Hypericum* species.

Discussion: Results obtained from this study were compared the data present in literature. Differences between these species were revealed. It was concluded that micromorphological characteristics can be used as a additional characteristic in their taxonomy.

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Keywords: *Hypericum*, Morphology, Micromorphology, NE Anatolia.
Relation of Biotechnology with Environment: A Review

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Introduction: Biotechnology is all the processes and techniques that are used to alter the functions of living organisms or components of organisms, as well as to provide an auxiliary environment for the development, efficient use, regulation or protection of biological systems. Environmental biotechnology is a system that combines the prevention of environmental pollution, the use of microorganisms and products, science and engineering. Today, biotechnological developments have brought many areas of life into the scope of this technology, from human health to agriculture, from chemical engineering to environmental protection, from food production to energy production. Particularly the progress of genetic science has given new impetus to the applications of biotechnology. However, the pollution rates of natural resources have also increased with technology. As a result of this, technologies for solving environmental problems have been developed. Environmental biotechnology; living organisms and products derived from them to provide sustainability, treatment of harmful wastes, measures to prevent environmental pollution.

Applications of environmental biotechnology include purification of waste with natural microorganisms and the use of genetically modified microorganisms to purify certain wastes. Bacteria that can use toxic substances in waste as a substrate are used. One of the important application areas of environmental biotechnology is to make wastewater reusable. Biosensors used to control environmental conditions and determine pollution are another application area of environmental biotechnology. Environmental biotechnologists develop and use processes to clean air, water and soil pollution. They identify and use appropriate microorganisms for correcting a specific area and specific pollutants. There are many fungi, germs and bacteria that can consume pollutants. Firstly, the relationship of biotechnology with the environment is targeted.

Discussion and Conclusions: Human health extremely relates to environmental biotechnology. Microbial systems involving with biotechnology contribute to cures or therapies by producing drugs or enzymes to fight diseases. Infectious diseases from pathogenic microorganisms remain the main cause of death worldwide and ecologic threats to disseminate pathogens heighten the danger. The sustainability of modern human society depends on extracting essential materials from renewable resources and reducing reliance on nonrenewable resources. Because of microbial communities have seemingly infinite ways to live, environmental biotechnology has an important role for humanity.

However, increasing world population and inadequacy in the evaluation, consumption and protection of ever-decreasing natural resources are also increasing. In this context, it should not be forgotten that the scientific and technological infrastructure for the utilization of alternative biotechnological methods should be understood, the environment must be protected and the environment must be protected. First of all, the living beings in their nature must be identified, their superiority-weaknesses must be investigated and protected.

Keywords: Bacteria, Biotechnology, Ecology, Environment, Waste
Effect of Phosphate Solubilizing Microfungi *Penicillium canescens* PSF77 on Growth and Development of (*Zea mays* L.) Plants in the Presence of Mazidagi Rock Phosphate

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**Introduction:** As known that phosphate solubilizing microorganisms (PSM) especially bacteria and microfungi convert insoluble rock phosphates to soluble form. In the other words, the use of rock phosphate as phosphate fertilizer and its solubilization through PSM have become a valid alternative to expensive chemical fertilizers. In this study, 147 microfungi were isolated from the rhizospheres soils and root of wild plants collected from different habitats of Mazidagi, Mardin Turkey and its surroundings. After the isolation procedures their phosphate solubilizing potentials were determined both qualitatively and quantitatively. It was found that a lot of isolates was able to solubilize the inorganic phosphate. One of these isolates (PSF77) was identified as *Penicillium canescens*. After this, corn plants infected with *Penicillium canescens* spores on their seeds were grown in the pots added Mazidagi Rock Phosphate. At the end of 21 days growth period, the plants were harvested and some growth parameters (root and shoot lengths, fresh and dry weights, protein, total sugar and chlorophyll) were measured. When compared with of the control group, it was found that inoculation of seed with microfungi *Penicillium canescens* PSF77 increased the values of growth parameters in the range of 10-80%.

**Material and Methods:** *Penicillium canescens* PSF77 were isolated from soil samples collected from fields in Mazidagi, Mardin province, Turkey and was identified as respectively, according to classical methods and DNA sequence analysis. The strain was evaluated for its P-solubilizing capability based on the qualitative and quantitative methods. The fungal strain was kept on PDA for long-term storage. After the surface sterilized seeds of maize (*Zea mays* L.) plants were inoculated with 2.10⁶/mL *Penicillium canescens* spore suspensions. Seeds were sown into the pots containing sterile sand, and the pots were irrigated with modified Hoagland solution. At the end of 21-days growth period, the plants were harvested and some growth parameters (root and shoot lengths, fresh and dry weights, protein, total sugar and chlorophyll) were measured.

**Results:** When compared with of the control group, it was found that inoculation of seed with microfungi *Penicillium canescens* PSF77 increased the values of growth parameters in the range of 10-90%.

**Discussion:** *Penicillium canescens* PSF77 enhanced corn yield and we conclude that it can be used as a biofertilizer. But further studies are required to determine the efficiency of this microorganism under field conditions with varies crops.

**Keywords:** Mazidagi Rock Phosphate, Phosphate Solubilizing Fungi, Biofertilizer
Distribution of CSR strategy types in floodplain forest in Aksaz-Karagöl Wetland

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Introduction: Wetland are very productive and stressful environment. Plant individuals adjust themselves phenologically, physiologically or morphologically to stress. Negative relation between competitive and stress tolerance is one of the most important factor that effecting the distributing of plant distribution and community structuring. In this study, we aimed to determine distribution of CSR (competitive, stress-tolerant, ruderal) strategy types in floodplain forest in Aksaz-Karagöl Wetland.

Material and Methods: The present study was carried out between 2015-2017 years. Plant taxa, CSR strategy types and cover percentage of each taxa were identified. Specific leaf area (SLA), canopy height, dry matter content, leaf dry weight, lateral spread, flowering initiation and flowering period were used to determine CSR types. For the field measurements, at least ten individuals of each species were marked, while three individuals were used for leaf characters.

Results: 85 plant taxa and 14 different CSR strategy types were identified in floodplain forest. The most abundant CSR types were C, C/CS, CR and C/CR. The cover percentage of these types were 107.7%, 43.1%, 36.9% and 13.3%, respectively.

Discussion: According to results, competitive strategies are abundant in floodplain forest. On the other hand, representing of ruderal strategies after competitive ones shows low disturbance in the forest. Presence of the other strategy types could be mean that the forest has functional diversity.

Acknowledgement: This study was supported by TUBITAK (The Scientific and Technological Research Council of Turkey, project no. 114O796).

Keywords: Floodplain forest, CSR strategies, Aksaz-Karagöl Wetland, Sinop
Introduction: The family Capillariidae represents a large group of trichuroid nematodes, including more than 300 species. The group occur a worldwide distribution, and these nematodes are parasites in members of all classes of vertebrates as fishes, amphibians, reptiles, birds, mammals and human. Capillariids have been recorded in both freshwater and marine fish. They occur both in the digestive tract and in various organs of fish, and may be highly pathogenic. In this research study is offered the presence and morphological features of *Capillaria (Procapillaria) gracilis* detected in marine fishes from Turkish coast of Black Sea.

Material and Methods: Fish samples were collected from commercial fishing vessels off Sinop coast in the Black Sea (Turkey) from June 2016 to May 2017. Collected fish were transferred to parasitology laboratory at the Faculty of Fisheries and Aquatic Sciences in Sinop and examined for capillariid parasites under a dissecting microscope. Totally, 34 fish species belonging to 26 families were investigated. Parasites recovered were either studied fresh or fixed and preserved using methods commonly applied. Morphological diagnostic features of the parasite were studied in detail using light (LM) and scanning electron microscope (SEM). Photomicrographs of each parts of the parasite were presented.

Results and Discussion: *Capillaria (Procapillaria) gracilis* was detected from 5 fish species, *Mullus barbatus*, *Solea solea*, *Gaidropsarus mediterraneus*, *Serranus scriba* and *Raja clavata*. Overall infection prevalence (%) and mean intensity values were calculated for each fish species, the highest prevalence and mean intensity were determined in *Mullus barbatus*, this value 58.8% and 3.80 ± 0.82. Morphological diagnostic features of the parasite were studied in detail using light and Scanning Electron Microscope (SEM). This nematode is mainly a parasite of gadoid fish, although it may occur in other fish superfamilies. *Capillaria (Procapillaria) gracilis* had not been previously reported from the Black Sea. This report is the first on the presence of *Capillaria (Procapillaria) gracilis* in marine fish inhabiting Turkish Black Sea waters.

Keywords: *Capillaria (Procapillaria) gracilis*, Nematode, Black Sea
Micropropagation of *Pistacia* Hybrids

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**Introduction:** Due to cross-pollination, commercial pistachio nut trees are virtually as variable as wild populations. The breeding strategy is to exploit this genetic variation using seed orchards and controlled crossing. Currently, in Turkey like elsewhere in the world pistachio trees are propagated by grafting or budding mature scions onto seedling rootstocks due to difficulties in rooting cuttings. Despite significant development of pistachio rootstock propagation, the expansion of pistachio plantation is limited by inadequate supplies of rootstock populations. In this study, micropropagation protocols were developed for seedlings derived from axenically germinated hybrid seeds of *Pistacia* L. genotypes obtained by controlled pollination.

**Material and Methods:** Hybrid seeds were produced from the inter- and intra-species of *P. khinjuk* Stocks, *P. vera* L., *P. terebinthus* L. and *P. atlantica* L. by controlled pollination in Gaziantep Pistachio Research Institute in 2014.

**Results:** The highest germination rate was 86.70% in the *P. vera × P. terebinthus* genotype when the hybrid seeds were cultured in MS medium supplemented with 1 mg/l BA or without any plant growth regulator to the establishment of *in vitro* culture. For the regeneration of clonal shoots, *P. vera × P. vera* gave the best results in terms of an average number of 2.45 shoots cultured on MS medium supplemented with 1 mg/l BA among different media (MS, WPM, and SH) tested. For rooting of hybrid clones, the 8 mg/l IBA treatment gave the best results among different IBA concentrations, and 40% rooting was obtained in the *P. khinjuk × P. terebinthus* genotype.

**Discussion:** Details of three rootstock candidate *P. vera × P. vera*, *P. khinjuk × P. atlantica* ve *P. khinjuk × P. terebinthus* were described for micropropagation among the 8 hybrid genotypes which may be used as rootstock for pistachio, showing better development during *in vitro* germination studies. In brief, the results on the micropropagation of hybrid *Pistacia* genotypes presented from this study may be useful for the optimization of the rapid clonal propagation and further development of regeneration techniques.

**Acknowledgement:** This work was supported by the Dicle University Research Foundation (Project No: Fen.16.003).

**Keywords:** Pistacia, Clonal Rootstock, Hybrid.
Metacercariae of *Condylocotyla pilodora* (Digenea: Heterophyidae): New Geographical and Intermediate Hosts Records

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**Introduction:** *Condylocotyla pilodora* is a member of Heterophyidae. Generally, this species is reported from garfish in Mediterranean Sea. Body is long and undivided. Tegument armed with spines that are longer anteriorly than posteriorly. Cercariae of this parasite that emitted by a bentic mollusc, has long and large tail. Their large tail, swimming movement and violet colour resemble to planctonic organisms. This features of *Condylocotyla pilodora* cercaria cause to be prey of intermediate hosts. Fish are intermediate host and generally birds are final host of this digenean species. In this study, information about morphology, hosts, infection values and infection site of *Condylocotyla pilodora* metacercariae that caught from Sinop coasts of the Black Sea were offered.

**Material and Methods:** Fish samples were collected with gill nets in Turkish coast of Black Sea between June 2016 - May 2017. Totally, 34 fish species examined. The examination included the skin, fins, gills, eyes (lens and vitreous humour), body cavity and visceral organs (stomach, intestine, liver, swim bladder and gonads). Morphological diagnostic features were detailed using light microscope and scanning electron microscope (SEM).

**Results and Discussion:** *Condylocotyla pilodora* was detected in five fish species that are *Spicara smaris*, *Symphodus cinereus*, *Uranoscopus scaber*, *Belone belone* and *Solea solea*. Overall infection prevalence (%) and mean intensity values were calculated and microhabitats were presented for each fish species. There is a limited number of researches on host of *Condylocotyle pilodora* and its geographical distribution. The present study is first report on host distribution and morphology of this digenean parasite in Black Sea. *Spicara smaris*, *Symphodus cinereus*, *Uranoscopus scaber*, and *Solea solea* are new hosts for *C. pilodora*.

**Acknowledgement:** We also would like to thank to The Scientific and Technological Research Council of Turkey (TÜBİTAK) for their financial support.

**Keywords:** *Condylocotyla pilodora*, Heterophyidae, Digenea, Black Sea
Three species of *Phyllodistomum* (Digenea: Gorgoderidae) from Black Sea Marine Teleost

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**Introduction:** *Phyllodistomum* is a cosmopolitan trematode genus. Species of *Phyllodistomum* occur in a wide range of both marine and freshwater fishes. They are usually parasites of the urinary bladder of fishes but they occasionally infect amphibians and reptiles and have also been reported from the swim bladder and ovary. Body is large and the leaf-shaped. Species of the genus are characterised by having a more-or-less foliate hindbody, blind caeca, oblique two testes and a slender excretory vesicle. In the present study, the presence of three *Phyllodistomum* species in marine fish from Turkish Black Sea coasts will be examined and information about morphology.

**Material and Methods:** Fish were caught by gill net from Sinop coast of Black Sea in Turkey from June 2016 to May 2017. Fish samples were transferred to parasitology laboratory at the Faculty of Fisheries and Aquatic Sciences in Sinop and examined in the laboratory for the presence of *Phyllodistomum* trematodes. Of 34 species of fishes from 26 families examined, only 4 fish species from 3 families were found to be infected with *Phyllodistomum* spp. Specimens of *Phyllodistomum* spp. obtained from fish urinary bladder were washed in physiological saline and then they were fixed and preserved in 70% ethanol. Morphological diagnostic features of three *Phyllodistomum* species were studied in detail using light microscope and Scanning Electrom Microscope. The photomicrographs of each parts of these parasites are presented.

**Results and Discussion:** In this study, three species of *Phylodistomum*, *P. crenilabri*, *P. acceptum* and *Phylodistomum* sp. were detected in four fish species, *Symphodus tinca*, *Symphodus ocellatus*, *Parablennius sanguinolentus* and *Gobius cruentatus*. The infection prevalence (%) and mean intensity values were calculated for each parasite species. Both *S. ocellatus* for *P. crenilabri* and *P. sanguinolentus* for *P. acceptum* are first host report. This investigation is first detailed study about morphology of *P. crenilabri* and *P. acceptum* in Turkey.

**Acknowledgement:** We also would like to thank to The Scientific and Technological Research Council of Turkey (TÜBİTAK) for their financial support.

**Keywords:** *Phyllodistomum*, Gorgoderidae, Digenea, Black Sea
**Introduction:** The striped piggy, *Pomadasys stridens* (Forsskål, 1775), a lessepsian migrant, is a member of the Haemulidae family and inhabits coastal waters and swims in schools over sandy substrates to a maximum depth of 25 m. Length–weight relations of fishes are important in fisheries research, partly because they allow the conversion of growth-in-length to growth-in-weight equations, and are used in determining stock structure and estimating fish condition. This study aims to provide knowledge on the length-weight relationship parameters of the species for the Turkish coasts of Eastern Mediterranean.

**Material and Methods:** A total of 363 the striped piggy, *Pomadasys stridens* were collected from İskenderun Bay, by a fishing vessel at depths of 18-20 m in July 2017. The length–weight relations were determined according to the allometric equation: \( W = aL^b \). The Student’s t-test was used to verify the existence of significant differences between sexes and to test the allometry in growth.

**Results:** A total of 363 striped piggy, *P. stridens* were sampled during the study and it was determined that 37.7% of the samples were female (n=137), 36.1% male (n=131) and the remaining ones were undetermined (n=95). The sex ratio was calculated as 1:0.96 (female: male) and chi-square analysis showed that there was no statistically significant difference between the number of males and females (\( \chi^2, P < 0.05 \)). The total length (weight) of females ranged from 7.0 cm to 15.8 cm (3.83 g to 51.09 g) and of males from 7.5 cm to 15.7 cm (6.61 g to 59.15 g). The length–weight relations were calculated as; \( W = 0.00943*L^{3.179} \) (R=0.989), \( W = 0.01074*L^{3.122} \) (R=0.935) and \( W = 0.01104*L^{3.311} \) (R=0.956) for females, males and sex combined, respectively.

**Discussion:** Approximately 14% of the Turkish Sea fishes is known as lessepsian migrant at now and the invasion in the Mediterranean is seem to be continue without stopping. The relationship between native and invasive fishes is so important for the future of the fish stocks, so that the biological characteristics of these new visitors should be known as well as their hosts. *P. stridens* is a well invaded species in the area and contribute to the demersal fish fauna with a respectable amount. By the study we would like to provide some preliminary informations about its length and weight and the relationship between these two parameters. Our results show that the species represents a positive allometric growth in the area.

**Keywords:** *Pomadasys stridens*, LWR, İskenderun Bay, North-eastern Mediterranean.
The Geophytes of Keltepe

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Introduction: Keltepe located in the western part of Karabük, at an altitude of 2000 m, in the Europe-Siberian phytogeographical region. It is located in A4 square according to the grid system used in Flora of Turkey.

Material and Methods: Plant samples of Keltepe (Karabük) region were collected with considering seasonal changes in 2015 and 2016. Collected plant samples were diagnosed and the geophyt species naturally spreading in the field were determined.

Results: As a result of the research, Fritillaria pinardii Boiss., Gagea granatellii (Parl.) Parl., Crocus chrysanthus (Herb.) Herb., Crocus speciosus subsp. speciosus M. Bieb, Allium flavum subsp. flavum var. flavum L., Allium guttatum subsp. guttatum Stev., Allium scorodoprasum subsp. jialae (Vved.) Stearn, Ornithogalum fimbriatum Willd., Ornithogalum oligophyllum E.D.Clarke, Scilla bifolia L., Muscari armeniacum Leichtlin ex Baker, Muscari neglectum Guss. ex Ten., Corydalis integra Barbey & Fors.-Major, Anemone blanda Schott & Kotschy, Eranthis hyemalis (L.) Salish., Cyclamen coum subsp. coum Mill. which are distributed naturally in the Keltepe region were identified as being a total of 16 geophytites belonging to 11 genera. one of these taxa has protected by the BERN agreement.

Acknowledgement: We would like to express our appreciation to the Kastamonu University Scientific Research Project Commission, which supported this study (KÜBAP-01/2015-25).

Keywords: Keltepe, Geophytes, Karabük.
Introduction: The aim of the study is to provide information on the presence of macroscopic species living in the marine environment of Tilkicik Bay. In addition, these species were assessed according to the Barcelona and Bern Conventions and the IUCN’s Red List. The main subjects that were studied as follows: 1) The present status of seagrass *Posidonia oceanica*, 2) Identification of invertebrate species encountered in underwater video footage and, 3) the presence of Mediterranean monk seal *Monachus monachus* and their potential habitats at study area.

Material and Methods: The field survey was conducted from R/V Dokuz Eylül-1 in Tilkicik Bay, Yalıkavak District of Muğla Province during 1-3 October 2017. The study was planned in two main parts; underwater surveys at sea and community surveys by having bilateral or multilateral meetings with local residents, especially with fishermen. In the western part of Tilkicik Bay two scuba dives, and one free-dive and in the eastern part one scuba dive were performed by two researcher-divers. One of the divers recorded the video footage and the other took photos for later identification of species - when possible. Divers also collected algae and sponge (Porifera) specimens randomly for identification at species level. Samples were placed in separate jars containing 4% seawater-formaldehyde solution. In the laboratory, samples were rinsed by fresh water and identification of samples was made using a stereo-microscope. For the community survey, a standard questionnaire applied in case any recent monk seal sighting was made by any member of the local community especially the fishermen.

Results: A total of 24 algae and phanerogam, 40 invertebrate and 32 vertebrate species were identified. Twenty-five percent of algae and phanerogam (n=6) and eleven percent of the vertebrate/invertebrate species (n=8) identified, are under protection by Bern and Barcelona Conventions. Twenty-six percent (n=25) of identified species (except the species protected by international conventions) are classified in IUCN’s Red List.

Discussion: Results mentioned above show that endangered marine algae, phanerogam, vertebrate and invertebrate species and their habitats are present in Tilkicik Bay and all these results reveal the necessity of protecting the area. In terms of *M. monachus*, Tilkicik Bay marine area and coastal zones should not be destroyed any more.

Acknowledgement: This study has been financially supported by Mr. Ahmet Murat Kaynar on behalf of the Platform for the Preservation of Bodrum Tilkicik Bays (Project: DBTE 244 Tilkicik Bay Macrobiological Study Project).

Keywords: *Posidonia oceanica*, marine invertebrate species, *Monachus monachus*, Bodrum, Muğla
Introduction: Erosion is the transported of soil or rocks by natural forces such as wind or water. Water erosion is an erosion that comes to the water with rain. Wind erosion is occured mostly in flat, bare areas; dry, sandy soils or anywhere the soil is loose, dry and finely granulated. It is generally effective in spring and summer.

Material: There is a great relationship between vegetation and erosion. Both water and wind erosion are a bigger problem in dry or bare soils. Therefore, especially forage crops and meadows are very important at soil protection. The most effective plant cover in erosion prevention is the forests. Meadows and forage crops are the groups of plants that protect the soil best. As a matter of fact, explained in some researches that the most loss of soil is in the fallow lands. However, the loss of soil is less in the meadows and forage crops fields. The most effective method of preventing erosion is to find vegetation on the ground. Field crops stay in the soil at certain times of the year and the soil is uncultivated after harvest a long time. In this case, the intensity of erosion increases.

Result and Discussion: Forage crops are plants that retain soil for a long time due to some characteristics. For example; alfalfa is a long-lived perennial plant and belongs to the leguminous family. Again, sainfoin is a a short-lived perennial leguminous forage crop and is resistant to cold. The plant such as orchardgrass (Dactylis glomerata), smooth brome (Bromus inermis), tall oat grass (Arrhenatherum elatius), bermuda grass (Cynodon dactylon) are also perennial and belong to the family of graminea. Because these forage plants are perennial, they stay in the soil for years. Leguminous forage crops are taproot and these roots prevent erosion. The plants such as white clover (Trifolium repens) and bermuda grass (Cynodon dactylon) that spreads by stolons and cover the soil surface. In addition, Chickpea milkvetch (Astragalus cicer), kentucky bluegrass (Poa pratensis), smooth brome (Bromus inermis), are also rhizome plants and spread underground. Plants with stolons and rhizomes keep the soil and prevent erosion. For this reason, the importance of these plants for controlling erosion is great. Some plants that evaluate poor areas are also used as forage plants. For example; crested wheatgrass (Agropyron cristatum) is resistant to dry, tall wheatgrass(Agropyron elongatum) is resistant to salinity and bermuda grass (Cynodon dactylon) is resistant to hot. Because of its many advantages, forage plants must be the first to come to mind in preventing erosion. So that; the planting of forage crops that are providing protection against water and wind erosion will greatly reduce erosion.

Keywords: Forages crops, erosion, erosion control
**Introduction:** *Pyracantha* is one of the most common genera of Rosaceae family. In Anatolia, it is commonly known as ateş dikeni due to bright red color of its fruits. Like other members of the family, *Pyracantha* species are also rich in many of bioactive compounds. This valuable property makes the *Pyracantha* species promising candidates for development of medicinal and eco-friend industrial applications. In this context, the present study was designed to research usability of *Pyracantha* aqueous extract in biosynthesis of metallic nanoparticles, which provide cheaper, biocompatible, nontoxic and environmentally friend nanomaterials.

**Material and Methods:** The *Pyracantha* sp. fruits were collected from local gardens in Erzurum. Then, they were washed with distilled water, dried and powdered. The aqueous extract was prepared on a magnetic stirrer with constant stirring for 2h. Then, it was filtered by using Whatman® Grade 1 Qualitative Filtration Paper and kept at +4 °C in the dark until biosynthesis assays. Zinc acetate·2H$_2$O was chosen as the precursor. During the biosynthesis reactions, the aqueous extract was added into the precursor solution (200 mM), and then incubated with stirring for 6 h. In the end of the period, NaOH solution (2 M) was added and kept on the stirrer under the same conditions for overnight. The precipitate was collected by centrifugation and washed with double-distilled water. Finally, the products were characterized by using SEM and EDX.

**Results:** The present results showed that ZnO nanoparticles were successfully biosynthesized from the Zinc acetate·2H$_2$O precursor by using the aqueous extract of *Pyracantha* sp. fruits. The average size of produced nanoparticles was approximately 10 nm. Moreover, all the nanoparticles were polygonal shaped with rounded corners.

**Discussion:** According to the results of the present study, it may be concluded that the aqueous extract of the *Pyracantha* sp. fruits have a potential use for biosynthesis of ZnO nanoparticles from the zinc acetate·2H$_2$O precursor. The present products and production steps can be optimized with the further studies in the near future.

**Keywords:** Biosynthesis, *Pyracantha* Aqueous Extract, Zinc Oxide Nanoparticles
Introduction: Kleptoparasitic behaviour is explained by the stealing of resources another animal has already procured most typically food items. A large majority of the subfamily Miltogramminae are known as kleptoparasites of the ground-nesting solitary bees and wasps utilizing the stored food (insects, spiders, pollen). Some species parasitize other insect groups (Orthoptera and Diptera) and may be useful for biological control of certain pests. The aim of the current study is to define this interesting feeding strategies of these species and the relationships of their hosts.

Material and Methods: The related information about these flies is based on the reviewing of the current literature.

Results: Members of this subfamily may have genus or species- specific kleptoparasitic strategies. Senotainia spp. larvoposits on prey as the host wasp pauses at the nest entrance, Metopia spp. locates open nests and deposit larva on prey in the nest chamber and Phrosinella spp. digs into closed nests to larvoposit on prey. All species of Taxigramma whose biology is known are kleptoparasites in the nests of sphecid, or more rarely, pompilid wasps. Subtribe Apodacrina includes genera Apodacra (13 species), Xeromyia (13 species), and Xerophilomyia (18 species). Larvae are kleptoparasites of different solitary bees and wasps. The kleptoparasitic behaviour of the flies have apparently spurred a remarkable morphological diversification of the first instar larva. For example, the first instar larva of Apodacra pulchra is shown to possess a strongly modified pseudocephalon. Senotainia species larvae were recorded from the nests of Sphecidae and Apidae. The genus Cricitculina was reported associated with Bembix wasps. The genera Hilarella, Protomiltogramma and Taxigramma were also reported as natural enemies of these wasps. Species of Metopia are kleptoparasites of a wide range of solitary wasps and bees (Aculeata: Vespidae, Sphecidae, Pompilidae, Crabronidae, Halictidae, Apidae). Cerceris fumipennis is a solitary ground-nesting wasp. Metopia campestris and M. argyrocephala are kleptoparasites with hosts of the Apoidea and Pompilidae. Metopia argentata is more specialized, with only one species of pompilid wasp, Batozonellus lacerticida. Metopia leucocephala has been found in cells of Philanthus sp. Oebalia minuta glues incubated eggs directly onto the host wasp for transportation into the nest.

Discussion: The Miltogramminae can be separated into two groups on the basis of kleptoparasitic larvipositing behaviour: Satellite flies (like Senotainia spp.) pursue provisioning female wasps and larvoposit on the prey while the host female is in flight, or as she is entering her nest. They are named as “satellite flies” because of adult females may follow behind potential hosts often keeping the distance within a very narrow range as though tethered to the wasp (like a satellite is “tethered” to its parent body). The second group consist of “hole searchers” (like Metopia spp.). The hymenopterans provide for their own progeny and the fly larvae, being primarily kleptoparasites, devour the host larval food.

Keywords: Kleptoparasites, Diptera, Sarcophagidae, Miltogrammiae
Two First Records for the Caddisfly Fauna (Insecta: Trichoptera) of Kosovo

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Introduction: The distribution, diversity and ecology of caddisflies from the Balkan Peninsula and southeastern Europe are still insufficiently known. The Kosovo caddisfly fauna has been intensively investigated during the last decade but insufficiently researched areas still remain.

Material and Methods: Adult caddisfly specimens were collected with entomological net, sweeping net, handpicking and ultraviolet light trap in Dërmajk village, Hani i Elezit municipality, Kosovo. The sampling was carried out between October 2016 and October 2017. Collected samples were preserved in 80 % ethanol.

Results: During this investigation we found 36 species and 22 genera belonging to 11 families. The distribution of species within families is as following: Limnephilidae (12), Psychomyiidae (6), Rhyacophilidae (5), Glossosomatidae (3), Polycentropodidae (3), Philopotamidae (2), Hydroptilidae (1), Uenoidae (1), Goeridae (1), Odontoceridae (1) and Sericostomatidae (1).


*Hydroptila taurica* and *Stenophylax mitis* are recorded for the first time from Kosovo. The distribution of *Stenophylax mitis* ranges from the Iberian Peninsula to the Balkan Peninsula and from southern Italy and Greece to the Central European highlands. *Hydroptila taurica* is absent from most of the Balkan countries and is also rare elsewhere in Europe.

This investigation is a contribution in understanding distributional and ecological patterns of caddisflies in Kosovo.

Keywords: Trichoptera, Kosovo, *Hydroptila taurica*, *Stenophylax mitis*. 
Endemic Element in the Arthropod and Mollusk Faunas of Kastamonu Province
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Introduction: Black Sea Region constitutes a separate biogeographic entity due to characteristic climatic conditions. Kastamonu Province, lying in the western portion of the region, has a high species richness and endemism rate. In the relatively higher surface area of the province, diversity of the topography, geology and vegetation types can be evaluated as the reasons behind the figure. Present study deals with distribution types of arthropod and mollusc endemites of the Kastamonu Province based on the literature data.

Material and Methods: All available literature on the arthropod and mollusc faunas of Kastamonu and distribution of the recorded species have been analyzed based on the biogeographical methodology.

Results: 200 insect and 20 non-insect arthropod endemics have been determined in the fauna of Kastamonu Province, whereas 31 species and subspecies of terrestrial mollusks are found to be endemics. Endemism rate is around 10% in arthropods and 36% in non-marine mollusks.

Discussion: According to available distributional information of the Western Black Sea Region fauna, arthropod and mollusk narrow/regional endemism is significantly high. Due to climatic and geographical conditions however, Kastamonu is distinct in having intruders from Central Anatolian steppe. Several individual insect groups are found to be represented by isolated subspecies along the Black Sea mountain chain as climatic vicariants. The endemics of relictary origin can also be found and more discoveries are expected. Faunal inventories of microhabitats are of conservative importance at the moment, due to developing tourism and other economic activities.

Keywords: Arthropods, Biogeography, Endemism, Kastamonu, Malacofauna
Assessment of water quality of the Morava e Binçës River based on the physico-chemical parameters and Water Quality Index

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Introduction: Water is a crucial natural resource, a basic human need and a precious natural asset. Environmental pollution and especially the contamination of freshwater ecosystems is one of the current challenges in the Balkan Peninsula. The increased urbanization, industrialization, the modernization of agriculture and the increase in traffic contribute to pollution, which in turn requires accurate monitoring and information about the quality of water resources. The aim of this study is to evaluate the water quality of Morava e Binçës River by measuring some physico-chemical parameters and use of the Water Quality Index (WQI) in five sampling stations during four months of 2017 year (February, May, July and October).

Material and Methods: Five sampling stations along the Morava e Binçës River were selected for this investigation. Water sampling for analysis was carried out by using equipment and containers based on the ISO 5667-6 standards. Water samples were taken on glass bottles for organic parameters and on polyethylene bottles for inorganic parameters. The analysis of the samples was carried out in the laboratory of the Hydrometeorological Institute of Kosovo in Prishtina. The WQI was calculated with the Water Quality Index desktop software.

Results and Discussion: During this investigation we evaluated these parameters: water temperature (WT), turbidity (TUR), electrical conductivity (EC), water soluble materials (WSM), hydrogen ion concentration (pH), dissolved oxygen (DO), oxygen saturation (OS), chemical oxygen demand (COD), biochemical oxygen demand (BOD5), total organic carbon (TOC), nitrates, detergents (DET), phosphates, ammonium ions, nitrates, sulphates and chlorides. The values of measured parameters were compared with the Rumanian Republic standards for the assessment of ecological status of surface waters (GD161). The values of parameters such as: WT, TUR, EC, WSM, pH, DO, OS, TOC, nitrates, DET, ammonium ions, sulfates and chlorides are categorized in the first class, while the values of the following parameters COD, BOD5, phosphates, nitrates have resulted over the recommended values of the GD161 regulation and were categorized on the fifth category. Based on the WQI calculations it has been shown that the best water quality was found at the MB1 station located at the upstream segment of the river with the WQI 88 value (good category), while the lowest water quality was found at MB4 station located at the downstream segment of the river with a value of WQI 65 (the category: fair). The average WQI value for the entire measurement period and all sampling stations was 77.60 (the fair category). This investigation shows that three sampling stations (MB3, MB4 and MB5) are more loaded with pollution but the level of pollution is not extreme and the river represents a convenient aqua-system for aquatic life and economic activity.

Keywords: Kosovo, Morava e Binçës, WQI, physico-chemical parameters
Anatomy and Palynology Features of *Cousinia foliosa* Boiss. & Bal. (Section Stenocephalae Bunge., Asteraceae) and their taxonomic implications

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**Introduction:** *Cousinia* is known that there are about 630 species in world. Most of these species are distributed in Iran, Afghanistan and Central Asia. According to flora of Turkey, *Cousinia* genus is represented by 38 species and these species are endemic to 26 in Turkey. Sect. Stenocephalae harbour 4 species growing in Turkey. In the present study, anatomical and palynological characteristics of *Cousinia foliosa* are examined in order to understand the usefulness of these characteristics for systematics purposes.

**Material and Methods:** Plant materials were collected from different localities in Turkey. According to standard common herbarium techniques were dried and deposited at the KNYA herbaria. The herbarium samples were examined using Flora of Turkey under the a stereo-binocular microscope. For anatomical studies, living material was kept in 70 % ethanol. The paraffin method was used for cross sections of root, stems and leaves. The specimens were embedded in paraffin wax and then sectioned between 5 and 15 μm thickness with a Leica RM2125RT rotary microtome. All sections were stained with safranin-fast green and then mounted with Entellan. Measurements and photos were taken using a Leica DM1000 binocular light microscope with a Leica DFC280 camera. In pollen investigations, pollen material were obtained from herbarium specimens, The pollen slides were prepared according to Wodehouse’s technique. P/E ratios were calculated. To determine exine sculpturing of the pollen were used SEM microscope.

**Results:** Some anatomical characters such as size of vascular tissue and number of vascular bundle provide information of taxonomical significance. Anatomical measurement of various tissues of the studied species are given. In stem transverse section, the epidermis is 1 layered and consists of rectangular and oval cells and is surrounded by a cuticle layer. *Cousinia foliosa* has 6-8 layers cortex cells. *Cousinia foliosa* has a single layer upper and lower epidermis cells, and also It has 2 layers palisad and 2 layers spongy paranchyma. Pollen shape of *Cousinia foliosa* is subprolate. Aperture types of *Cousinia foliosa* is tricolporate. As a result of SEM studies, pollen ornamentation was determined as verrucos-perforate.

**Discussion:** The present study provides useful, morphological, anatomical and palynological information of the examined *Cousinia foliosa*. The anatomical and palynological properties given in this work provides the first detailed description of *Cousinia foliosa*.

**Acknowledgement:** We are grateful to the curators of herbaria AEF, ANK, E, G, GAZI, HUB, ISTE, ISTF, K and LE for permitting the examination of *Cousinia* specimens.

**Keywords:** Anatomy, Asteraceae, *Cousinia foliosa*, Palynology.
Desert Dust Transport and Rainfall Relation: Marmaris Case

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Introduction: Desert dust advection is a global phenomena which regulates natural climate cycle via contributing atmospheric cooling and glacier formation, global iron circulation, terrestrial and marine vegetative fertilization, cloud condensation nuclei (CCN) and ice nuclei (IN) formation and associated precipitation alterations for ages. These moderately long-lived aerosol species may transported and mixed through planetary boundary layer (PBL). If they reach to the tropospheric layers they gain the ability of in/intra hemispheric transport. However wet and dry deposition mechanism of desert dust still needed to be disambiguated in order to quantify their direct and indirect radiative forcing effects. This can be estimated by spatiotemporal analysis of both dust and associated possible data of wind, humidity, precipitation, temperature, etc. As an intercontinental transition area, Turkey is located amidst of global dusty belt which consists of North African, Asian and Middle East desert areas. Prevailing westerly and local wind patterns makes this Peninsula such a 365-days open exposure region to mostly North African and Middle East desert dust advections. As the part of Alpine-Himalayan orogenic transition through Anatolia, Taurus mountains have the affect of rainy katabatic winds. It has well known that aerosols and especially desert dust particles triggers the formation of CCN and associated rainfall alterations.

Material and Methods: In this study we used the rain water data of Marmaris meteorological station (Lat 36°,84'- Lon 28°,25') which is run by Turkish State Meteorological Service (TSMS), The Hybrid Single Particle Lagrangian Integrated Trajectory Model (HYSPLIT), and Aerosol Optical Depth (AOD) data of The Moderate Resolution Imaging Spectroradiometer (MODIS) - Aqua. Dust transport cases for Marmaris station have determined via HYSPLIT 1°×1°, 5-day back trajectories and associated 1°×1° regional MODIS-Aqua AOD patterns. We assessed over 80 rainfall cases from mid 2011 to the end of 2012 against dusty cases. Furthermore, we evaluated same dataset in terms of some marine and dust aerosol tracer parameters such as pH, Cl, Ca, Na, SO₄, etc.

Results: Although local and long range transported anthropogenic aerosols are affecting the content of rain samples, dust intrusions are dominating the formation of CCN and associated rainfall in this region. For a significant majority of evaluated dusty cases, rain was observed within the following three days.

Discussion: Southern Anatolia including Aegean and Mediterranean coastal areas are highly affected from Sahara and Middle East originated desert dust intrusions. This natural phenomena triggers a degradation in air quality in terms of increasing particulate matter (PM) load and rainfall formation. Within the natural climate cycle, desert dust transport for this region forms up its own pollution load and in a sense its own washout mechanism.

Keywords: Desert Dust, CCN, Rainfall, AOD, Southern Anatolia
Determination of the Biological Activity of Verbascum Spp. L. Leaf and Seed Extracts against Four Different Plant Pathogens

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Introduction: The availability of bio-pesticides obtained from naturally grown plants is increasing day by day. Worldwide there are about 2500 species of Verbascum spp. The biological activity of ethanol extracts obtained from leaves and seeds of this plant species was investigated against Sclerotinia sclerotiorum, Fusarium oxysporum f.sp cucumerium (FOC), Monillia fructigena and Rhizoctonia solani plant pathogens causing fungal diseases in culture plant.

Material and Methods: In the biological activity studies, doses of 0.1, 0.5, 1, 2 and 5 mg/ml of extracts were determined against pathogens using the agar plate method.

Results and Discussion: As a result, the plant extracts which used in our study was showed a different level of antifungal activities in a dose depend manner. No effect was observed against S. sclerotiorum in all of leaf extracts. The effect of 5 mg/ml of leaf and seed extracts were found to be 0% and 38% for S. sclerotiorum. These rates, 81% and 95% for FOC, 59% and 90% for M. fructigena and 15% to 59% for R. solani, respectively. Lethal dose values of extracts (LD₅₀-₉₀) were calculated against pathogens. Accordingly, the most effective LD₅₀ value was determined to be 0.58 mg/ml against FOC in leaf extracts and the most effective LD₉₀ value was 5.27 mg/ml against FOC in seed extracts. Accordingly, to these results it seems that the most sensitive fungus species against extracts in FOC. It is respectively followed by M. fructigena, R. solani and S. sclerotiorum. Research results showed that all extracts tested against all disease agents had bio-fungicidal activity.

Keywords: Plant extracts, Plant pathogens, Lethal dose, Verbascum spp.
Investigation of Fumigant Effects on *Rhyzopertha dominica* (Coleoptera: Bostrichidae) and *Oryzaephilus surinamensis* (Coleoptera: Silvanidae) at Different Concentrations of Essential Oils in Laurel (*Laurus nobilis* L.) and Zahter (*Thymbra spicata* L.)

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**Introduction:** In this research study, fumigant effects of essential oils with different concentrations of laurel (*Laurus nobilis* L.) and zahter (*Thymbra spicata* L.) on *Rhyzopertha dominica* (Coleoptera: Bostrichidae) and *Oryzaephilus surinamensis* (Coleoptera: Silvanidae) are being investigated.

**Material and Methods:** For each insect species separately for *R. dominica* and *O. surinamensis* species, 12 groups were formed in each group as 20 insects. These groups were the control group, solvent control group (150 μl/l) include five different doses for *L. nobilis* essential oils group (12.5 μl/l, 25 μl/l, 50 μl/l, 100 μl/l, 150 μl/l) include five different doses for *T. spicata* essential oils group (12.5 μl/l, 25 μl/l, 50 μl/l, 100 μl/l, 150 μl/l). The insects in the control group were fed with pre-sterilized cereals without added any substance. For the other groups, glass tubes (65 ml) were prepared as pre-sterilized 10 gr wheat and 20 adult beetles in glass tubs. The experiments were established according to the design of random blocks and incubated for 24 hours. Twenty-four hours later, the first mortality counts were made and the dead insects were removed and transferred to fresh 65-ml glass tubes containing no essential oil in healthy insects and kept under the above conditions. Mortality rates were recorded at intervals of 24 hours for seven days. The resulting values were analyzed by the Kruskal-Wallis test.

**Results and Discussion:** In the experimental setup for *R. dominica*, familiar results were obtained from *L. nobilis* with negative group (with no solvent material), and solvent solution group (with acetone), but mortality increased due to increase in time and concentration. At the end of 24 hours, 100% fumigant toxicity was recorded in 100µl/l solution. Similar results were obtained with the *T. spicata* application for the same insect species, with the highest concentration showing 100% fumigant toxicity after 24 hours. Similar results were recorded for *O. surinamensis* another storage pest, using the same plant essential oils and concentrations.

**Conclusion:** It is known that the chemical pesticides used today have the potential to lead to the death of many living beings in addition to carcinogenic, mutagenic and teratogenic potentials. At the same time, many unsuspecting types of pesticides are also affected and are accessible to people through food chains. When we look at the research data we made, it seems that the fumigant effect on the two important pest pests used in the experiments of the essential oils obtained from the plants. It is suggested that the two plants used should be used for fighting in closed areas especially because the oil components are volatile. It is recommended to use it especially in a fight in a closed area because the oil components of the two plants used are volatile. Our country is host to many herbs thanks to its rich flora. Testing the plants and the essential oil components obtained therefrom on the harmfulness and determining the successful plant components and using these active substances instead of chemical pesticides for harmful purposes will make a positive contribution to both the environment and human health.

**Acknowledgment:** This research was supported by Kafkas University Scientific Research Projects Coordinator (KAU-BAP) within the scope of project number 2016-FM-15.

**Keywords:** *Laurus nobilis, Thymbra spicata, Rhyzopertha dominica, Oryzaephilus surinamensis, Fumigant effect.*
The Bioherbicide Effects of *Cinclidotus pachylomoides* (Bryophyta) Extracts on Wild Oat and Wild Mustard

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**Introduction:** Bryophytes are able to stimulate or inhibit the growth of higher plants in their habitats while protecting themselves against various stress factors, through the secondary metabolites they contain. In this study, it was aimed to determine the allelopathic effects of different concentrations of *Cinclidotus pachylomoides* Bizot extracts in three different solvents on wild mustard (*Sinapis arvensis*) and wild oat (*Avena sterilis* L.) plants which are among the common weeds.

**Materials and Methods:** The extracts of *C. pachylomoides* samples collected from Nigde-Camardi region were prepared at the concentrations of 0, 25 and 50 mg.mL⁻¹ in distilled water, ethanol and ethyl acetate. The prepared extracts were foliar-sprayed on wild mustard and wild oat seedlings. The total phenolic compound analysis, Superoxide dismutase (SOD), Peroxidase (PO) and Catalase (CAT) antioxidant enzyme analyses were performed using spectrophotometric method for the samples obtained from the leaves.

**Results:** The maximum change in the total phenolic compound amount was observed in the treatment of 25 mg.mL⁻¹ *C. pachylomoides* ethyl acetate. All treatment groups in the total phenolic compound amount caused an increase in wild oat and wild mustard plants compared to the control group. It was determined that SOD enzyme activity increased in all treatment groups compared to control samples except for 25 mg.mL⁻¹ *C. pachylomoides* ethyl acetate in wild oat plants. PO activity of wild mustard leaves decreased in all treatments compared to control group except for 50 mg.mL⁻¹ *C. pachylomoides* ethyl alcohol and 50 mg.mL⁻¹ *C. pachylomoides* ethyl acetate treatments. Wild oat PO enzyme activities decreased in 25 mg.mL⁻¹ *C. pachylomoides* ethyl acetate groups and increased in the other treatment groups. The decrease of wild mustard CAT activity by 53.27% in 50 mg.mL⁻¹ *C. pachylomoides* distilled water group is significant. Wild oat CAT activity increased in all treatment groups.

**Discussion and Conclusion:** As a result of the study, it was determined that *C. pachylomoides* extracts prepared at different concentrations and in different solvents have allelopathic effects on wild mustard and wild oat plants and that this stimulatory or inhibitory effect changes depending on the plant species, the solvent used and the concentration. In order to use bryophyte extracts as bioherbicides, some of the allelopathic effective secondary metabolites of bryophytes have to be purified and compared with commercial herbicides and field studies have to be done.

**Acknowledgement:** This study is supported by The Scientific and Technological Research Council of Turkey with Project number TUBITAK-TOVAG-115O923.

**Keywords:** Antioxidant enzymes, Phenolic compounds, Allelopathic effect, Bryophyte
The Effect of *Palustriella decipiens* (Bryophyta) on Antioxidant Enzymes and Total Phenolic Compounds in Pepper and Corn Plants

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**Introduction:** Many secondary metabolites and allelopathic chemicals involved in bryophytes are known to have an activity on vascular plants, regulating the growth. In this study, the effect of *Palustriella decipiens* (De Not.) Ochyra extracts on antioxidant enzymes and phenolic compounds in pepper and corn were investigated.

**Materials and Methods:** *P. decipiens* extracts were prepared at the concentrations of 0, 25 and 50 mg.mL⁻¹ in distilled water and ethanol. The extracts were foliar-sprayed on pepper (*Capsicum annuum* L.) and corn (*Zea mays* L.) plants. The total phenolic compound analysis, Superoxide dismutase (SOD) and Catalase (CAT) antioxidant enzyme analyses were performed using the spectrophotometric method for the samples taken from the leaves.

**Findings:** When the effect of bryophyte extracts in different solvents and at different concentrations on SOD enzyme activity of pepper was examined, the maximum activity was found in the treatment with 25 mg.mL⁻¹ *P. decipiens* in distilled water. SOD enzyme activity of corn leaves decreased when compared to the control group. When the catalase activity of pepper plant was evaluated, the lowest activity was found as 2886.179 EU.g⁻¹ t.a for the treatment with 25 mg.mL⁻¹ *P. decipiens* in ethyl alcohol. CAT enzyme activity of corn leaves increased in water extracts and decreased in ethanol extracts when compared to the control samples. The increases and decreases in the total amount of phenolic compounds of pepper leaves were not significant. The total amount of phenolic compounds of corn plant decreased in water extracts.

**Conclusion:** The findings obtained are thought to contribute to future studies in this area as a basic information. The purification of several secondary metabolites with allelopathic effect involved in bryophytes and comparison of them with commercial herbicides and the field studies are required in order to use bryophyte extracts as bioherbicides. The support of the results with biochemical, anatomical, molecular and genetic studies is also recommended.

**Acknowledgement:** The study was supported by the Scientific Research Projects Unit of Nigde Omer Halisdemir University with the project, FEB 2015/20.

**Keywords:** Antioxidant, Phenolic, Bryophyte, Allelopathic effect
Invisible Danger in a Subterranean Stream: Microbiological Contamination

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Introduction: Underground river or streams are one of the groundwater resources that are used for many important purposes with the largest amounts to irrigation of crops as well as local public use such as for delivery household, business sector and industrial area. Groundwater resources, is of vital importance for human activities as mentioned above for various human consumption, thus it become important by sanitation point of view.

Material and Methods: This study was carried out in a groundwater stream which is situated in the Mount Kazdağı. For this purpose, water samplings were performed in bimonthly periods, from three different stations pre-selected localities in the groundwater. Water samples were transported in cold chain (+4°C) by using thermos boxes. In the laboratory, water samples were inoculated to the selected medium immediately after transportation. Total coliform bacteria, Escherichia coli and fecal Streptococcus procedures were applied.

Results: In this periodical study, we were detected higher levels of the bacteriological contamination: total coliform bacteria, Escherichia coli and fecal Streptococcus, in only September 2016 that decreased the water quality class.

Discussion: Flow regime of the underground stream was very fast in the season winter and spring considered as wet season which is not detected any bacteriological contamination. Once the flow rate reduced at the season autumn, risky bacteriological contamination was detected especially in fecal Streptococcus indicating animal activities such as bats nesting in the karst system.

Keywords: Kazdağı (Mount Ida), Karst Stream, Groundwater, Microbiological Contamination, Water Quality.

Acknowledgement: This study supported by The Scientific and Technological Research Council of Turkey -TUBITAK coded with 115Y419.
Introduction: Landscape planning consists of two basic process emphasizes by the European Landscape Convention (ELC) namely the identification and evaluation of landscapes. Landscape inventory and analysis process that occurred during the definition of landscapes has been expressed in recent years with the term "Landscape Character Analysis" (LCAn). The LCAn encompasses landscape character classification and identification that differs from one area to another, which is the reason for the existence of the ELC. However, the disconnection between landscape planning and design causes landscape deterioration in Turkey. For this reason, it is aimed to guide the landscape design process considering the characteristics of the study area where the landscape character analysis is performed. Thus, recreational landscape strategies and designing process are taken into account by considering landscape character analysis.

Material and Methods: In this study, the upper and lower basins determined by the existing river systems of Bilecik Pelitözü and surroundings have formed the planning and design boundaries of the site. The study basically consists of landscape inventory, landscape character analysis and landscape character assessment. Within the context of landscape character analysis, ecological and visual landscape analyzes were carried out through ArcGIS 10.2 and SketchUp and landscape design was visualized with the AutoCAD and Photoshop CS5 programs.

Results: The analyzes obtained within the context of the LCAn are mapped to guide the designing process. LCAn studies have been evaluated ecologically and in terms of visual landscape, general design principles have been established and the vision of landscape development determined with these principles and finally recreational development scenario suitable for the area have been determined. In the spatial development of the scenario, a functional diagram has been created based on general landscape design principles. Finally, recreational landscape design was carried out by determining landscape character analysis.

Discussion: It has been tried to maintain the continuity of the landscape through landscape inventory and analysis process and design solutions, that will contribute to the preservation of the original value of the area, the decisions were taken from the planning to the design scale. Thus, the problems that may arise in the study area later are also minimized.

Acknowledgement: This study was published with the title "Bilecik Pelitözü Gülpark Landscape Character Analysis and Recreational Landscape Design" which was prepared within the joint studio of 4 postgraduate courses; Landscape Survey, Landscape Survey in River Corridors, Visual Landscape Analysis and Urban Landscape Design at the Ankara University Graduate School of Natural and Applied Sciences Department of Landscape Architecture. ISBN:978-605-136-264-9.

Keywords: Landscape character analysis, recreational landscape design, Bilecik.
The state of Kosovo biodiversity 2011 - 2017

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Introduction: The Republic of Kosovo, despite its small territory (10.908 km2), is characterized with high diversity on genetic, species, and ecosystem level including the presence of many relict, endemic and other important species. This high diversity is due to geographic position of the country, including geological, pedological, hydrological and climate factors.

Material and Methods: We used the data from published national reports and scientific papers related to the state of biodiversity in Kosovo. In addition to this we analyzed some of the data within the ongoing project of the Kosovo Red Book of Fauna.

Results and Discussion: Although there is still no complete inventory of flora taxons in Kosovo, according to various authors around 2,800 – 3,000 species of vascular flora are present. Especially important are the local endemic species whose number is considerably high but still not fully defined. Regarding fauna diversity the presence of around 350 taxons of vertebrates and approximately 600 taxons belonging to invertebrates are registered within the ongoing project of the Red Book of Fauna but this number is still not definite. Many stenoendemic species are especially registered within the class of Insects. Some habitats are being damaged and degraded while ecosystems are being destabilized as a consequence of human intervention and various species of flora and fauna are faced with the danger of extinction.

Keywords: Kosovo, state of biodiversity, flora, fauna. Landscape
**Introduction:** Carbon dioxide (CO\textsubscript{2}) is one of the main impurities in atmosphere that caused crucial air pollution. CO\textsubscript{2} is mainly responsible for the global warming and climate change resulted by the sera gas effect. Therefore, CO\textsubscript{2} removal becomes an important issue for the research on environmental science. The CO\textsubscript{2} separation systems are classified into three groups as; pre-combustion, post-combustion, and oxyfuel combustion. Currently, the main energy sources of the industrial plants are still based on the fossil fuels. Therefore, the post-combustion system is applicable for the today’s technology. Almost all industrial plants emit more than 3-10 % of CO\textsubscript{2} in their flue gas stream and the cost of the separation is significant. There are several separation techniques such as, absorption, adsorption, cryogenic distillation, and membrane separation. Among these techniques, membrane gas separation is promising depending on its cost effective, modular, and energy saving process properties. The performance of the system is directly related to the membrane. In this study, ZSM-5 zeolite incorporated Pebax-2533 mixed matrix membrane was prepared and applied to selectively remove CO\textsubscript{2} from nitrogen (N\textsubscript{2}). Because of the air consist of nitrogen more that oxygen, gas separation experiments were applied for CO\textsubscript{2}/N\textsubscript{2} separation. Effect of trans membrane pressure on CO\textsubscript{2}/N\textsubscript{2} selectivity was investigated at the constant temperature.

**Material and Methods:** Membrane preparation was made by dissolving Pebax 2533 particles into acetic acid at 50 °C. A certain amount of zeolite (varying concentration from 0 % to 20% respect to the dried polymer) was incorporated into the homogeneous polymer solution. Solution was cast onto a Teflon plate. Membranes were dried and crosslinked. Gas separation experiments were carried on a membrane cell having an effective separation diameter of 3 cm. effect of transmembrane pressure on CO\textsubscript{2}/N\textsubscript{2} selectivity was investigated both for unfilled and filled Pebax membrane.

**Results:** Gas separation experiments showed that the zeolite incorporation improved the CO\textsubscript{2}/N\textsubscript{2} selectivity, since the restricted chain mobility was effective on enhancing the CO\textsubscript{2} selectivity. Increasing trans membrane pressure was effective on the rate of gas permeation. With increasing pressure, the permeability of gasses increased. The CO\textsubscript{2}/N\textsubscript{2} selectivity showed a slight increase with pressure.

**Discussion:** The increasing trans-membrane pressure was effective on the permeability because of the increasing driving force between the two sides of the membrane. Zeolite incorporation increased the tortuous pathway in Pebax matrix and gas selectivity increased. Results showed that the ZSM-5 incorporated Pebax was appropriate to separate CO\textsubscript{2} from flue gas selectively. Both for the filled and unfilled membranes, selectivity values obtained greater than 10.

**Acknowledgement:** This study was supported by the Scientific Research Center of Kocaeli University.

**Keywords:** Pebax, CO\textsubscript{2} separation, air pollution.
**Introduction:** Lagoons are the wetlands that fish have introduced for sheltering, feeding, growth, and spawning for a period of their life. So these regions have high biodiversity and productivity. In this context, various fish species, Crustacea species and bivalve species which have economic value in these regions have been evaluated for a long time. Progresses in technology provide opportunities for aquaculture activities beside the fisheries activities. Çardak Lagoon encompasses Burunucu Lagoon, Buruniçi Lagoon Lake, and Ortagöl Lake. The main purpose of this paper is assessment of Çardak Lagoon in terms of fisheries and aquaculture production.

**Material and Methods:** Çardak Lagoon is located on the Çanakkale Strait which separates the continents of Europe and Asia. Therefore, it is ecologically important area since it is placed on the migration route for marine species between Black Sea and the Mediterranean Sea. Buruniçi Lagoon Lake is a saltwater lake that has a total area of 180 ha. The average depth of lake is 1.5 m although depth varies from 2.5 m to 3.5 m near to the gateway that has 10 ha total area. The lagoon is under the influence of the sea due to the deep and continuously open gateway. There are many fish species and bivalves such as *Mugil sp.*, European flounder (*Platichthys flesus*), scad (*Trachurus sp.*), picarel (*Spicara sp.*), sea bream (*Sparus aurata*), saupe (*Sarpa salpa*), sand steenbras (*Lithognathus mormyrus*), bluefish (*Pomatomus saltatrix*), eel fish (*Anguilla sp.*), common sole (*Solea sp.*), garfish (*Belone belone*) in Çardak Lagoon. The bivalve species are smooth scallop (*Flexopecten glaber*), Mediterranean mussel (*Mytilus galloprovincialis*), manila clam (*Ruditapes philippinarum*), carpet shell clam, (*Ruditapes decussatus*), flat oyster (*Ostrea edulis*), razor clam (*Ensis sp.*) and venerid clam (*Venus gallina*). These economically important species are assessed by fisheries. In this context, there is a fishery cooperative operating in the lagoon since 1979. A total of 50 fishermen including members and non-members to the cooperative are fishing in the lagoon.

**Results and Discussion:** Each lagoon area has its own special structure, characteristics and water regime. Therefore, continuously monitoring and protect the specified structure are necessary to ensure the sustainable production in lagoon areas. Subsequently, further studies are needed on the geographical characteristics, economic structure, fisheries, physicochemical properties, and external factors such as marine traffic, tourism activities, and inflow adversely affecting the characteristics of the lagoon. In conclusion, the assessment of lagoon, which is valuable for fish and especially bivalve production, is very important for the country economy and protection of natural life.

**Keywords:** Çardak Lagoon, Çanakkale Strait, aquaculture, bivalve, fish
Influence of Reactive Oxygen Species Generated By Microorganisms on the Processes of Hydrocarbon Pollution Remediation

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Introduction
The ways of enzymatic degradation of hydrocarbons by microorganism are quite extensively studied today. But the compounds for which specific enzyme systems are unknown are also exposed to microbial degradation. This can occur due to cometabolical transformation or to reduction of the enzymes specificity of known metabolic pathways for utilization of a new substrate. It is shown that in this case the frequency of «erroneous» reactions may increase, which leads to increased generation of reactive oxygen species (ROS). ROS production by microorganisms leads to oxidative stress in a cell, but the resulting oxygen radicals may be able to implement the stages of initial nonspecific oxidation of hard to degrade substrates. Confirmation of this hypothesis is the fact of inhibition of microbial degradation of oil hydrocarbons by antioxidants. The aim of this work is to study the generation of such ROS as superoxide anion radical and hydrogen peroxide during incubation of oil-degrading microorganisms with different hydrocarbons.

Materials and Methods
The following microorganisms were used in the work: Exiguobacterium undae, Achromobacter xylosoxidans (4 strains), Kocuria rosea (2 strains), Acinetobacter calcoaceticus (2 strains), Pseudomonas anguilliseptica (2 strains), Shewanella putrefaciens, Micrococcus luteus, Kocuria rhizophila. The generation of superoxide anion radical was detected using lucigenin-activated chemiluminescence. The generation of hydrogen peroxide was detected using the luminol-activated chemiluminescence.

Results
Reliable amplification of lucigenin-activated luminescent response (compared to control) in the presence of various hydrocarbons as a sole source of carbon and energy was observed for bacteria that are active oil-destructors: Achromobacter xylosoxidans (1.6–6.8 times stronger – pentane, decane, diesel fuel, cyclohexane), Acinetobacter calcoaceticus (1.5–13.9 times stronger – pentane, cyclohexane, benzene, anthracene, naphthalene, diesel fuel), and Shewanella putrefaciens (2.7–3.3 times stronger – benzene, naphthalene).

It was shown that in all studied strains, the generation of hydrogen peroxide increased to different extents (2.7 to 13 times) only at incubation with diesel fuel as the sole source of carbon and energy. Only in Kocuria rosea formation of hydrogen peroxide was also induced by decane (12 times higher than the control level) and in Shewanella putrefaciens by cyclohexane (2.3 times higher).

Discussion and Conclusion
Generation of ROS - superoxide anion radical and hydrogen peroxide by oil-degrading strains of microorganisms was shown at incubation with various hydrocarbons as the sole source of carbon and energy. ROS production may be one of the cometabolism mechanisms of hard to degrade substrates due to their initial, non-specific oxidation and thus to enhancing their bioavailability. Strains that are active oil-degraders displayed the highest levels of the ROS generation which allows to evaluate the potential of hydrocarbon-oxidizing strains according to this parameter for their application in bioremediation of hydrocarbon pollution.

Acknowledgements
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Keywords: reactive oxygen species, biodegradation, oil-degrading microorganisms
Comperative Morphology of Endophallus (Male Genitalia) on Some Species of *Lixus* (Coleoptera: Curculionidae: Lixinae) Genus: A Scanning Electron Microscope Study

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Introduction: In Coleoptera, the internal male genitalia have been poorly studied, and the functioning of internal male structures is not yet well understood. Genitalia provide, in many cases, taxonomically useful characters for distinguishing organisms at the species level. In Curculionidae, external and internal male genitalia have important structures that have been used to define taxonomic groups. The structure of the genital chamber in weevils (Curculionoidea) and other Coleoptera and explained the genital membrane in aedeagus as endophallus (internal sac). The endophallus membrane often has various sclerotised outgrowths forming variably shaped sclerites, larger teeth, spinules or miniplates, and usually becomes outwardly prominent when the endophallus is extruded.

Material and Methods: In this study, the eight species of *Lixus* (Curculionidae: Lixinae) genus (*Lixus pulverulentus, L. ascanii, L. cardui, L. circumcinctus, L. cineracens, L. filiformi, L. furcatus and L. scolopax*) were investigated. The specimens were selected from the museum (Ahi Evran University Entomology Museum) materials. Specimens were collected from the central Anatolia. First, the specimens were dissected under the light microscope and the aedeagus obtained after softening the abdomen in 10% KOH for 24 h at 30°C. Then, the endophallus were removed from the aedeagus and extended by the fine dissection.

Results: Endophallus have two apical sclerites symmetrically. The armatures such as teeth, spines, denticles are settle in the medial area, but they are locate in ventral surface. Under the scanning electron microscope; raspules are strongly covered with teeth that form two or three groups, they join basally (*Lixus pulverulentus*); the teeth seem very short and join in range (*L. ascanii*); raspules have folds and long teeth that like groups (*L. cardui*); the teeth are short and look like regular groups (*L. circumcinctus*); the surface have strong teeth that generally seem three groups, the middle tooth is very long and other teeth in the side are very short (*L. cineracens*); the teeth are intense and look like fringes (*L. filiformi*); the surface have teeth that are long and form groups (two or three) (*L. furcatus*); the teeth are strong and seem short groups which like smooth (*L. scolopax*).

Discussion: Characters of endophallus such as spines, denticles, hairs, scales, papillae etc. are not enoughly studied in light microscope, they only look like a transparent membrane. But in scanning electron microscope, all details are appear clear enough. We showed the armatures of teeth in ventral surface of endophallus. The armatures of teeth are strongly sclerotised and have differences in all species. These characters are usefull for taxonomy and may help in differentiation of similar species. Generally, the researchers compared the shapes of aedeagus, but the aedeagus seem sometimes similar in forms and the division of species seem to be difficult. In these cases, the armature of endophallus can be examined by the scanning electron microscope and contituted to all details.

Keywords: Coleoptera, Curculionidae, *Lixus*; Male genitalia, Aedeagus, Endophallus
Introduction: Solifuges can be difficult to collect because of their rapid movements. So most description of species are known only from male specimen or only from female. Little is still known about diversity of the solifuges in Greece and no comprehensive surveys of Greek’s solifuges, hence the number of species are very few. This study describes the history of taxonomic research on solifuges with nomenclatural notes and new synonyms and provides an updated checklist currently known in Greece.

Material and Methods: This checklist is based on a thorough review of the extant literatures on solifuges species whose presence has been confirmed in Greece.

Results and Discussion: In this study, 4 families, 8 genera, 15 species of solifuges are present for Greece, of which one subspecies and two nomen dubius are prepared in the list. Regarding the records for Greece, two species have not previously reported for the country; Galeodes araneoides (Pallas) and Galeodes barbarus Lucas. Four species and one genus can be considered endemic according to present knowledge. In a critical examination of previous publications considering Greek solifuges, some nomenclatural issues were uncovered. Based on these, the following new synonymy are proposed: Galeodes (Solpuda) scenicus Dufour, 1861 = Solpuga scenica Lichtenstein, 1797, nomen dubium and Galeodes (Solpuda) tardus Dufour, 1861 = Solpuga tarda Lichtenstein, 1797, nomen dubium.

Keywords: Solifugae, solifuges, synonymy, Greece, checklist
Cytotoxic Effects of Methanolic Extracts from Different Cladonia Species on Human Colon Cancer Cell Line

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Introduction: Lichens produce a large number of secondary metabolites of great interest due to antiviral, anti-microbacterial, antitumour, anti-allergic, inhibitory activities of plant growth and the like. It has been suggested that the extracts of Cladonia species, including Cladoniaceae family, were used for different medicines in the folk medicine. In this study we aimed to investigate the effects of the extracts of Cladonia pyxidata (L.) Hoffm. and Cladonia coniocraea (Flörke) Spreng. on colon cancer (Colo 205) with in vitro cytotoxicity assay.

Material and Methods: Within the scope of this study, 70% methanol extracts of Cladonia species, were prepared. Cytotoxic effects on Colo 205 cell line were studied with MTT assay.

Results: It has been elucidated that Cladonia coniocraea extract was found to be most cytotoxic extract with 191.45 µg/mL IC50 value on Colo 205 cell line.

Discussion: Among the two Cladonia species studied, C. coniocraea was found promising on Colo 205 cell line. The inhibitory effect of C. coniocraea extract on colon cancer cell line at different concentrations for 48 and 72 h will be examined in our subsequent studies.

Acknowledgement: This study was financially supported by 6602b-BMYO/17-121 coded Bozok University project.

Keywords: Cladoniaceae, Cladonia pyxidata, Cladonia coniocraea, cytotoxicity
**Antibacterial Effects of *Alyssum* L. Against Some Gram-Positive and Gram-Negative Bacteria**

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**Introduction:** It has been emphasized since the past that antibacterial plants should be used against bacterial diseases. But it has been shown that treatment with antibiotics may cause drug resistance and various side effects. It has therefore been shown that plant medicines, which are less resistant to bactericides and which may have less side effects, may be helpful in treating such infectious diseases. In this study, the antibacterial effects of *Alyssum* plants were evaluated against a number of gram-positive and gram-negative bacteria.

**Material and methods:** At the plant stage, the extraction plant was pre-dried and dissolved in water, acetone and methanol. Extracts were prepared at 50 mg/ml and antibacterial effects against nineteen types of bacterial (Staphylococcus aureus, Streptococcus pneumoniae gram-positive bacteria and *E. coli* gram-negative bacteria etc.) were evaluated. At various stages of development, the antimicrobial effects of aqueous and organic extracts of *Alyssum* were first tested in the Muller-Hinton agar medium and then the minimum inhibitor concentration (MIC) and minimum bacterial concentration (MBC) were determined.

**Result:** In this study, the extracts of the plant, impregnated with methanol and aqueous extrusion disc diffusion method, were found to be effective in most gram-positive bacteria in the Muller-Hinton agar (MHA) medium and did not have much effect on gram-negative bacteria. In addition, the zone areas of plant extracts formed on the bacteria were measured and analyzed. the density of the tested bacteria was adjusted to 0.5 McFarland blush followed by a 1:10 dilution to yield 107 CFU/ml. Blurring measurements of each bacterium were made on a spectrometer and the absorbance of the bacteria was maintained at 0.5-1. Based on the Minimum Inhibition Concentration (MIC) and the Minimum Bacterial Concentration (MBC), the lowest concentration obtained from the plant inhibited the recycling of the bacteria present in the hand.

**Discussion:** By this study was aimed to find out the bacterial effect of the *Alyssum* cataract and how it was beneficial to use it as a medicinal herbal medicine.

**Keywords:** *Alyssum* L., Anti-bacterial effect, Gram-positive bacteria, Gram-negative bacteria
Rain Gardens in Landscape Architecture

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Introduction: Rapidly developing technology and increasing needs bring with it many problems. These problems rapidly increased the impermeable surfaces. Some problems causing the natural balance to deteriorate. These are the increase in impermeable surfaces, the destruction of natural areas, the deterioration of water quality, and the increase of hard floors. Nowadays, the rehabilitated approach is the sustainable development approach. Many studies are being carried out in the direction of sustainable approaches. Water, which is an indispensable and limited source of life. It’s place in every step of these approaches in this process. As a result of increasing structuring, precipitation waters accumulate. Accumulated water can not be absorbed enough by the soil. Accumulated water is collected at low elevations and floods, floods, etc. This matter causes many problems. Rain gardens are applied to answer many these problems. In this study, the use areas of the rain gardens in landscape architecture were investigated. Ecological, aesthetic and functional aspects of a rainforest were discussed.

Material and Methods: The main material of the work is “rain gardens”. The rain gardens were examined from an ecological, aesthetic and functional point of view. Studies related to the subject have been examined. Design examples of rain gardens have been worked out.

Results and Discussion: Rain gardens examined in this study, which is the recovery of general purpose rain water. Rain gardens are very important in terms of landscape architecture in order to reduce both resource consumption and proper applications. Design examples are given in the scope of the study. these specimens were discussed as having both ecological and aesthetic features of the rain gardens at the same time. Design examples are given in the scope of the study. At the same time, these designs were discussed both ecological and aesthetic features of the rain gardens. As a result this study, the importance of rain gardens in landscape architecture has been examined. Rain gardens are one of nature-friendly-sustainable solutions of landscape architecture.

Keywords: planting design, concept garden, rain garden
Hair Goat Breeding in Ecological Environment and Products: A Review

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Introduction: Goat hair is about ninety percent of goat breeds in Turkey. Feeding of hair goats, dominant in the forests and in the villages, depends more on nature. In this context, goats are the most suitable species for organic farming. In recent years, goats have been regarded as economically valuable because of their ability to evaluate and yield even the most unfavorable materials even in scarce conditions, and the demand for their number and products is increasing. With the introduction of imported goat breeds such as the Saanen Turkey in the 1960s, goat breeding has developed rapidly for the goat’s milk yield. Even a portion of the breeders in the west of Turkey rearing Saanen X Hair Goat F1 crossbred or Malta X Hair Goat F1 crossbred, the important part continues to grow in traditional Hair Goat breeding. When the goats are removed from the nature and are not grazed, the feeding, behavior, and welfare of the goats are also affected and these changes are reflected in their products. However, negative reflections of the products of the non-grazing of the goats should also be evaluated in terms of human health. It has been reported that the studies carried out with grazing goats have shown that the goats can evaluate the highest level and more variety of grassland compared to other livestock. Therefore, it also benefits from the positive effects of aromatic plants found on high slopes, which affects the quality of goat’s milk and its products positively. Aromatic plants, especially natural polyphenols, have antioxidant activities, anticarcinogenic and antiviral products. It has been reported that pure aromatic plant leaves both improve the technological suitability by shortening the polyunsaturated fatty acid content and the duration of the coagulant. Goat meat, calorie is the lowest source of red meat. The fat content of the meat is about 50% less than that of cattle and sheep meat, and calories are similar to chicken meat. It is rich in amino acid composition. In terms of mineral matter, iron and calcium content can be consumed to pay attention especially to osteoclasts. The rich vitamin content has a positive effect on the formation of skin diseases and nervous system in the protection, healthy hair, skin and nail formation, fat breakdown, heart health, memory support, cell renewal.

Discussion and Conclusion: Compared to other red meats, it has the lowest value in terms of cholesterol content, and one of the most important features is that the proportion of unsaturated fatty acids is high and saturated fats are low. The high useful fatty acid content is between 61 and 80%. In this context, goat meat is a kind of red meat which is especially recommended for heart and vascular health. Compared to other red meats, it is more advantageous in terms of effect on cholesterol level and coronary problems. However, omega-3 fatty acids in the structure of the flesh are transformed into omega-6 fatty acids in non-grazing goats, as in all non-grazing, non-grazing all-terrain species. This is especially harmful to heart health.

Hair goats to be sustainable farming in Turkey, support is needed in terms of ecological balance and human health. Increasing awareness of goats in terms of consumption habits especially for red meat, milk and milk products will encourage farmers as well as provide important contributions in terms of public health.

Keywords: Goat, Hair goat, biotechnology, ecology
Determinant of Relations Between Factors Affecting to Yield by Correlation in Organic Cotton (Gossypium hirsutum L.) Produced by Application of Organic Fertilizers in Harran Plain

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Introduction: The unique structural feature of cotton fibers, the development of the technology for the processing of this structure, has ensured that the cotton plant is the most important fiber plant in the world. Cotton is important with regard to fiber and its seeds containing oil and protein. Pulp is containing rich protein and oil and some mineral materials. Pulp is considered as an important feed source. In addition, the linters on the seeds are used in a wide material of industries requiring cellulose such as twine, lamp-wax cord, carpet yarn, medical cotton, photographic film, plastic, rayon (rayon) and gunpowder. There are various correlations between yield and related yield components of cultivated cotton varieties.

Material and Methods: This study was carried out in the organic agriculture conditions under Harran Plain Conditions that place in the Semi-Arid Climate Zone at 2014 and 2015 growing seasons. In the study "Stonoville 468" (ST 468), "BA 119" and "Candia" cotton varieties used as plant material. In the trial; organic farm manure (2000 kg / ha), pigeon manure (1000 kg / ha) and microbial fertilizer (1000 cc / 1000 lt water) were creat organic fertilizer material. The experiments were carried out with two factors and four replications according to the split parcel trial design in randomized blocks design.

Results: According to the two year results obtained from the experiment, various correlations were found between the yield and yield components. In the study, there was a positive and significant relationship between the number of sympodial brunch and the plant height (r = 0.2918 **), and a negative and significant relation between number of sympodial branches and the monopodial branches (r = -0.2351 **). In the study, positive and significant relationships were determined between seed cotton yield per/ha and the plant height (r = 2997 **) and the number of monopodial branches (r = 0.4801 **)

Discussion: The increase in unit area yields is due to the increase in plant height and number of monopodial branches. In addition, there is a positive relationship between number of sympodial branch and plant height.

Acknowledgement: We would like to express our appreciation to the Harran University Scientific Research Project Commission, which supported this study (HÜBAK-2014). This study was produced from a doctorate thesis entitled "The Effect of Organic and Microbial Fertilizer Practices on Agricultural and Fiber Quality of Cotton Varieties (Gossypium Hirsutum L.) in Harran Plain Organic Condition".

Keywords: Organic Agriculture, Organic Cotton, Correlation.
A New Record for Spider Fauna of Turkey (Araneae: Linyphiidae)

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Introduction: The spider family Linyphiidae commonly knows as money spider, consists mainly of very small spiders, which are sheetweb builders. The Linyphiidae Blackwall, 1859 is one of the largest family of spiders with 4564 described species in 606 genera. A total of 1022 species in 53 families are known in Turkey and 116 species in 64 genera in linyphiidae family in Turkey. Linyphiid spider. This paper deals with the characteristic features and distribution of Stemonyphantes agnatus Tanasevitch, 1990 adding a new linyphiid species to the araneo-fauna of Turkey.

Material and Methods: The present study is based on the materials collected in 2016 from Rize in Turkey. The specimen was collected from forest by means of shifter and hand aspirator during the daytime. Specimen was preserved in 70 % ethanol. The identifications were made with a Leica S8APO microscope and pictures were taken by means of the Leica DC 160 camera. Principally well known identification keys were used for identification (Heimer & Nentwig 1991, Roberts 1987 and Tyschchenko 1971). All measurements are given in millimeters. Collected and examined specimens are deposited in collection of the Zoological Museum of Kastamonu University (KUZM).

Results: This species collected and identified from Rize province. The total number of linyphiids recorded in Turkey is now 117 species. Material examined, Stemonyphantes agnatus Tanasevitch, 1990, 1 ♂, Turkey, Rize Province, Hemşin Yaltkaya District, (41°04'12.2"N 40°53'26.5"E, 520 m), 12.05.2016, leg. Z Sancak. Body length 4.53 mm. Prosoma length 2.18 mm, abdomen length 2.35 mm.

Discussion: Turkish spiders have been poorly studied. Despite an increase in studies on Turkish spiders during recent years, there are still many regions of the country that remain insufficiently investigated. The studies on the spiders in our country, which contains faunal and floral diversity in terms of geographical location, are still new and are gaining momentum.

Keywords: New record, spider, Araneae, Linyphiidae
A Study on Pollen Morphology of *Centaurium erythraea* Rafn. subsp. *rhodense* (Boiss. & Reut.) Melderis (Gentianaceae) in Turkey

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**Introduction:** The genus *Centaurium* Hill (Gentianaceae) comprises about 20 species mainly distributed in wet and stable habitats of the Mediterranean basin. The *Centaurium* species are mainly annual or biennial plants, with opposite leaves, salver-shaped and pink, purple or yellow, rarely white colored corollas, and helically twisted anthers after dehiscence. The genus is represented by 5 species, 6 subspecies and 2 doubtful records totally 11 taxa in Turkey. In this study, it is aimed to determine pollen morphology of *Centaurium erythraea* Rafn. subsp. *rhodense* (Boiss. & Reut.) Melderis using light (LM) and scanning electron (SEM) microscopes.

**Material and Methods:** The flowering plant specimens (M. Çiçek & A.E. Yaprak 2010-208) were collected during the growing season from the Hisarönü village in the Marmaris district of the Muğla province (Turkey) in 2010. The pollen slides were prepared according to Woodhouse method. Pollen morphological studies were conducted using light (LM) and scanning electron (SEM) microscopes. In morphological descriptions of pollens, Ertman’s terminology was followed.

**Results:** The ornamentation is striate-reticulate. Aperture type is tricolporate. Pollen size is 25.10±1.44 µm x 25.34±1.14 µm. P/E ratio is 0.99±0.03 µm. According to P/E ratio, pollen shape is spheroidal (oblate-spheroidal to prolate-spheroidal). C1g (Colpus length) is 20.63±1.78 µm, Clt (Colpus width) is 6.11±0.86 µm. C1g/Clt ratio is 3.44±0.53 µm. Pore diameter is 5.46±0.92 µm. Mesocolpium is 16.00±1.39 µm and apocolpium is 5.42±0.78 µm. Intine thickness is 0.54±0.15 µm and relatively thin. Exine is 1.39±0.25 µm and at medium thickness. Lumen diameter is 0.44±0.10 µm and the distance between lumens is 0.49±0.21 µm.

**Discussion:** The ornamentation is striate-reticulate as like the other species of *Centaurium*. The pollen shapes of genus *Centaurium* is generally spheroidal, while the pollen shape of *C. erythraea* subsp. *rhodense* is oblate-spheroidal to prolate-spheroidal. This study will palinologically contribute to taxonomy of the genus *Centaurium*.

**Acknowledgement:** We thank Pamukkale University Scientific Research Projects Coordination Unit for financial support (PAUBAP project no: 2010BSP007).

**Keywords:** Pollen morphology, taxonomy, Gentianaceae, *Centaurium erythraea* Rafn. subsp. *rhodense* (Boiss. & Reut.) Melderis
Investigation on Ecotoxicity of Green-synthesized Magnetite Nanoparticles on the Aquatic Plant *Azolla filiculoides* of anzali District, Guilan Province, Iran

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**Introduction:** In the recent years Magnetite nanoparticles (Fe₃O₄ NPs) attracted attention of scientists due to their unique physicochemical aspects and industrial applications like degradation of organic contaminants in water. Different routes were applied for Fe₃O₄ NPs fabrication. In the present study Fe₃O₄ NPs were synthesized, for the first time, by green synthesis using plant extracts of *Fumaria officinalis*. On the other hand, it has been claimed that the green-synthesized NPs possess no ecotoxicity in comparison to the NPs fabricated via other protocols. Thus, it is necessary to test their ecotoxicity on environment. Therefore, we studied on the eco-toxic effects of as-synthesized Fe₃O₄ NPs on growth and developmental indices of the aquatic plant species *Azolla filiculoides*. The present evaluation on *A. filiculoides* as a model plant could reveal the probable toxicity of the NPs on ecosystem.

**Material and Methods:** At first Fe₃O₄ NPs was synthesized using extracts of *Fumaria officinalis* and the obtained NPs was characterized. Then, the relative frond number (RFN) and relative growth rate (RGR) were calculated after treatment of *A. filiculoides* plants of anzali district with different concentrations of the NPs. In addition, the content of phenols and flavonoids and antioxidant enzymes’ activity including superoxide dismutase (SOD) and peroxidase (POD) were assessed.

**Results:** The green-synthesized Fe₃O₄ NPs displayed notable toxic effects on *A. filiculoides*, resulting in reduction of growth parameters such as RFN and RGR. Moreover, notable variations in antioxidant enzymes’ activity as well as total phenol and flavonoid quantities were observed. All these changes propose production of reactive oxygen species (ROS) in plant cells as a result of the stress occurred by green-synthesized Fe₃O₄ NPs.

**Discussion:** Owing to the phytotoxicity made by the Fe₃O₄ NPs, the plant defense system is activated especially in order to remove ROS. In addition, it can be concluded that *A. filiculoides* possesses different mechanisms to battle the toxic NPs in the environment and accordingly high potential for water remediation and waste management purposes.

**Acknowledgement:** The financial support by University of Tabriz is gratefully acknowledged.

**Keywords:** Magnetite, Ecotoxicity, Nanomaterials (manufactured), Bioaccumulation
Natural Regeneration of Caucasian maple (*Acer trautvetteri* Medv.) in Hendek, Sakarya

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**Introduction:** *Acer trautvetteri*, the Caucasian maple, is a broadleaved shade-tolerant tree found in Caucasia and northern Turkey. *A. trautvetteri*, growing at the height of 100-2100 m above sea level, it grows up to 90 cm in diameter and 25 m in height. The tree has large five-lobed leaves 9-15 cm long and 11-16 cm wide, which dark green in summer they turn carmine in autumn. Caucasian maple has ornamental value due to a handsome foliage and interesting crown shape. The current study discusses the natural regeneration of *A. trautvetteri* Medv. in Hendek, Sakarya.

**Material and Methods:** The study area of *A. trautvetteri* is located in Sakarya-Hendek. The slope of the research area is about 30-60% and the altitude is 1500-1700 m. The total natural regeneration area of the research site is 4 ha. Shelterwood regeneration method has been used. The seeding cut lowering the crown closure to % 60-70 was made in the Fall of 2015. Site preparation and deep soil tillage were applied before the seed dispersal in the Fall of 2015. Additionally, two-years-old seedlings of *A. trautvetteri* were planted in the site in the spring of 2017. The seed supplement with the dormant fresh seeds was also applied to increase the success of natural regeneration in the autumn of 2017.

**Results:** The natural regeneration of *Acer trautvetteri* was a successful operation with the help of seed supplement and the planting of seedlings from the neighboring seed sources. Since the site was very moist and north-facing, the competitive vegetation was very high and dense. The seedlings have been obliged to struggle with the herbaceous vegetation. The seedling recruitment treatment have been applied two times (in June and August) each year. Currently, the natural regeneration of *A. trautvetteri* has been accomplished and the battle against the competitive vegetation will continue until the independence of seedlings from the oppression of the neighboring vegetation.

**Discussion:** Finding a suitable natural regeneration site is very difficult in scattered forest trees since they rarely form forest stands. The current study is the first report on the natural regeneration of a stand of *A. trautvetteri*. The successful results were obtained with the carefully applied shelterwood natural regeneration method as in beech forests. The seed mast, sound seed, and the combating against competitive vegetation were key components of the success. The natural regeneration of *A. trautvetteri* will hopefully open new perspectives in the restoration, conservation, and the sustainability of many scattered trees of Turkey.

**Keywords:** Caucasian maple, *Acer trautvetteri*, Natural regeneration.
Skeletochronological Analysis of *Lacerta trilineata* (Balkan Green Lizard, Bedriaga 1886) From Bolu

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Introduction: The Balkan green lizard (*Lacerta trilineata* Bedriaga, 1886) is the largest species within its genus and one of the largest lacertids in Europe. Age is an important life history trait influenced by the many environmental factors. Despite this species is abundant in its range there is scarce data given its age structure in literature. The aim of this study to provide data on the population traits of *L. trilineata* and information about the species’ life span and age structure which estimating by skeletochronology.

Material and Methods: The specimens (9 ♀♀, 7 ♂♂ from Bolu) of this study was previously collected and preserved in Herpetological Collection of the Section of Zoology, Department of Biology, Çanakkale Onsekiz Mart University, Turkey. Snout-vent lengths (SVL) were measured to the nearest 0.01 mm with a digital caliper (Mitutoyo Corp., Kawasaki, Japan) for each individual. Skeletochronological analysis were done by following standard age structure procedure. Cross-sections about 17 μm of the diaphyseal part of each phalanx were obtained using a freezing microtome (Shandon, Thermo) and stained in Ehrlich’s haematoxylin. Due to low sample size of the studied populations, normality was calculated by using the Shapiro-Wilk test. We used Independent Samples t-test to compute statistical differences between sexes. We also present the survival rate (Sr) and the adult life expectancy (ESP) of studied population.

Results and Discussion: The average age of males was 4.86±0.90 years and 5.44±1.51 years for females. The age varied 3 to 7 for Bolu population. The adult survival rate of males was 0.59 and 0.24 for females in Bolu population. The adult life expectancy (ESP) was detected as 2.94 for males and 1.82 for females in Bolu population. The mean body size (SVL) was detected as 102.50±10.54 mm in males and 98.33±15.80 mm for females. SVL were not differentiated between sexes. The body size and age were significantly correlated in both sexes. There are insufficient studies presented in literature about life history traits of *L. trilineata*. Age structure of studied populations showed wide range in literature. In conclusion, results of this study exhibit basic information about the life history traits and demography of *L. trilineata* from Turkey.

Keywords: Skeletochronology, *Lacerta trilineata*, Bolu, age structure
Morphological and Age Structure Variation Between Populations of *Bufo bufo* from Turkey

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**Introduction:** It is a general and accepted rule (Bergmann’s rule) that animals to be larger in colder environments. However, not every animal tend to follow this broadly accepted rules. Amphibians’ age linked to different combination of life circle’s parameters such as longevity, age at sexual maturity of populations, body size of individuals and other ecological factors. In this study, our aim to test to differences in body size and age structure of two different populations (Teşvikiye, Yalova and Taşlık, Kastamonu) of *B. bufo* from Turkey.

**Material and Methods:** A total of 38 individuals (8 ♀♀, 30 ♂♂) were studied from two different altitudes (Yalova; 65 m a.s.l., Kastamonu; 925 m a.s.l.). The animals were released back into their respective habitats following sex determination, measurement of snout-vent length (SVL), and toe-clipping (the 4th toe of the hind limb was taken for each toad). Skeletochronology was used for age determination. Statistical analysis of data obtained from age and SVL were done using by SPSS 21 programme.

**Results and Discussion:** The maximum age was 7 years for the Teşvikiye (Yalova) and 6 years for the Taşlık (Kastamonu) population. Although mean age of Teşvikiye population were older than Taşlık population, no significant differences were found from age of individuals. Congruently, mean SVL of Teşvikiye was greater than Taşlık population but no significant differences were found between populations. There is more than one reason for the variation in the adult body size and age in anurans, such as age, food availability, and temperature, all depend on geographical location.

**Keywords:** Skeletochronology, Common toad, Bolu, Kastamonu, age structure
Introduction: Trees, parks or nature found in urban environments provide positive health care effects, benefits and improve the quality of human life. Literature on urban forests, ecosystem services, sustainability promotes positive contributions of nature in maintaining air quality. In general, all researches conducted led to any increase in urban forests is desirable and help mitigate the pollution problems. The purpose of this paper is to analyze the effect of urban forests on environment quality and also the health of people who live in and around of those areas.

Material and Methods: We have conducted a face to face interviews with around 100 people who visit the forested areas inside the cities, city forests and protected areas which are very near to cities. In the survey we asked 20 questions regarding their reason to come to the nature or forested areas and what are the benefits they get out of it.

Results: According to the survey results, we have discovered some health benefits people get being in the nature or forested areas. Those benefits are; 1. Nature based play and activities for the children reduce the attention problem and hyperactivity disorder which most families complain about, 2. Adults who live in and around the forested areas may have less risk of death from cardiovascular or respiratory disease, 3. Elderly who can access to the parks and forested areas easily and do take a walk regularly has reduced symptoms of depression and cognitive disorders, 4. The type and composition of trees that maximizes people's overall quality of life in a city at least cost.

Discussion: Researches have been done in different countries also found out that the presence of nature and trees resulted pregnant women delivering healthier babies with good birth weight. Other positive impacts of nature or forested areas in cities lower crime rates, which we would have the similar results. Reducing health care and social costs can be calculated with nature-linked health and social outcomes. If we plant more trees this could reduce the cost of prescription drugs or reduce police budgets against crimes. Trees remove substantial amounts of pollution and can produce substantial health benefits and monetary values with most of the health values derived from urban trees.

Keywords: urban forest, health benefits, nature, healt care
Eco-friendly Fabrication of La/ZnO Nanocomposites as An Efficient Semiconductor by using Fruits of Rosa canina plant of Mahabad District, West Azerbaijan Province, Iran

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Introduction: The fabrication of a semiconductors like La/ZnO nanocomposites (La/ZnO NCs) has been a challenging problem toward fulfilling the future energy demands in electrical applications. Plant systems which widely distributed along the ecological boundaries are easily available and safe to handle. Such ecological resource could have an huge effect in the immediate future if plant tissue culture and downstream processing procedures are applied to fabricate various nanomaterials on industrial scale. This work, for the first time, reports a very facile and eco-friendly method for the fabrication of La/ZnO semiconductor by fruit extract of rosa canina.

Material and Methods: The fruits of rosa canina was collected around Mahabad city, a county located at west Azerbaijan Province. Zinc and Lantanium nitrate and the fruit extract were taken in 1:2 weight ratio and subjected to microwave heating at 180 W. The obtained raw product were centrifuged, and dried in hot air oven for 5 h.

Results: The as-fabricated La/ZnO NCs were characterized by using FT-IR, XRD, SEM, diffuse reflectance spectra (DRS) and dynamic light scattering (DLS) techniques. According to FT-IR, the peaks in the regions of 400, 1750 and 3451 cm⁻¹ were assigned to La/Zn-O, C=O stretching and O-H stretching bonds, respectively. The SEM micrographs clearly show well dispersed, versatile and spherical shape distribution of the La/ZnO NCs prepared with the fruit extract of rosa canina with particle sizes ranging under 50 nm. The particles are, also, crystalline in nature based on XRD diffractograms.

Discussion: The resulted data from FT-IR spectroscopy were used to identify the functional groups that are bound to the surface of La/ZnO NCs and lead to the stability of the NCs. It appears that the presence of metabolites in the fruits such as phenolic acids, proanthocyanidins, tannins, flavonoids, fatty acids, pectin, carotenoids, sugars and fruit acids such as ascorbic acid and malic acid which adhere to the surface of La/ZnO NCs can stabilize them from agglomeration.

Acknowledgement: The financial support by University of Tabriz is gratefully acknowledged.

Keywords: Eco-friendly fabrication, Semiconductor, Nanocomposites, Metabolites
Salt Leaching Characteristics Under The Effect of Irrigation Water Salinity And Leaching

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Introduction: Irrigation practices such as water quality and leaching fraction ratio, strictly affect the drainage water salinity in irrigated lands. From this point of view, irrigation water quality and applied leaching fractions are the most important factors. Leaching water quality is the main media that takes inside the salts from the soil during the leaching process, and the amount of water that passes through the soil profile which affects the total salt leached.

Materials and Methods: In this study, we investigated the total salt put into the soil with irrigation and the total salt leached by drainage water as the mean salt mass balance which is calculated by the water volume multiplied by the water concentration. Experiments were done in PVC soil columns with 115 cm depth and 40 cm diameter.

Results and Discussion: The results were evaluated with EC and some ion concentrations of irrigation and drainage water that accumulated into the plastic cups which were situated at the bottom of the columns. Results showed that salt mass balances varied in relation to the irrigation water quality and leaching fractions.

Acknowledgement: This study was supported by TUBITAK/TOVAG (109O165)

Keywords: Salinity, Drainage water quality, Irrigation water quality, Leaching fraction
Introduction: Among the biggest current threats affecting the hydromorhological status of the rivers are the hydropower plants. Their benefits as a renewable source of electricity production is well known, but there is also a need to recognise that they can significantly affect the ecological functions of rivers and adjacent habitats in which they are located. The following research presents the impact of seven different small hydropower plants (SHPPs) in Republic of Macedonia towards the macroinvertebrate communities and their habitats in the affected river ecosystems.

Material and Methods: Macroinvertebrates were collected using Kick sampling method above and below the intake and the powerhouse on seven small hydropower plants (SHPP Lipkovo, SHPPs Tearce 97, 98, 99, SHPP Tresonecka, SHPPs Brajcino 1 and Brajcino 2) in R. Macedonia during the September 2017.

Results: The results presented in this study show that the sampling sites above the intakes remained in favorable and undisturbed conditions. Macroinvertebrates are characterized by high number of taxa, number of EPT taxa, and number of sensitive taxa, as well as dominance of sensitive EPT taxa. Good populations of *Austropotamobius torrentium* and *Cordulegaster heros* whose conservation requires designation of Special Areas of Conservation within the Natura 2000 network occurred above intakes. Macroinvertebrate fauna significantly changed in the river stretches between the intakes and the powerhouses. Drastic reduction of species, severe drop in the number of EPT taxa and in the abundance of the benthic community, even disappearance of sensitive taxa and endemic species was registered.

Discussion: Biodiversity and ecological status assessment clearly show that almost all investigated SHPPs cause alteration in composition and structure of macroinvertebrate communities downstream. It is possible that the hydropoeaking event, long-term dried condition or activities during the construction and the operational phase caused moderate or drastic reduction of macroinvertebrate richness, moderate or severe drop in the abundance of the benthic community, disappearance of endemic, and still undescribed species as well as the species of Community interest. Significant reduction of the ecological status (poor or bad) of the rivers Tresonecka reka, Kriva Kobila and Brajcinska reka (SHPP Brajcino 1 and Brajcino 2) below the intake and above the powerhouse, confirm the harmful impact of the investigated SHPPs. The occurrence of rivers with moderate, poor, or even bad ecological status in a protected area is contradicting with the principles of non-deterioration status in the WFD.

Keywords: Small hydropower plant, aquatic ecosystems, macroinvertebrates, impact, protected areas, R. Macedonia.
**Introduction:** Amphibians have a prominent role as a standard model for the research into many biological processes. However, relatively little is known about the cardiac histology of amphibians. Therefore, the aim of the current study was to reveal the histological characteristics of the heart of *Pelophylax bedriagae*, and to compare it with the histological cardiac features of other vertebrates.

**Material and Methods:** Four adult amphibians (two males and two females) of *P. bedriagae* were anaesthetized with ether, and euthanized by decapitation. Immediately afterwards heart was removed. Tissue samples were fixed in Bouin’s fluid. Thereafter, the samples were processed by using standard histological protocols for paraffin embedding. Five micrometer thick sections of the embedded heart were stained with Gill’s hematoxylin-eosin to demonstrate the general morphology of the tissue.

**Results:** The heart of *P. bedriagae* consisted of three chambers. Two atria were completely separated, but the ventricle were undivided. When looking dorsally on the heart, thin-walled sinus venosus was observed. Pacemaker cells and ganglion cells are the major cells in the sinus venosus. The layer of the heart wall was composed of epicardium, myocardium and endocardium. The epicardium was the outer layer of the heart. The epicardium contained connective tissue and mesothelium which was simple squamous epithelium. The myocardium was the middle layer which was the largest of the three layers. It contained cardiac muscle fibres and loose endomysial connective tissue. The endocardium was the inner of heart which was lined by flat endothelial cells. The atrioventricular valves were composed of dense connective tissue.

**Discussion:** As in all higher vertebrates, the heart of *P. bedriagae* was segmented into clearly defined chambers. The heart of *P. bedriagae* consisted of three chambers: two atria were completely separated, but the ventricle were undivided. Reptiles have well developed atriums and a partially compartmentalized ventricle. Crocodilians possess a fully divided ventricle. When it comes to birds and mammals, there are four chambers (two atria and two ventriculi). When looking dorsally on the heart, thin-walled sinus venosus was observed. Sinus venosus is responsible for initiating the heart beat and receives venous blood returning from the head, limbs, and body that then flows to the right atrium. The sinus venosus is the most simple and natural amphibian pacemaker model that is close to mammals. The truncus arteriosus should be considered transitional between the heart and vascular system. The layer of the heart wall consisted of the epicardium, the middle myocardium and the inner endocardium. Trabecular myocardium of ectothermic vertebrates can be considered as the homologue of the Purkinje network.

**Keywords:** Amphibian, heart, sinus venosus, pacemaker cells, atrium, ventriculus
The Spider Fauna of the Türkmen Mountain (Eskişehir, Turkey)

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Introduction: Spiders belong to the phylum Arthropoda as important predators of terrestrial arthropods. Most of countries have completed their faunistic work on spider. Unfortunately there are only a few studies on spiders in Turkey. About 47491 spiders species belonging to 116 families are known in the World and total of 1022 species in 53 families are known in Turkey. The aim of this study was to determine the spider fauna of Turkmen Mountain, which will contribute to knowledge of the spider fauna of Turkey.

Material and Methods: In this study a total of 10 sampling stations were chosen among different habitats and spider collected by means of pitfall traps, hand aspirator and identified. The adult spider specimens were collected between May 2012 and April 2013 on Türkmen Mountain. Specimens were preserved in 70% alcohol + 5% glycerin. Digital images of the palps and epigynes were taken with a digital camera (Leica DC160) that was connected to the optical tube of a stereomicroscope (S8APO). Female genitalia were dissected, cleared in Potassium Hydroxide (KOH) and observed under microscope. All measurements are given in millimeters. Collected and examined specimens are deposited in collection of the Zoological Museum of Kastamonu University (KUZM).

Results: In the present study, most of the collected specimens belong to ground spiders and a few belong to other group of spiders. A total of 215 adult specimens 92 male, 123 female were collected. In addition, 1 species were recorded for the first time from Turkmen Mountain, so the spider fauna increased to 1023.

Discussion: The most dominant family among the present research was Lycosidae. However, the least numbers of species were recorded from families Araneidae, Thomisidae and Sparassidae. As a result, this and similar studies will contribute to the Turkish Spider fauna, and will also shed light on other systematic and ecological studies.

Keywords: Spider, Fauna, Araneae, Turkmen Mountain
Effect of Biofuels on Vehicle Emissions

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Introduction: The transportation sector has an important effect in increment of air pollution levels. Increasing population results in increment of vehicle numbers in big cities. Increasing vehicle numbers are responsible for the harmful emission. CO₂, CO, NOx, SOx, CC, HC, PAHs and PM are the gases resulting from complete combustion of fuel in vehicles. These gases have impacts on the greenhouse effect and global warming. In addition, these gases can react with each other and to form other pollutants. Many countries investigate the different type of alternative fuels for use in motor vehicles in order to reduce greenhouse gas emissions. Biodiesel, bioethanol, biobutanol and other biofuels are candidate fuels for substitute with fossil fuels in the transportation sector. Types of fuel affect the vehicle emissions. Biofuels are derived from biomass. There are several types of biofuels such as alcohol (ethanol and butanol), biodiesel, biokerosene, H₂ and others. The raw materials of these fuels can be vegetable wastes, vegetable oils, animal fat, and lignocellulosic biomass materials. The number of scientific researches on biofuels has increased exponentially. In this study, focus on the analysis of vehicle emissions data when the biofuels are used in vehicles.

Material and Methods: Different literature studies are evaluated and effects of different type of biofuels on emission values are investigated.

Results: CO, NOx and CO₂ emissions are significantly lower for the all the biofuels as compared with the diesel and gasoline fuel. The average results showed on the emissions of the engine that were about 19% reduction in NOx, about 22% reduction in CO, and 13% reduction in CO₂. The reduction in exhaust emissions has made biofuels suitable alternative for diesel engines and biofuels could contribute in controlling air pollution.

Discussion: Biofuels are supported in many regions of the world. The usage of biofuels reduces the emission from burning fossil fuel and improve the air quality. The developing countries have production of biofuel and utilization as transport fuel. The observed values are shown that low emission values make biofuel a promising fuel type for reduce the harmful emissions.

Acknowledgement: We would like to express our appreciation to the Kocaeli University Scientific Research Projects Unit.

Keywords: Biofuel, Emission, Vehicle
Comparison of Soil Ammonium and Nitrate Contents of *Citrus sinensis* (L.) Osbeck cv. Valencia and *Citrus reticulata* Blanco cv. Fremont, Çukurova University, Adana

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Introduction: *Citrus* is one of the most important agricultural plant in the Mediterranean region. The growth and productivity depends on the soil characteristics as ammonium and nitrate contents. Two species, *Citrus sinensis* (L.) Osbeck cv. Valencia and *Citrus reticulata* Blanco cv. Fremont, are cultivated in the Campus of Çukurova University and their soils were compared from these aspects.

Material and Methods: Soil samples were collected in August 2017 and February 2018 in University of Çukurova and analyzed by the proper method. All analysis are made by 3 repeat.

Results: Average ammonium and nitrate values of *Citrus* species differs within 6 month. Soil ammonium values are 118.13 mg/kg for orange and 41.87 mg/kg for mandarin in August 2017; 54.24 mg/kg and 14.49 mg/kg respectively in February 2018. The nitrate values are 96.93 mg/kg for orange and 312.49 mg/kg for mandarin in August 2017; for February 2018, 278.77 mg/kg and 37.09 mg/kg respectively.

Discussion: Great change in ammonium and nitrate contents of orange and mandarin reflects the unbalance in soils that can be resulted from application of agricultural fertilizers after August 2017. This research is ongoing, new data will give us more comprehensible results for these orchards and its soils in this ecological conditions.

Keywords: *Citrus sinensis, Citrus reticulata*, Mediterranean region
A Palynological Evidence to the Current Generic Status of *Schenkia spicata* (L.) G.Mans. (Gentianaceae)

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**Introduction:** The genus *Schenkia* Griseb. (Gentianaceae) is represented by 5 species in the world. *Schenkia* shows a distribution from Western Europe to eastern Asia. *Schenkia spicata* (L.) G.Mans. is easily distinguished by having a spike inflorescence. *Schenkia spicata* was firstly described as “*Gentiana spicata*” by Linnaeus. Later, it was placed into the genera *Hippion*, *Chironia*, *Erythraea*, *Centaurodes* and *Centaurium*, respectively. Finally, it was transferred to the genus *Schenkia* by Mansion. Due to being transferred *Centaurium spicatum* (L.) Fritsch to the genus *Schenkia*, 1 species of *Schenkia* appears in the Flora of Turkey. In this study, pollen morphology of the specimens cited as *Centaurium spicatum* in the Flora of Turkey are investigated comparatively with the other *Centaurium* species in Turkey.

**Material and Methods:** The pollen slides were prepared according to Woodhouse method. Pollen measurements were made by BAB TCA-5.0C image analyzing system. The surface ornamentations of pollen grains were examined using ZEISS Supra 40VP model electron microscope (SEM) in Pamukkale University Advanced Technology Application and Research Center (PAÜ-İLTAM). And also, detailed measurements of pollens were carried out in SEM. In morphological descriptions of pollens, Ertman’s terminology was followed.

**Results:** In the result of palynological analysis of *Schenkia spicata*, the ornamentation is reticulate. Aperture type is tricolporate. Pollen size is 25.11±2.18 µm × 24.36±1.96 µm. P/E ratio is 1.03±0.03 µm. According to P/E ratio, pollen shape is determined as spheroidal (oblate-spheroidal to prolate-spheroidal). Clg (Colpus length) is 20.45±2.22 µm. Clt (Colpus width) is 5.80±0.94 µm. Clg/Clt ratio is 3.66±0.92 µm. Pore diameter is 5.81±0.79 µm. Mesocolpium is 15.45±1.09 µm and apocolpium is 5.80±0.78 µm. Intine thickness is 0.55±0.13 µm and relatively thin. Exine is 1.36±0.23 µm and at medium thickness. Lumen diameter is 0.48±0.12 µm and the distance between lumens is 0.51±0.14 µm.

**Discussion:** The ornamentation in *Centaurium spicatum* (=*Schenkia spicata*) is reticulate, while the other species of *Centaurium* are striate-reticulate. As a result of comparing pollen morphologies of *Centaurium spicatum* (=*Schenkia spicata*) and the other *Centaurium* species, this obvious difference in the ornamentation shows that *Centaurium spicata* is necessitate be classified under a different genus. The results of this palynological analysis support the current generic status of *Schenkia spicata*.

**Acknowledgement:** We thank Pamukkale University Scientific Research Projects Coordination Unit for financial support (PAUBAP project no: 2010BSP007).

**Keywords:** Pollen morphology, taxonomy, Gentianaceae, *Centaurium spicatum* (L.) Fritsch, *Schenkia spicata* (L.) G.Mans.
**Pollination Strategies of Jasione supina at subspecies level**

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**Introduction:** The pollination of *Jasione supina* Sieber for all subspecies are investigated in this work. *J. supina* has four endemic subspecies in Turkey that are *J. supina* subsp.* supina*, *J. supina* subsp.* tmolea*, *J. supina* subsp.* akmanii*, *J. supina* subsp.* pontica*. Its flowers are hermaphroditic, protandrous and; they exhibit secondary pollen presentation with pollen collecting hairs on their style. These features imply allogamy and presence of biotic pollination. In the field observations of pollinators, behavior of pollinators and their visiting hours are determined.

**Material and Methods:** Perennial, ± caespitose, with-numerous procumbent or ascending stems, hairy to 5-10 cm from base, glabrous above. Basal leaves oblong, spathulate, ± obtuse, ciliate at base, 10-15 x 2.5-4 mm. Cauline leaves ovate-lanceolate, sessile. Involucral bracts ± ovate-lanceolate, acuminate to obtuse, entire or dentate, glabrous on the inner side or with a few short hairs. Capitula 10(--20) mm diam. Calyx lobes linear-lanceolate. Flowering time of subsp.* tmolea*, subsp.* pontica* 7-8 and subsp.* supina*, subsp.* akmanii* 7-10. All subspecies of *J. supina* are our materials in this investigation. Style length at the first stage of secondary pollen presentation, length of pollen collecting part on style, style length at presentation, and style length at female phase were measured at 50 flowers. Flower opening times for each stage have been compared for touched and untouched styles. Pollinators and pollination activity have been observed two days in their most active period (between 08:30-17:00). The temperature, wind speed, pollinators and the number theirs visits during this period is recorded for every half hour.

**Results:** Phase based style length development are almost same for all subspecies. Style length at the beginning of the presentation is 5-5.2 mm. Pollen collecting hair length is 2.80-2.84 mm. Style length at pollen presentation is 9.8-9.91 mm. Style length at female phase is 9.80-10.12. Lifespan a flower is ~2 days for all subspecies. For *J.supina* subsp.* supina*, male and female phase last 25.5 hours at untouched style. Contrarily, this period takes 7.5 hours for touched styles. For *J. supina* subsp.* akmanii*, male and female phase last 28 hours at untouched style, being 8 hours at touched styles. For *J. supina* subsp.* pontica* male and female phase is 24 hours for untouched and 8.45 hours for touched styles. Pollination of *J. supina* ssp. depend on three groups, which are Hymenoptera, Diptera and Lepidoptera, among these, the first two are most effective. Total visit of pollinators, ranked decreasingly, are as follows: subsp.* akmanii* (4458 visits), subsp.* pontica* (3670 visits), subsp.* supina* (2401 visits), subsp.* tmolea* (1177 visits).

**Discussion:** In the observations of pollinator realized in the field, pollinators, their behaviors, visiting hours, temperature and wind speed wishes are determined. 10 species belong to 6 family on subsp.* supina*, 9 species belong to 7 family on subsp.* akmanii*, 16 species belong to 6 family on subsp.* pontica* have been discovered as pollinator insect. The most advantageous reproductive system, gradually, were found as subsp.* supina*, subsp.* tmolea*, subsp.* akmanii* and subsp.* pontica*.

**Keywords:** *Jasione*, pollination, secondary pollen presentation.
Determination of Potential Plantation Areas of Turkish Sweetgum in Turkey

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Introduction: Turkish sweetgum (TSG) (Liquidambar orientalis L.) is endemic to some isolated sites in southwest of Turkey. Its balsam “liquid storax” (in Turkish “Günlük” or “Sığla”), a valuable substrate makes this plant economically important besides its ecological value. At the beginning of 20th century, the species was covering a 6321-ha in Turkey. However, currently, its distribution is restricted to only 1337 ha, resulting in approximately 80% decrease. The objective of this study was to determine potential areas, which are proper for adaptability of TSG across Turkey.

Material and Methods: The maximum and minimum monthly temperature values, obtained from National Meteorological Service of Turkey, were interpolated by ordinary kriging (OK). We used 80% of the climate data for calibration and 20% for validation in OK-interpolations. We considered sum of squared errors and coefficient of determination (R²) in semivariogram modeling, and relative sum of squared errors and correlation coefficient between measured and predicted values of verification data in OK interpolation. Spatial distribution areas of natural TSG in Turkey were obtained from Turkish Plant Data Service, the maps of each taxon were rectified by GIS, and spatial information of TSG was digitized on the rectified maps. We obtained the information on the elevations and phytogeographical regions from literature and compared elevation classes obtained for natural TGS by GIS, superposing the data from SRTM and DEM. Finally, we rectified the OK-interpolated climate map by GIS, and determined the potential areas where TSG may have been planted.

Results: The OK successfully interpolated the monthly means of minimum and maximum temperatures across Turkey. Our results showed that when mean monthly minimum and maximum temperature were used as only limiting factors of TSG adaptability, large areas appeared proper for its planting. However, use of elevation and temperature as limiting factors resulted in its potential plantation areas to reduce substantially.

Discussion: Our results showed that TSG can be planted at locations with elevations from 0 to 800 m (m.t.l) in Black sea, Marmara, Aegean, Mediterranean, and central Anatolian regions. It’s commonly considered that TSG mainly grows at altitudes from 180 to 550 m, while it can be found rarely at landforms as high as 900 m. However, we observed TSG trees at elevations below 180 m, suggesting that the lower elevation limit set for its adaptability should be revised. Because of its aesthetic value, TSG can also be used on urban landscapes within potential adaptation regions determined in this study.
Introduction: Vine is one of the oldest fruited plant species in the world. The viticulture and wine culture began in the region covering the northeastern part of Anatolia thousands of years ago and is considered to have spread all over the world. Turkey is among the largest grapevine growing countries of the World. Turkey is among the most important countries with the area of vineyards and grape production in the World. Due to climate conditions and the suitability of growing conditions, viticulture is a source of livelihood for many producers throughout the country. The aim of organic grape growing is to eliminate the environmental problems by the insensible tillage practices, excessive use of synthetic chemical fertilizers and pesticides for many years and to protect uncontaminated areas. Organic grape growing is an agricultural production system that requires knowledge and analysis.

Material and Methods: All the necessary materials in this study were obtained from some sources such as TUIK, BUGEM, FIBL-IFOAM, FAO.

Results: Nowadays, organic cultivation has been headed towards by people that faced problems that the rapid growth of the world population and the unconscious and unsupervised development of industrialization have brought many problems about human and environmental health. The aim of organic grape growing is to eliminate the environmental problems by the insensible tillage practices, excessive use of synthetic chemical fertilizers and pesticides for many years and to protect uncontaminated areas. Organic grape production is carried out in a limited number of countries around the world. In the world, 332,905 hectares of organic grapes are grown constituting 4.7 percent of the world’s grape growing area. Grape is one of the most important of the 197 organic products grown in our country. Since 1985, our country producing and exporting organic raisins, is a world leader in the production of raisins. In Turkey, 10,645 hectares grape are grown organically which constitutes 2.3 % of the total grape production area. The demand of the foreign market for the organic grapes that are produced largely dry is very important in this issue and all are exported to abroad.

Discussion: Organic grape growing is an agricultural production system that requires knowledge and analysis. Organic viticulture is an opportunity for us to appreciate the little pollution of our country's geography and its climate. When we consider these opportunities in our country, organic grape production and products obtained from organic grape will also increase.

Keywords: Vitis vinifera L., Organic viticulture, Organic production, Development
Species Richness of Zooplankton in Aksaz-Karagöl Wetlands

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Introduction: There is no record on zooplankton fauna of Aksaz-Karagöl wetlands in the literature so this study was conducted to determine the species richness of zooplankton in Aksaz-Karagöl wetlands.

Material and Methods: To determine the zooplankton fauna of Aksaz-Karagöl wetlands, the samples were collected by 55 micrometer plankton net from different water bodies in August and September 2012. After filtering the samples by the plankton net, they were transferred and fixed in 3% formaldehyde solution in 200 mL plastic bottles.

Results: In the wetlands, 44 zooplankton species were recorded during the study period. Fourty of these species belong to Rotifera, 3 of them belong to Cladocera and 1 belong to Copepoda. Rarely observed species in Turkey were recorded in the present study and these species are; Ephora najas, Epiphanes brachionus, Itura intermedia, Lecane hastate and Lecane punctata. Only three species of Cladocera were identified and they are; Alona rectangula, Chydorus sphaericus and Scapholeberis ramnerii. In the same way, only 1 Copepod taxon was found.

Discussion: No study has been carried on zooplankton fauna of Aksaz-Karagöl wetlands so zooplankton species composition of the area has been identified for the first time in the present study. All these results will help to understand biodiversity of the country.

Acknowledgement: This study was supported by Ministry of Forestry and Water Affairs of Turkey (under the supervision of Ekozon Company).

Keywords: Aksaz, Karagöl, Sinop, Zooplankton, Rotifera,
Introduction: Lake Kaz is one of the oldest lakes in Turkey and it is located in Pazar, Tokat. Another importance of the lake, water source is coming from only ground sources because there is no river or lake flowing the lake. Because of the irrigation systems, underground water level has been decreasing in the territory so the water level in the lake is decreasing quickly in recent years. And the lake is becoming a marsh. In the literature, there is no detailed study on zooplankton fauna of the lake so it was aimed to reveal the zooplanktonic fauna of this old lake located in Tokat.

Material and Methods: Zooplankton species composition of Lake Kaz was investigated by collecting samples using a 55 micrometer plankton net from 5 selected stations between November 2012 and August 2013. The samples were preserved in 3% formaldehyde solutions in 500 mL plastic bottles during the field trip after collecting. Different kinds of inverted and binocular microscopies were used for species identifications.

Results: Ninety-eight zooplankton species were identified from Lake Kaz. The distributions of the species according to the groups are; 3 of these species belong to Copepoda, 6 to Cladocera and 89 to Rotifer groups. The recorded genus, Proaliniopsis is a new record for the Turkish fauna. And also the recorded species, Proaliniopsis caudatus and Aspelta circinator are new records for the Turkish fauna too.

Discussion: Some of the recorded species during the study; Brachionus patulus, Encentrum mustula, Encentrum wiszniewskii, Lecane curvicornis, Lecane inopinata, Lecane ungulata, Lepadella biloba, Notommata copeus, Notommata glyphura, Testudinella eliptica and Testudinella truncata are rarely observed species in our country (Ustaoğlu 2004; Ustaoglu et al. 2012) so it is important to protect these new record and rare species in the region in terms of the biodiversity of our country.

Until now, 341 rotifer species has been known from Turkey (Ustaoglu 2004; Ustaoglu et al. 2012). With the present study, this number has been increased from 341 to 343. Only in this lake, one fourth of the Turkish species of Rotifera was observed. This high species richness in the Lake Kaz could be attributed to the age of the lake (very old nature).

Acknowledgement: This study was supported by Ministry of Forestry and Water Affairs of Turkey (under the supervision of Ekozon Company).

Keywords: Lake Kaz, Tokat, Zooplankton, Rotifera,
Should We Use Commercial or Local Bombus Species for Pollination?

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Introduction: Bombus species play a very important role in the pollination of flowering plants and there are nearly 30 species in Turkey. Recently, Bombus species have frequently been used in Turkey, especially in good farming practices. For a long time, European countries have been using their local Bombus species as pollinators in greenhouses. However, after a while, a decline in the local populations was observed. European countries have been purchasing Bombus species from Turkey since 1987. The commercial market was first initiated by some European countries, such as the Netherlands, Belgium, and France, then later, several other countries, such as Israel, the US, Japan, Spain, and the UK, became involved. In Turkey, Bombus terrestris dalmatinus is commercially preferred owing to its wide distribution and ability to adapt different environmental conditions. Bombus species have recently been used for the pollination of commercial crops (such as tomatoes, melons, and peppers) and field plants (such as plums, almonds, and cherries). In addition to their agricultural applications and use in good farming practices, Bombus species also pollinate natural flora and commercial plants.

Material and Methods: In this review, we followed available literature examined the relationships between Bombus terrestris and other pollinator species in some world countries.

Results and Discussion: Despite their advantages in good farming practices, there are also some disadvantages in the use of Bombus species. Recent studies conducted in the USA, Israel, and Japan have shown that commercial Bombus species that either escaped from the greenhouse or were released competed with the local pollinator species for resources and hives, reducing the population of local species. Moreover, these commercial species interbred with other Bombus species, causing genetic pollution. Hybridization studies conducted in the laboratories of some Asian countries, such as Japan and South Korea, have also confirmed that the commercial B. terrestris species has been crossbreeding with other Bombus species and subspecies. Canada and the US have taken some precautionary measures by prohibiting the entry of commercial Bombus species into the country and using indigenous species, such as B. impatiens and B. occidentalis. In Turkey, studies on the relationship between commercial and local Bombus species have been ongoing. Considering the fact that Turkey is rich in Bombus species and the commercial use of Bombus species in greenhouses is common, it is very important to determine the relationship between the commercial and local species and the level of possible gene flow from commercial to local colonies.

Keywords: Hymenoptera, Bumblebee, Bombus, Polination.
Introduction: Vegetation research in Turkey started with the classification of vegetation in our country at the formation level and phytosociological study and focused later on. Recently, it has also been defined using the EUNIS codes developed by the European Union for the classification of habitat types.

Material and Methods: In the field studies conducted in 2016-2017, all of the provinces were visited and the aquatic and terrestrial ecosystems developed on each geological unit were studied. Habitats in these ecosystems, dominant and common species, their province-wide distributions and topographical distribution have been determined. Based on the field observation data, existing habitats listed in EUNIS habitat lists and identification guides have been identified. According to the coordinate data of these habitats, a distribution map has been created.

Findings: According to the results of the study, 11 different natural EUNIS habitat types were detected in Bayburt. These habitat types and codes are: C1.3 Permanent eutrophic lakes, ponds and pools, E1.2B Serpentine steeps, E1.2E Irano-Anatolian steppes, E2.2 - Low and medium altitude hay meadows, E2.32 - Ponto-Caucasian hay meadows, E4.44 Ponto-Caucasian alpine grassland, F9.13 - Montane river gravel low brush, G1.11 Riverine willow woodland, I1.5 Bare tilled, fallow or recently abandoned arable land, G1.7A Irano-Anatolian steppe oak woods, G3.4E Ponto-Caucasian Scots pine forests. Apart from these natural habitats, there are also three fully man-made EUNIS coded habitats.

Results and Discussion: The main plant formation in the city is steppe dominated by spiny cushions species specifically *Astragalus microcephalus* and *Astragalus gummifer*, however, as a result of Anatolian steppes are not adequately defined in EUNIS codes, different steppe types in Bayburt are listed under a single code. There are also scattered forest areas. It is understood that all ecosystems developed in Anatolia need to be included and coded in EUNIS habitat lists. Furthermore, Shannon’s index of variety for the city is calculated as 1.2364 and index of regular distribution as 0.5156. This confirms that the habitat diversity in the province is low and certain habitat types are predominant. Finally, coordinate data for the habitat types in Bayburt are traced and a detailed vegetation map is created for the first time.

Acknowledgement: This work was supported by the Bayburt Directorate of Nature Conservation and National Parks under the project of "Bayburt’s Terrestrial and Inland Water Ecosystems Biodiversity Investigation and Monitoring Project".

Keywords: Bayburt, EUNIS habitat types, Vegetation map
Some Biological Parameters of Long-spined sea urchin *Diadema setosum* (Leske, 1778) in Iskenderun Bay

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**Introduction:** *Diadema setosum*, known as Lessepsian species, was first reported from the Mediterranean Sea in 2006. The reason for its existence in the Mediterranean is the result of ships and sea currents coming from the Red Sea over the Suez Canal. *D. setosum* is found usually in the sand plains in conjunction with coral reefs and sea grass beds. This species is distinct from the other five *Diadema* species with five characteristic white dots in their bodies.

**Material and Methods:** 87 individuals of *D. setosum* were collected by diving from areas in Iskenderun and Dörtyol Fishing Port in Iskenderun Bay between January and March 2018. Collected samples were transported to Fish Behaviour Laboratory. These 87 individual's length, weight were measured and gonads were examined. Individual total length (TL) was measured using digital calipers and individual body weight (BW) was taken using a digital balance.

**Results:** Mean length of *D. setosum* was estimated as 55.85 mm and the mean weight was 86.71 g. This study presents results on the total length-body weight estimates of this Sea Urchin from Iskenderun Bay.

**Discussion:** Information on the length-weight estimates of *D. setosum* is presented here for the Iskenderun Bay. Length-weight estimates and LWR can be useful in studies of gonad development, feeding and maturity of the species population and sustainable ecosystem.

**Keywords:** *Diadema setosum*, Biological parameters, Iskenderun Bay, Mediterranean Sea
Investigation of Crude Protein Yield and Amino Acid Composition of Buckwheat (Fagopyrum esculentum Moench) Cultivated in Turkey

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Introduction: This study, crude protein yields and amino acid components of seeds of buckwheat (Fagopyrum esculentum Moench) grown at different sowing times and fertilizer doses for two years of newly imported foreign origin in our country were investigated.

Material and Methods: The analysis of amino acids was performed with a HPLC system consisting of HP Agilent 1200 series Quaternary Pump with degasser, injector and photodiode array detector. All the calculations concerning the quantitative analysis were performed with external standardization by measurement of peak areas.

Results: The crude protein content of buckwheat seeds grown at Konya ecological conditions at five different sowing times and different fertilizer doses (0, 10 and 20 kg / da DAP-18-46) ranged from % 11.21 -12.95. The amino acid content of the crude protein of buckwheat ranged from %14.93-16.16 of glutamic acid from the major components while the amount of Phenlyalanine from the minor components ranged from %0.77-3.11

Discussion: In this study, it was determined that seeds of buckwheat (Fagopyrum esculentum Moench) grown at different sowing times showed significant differences between crude yield and amino acid components

Keywords: Buckwheat seed, Planting Time, Fertilizer, Crude Protein, Amino Acid
Present Status of the Genus *Euscorpius* of Turkey (Scorpiones: Euscorpiidae)

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Introduction: The position of *Euscorpius* genus within the scorpion branch, the classification of euscorpids shambolic, exist a great variation and the keys for identifying euscorpid species unworkable. This study reports on the present status of the genus *Euscorpius* of Turkey.


Keywords: Scorpion, Scorpiones, *Euscorpius*, Euscorpiidae, Turkey
The Importance of Natural Species as Environmental Community: In the Light of Islamic Inheritance

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Introduction: Muslims contributed to world civilization constructing environmentally and ecologically friendly societies which were different then today’s industrialized and digitized world in terms of principles and ethics. The main source of protected and livable environment was Quran and the Hadith. Environment is very important theme for the human life sustainability in the Qur’an. For example God talks about how He creates life through water then sustains it by streams, the rains, rivers and oceans that are homes for so many creatures. “And Allah has sent down rain from the sky and given life thereby to the earth after its lifelessness. Indeed in that is a sign for a people who listen.” (Qur’an, 16:65). “And we have sent down blessed rain from the sky and made grow thereby gardens and grain from the harvest.” (Qur’an, 50:9).

As a clean environment is very important for prayer, particularly water is one of the main sources of cleanness and life of nature, in Muslim countries, Muslims believe that environment and water belong to God and nobody can utilize and monopolize just for his/her benefits. Environment is for sharing and there are enough places for all. How Mahatma Gandhi explains the importance of environment briefly “The world has enough for everyone's need, but not enough for everyone's greed.” This study aims to investigate how Qur’an and the Hadith declare the importance of environment for the sustainable human life.

Material and Methods: Environmental protection with all species is very important for sustainable life. This study tracks all the main ayats about environment and natural resources. And this study also elaborates ayats, which order the importance of protection of water, earth, mountains, specious, seas and rivers, about not to utilize and monopolize just for individual’s benefits.

Results: The results suggest that Qur’an attracts all humankind’s attention to environmental protection and water conservation and Qur’an also instructs people not to be wasteful even if they were next to a flowing river, and stipulated the importance of keeping public places tidy.

Discussion: This study emphasizes that countries particularly Muslim countries are not aware of importance of protection of environmental resources in the light of Qur’an. Although Qur’an instructed these principles centuries ago, scientific resolution highlighted the same problem a half century ago. It is recommended that if we have a livable earth we have to reorganize all environmental policies in the principles of Qur’an at least in all Muslim countries.

Keywords: Ayats, Qur’an, Environment, Natural Resources.
Culture of Mussel: Solution for Environmental Pollution generated by Solid Wastes of Fish Farming Cages

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Introduction: Natural mussel beds are insufficient; therefore, the mussels are cultured as food for humans in some parts of the World. Culture of the mussel has become very popular due to the high demand in some European countries such as France, Portugal and England. The purpose of this study was to determine the spatial and temporal changes in growth, survival rate and meat composition of *Mytilus galloprovincialis* cultured near and far from fish (sea bream and sea bass) farming cages in İzmir at two different depths (3 and 15 m).

Material and Methods: In this study, the Mediterranean mussel (*Mytilus galloprovincialis*) that is native to the Mediterranean, Black, and Adriatic Seas, but has spread (mostly via ballast water and ship hull fouling) to many other regions worldwide usually occur in the low intertidal zone of exposed rocky coasts with relatively high wave energy were used in the experiments as material. In this study, the material was supplied from Izmir province. The Mediterranean mussel samples were placed on the ropes of 6 mm width. These ropes were hung on the floaters which were near and far from the cages. On each location mussel ropes were submerged at 3 m and 15 m depths. In order to identify the meat composition of mussel, the samples were taken from the the ropes near and far from the cages both at the beginning and end of the trial.

Results: In this study, the highest and lowest survival rates of cultured mussels were found as 90.3%±5 (near the cage, 3 m depth) and 75%±6 (far from the cage, 15 m depth), respectively. The results showed that mean length and thicknesses of the mussels were 3.01±0.20 cm and 2.51±0.10 cm, respectively, in the beginning of the experiment. After five months period, the best growth was detected in the mussels living at 3 m depth with mean values of 2.51±0.10 cm length and 4.63±0.10 cm thickness. It was determined from this study that the growth and the survival rate of the Mediterranean mussels near the cage increase substantially. The data indicate that the solid wastes including high amount nutrient near the cages may increase the growth rate. Furthermore, the depth, the heat and the chlorophyll-a had an effect on the growth.

Discussion: The mussel is very valuable in terms of nutrition. Culture of mussel is an important gain for the optimum utilization of natural resources. The fish farming companies that cage culture sea bream and sea bass in Turkey have some solid wastes and negative effects on the environment. Culture of mussel near these cages could gain additional profit from the same area and take an advantage for solution of environmental pollution. In the near future, it is expected that mussel stocks will be better assessed, and culture-related undertakings will increase.

Acknowledgement: We would like to express our appreciation to the Mersin University Scientific Research Project Commission, which supported this study.

Keywords: Culture, Environmental pollution, Mussel, Solid Waste
Determination of the Poaceae Pollens 2016 Monthly and Intradiurnal Changes in Agri Atmosphere

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**Introduction:** Wind-pollinated (Anemophilous) plants produce lots of pollen to ensure pollination. Pollens from different taxa can provoke allergic symptoms in humans and animals. Herbaceous plants that belong to Poaceae produce important aeroallergens on their pollen grains. This family comprises 10,000 species, some of them with a high economical relevance. In our country it is represented with 602 taxa and 140 genera. Thanks to its wide spread of Poaceae family members, with different reproductive phenology, Poaceae pollen can be detected in the atmosphere throughout all the year.

**Material and Methods:** During 2016 weekly pollen samples were obtained by volumetric pollen trap (Lanzoni VPPS 2000). Weekly samples were converted to daily preparations and these preparations were analyzed in Olympus CX21 light microscope. The obtained pollen data were converted to monthly tables.

**Results:** As a result of pollen sampling carried out in Agri atmosphere, a total number of 16631 (pollen/m³) pollen grains were detected from a year period. A total number of 44 taxa were identified. 23 of these were woody (5055 pollen – 30.40%), 21 of these were herbaceous (11549 pollen- 69.44%). The 0.16% of the total pollen (27 pollen) cannot be diagnosed. Poaceae pollens were seen more or less throughout the year in Agri (31.56%). Poaceae pollens starting to see as of January were recorded as maximum levels in June (14.74%) and were observed as minimum levels in January (0.01%).

**Discussion:** In this study, total pollen concentrations (30.97%) in Agri atmosphere were determined as the highest level in June due to the highest levels of Poaceae pollen counts in this month. When Poaceae pollen diurnal variations are examined, the highest concentration of Poaceae sp. pollen recorded noon, in May (3.75%), from noon to evening, in June (14.74%), evening, in July (5.97%), from morning to noon, in August (4.98%) and evening, in September (0.55%).

**Acknowledgement:** We would like to thank TUBITAK for its financial support (Project number KBAG–113Z649).

**Keywords:** Agri, Poaceae, Pollen.
Introduction: *Fraxinus* genus in the Oleaceae family has 40 species in the Northern Hemisphere. In our country there are four species, *Fraxinus ornus* L., *Fraxinus excelsior* L., *Fraxinus angustifolia* Vahl and *Fraxinus pallidae* Wilmott ex Pallis. Called as the ash tree *Fraxinus angustifolia* species is the widest distribution in our country. These species are naturally distributed in our country in the forest formation in North, West and South Anatolia and in other areas they are grown as ornamental plants in parks, gardens and roadsides. *Fraxinus* sp. pollens are separated from the other taxa belonging to the Oleaceae family by wind.

Material and Methods: This study was performed using Lanzoni VPPS 2000 device which is a volumetric method in Agri province during the year of 2015. Weekly pollen samples were obtained and they were converted to the daily pollen preparations in labortary. These preparations were analyzed in light microscope. The obtained datas were converted to hourly, daily, weekly and mothly tables.

Results: As a result of this study which was carried out in Agri Province atmosphere, 15470 pollen/m³ is detected during the year of 2015. *Fraxinus* sp. pollens are 2.81% of total pollen and the eighth most intense amount of pollens. *Fraxinus* sp. pollens are observed in March, April, May, June, July, August and September during the study period. The highest pollen distribution was identified in May (1.88%).

Discussion: Pollens of *Fraxinus* sp. were observed from March to September during the study period. The highest concentration of that pollens were found that in June (291 pollen/m³ – 1.88%). When *Fraxinus* sp. pollen intradiurnal changes are examined, the highest concentration of *Artemisia* sp. pollen is found that in April (0.47%) and June (0.23%) at noon, in May (1.88%) and in July (0.18%) in the morning time.

Acknowledgement: We would like to thank TUBITAK for its financial support (Project number KBAG–113Z649).

Keywords: Agri, *Fraxinus* sp., Intradiurnal variation, Oleaceae, Pollen
Introduction: Pollens of herbaceous plants that belongs to the Compositae family are known aeroallergens both humans and animals. The sensitivity to mugwort pollen Artemisia sp. ranges between 10-14%. There are nearly 400 species of Artemisia genus in the world and 57 species exist in Europe and 22 Artemisia species recorded in Turkey. The most widespread species are the followings: Artemisia vulgaris, Artemisia annua, Artemisia absinthium, Artemisia campestris, Artemisia marchalliana, Artemisias coparia, Artemisia santonicum, Artemisia spicigera.

Material and Methods: Daily airborne pollen samples were taken by using Hirst type volumetric sampler (Lanzoni VPPS 2000) in Kars province during the year of 2015. Collected samples were analysed under light microscope and average hourly and daily pollen concentrations were reported.

Results: During 2015 in the atmosphere of Kars Province a total sum of daily pollen concentrations reached 19163 pollen. It was found that the nonaroreal plant pollens were 82.12% and arboreal plant pollens were 17.60%. The 0.28% of the total pollen (53 pollen) cannot be diagnosed. With 10.30% of the total pollen sum Artemisia sp. pollen was the second most abundant pollen type. It was suspended in the air from February to December expect May. The highest contribution of Artemisia sp. pollen to total airborne pollen spectra was identified in July (4.95%).

Discussion: When Artemisia sp. pollen diurnal variations are examined, the highest concentration of Artemisia sp. pollen recorded noon, in July (4.95%) from morning to noon, in August (0.92%), in from evening to midday, in September (0.74%) and in evening, in October (3.54%)

Acknowledgement: I would like to thank TUBITAK for its financial support (Project number KBAG–113Z649).

Keywords: Kars, Artemisia, Pollen
Effects of Cadmium and Lead on Total Hemocyte Counts of Lesser Wax Moth, *Achroia grisella* Fabr. (Lepidoptera: Pyralidae)

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**Introduction**: *Achroia grisella* (L.) (Lepidoptera: Pyralidae), known as the lesser wax moth, is a serious pest for the apiculture industry. Larvae of this moth species feed on honeycomb, honey and wax found in honey bee hives. Hemolymph, the only extracellular liquid present in insects, is composed of plasma and cells called hemocytes. Environmental pollutants, including heavy metals and insecticides, can alter the number of and/or induce structural abnormalities in hemocytes. In the present study, the influence of the cadmium (Cd) and lead (Pb) on total hemocyte counts (THCs) of the lesser wax moth was studied under laboratory conditions.

**Material and Methods**: *A. grisella* larvae were fed diets that were separately contaminated with Cd or Pb in three concentrations each: 50, 100 and 200 mg/kg. The control group (C) was reared on uncontaminated artificial diet. Hemolymph samples were collected from each group and 10 preparations were prepared for each group. From each of the study groups, 5 μl of the hemolymph sample spread over the slide. After Giemsa staining, counts were made in 20 different regions in the preparations. Total hemocytes count was obtained by multiplying the mean cell number by the microscope factor obtained by calculating the microscope sight field. The results were evaluated statistically.

**Results**: Addition of Cd or Pb (50, 100 and 200 mg/kg) to the diet generally resulted in a decline in the total hemocyte numbers of *A. grisella* larvae.

**Discussion**: Insect hemocytes have the ability to discriminate stranger agents, mediate phagocytosis, cytotoxicity, encapsulation, wound repair and coagulation. Therefore, they are frequently used to demonstrate the cytogenetic damage caused by toxic chemicals. Our results revealed significant decline in THCs of Cd and Pb- treated *A. grisella* larvae. Similar results were also reported by different researchers. As in vertebrates, the efficiency of the immune system in insects is correlated with the number of hemocytes and their function. Therefore, further analysis are still required to bring additional details about the types of the hemocyte and the functions of each hemocyte type to understand how the heavy metals affect the immune system of this insect species.

**Keywords**: *Achroia grisella*, hemocyte, heavy metals, cadmium, lead
Optimized Fish Protein Hydrolyzates Using Commercial Enzymes Trace Element Contents

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Introduction: In this study, the hydrolysis of trout, anchovy and whiting wastes by using the alkaline protease, protamex and flavourenzyme enzyme was studied to evaluate the influence of temperature and enzyme: substrate ratio on the responses of degree of hydrolysis. The enzymatic hydrolysis was optimized for maximum degree of hydrolysis using Central Composite (CCD) and Box-Benhken (BBD) models in the Response Surface Method (RSM) and, the trace element contents of optimized hydrolysates were determined.

Material and Methods: In this study, the wastes of trout (Onchorhyncus mykiss), anchovy (Engraulis encrasicolus) and whiting fish (Merlangus merlangus) has hydrolyzed by using alkali protease (pH 8), protamex (pH 7.0) and flavourenzim (pH 7.0) and applied 3 different enzyme rates (1%, 1.5% ve 2%), time periods (1, 4.5 ve 8 hours) and temperature rates (40 °C, 50 °C ve 60 °C). Trace element analysis of optimized protein hydrolysates were carried out by the method of Intarasirisawat et al. (2011).

Results: As a result of optimization, significant differences in mineral contents of all produced fish groups protein hydrolysis, have been detected according to fish species and enzyme types. Especially the trace elements content of the hydrolysates obtained from trout wastes was determined to be lower.

Discussion: It has been found that the different enzymes in the hydrolysates obtained from the same fish species wastes make significant differences in the trace element contents of the hydrolysates.

Acknowledgement: We would like to express our appreciation to the Ordu University Scientific Research Project Commission, which supported this study (ODUBAP-BD-1701).

Keywords: Fish waste, protein hydrolysis, trace element
Introduction: As a major stress factor, low temperature has a significant effect on the distribution and production of plants. It can adversely impact the growth and development of plant by altering the metabolism and physiology processes. About two thirds of the world’s landmass is annually subjected to temperatures below the freezing point and about half of it suffers from temperatures below -20°C.

Afforestation success depends largely upon the physiological and morphological characteristic of seedling to survive and grow after planting. Especially in areas where frost and drought effects are observed, the selection of origins in these regions is of great importance for success. In Turkey Anatolian Black Pine is one of the mostly used pine species in afforestation studies in Turkey, especially in regions experiencing drought or cold temperatures.

Plant cold hardiness is measured by exposing plant tissue to controlled freezing temperatures, then quantifying tissue damage by one or more methods such as; visual observation, Electrolyte leakage, sugar concentration, bud mitotic activity and Chlorophyll Fluorescence Techniques. Visual observation is a cost effective method in determining cold hardiness and is used in combination with other methods. In this method, the frost damage is determined after 7-15 days by creating a scale based on the color change in the plant tissue.

Material and Methods: In this study, the effect of cold hardiness was investigated on Pinus nigra seedlings from 7 provenances representing different bioclimatical regions in Turkey. To assess the cold hardiness of provenances, 3+0 years old seedlings were exposed to -20, -25, -30, and -40 °C freezing temperatures in winter. After treatments, frost damage was determined by visual observations.

Results: In cold hardiness tests, damages on seedlings started from -20 °C and -25 °C according to visual observation. In addition, it was found that some provenances survived until -30 °C. All provenances were died at -40 °C. While the most resistant provenances to cold hardiness were Karaman, Çerkeş and Kargı, the most sensitive provenance was Dirgine.

Discussion: The visual observation technique used in this study to measure the cold hardiness of P. nigra provenances was proved useful and a cost effective method. Significant relations were found between cold tolerances of Anatolian Black Pine provenances and their bioclimatical regions. In conclusion, Karaman, Çerkeş and Kargı provenances should be used for afforestations in areas where frost effects are observed especially in Central Anatolia.

Keywords: Anatolian Black Pine, Cold hardiness, Visual observation, Seedlings, Ecophysiology, Plant stress physiology.
Effects of Sulfur Applications on Some Soil Properties and Micronutrient Concentrations

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Introduction: The great majority of the Turkey soils was formed on the limestone parent material. The soils which have high lime contents and pH restrict the intake of nutrients by plants with making plant nutrients unavailable. The most effective material which is used for such soils is elementel sulfur. Besides sulfur is a plant nutrient, it increases the availability of phosphorus and micronutrients by decreasing the pH and lime content of soils.

Materials and Methods: This study was conducted in Büyü Karacaören village in Gaziantep-Oğuzeli district. In the research area 5 doses of (0, 25, 50, 100, 150 kg da-1) elementel sulfur with 4 replications were applied to the soils. 40 soil samples were taken from the upper and lower soil depths at the end of 9 months, and pH, lime and micro nutrients were measured.

Results: As a result of the study, it was observed that soil pH’s were decreased from 7.72 to 7.61, 7.54, 7.38 and 7.18, respectively, with the applications of 25, 50, 100 ve 150 kg da-1 of elementel sulfur at the end of the incubation. Also, lime contents were determined decreased as 0.45, 0.88, 1.69 and 2.80% with the application doses. However, increases as 0.14, 0.34, 0.28 ve 0.32 mg kg-1 in iron concentrations, 0.1, 0.11, 0.14, 0.16 mg kg-1 in zinc concentrations, 0.08, 0.12, 0.13 ve 0.16 mg kg-1 in copper concentrations and 1.77, 2.55, 2.43 ve 3.13 mg kg-1 in manganese concentrations were measured with the increasing doses of Sulfur, respectively.

Discussion and Conclusion: At the end of this research, it is revealed that sulfur applications decrease the pH and lime contents of soils, thus increase the available concentrations of micronutrients. So, with regards to soil fertility elementel sulfur could be used to decrease soil pH and lime, and make the micro nutrients more available.

Keywords: Soil, pH, sulfur, improvement
Assessment of Some Climate Parameters in the Eastern Black Sea Basin in Terms of Climate Change Process

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Introduction: The United Nations climate conference, the fourth report on climate change, is expected to raise the world's temperature by 1.8 to 4 degrees by 2100. Carbon dioxide, methane and N\textsubscript{2} monoxide gases, which tend to increase in the atmosphere due to the use of fossil fuels in recent years, deforestation, rapid population growth and increasing consumption trends in societies, cause global warming. Due to the increase in global temperatures, it is expected that there will be significant changes that will affect ecological systems and human life. Turkey, which is located in the western part of the subtropic continents and is under the influence of Mediterranean climate, is among the risk group countries in terms of the potential effects of global warming. Successive hot years starting in the 1980s and high temperatures in recent years indicate that global warming continues as expected and foreseeable. In this study, the average of some climate parameters selected in meteorological stations in the Black Sea basin was calculated and compared in two terms (1960-1985, 1986-2016) for many years.

Material and Methods: Some meteorological parameters were gained from Meteorology 11th Regional Directorate (Trabzon). In the study, a total of 14 meteorological stations (Artvin, Artvin-Hopa, Artvin-Kemalpaşa, Bayburt, Giresun, Giresun-Bulancak, Giresun-Doğankent, Gümüşhane, Ordu, Ordu-Fatsa, Rize, Trabzon, Trabzon-Maçka, Trabzon-Of) was evaluated. Climate parameters such as annual average temperature, summer average temperature, vegetation period average temperature, average total precipitation, vegetation period mean precipitation, summer mean precipitation and mean humidity were used.

Results: In this study, in the statistical analysis, two terms (1960-1985, 1986-2016) was compared. The average temperature is the highest in Trabzon-Maçka. The highest temperature increase in the summer season and vegetation period were in Ordu. The average precipitation, the average precipitation increases in summer season and the average precipitation increase in summer season were in Artvin-Kemalpaşa. The average humidity increase was in Giresun-Doğankent. Average temperature (except Giresun-Doğankent and Trabzon-of) and rainfall increases were realized in all meteorological stations. The average temperature rise was 1.8 \textdegree C in Trabzon-Maçka and the rainfall rise was 909.4 mm in Artvin-Kemalpaşa.

Discussion: Average temperature and precipitation increases in the Eastern Black Sea basin will cause significant natural events in the process of climate change. The recent flood disaster in Artvin-Hopa is an important witness to this. In fact, the average annual precipitation increases in Artvin-Kemalpaşa as a close basin supports this belief. For this reason, the average temperature and precipitation increases should be evaluated by the relevant institutions in planning on the East Black Sea region scale.

Keywords: Climate change, natural events, average temperature, average precipitation, eastern black sea basin
Introduction: Site conditions affect the spread out and distribution of tree species with different ecological characteristics. Forest trees of varying ecological desires can exhibit different growth and development, showing different ecological tolerances in different growing environments. Changes in some ecological conditions may have an adverse effect on another ecological factor that tree species may have in other natural habitats. Interesting ecological relations are in this way in oriental beech ecosystems which are one of the primary forest tree species and make an optimum distribution in Ordu-Akkuş region.

Material and Methods: The research area is located in the Canik-Giresun Mountains Growth Environment zone. Twenty sampling areas were sampled in the pure oriental beech ecosystems. In order to determine the site index, age and height measurements were made. The location factors of the sample areas were determined. Soil sampling was performed from the opened soil pits to genetic soil horizons. Physiological soil depth and soil type were determined. In soil samples, particle diameters, actual and potential acidity, organic carbon, were determined. The amount of thin soil is calculated as gr / lt on the bulk samples taken. The available water capacity of the soils were determined as %, calculated in mm in relation to thin soil quantities and horizon thicknesses. In the research area, correlation analysis was used to determine the relationship between the productivity of the eastern beech and the soil characteristics and location factors of the growing environment.

Results: The site index ranges from 20.1 m to 30.2 m. The land slope is between 5% and 70%. Specimen areas are distributed on the lower slopes and on the upper slopes. The positive correlation between the site index of the oriental beech and the land slope is interesting ($r = 0.445$, $p <0.01$). The difference between the clay and silt amounts of the soil with the site index was negative ($r = -0.228$, $p <0.05$ and $r = -0.274$, $p <0.05$). Positive correlation between the site index and sand quantities ($r = 0.242$, $p <0.05$). Positivity ($r = 0.268$, $p <0.05$) between organic matter of Ah horizon ($r = 0.409$, $p <0.01$) and physiological soil depth with site index. There is a negative correlation ($r = -0.483$, $p <0.01$) between the site index and the moisture content of the field capacity.

Discussion: Soil properties have changed due to geological formation and climate conditions. The relationship between the grain diameter ratios of the soils and the site index can be expected. Increase in the sand content of the study area and increase in the site index, increase in the content of clay and dust, and decrease of the site index are due to the local ecological conditions. In general, the increase in the slope of the land decreases the height development in the forest trees and the site index falls. However, with the increase in the number of land slopes in the Akkus region, the site index has increased significantly. This is a typical example of regionalities and is due to the ecological requirements of the local ecological conditions (relative humidity, abundant rainfall, soil characteristics) specific to the Akkus region and the eastern beech.

Keywords: Oriental beech, relative humidity, soil properties, site index, slope
Isolation and Molecular Characterization of Bacteria from Contaminated Soils with Industrial Waste

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Introduction: The contamination of soils with petroleum compounds is among the most prevalent problems in environments worldwide. The reason for petroleum biodegradation is the ability of microorganisms to utilize hydrocarbons to satisfy their cell growth and energy needs. Bacteria that biodegrade the components of petroleum hydrocarbons are isolated from various environments, particularly from petroleum-contaminated sites. Hydrocarbon-degrading bacteria are widely distributed in marine, freshwater, soil habitats and their use in bioremediation of hydrocarbon-contaminated soils, which exploits their ability to degrade has been established as an efficient, economical, versatile and environmentally sound treatment.

Materials and Methods: About 10 g soil samples were aseptically collected from different areas contaminated with industrial waste containing petroleum derivative hydrocarbons from in Mersin. Bacteria were isolated from soil samples using an enrichment medium containing petrol and were isolated 2 bacteria. Morphological, physiological, biochemical and kentaxonomical characterisation of bacterial strains were carried out.

Results and Discussion: As a result, in this study, Acinetobacter calcoaceticus (KY010271) strains were identified by 16S rRNA sequence analysis. Acinetobacter calcoaceticus is a Gram-negative coccobacil, oxidase-negative and catalase-positive and nonmotile bacterium.

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Keywords: Industrial waste, Petroleum hydrocarbons Bioremediation, Acinetobacter calcoaceticus
The Effects of Heavy Metal Stress on the Leaf Relative Water Content in Some Poplar Taxa

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Introduction: All stress factors such as heavy metals are directly or indirectly caused by osmotic stress. They are induced ionic stress in plants and increase some tissue diebacks. Moreover, toxic metals have deteriorating effect on cellular level the physical, chemical, physiological and metabolic mechanisms. Plant based soil remediation systems provide some advantages for bioaccumulation. Phytoremediation techniques are used as an environment cleanup systems. New study results demonstrate that hyper accumulator plants such as Populus and Salix sp. can accumulate metals in large amounts.

Material and Method: In order to identify the adverse effects of cadmium stress on physiology, it was investigated some poplar taxa: Populus nigra L. clones Geyve and N.03.368A, P. tremula L. and P. euramericana Dode. Guinier (I-214). It was determined the Leaf Relative Water Content (LRWC) for control and Cd stress treatment (200 mM) in poplar clones. This method is the physiological measurement of the plant water status. Leaf fresh weight (W) was determined within 6 hour. Turgid weight (TW) was obtained after hydration in deionized water at room temperature for 24 hours. After hydrating, the samples were removed from the water and dried quickly and gently with filter / paper from any surface moisture and weighed immediately to obtain the completely turgid weight (TW). Then the samples are dried in the oven at 80 °C for 24 h and weighed (after cooling in a desiccator) to determine the dry weight (DW). LRWC was calculated from the following equation: LRWC (%) = [(W-DW) / (TW-DW)] x100.

Results: As a result; this study determined the tolerance mechanism of some poplar taxa for cadmium stress by the LRWC method. Some poplar clones were able to protect themselves against to stress. Especially P. tremula and P. euramericana (I-214) poplar species were determined to resistant of cadmium stress. The leaf relative water content for these species was found to be high in cadmium stress application compared to the control.

Discussion: The present results allow us to conclude that the physiological process in poplar taxa was significantly affected by stress of cadmium. More research is needed to better understand the stress defense mechanisms and find to the most resistant genotype and taxa for forest tree breeding programs.

Keywords: Populus, Heavy metal, Cadmium, Phytoremediation, Leaf relative water content, Bioaccumulation.
**Determination of the Synthesis and Activity of CoO Nanoparticles Showing Antimicrobial Properties by the Green Synthesis Method**

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**Introduction:** Unique sizes and high bioavailability of metal oxide nanoparticles (MONP) allow for interacting directly with infectious agents, toxins, different chemical compounds and cell structures (proteins, lipids, nucleic acids). In some studies, it has been found that nanoparticles have the potential to be used in different forms, due to their less toxicity than microscopic materials. Today, nanoparticle synthesis, which is a large research topic, has gained importance. For this purpose, physical, chemical and biological methods are used. Cobalt oxide (CoO), a transition metal, has been used in many fields such as gas sensor and battery production in nano size and has attracted much attention because of its potential applications.

**Material and Methods:** Although there are experiments on the preparation of CoO nanoparticles, the chemical production of nano CoO is quite difficult. For this reason, the environment-friendly green synthesis method was used in our research. In our research, grape extract of Erzincan Cimin (*Vitis vinifera*, Cimin) which is an endemic species as green synthesis reaction medium was used and nanocobalt oxide synthesis was carried out under moderate conditions with less cost. Characterization of the obtained CoO NPs was performed using SEM, XRD FTIR analyzes. The CoO NPs were screened *in vitro* (well diffusion method) for antimicrobial activity against pathogenic strains; *Listeria monocytogenes* 4b, *Salmonella typhi* H, *Bacillus cereus*, *Staphylococcus epidermis*, *Micrococcus luteus*, *Escherichia coli*, *Staphylococcus aureus*, *Micrococcus luteus*, *Staphylococcus aureus*, *Brucella abortus*, *Proteus vulgaris*, *Klebsiella pneumoniae* and antifungal activity against *Candida albicans*.

**Results:** After the size and structure of obtained CoO NPs was determined as 50-70 nm, the presence of its antimicrobial activities was investigated. As a result of the study, CoO nanoparticles were tested against pathogenic microorganisms (*Listeria monocytogenes*, *Salmonella typhi* H, *Bacillus cereus*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Micrococcus luteus*, *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *Serratia marcescens*, *Pseudomonas aeruginosa*, *Candida albicans*) and CoO NPs were found to be quite effective at different levels.

**Keywords:** Antimicrobial activity, Green Synthesis, CoO Nanoparticles, *Vitis vinifera*, Cimin
Introduction: In terms of vegetation geography, Turkey which examines the relationship between the vegetation covering in the earth and the environment is one of the most important vegetation region of the world. In Turkey which is in the southern part of the middle zone and is located in the transition zone of Europe, Siberia, Mediterrenaen and Iran-Turan vegetation geographical regions has been founded more than 12000 plants taxa in the researches carried out to date. It has been determined that no study has been done on the distribution of the Berit Daği vegetation formations in a special location in Turkey in the sense of the Floristic area.

Berit Mountain located within Kahramanmaras province borders lies to the north of the Ahır Dağı, to the south of Göksun-Afşin Plain and to the west of Engizek Mountain. The study area is located in a special position in terms of plant studies and It is aimed to determine the floristic properties of the formations by determined the distribution areas of vegetation formation.

Material and Methods: Land observations were made in the spring, summer and autumn seasons of 2016.

Results: Berit Mountain is the highest altitude point of Kahramanmaras. Berit Mountain's elevation ranges from 600 to 3027 meters. As the temperature and precipitation conditions that occur due to the change in altitude difference at short distance, It enables the diversity of plants rich in bioclimatic conditions in the region and the growth of different vegetation communities. As a result; It has been observed that the vegetation communities on the Berit Mountain are distributed in three main forms. On the slopes overlooking the plains of Elbistan -Afşin in the north of Berit Mountain, It is seen poor and sporadic distribution due to increasing drought. In the south of the Berit Mountain, along with the shrub species along the Ceyhan river valley, the pinus brutia and oak communities dominate. The vegetation communities in the southern part appear to be in vegetation zone with the effect of altitude. While pinus nigra communities are seen between 1200-1400 m, cedrus libani forests are distributed between 1500-2100 m. On the Berit Mountain, there are plants (astragalus , acantholimon acerosum ) that form a thorn along the Alpine belt, which starts after 2100 m.

Keywords: Vegetation, Kahramanmaras, Berit Mountain
Introduction: The impact of anthropogenic activities on nitrogen cycle has become significantly important. Today the nitrogen fixation has doubled compared to times before the industrial revolution. Reactive nitrogen is the main parameter of eutrophication and deterioration of environmental reservoirs such as seas, lakes, groundwater, soil and atmosphere. Anthropogenic reactive nitrogen in the environment is the by-product of food and energy production, which are vital for civilization. Increasing demand for food production as a result of growing population as well as growing grazing demand for cattle has given rise to fertilizer production and usage. The usage of Haber-Bosch process in nitrogen fertilizer has expanded in the world. In return, biologically available nitrogen in soil has increased. Management of reactive nitrogen will be among the challenging environmental subjects of Turkey for sustainable development for the following years since both agriculture and industrial development are major economical driving forces of the country. In this research a database is established in excel comprising each type of crops grown and animal raised with respect to 81 provinces and years. The amount of reactive nitrogen produced by chemical fertilizer use, livestock production and nitrogen consumed in crop growing are determined.

Material and Methods: The data used in this study is obtained from the Ministry of Food, Agriculture and Livestock and Turkish Statistical Institute. Literature data and OECD reports are used for the rate constants in determining the nitrogen amounts. Mapping utilities of GIS systems are also used as an illustration to depict nitrogen production potentials of the provinces for a specific year.

Results: Total chemical fertilizer-N consumption shows a variable trend in time changing between 800 and 1400 ktones since the year 1981. Nitrogen uptaken by each crop type grouped as fruits, vegetables field crops are calculated separately and it is found to be around 1300 and 1800 kilotones depending on the agricultural cultivation each year. As well as mineral fertilizers, animal manure has been used as nitrogen supply for agricultural lands. Animal manure nitrogen due to different animal types which are grouped under cattle breeding, poultry raising, sheep and goat farming and single shank raising is found to be around 1100 to 1200 kilotones. Cattle breeding produces the highest amount of nitrogen following sheep and goat farming, poultry raising, single shank animals raising and other animals respectively. Nitrogen fixation by N-fixing plants is around 155 tones.

Discussion: The challenge is to create a sustainable food and energy supply while reducing the release of reactive nitrogen to the ecosystems. The demand for balanced global nitrogen consumption clearly enforces new technological approaches and indicates the need for alternative life styles. The solution may start with the country tailored and manageable nitrogen budget models.

Keywords: reactive nitrogen; mineral fertilizer, animal manure, Turkey
Determination of Morphological Properties of *Plexippus paykulli* with Scanning Electron Microscope (Arachnida: Araneae)

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**Introduction:** Spiders have extremely developed cuticular scales and mechanosensory systems including lyriform organs, slit sense organs and trichobothria, which are specific to detect vibrations and air current. The cuticular morphological characters that could be used to describe *Plexippus paykulli* were studied using stereo light microscopy and scanning electron microscopy (SEM). In particular, the chelicerae, pedipalp, cephalatorax, abdomen, spinnerets and all body parts of *P. paykulli*, and the cuticular structures on their appendages were studied for the first time using SEM in present study.

**Material and Methods:** The present study is based on the materials collected from Hatay province of Turkey in 2017. The specimens were collected in a forest by hand aspirator during daytime. Specimens of *Plexippus paykulli* were preserved in 70% ethanol. The specimens were prepared for SEM by drying the specimens on aluminum stubs. The identifications were done with a Leica S8APO microscope, and pictures were taken by means of the Leica DC 160 camera. All measurements are given in millimeter. Collected and examined specimens were deposited in collection of the Zoological Museum of Kastamonu University (KUZM).

**Results:** Lyriform slit sense organs and trichobothria were examined on the exoskeleton cuticle of the species. These cuticular structures on their appendages were shown using scanning electron microscopic techniques.

**Discussion:** This study, which is thought to provide important contributions to the morphology of spiders, has discussed the probable functions of the structures studied. The leg sensilla organs are often situated where the cuticle is curved near the surfaces.

**Keywords:** Slit sense, lyriform, trichobothria, spider, cuticula
Comparison of the Efficiencies for the Removal of Congo Red and Methylene Blue from their Aqueous Solutions by Adsorption with the use of Illite Mineral

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Introduction: Synthetic dyes are one of the major chemicals in several industries. The dyeing process goes through several steps and performed in media, generally dissolving solvent is water. Through the steps of the processes, high volumes of water are used and finally some of the toxic synthetic chemicals exist in wastewater of these productions. Discharge of these streams causes critical and dangerous environmental problems. Therefore, these aqueous streams should be cleaned with an appropriate technique or procedure in advance. For this purpose, adsorptive separation techniques have been tested and they have shown great success. The most critical step of the method is the selection of the adsorbent. In this study, removal efficiencies of Congo red and Methylene blue from their aqueous solutions using illite mineral by adsorption were compared.

Material and Methods: Illite mineral was obtained from the city of Ordu of Turkey. Congo red (CR) dye and Methylene Blue (MB) are obtained from Merck Co. Concentrations of the dye solutions were varied between 25-500 ppm. The pH of the solutions were adjusted using solutions of HCl and NaOH. The experiments were carried using 10 mL of aqueous solutions and the dosage of the adsorbent was in the range of 0.01-0.05 g.

Results: Effects of several parameters such as aqueous pH, adsorbent dose, contact time, dye concentration and temperature on the removal of MB and CR were investigated. Influences of the parameters were clearly observed. The system reached the equilibrium in 120 minutes. The experiments were carried out at different pH values for the dyes since maximum efficiency for MB was obtained at pH 9.9; while that of CR was reached at pH 5.7. Adsorbent dose positively affected the process while an opposite influence was observed with dye concentration. When the initial dye concentration and illite dose were 100 ppm and 0.01 g, respectively; a removal of 66.1% was obtained for MB. At the same conditions the dye separation efficiency was 89.7% with CR. The data showed that the adsorption process can be characterized by Langmuir isotherm model for both solutes.

Discussion: The results presented that illite mineral is an appropriate adsorbent for the removal of synthetic dyes having the nature of anionic and cationic features.

Acknowledgement: The authors like to thank Selçuk University Scientific Research Projects Coordination Unit for the fund of the study with project number of 17201137.

Keywords: Illite, adsorption, anionic dyes, cationic dyes, comparison
Comprehensive Assessment of the Environmental Quality of Soil in an Industrial Area (Dilovası) of Turkey

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Introduction: Due to rapid growing of industrialization, soil pollution has become one of the major environmental problems worldwide. Pollutants may be introduced to surface soils via atmospheric deposition of suspended particles, deposition of contaminated sediments and circulation of groundwater. These pollutants can reach to humans by inhalation of resuspended dust and digestion of foods on which pollutants adsorbed/absorbed. Dilovası region, including 185 small and medium enterprises from 45 different sectors, is one of the regions in Turkey that is exposed to soil pollution. This performed study was designed to achieve the following objectives: (1) to determine the levels of soil pollution in Dilovası, where industrial activity is very high, (2) to determine whether there is a seasonality in the concentrations of measured parameters, (3) to determine the spatial distribution of parameters determined in the soil.

Material and Methods: In this study, soil samples were collected at 23 different points in Dilovası in February, July and October, 2015. The soil samples were collected at a depth of 0-10 cm from top of the soil surface. Then samples were transferred to aluminum foil, which was washed with acetone-hexane solution, labeled and stored at -4 °C in the laboratory till analysis. The pH content of the soil samples were determined by following the 9045D method developed by USEPA. The metal content of the samples were determined by PANALYTICAL AXIOS Adwance model WDXRF instrument. The elements measured in this study were U, Br, Sc, Th, Ga, Nb, As, Co, Sn, Y, Nd, La, Ni, Pb, Cu, Ce, Rb, V, Zr, Cr, Sr, Zn, Ba, Mn, S, P, Ti, Mg, K, Fe, Ca, Al and Si. The accuracy of the measurements was checked by analyzing different standard reference materials.

Results: The measured pH values were ranged from 7.30 to 8.10 for the whole study period. The average pH value was found as 7.69±0.19, which implies that soil in Dilovası region shows alkaline character. For trace metals, concentrations were found to change between 1.85±0.47 ppm for U and 1007±413 ppm for Mn. The concentrations of major elements were ranged from 0.16±0.10 ppm for S to 21.55±4.26 ppm for Si. When the temporal variations of the measured parameters were evaluated, it has been found that As, Ba, Ca, Fe, Ti and Mg showed statistically significant variations between the months.

Discussion: Levels of trace and major elements were determined in Dilovası (Kocaeli) soil composition in this study. In addition, temporal and spatial variability of measured parameters were also assessed. When the measured values were compared with the limit values set at the Turkish Soil Pollution Control Regulation, Cr concentration was found to exceed the permissible level.

Acknowledgement: We thank to Turkish Scientific and Technological Research Council (TÜBİTAK), which supported this study with grant number 115Y495.

Keywords: Dilovası, Soil, WDXRF, Metals
Determination of Levels of Indoor Nano Particles in Different Buildings of an University Campus

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Introduction: In 2000, World Health Organization (WHO) implemented the right of healthy indoor atmosphere and estimated that about 1.5 million people death annually due to improper indoor air quality in 2007. Indoor PM can be of indoor and outdoor origin. Outdoor PM can penetrate into indoor as a result of air exchange processes, which is affected by the building characteristics and ventilation method. Human activity also determines the indoor sources of PM. Dry deposition or the indoor/outdoor exchange are the two mechanisms removing indoor PM. Human activities resuspend the settled PM and then they become airborne. School gyms and care centers are taking attention due to increase re-suspension of PM as a result of mechanical human activity. The main objective of this study is to find the number concentrations of PM in the size range from 10 nm to 10 µm in different indoor environments in a university campus.

Material and Methods: The particle number concentrations in different locations, which are hall of engineering faculty, hall next to canteen, canteen of education faculty, student sport center, student activity center, a lecture room in engineering faculty and housing, of Abant Izzet Baysal University (Bolu, Turkey) were measured during November 2017. TSI Scanning Mobility Particle Sizer (SMPS) Model 3910 was used to measure particle number concentration between 10 nm and 360 nm in 13 different bins. In addition, TSI Optical Particle Sizer (OPS) Model 3330 was used to determine the particle size concentration between 0.3 and 10 µm in 17 different bins. Both of these instruments were operated in parallel at least for two hours. Time resolution for data recording was one minute in SPMS while one average value for the whole measurement period was obtained with OPS.

Results: Obtained results revealed that the highest particle number concentration was recorded for the student activity center while the lowest one was recorded for the hall in the building of faculty of engineering especially for particles less than 2 µm in size. The average total number concentration in the student activity center was found as 126x10³ per cubic centimeter of air for particles less than 365.2 nm. The number concentration measured in the student activity center was further investigated in terms of particle size in nanometer size fraction. The highest particle number concentration was obtained at 86.6 nm with a value of 23.2x10³ per cubic centimeter of air. The average median, geometric mean and mode particle size measured in the student activity center were 73.96, 69.96 and 75.73 nm, respectively.

Discussion: The particle number concentration in the range from 10 nm to 10 µm was measured in several places in the university campus. The particle number concentration enriched in the ultrafine particles in the student activity center was attributed to the emissions from cooking and copying activities in this location.

Acknowledgement: We thank to ATS Elektronik for providing the SMPS and OPS.

Keywords: Nano particles, indoor air quality, university campus, Bolu
Introduction: Changing and developing world conditions are affecting cities, and cities are having difficulty in meeting the demands of the population who want to catch up with world trends. Cities have been faced with different problems and needed the renewal every period. When the squatting and rapid urbanization process experienced by rapid population growth in the 1950s, they left the place to apartment in 1960s. In particular, with the 1980s, urban transformation activities have started in our country in order to renovate the historic fabric and to clear the slum areas. The Marmara and Düzce earthquakes in 1999 particularly attract attention the areas where there were unqualified buildings damaged by the earthquake. However, the transformation of disaster areas in our country has gained importance.

92% is in the earthquake zone in Turkey and approximately 98% of the population lives under the earthquake risk (AFAD, 2014). As many cities, Van province is located on active seismic zones.

Material and Methods: In the study, Ercis District in Van located on 1st degree earthquake zone and shaken by two big earthquakes in October 2011 and November 2011, are discussed. One of the reasons for the discussion is the presence of unqualified building sites affected by the earthquake, and the other is the loss of life and property by the earthquake. In the study, the physical suitability of the urban transformation works in Erciş Center is evaluated.

Results and Discussion: Approximately two years after the earthquake, in 2013, 7 neighborhood risk areas in Erciş center were declared and the post-disaster urban transformation project started. There are residential areas, trade areas, mosque, cultural center, municipal service building, shopping center and school within the project area. Urban transformation works have commercial areas in the 1st stage zone and residential areas in the 2nd and 3rd stage. Today, approximately 4 hectares of mosque and municipal service building under the urban transformation are completed.

Lack of participation in the transformation process and lack of holistic planning cause various problems. So, urban transformation projects which participation is provided at every stage and cooperated with various actors and met the needs of the living, should be implement.

Keywords: Urban Transformation, Risk Area, Earthquake, Ercis
Identification and Characterization of Intestinal Probiotic Bacteria in Wild Adult Sea Bream (Sparus aurata)

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Introduction: Metchnikoff (1905) has first described that “it may be possible to displace beneficial microorganisms by harmful microorganisms in our bodies by the passage of beneficial microorganisms in the gut”. Bacterial cells are transient in the gut, with of microbes coming from water and food. Given the importance of nutrition in maintaining the health of fish, with respect to nutritional involvement on immuno-competence and disease resistance, as well as its role in stress mediation, there is a growing trend towards exploring dietary components of a non-nutritional nature to provide various functional attributes.

Material and Methods: The isolation of potential probiotic bacteria to be detected in Tuzla lagoon was made from 25 healthy seabream (Sparus aurata) intestine. The fish were placed into ice, followed by disrupted with sterile scissors. Hydrophobicity was made according to Wang and Han, 2007. VITEK-2 compact (Biomerux) device was used for the naming of bacteria. Siderophore abilities were performed according to Shin et al., 1997. Low pH resistance of potential probiotic bacteria was made according to Balcazar et al.2008. Antagonistic effect was made by dilution of agar method. Determination of Antibiotic Sensitivity Levels of Strains Five different antibiotic discs (Amoxicillin + Clavulanic Acid, AMC; Enrofloxacin, ENR; Sulfamethoxazole-trimethoprim, SXT; Oxytetracycline, T; Erythromycin, E) were used intensively in fish treatment. Sensitivity was assessed according to CLSI (Clinical and Laboratory Standards Institute) standards.

Results: The 64 bacteria were isolated from the intestinal microflora. 22 different strains (35.9%) of 64 strains showed hydrophilic character. hydrophilic character allows us to distinguish it from pathogens and to name it as a potential probiotic species. Potential probiotic strains were determined Kocuria kristinae (22.72%), Brevundimonas diminuta (22.72%), K. rosea (13.64%), Pseudomonas flourecens (13.64%), Shingomonas pauchimobilis (9.09%), Shwanella putrafaciens (4.54%), Rothia dentocariosa (4.54%), Aeromonas salmonicida (4.54%), Rhizobium radiobacter (4.54%). Only 5 species were able to survive at pH 3 than pH 1 (p<0.05). The ability of the siderophore was seen in only 4 species. K. kristinae (5), B. diminuta (4), K. Rosea(3), P. flourecens (2), S. pauchimobilis(1), S. putrafaciens (1), Rothia dentocariosa (1), Aeromonas salmonicida (1) were showed antagonistic activity against Aeromonas hydrophila, than B. diminuta(1), P. flourecens (1) S. putrafaciens(1), R. radiobacter were showed antagonistic activity against Vibrio fluvialis. 9 strains were resistant to E, 5 strains were resistant to AMC, 3 stains were resistant to SXT, a strain was to resistant to T, than the other strains were sensitivity to all the antibiotic discs p<0.05

Discussion and Conclusion: The results of the study indicated that strains have a potential as probiotic culture of various aspects. However, the advanced studies are required for the determination of some other technological and virulans factors properties of this strains.

Acknowledgement: This research was supported by the Academic Research Projects Unit of Çukurova University (Project number: FDK -2016-5194)

Keywords: Probiotics, Tuzla lagoon, Seabream (Sparus aurata).
Determination of Biofilm Formation by Thermophilic Bacteria from Hot Water Spring

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Introduction: In food industry, contamination is an important concern in dairy product. Thermophilic bacteria are one of the problem in food industry facilities. The operation on 40°C to 65°C support growth and biofilm formation of thermophilic bacteria. Biofilm formation is the mechanism which bacteria can attach surface with these mechanism. Also, biofilm formation give advantage to attach and protect against antimicrobials to bacteria. In this study, we aimed isolation thermophilic bacteria and determination their biofilm capability.

Material and Methods: All samples were taken hot spring water in Ayaş/Ankara, Turkey. Each sample was diluted with sterile saline solution. After serial dilution, 50 µl volume sample was taken from each dilution and inoculated on Congo Red Agar medium. All plates were incubated at 60°C 24-48h. Mucoid and black colonies were selected as a biofilm former isolates. For quantitative analysis, biofilm formation was evaluated by crystal violet method in 24 well plates. Biofilm formations were measured by spectrophotometer.

Results: Obtained isolates for biofilm formation were determined its black and mucoid colonies on Congo red agar. Then biofilm formation was assayed microplate titer method. All results were evaluated by statistically.

Discussion: Biofilm formation is one the important mechanism for bacteria defense to antimicrobial. Also, it is caused corrosion into mechanic part of food industry machine. For these reason, we thought that biofilm formation detection could give us information about thermophilic bacteria biofilm mechanism.

Keywords: Thermophilic bacteria, Biofilm
Characterization of Some Local Green Beans (*Phaseolus vulgaris* L.) Genotypes

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**Introduction:** Green beans (*Phaseolus vulgaris* L.) is one of the most cultivated leguminous vegetables in the world, and it is the most important food legume. There has been a large variability in common bean having a widespread distribution in Turkey. The Fabaceae family is one of the major and important families and has about 10000 species, including 450-500 genera.

**Material and Methods:** This research was carried out in the organically managed and certified field of Agricultural Research Center at Erciyes University, Kayseri, Turkey. The objective of this study was to characterize the local bean genotypes stored in the chest for many years. The morphological identification of the collected genotypes has been made and molecular characterization studies are continuing.

**Results:** The plant characteristics of the genotypes, leaf and flower structures, and pod and seed characteristics are completely different. Some of the green bean genotypes used in the study is bushy, while others are climbing-type. Leaf and flower petals are statistically different in size, while leaf colors of flowers are found in colors ranging from white to pink and purple. Ten of the genotypes by name of the pod structure are tongue-free, and the type and taste of beans are suitable for consumer demands in terms of eating quality. There is also diversity in terms of seed color and size; 4 genotypes had single color seeds, 10 genotypes secondary color, others had tertiary color. As molecular studies continue, genetic variation has been observed.

**Discussion:** The purpose of this study was to identify genotypes suitable for consumption as green beans, which have been stored for many years without losing their germination abilities, and to characterize local bean genotypes supported by molecular studies and morphological studies.

**Keywords:** Green Beans, *Phaseolus vulgaris*, morphological.
Introduction: Onion is grown the most in the world and in our country (Turkey). It becomes necessary to control many pests in onion that are generally grown in fields cultivation. There are a lot of harmful organisms that effects the efficiency of the onion (Allium cepa L.) which has an important place growth in Turkey. One of the harmful organisms are plant parasitic nematodes (PPNs). The Tylenchida and Aphelenchida (Nematoda) constitutes the most important group of PPNs due to the fact that plants contain a large part of economically important harmful species. In this study, species of PPNs are examined at onion planting areas in Tokat city by considering their two main aspects, namely faunistic and taxonomic.

Material and Methods: In this study 2014-2015, during the June-September months, when adult nematod species are more abundant, soil and plant samples were taken from onion fields in Tokat (Reşadiye and Zile). From these samples, nematodes were extracted, prepared and the ones belonging to plant parasitic nematodes were identified by morphological and morphometric characters. Identifications, synonyms, possible variations, distribution and habitats of each species are given as a result of both laboratory studies and literature records. In laboratory studies, a modified Baermann funnel method was used to obtaining active nematodes from soil. Incubation method was used to extract the nematodes from plant and roots. For identification nematodes were fixed. The slides were prepared by ring method.

Results and Discussion: At the result of the study at onion plant 6 species are determined depending on Tylenchida and Aphelenchida orders. These are Filenchus thornei, Ditylenchus dipsaci, Helicotylencus digonicus, Pratylenchus penetrans, Merlinius brevidens, Aphelenchus avenae. The most encountered species in this study are Ditylenchus dipsaci, Helicotylencus digonicus, Aphelenchus avenae. Ditylenchus dipsaci is an important plant parasitic nematode species in the quarantine lists of countries. This species has zero tolerance in quarantine. Of all the 5 plant parasitic species were recorded for the first time in the region (H. pseudorobustus, Z. guaverai, P. loofi, T. imperialis, P. hilarulus). This study is the most comprehensive work done in the region up to now. And 4 plant parasitic species 4 (from 4 genus) were new recorded for the plant parasitic nematodes of onion (Allium cepa L.) (Z. guaverai, P. loofi, T. imperialis, P. hilarulus) in Turkey.

Keywords: Tylenchida, Aphelenchida, Nematoda, plant parasitic nematodes, onion, Allium cepa, Tokat
Introduction: Hazelnut (Corylus avellana L.) is one of the most important agricultural products for Turkey that is the first producer and exporter in the world. In 2013, powdery mildew infection symptoms different from those observed previously was observed on hazelnut in the Black Sea Region. The disease caused by Erysiphe corylacearum has become epidemic throughout all hazelnut production areas over the subsequent years. Several fungicides applications were necessary for the management of this emerging disease. Regarding environmental impact of these widespread fungicides application, it is very important to use of environmentally friendly products for control the disease. This study was conducted to determine the effects of one biological fungicide, one botanical fungicide and one plant activator on powdery mildew on hazelnut in Giresun in 2017.

Material and Methods: Commercial products including Ampelomyces quisqualis M-10 isolate, Reynoutria spp. extract and Lactobacillus acidophilus fermentation product were used as environmentally friendly products. One chemical fungicide determined as effective to this disease (Azoxystrobin 200 g/l + Difenconazole 125 g/l) was used also. Results derived from treated plots were compared to non-treated hazelnut plots in Giresun. Leaves and fruit clusters of hazelnut were visually rated using a 0-4 scale for disease severity.

Results: The effectiveness were 21.07% on leaves, 21.29% on clusters for Ampelomyces quisqualis M-10 isolate; 19.13% and 28.09% for Reynoutria spp. extract, 19.23% and 10.80% for Lactobacillus acidophilus fermentation product respectively. The effectiveness of chemical fungicides were 91.98 on leaves and 73.63 on clusters.

Discussion: While chemical fungicide achieve a enough effectiveness for control of disease, effectiveness of other products were very low.

Acknowledgement: We would like to thank to the General Directorate of Agricultural Research and Policies which supported this study (TAGEM-BS-15/10-03/02-14).

Keywords: Hazelnut, powdery mildew, control, environmentally friendly products
**Introduction:** Anis is from the group of Apiaceae, and also it is a single year medical and aromatic plant. It is one of the ancient crop plants (cultigen) and has a Mediterranean origin. It likes medium temperature and hot climate. It is first raising and germination period, it also likes dampy weather. Anis is mostly grown in Mediterranean countries naturally. It is grown as a culture plant in many countries such as India, China, Mexico, Russia and Iran. Turkey, Syria, Egypt, Morocco, Italy and Spain are the primary (major) anis growers (producers). One of the main Anis in the porter country U.S.A, provides more than 50% of its Anis request from Turkey.

**Material and Methods:** In early November anise sowing has been done to fruit trays as three seeds to each part totally 6 in Greenhouse conditions. After giving the first water to seeds, they were well cared and observed. The temperature in Green house way 20°C when the sowing finished and it was only 15°C when the germination started. The average germination ratio of the seeds in plant trays has been 86%.

**Result and Discussions:** The purpose of this research to determine the effect of different sowing dates to the yield and quality of anise (Pimpinella anisum L.) in Diyarbakir ecological conditions. In the study, it has been determined that plant height value of between 36.25 to 43.53 cm, the number of branches between 5.45-8.67 units/plants, umbrella plant number between 6.72 to 11.62 per unit/plant, the number of seeds in the umbrella between 15.61 to 18.50 units/plants, number of plants per umbel between 130.50 to 185.81 units/plants, 1000 unit weight between 5.59 to 9.11 g, seed yield per plant is between 1.38 to 3.51 g, seed yield between 46.47 to 94.26 kg/da, essential oil between 2.70% to 3.07%, essential oil yield between from 1.25 to 2.89 l/da.

**Keywords:** Anise, Pimpinella anisum L., sowing time, seed yield
Physicochemical Properties of Some Stream in the Lower Çoruh River Basin (Artvin)

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Introduction: Coruh River is one of the fast running rivers in the world. It rises from Civilikaya Hill in the Mescit Mountains and flows towards the Bayburt plain. It merges with the other rivers, reaches to Artvin City, and flows into the Northeastern Black Sea from Georgian City, Batumi. Surface waters can be used for natural and anthropogenic events (such as industrial and agricultural activities, excessive consumption of water resources) and for surface waters, drinking, industrial, agricultural, recreational and other purposes. Water quality plays a vital role in maintaining human and ecosystem life. For this reason, the water quality of surface and groundwater must be determined.

Material and Method: 12 stations were sampled the Upper Coruh Basin in September-2014 and May 2015 periods. The temperature, dissolved oxygen, pH, electrical conductivity, total dissolved solids (TDS) parameters were measured with the HQ 40 D water measuring instrument. Nitrite (NO2-N), Ammonium (NH4-N), Phosphate (PO4-P), and Chlorophyll-a determined with spectrophotometric method. BOD5 analysed with Winkler method.

Results: The maximum and minimum values of parameters 9.9-19.1° C, for the temperature, 7,2-9,1 mg / L for dissolved oxygen, 7,3-8,4 for pH, 29-358 μS / cm for electrical conductivity, 17,1-171,9 mg / L for TDS, NO2-N L for NH4-N, 0,021-0,87 for PO4-P, 2,1-4,5 mg / L for BOD5, and chlorophyll- for a, 1.03-4.6 μg / L.

Discussion: According to the water pollution control regulations, stations selected from Artvin have the first class water properties in terms of temperature, dissolved oxygen, pH, electrical conductivity, TDS and BOD5. It has 1st and 2nd class water categories in terms of NH4-N. In terms of NO2-N and PO4-P, values ranging from clean water (1st class) to highly polluted (4.class) water have been reached.

Acknowledgement: We would like to express our appreciation to the TUBİTAK-ÇAYDAG, which supported this study (114Y805).

Keywords: Çoruh River, Physicochemical Properties
Effects of Some Indigenous Medicinal Aromatic Extracts [Mentha xpiiperita L. (peppermint), Artemisia absinthium L. (wormwood) and Ricinus communis Linn (castor bean)] On Hatching and Mortality of Root-Knot Nematode [Meloidogyne incognita (Kofoid and White)]

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Introduction: Root-knot nematodes (Meloidogyne spp.) (Nematoda: Meloidogynidae) (RKNs) are one of the major pests of the vegetables causing losses in crop production by forming knots on the roots. RKNs are generally seen in the greenhouse vegetable production areas of the coastal regions of Turkey. In Turkey, the species M. incognita, M. arenaria, M. javanica and M. hapla are the most commonly found, with M. incognita and M. javanica which causes serious problems to a number of economically important agriculture and greenhouse crops. The main aim of this study was to determine the nematocidal effects of RKN, Meloidogyne incognita (Kofoid and White) of some medicinal aromatic plant, Mentha xpiiperita L. (Peppermint), Artemisia absinthium L. (Wormwood) and Ricinus communis Linn (Castor bean) aqueous extracts derived from different parts of three plants at four concentrations i.e. %100, %75, %50 and %25 the in-vitro conditions (under laboratory conditions, Petri dishes experiment).

Material and Methods: One ml of M. incognita juveniles (J2s) and eggs suspension (100 J2 or egg ml⁻¹), was added to 1 ml of the above mentioned plant extract concentrations and 3 ml of distilled water in sterilized Petri dishes. Distilled water was served as a check. All treatments were kept at 28±2°C. After 24, 48 and 72 hours of exposure, numbers of live J2s and numbers of hatched eggs were counted using a stereomicroscope. Toxicity of plant extracts was assessed as mean percentage of the dead nematodes. Treatment was replicated 4 times. J2s were considered dead if they did not move when probed with a fine needle.

Results and Discussion: Effect of plant extracts on eggs (egg inhibition test); all the plant extracts; M. xpiiperita, R. communis and A. absinthium were the good effective of eggs of 75% concentration level (79.19, 88.75 and 90.81 respectively) after 72 hour of exposure. And 100% inhibition of egg was obtained 72 hour in all treatment at the all plant extracts of 100% concentration levels. The J2 mortality was increased by increase of plant extract concentration. Effect of plant extracts on J2s (Mortality test); all the plant extracts; M. xpiiperita, R. communis and A. absinthium were the good effective of J2 mortality of 75% concentration level (77.75, 78.75 and 81.25 respectively) after 72 hour of exposure. 100% J2 mortality was obtained 24 hour in all treatment at the all plant extracts of 100% concentration levels. Egg inhibition and larval mortality decreased with an increase in dilution of the extracts. Similarly whit an increase in exposure time, juveniles mortality was also increased. A. absinthium was more effective than the other plant extracts. These findings and further studies should be considered in greenhouse-pots and under natural conditions of vegetables in Turkey.

Keywords: Plant extracts, Meloidogyne incognita, hatching, larval mortality, Mentha xpiiperita, Artemisia absinthium, Ricinus communis, Peppermint, Wormwood, Castor bean
Comparision of Einkorn Wheat (Triticum monococcum) Harvested From Ihsangazi and Devrekani Districts of Kastamonu: Morphological Properties and Mineral Contents

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Introduction: Primeval wheats known as “hulled wheat” due to their hulls during the harvest, were the first domesticated wheats which are ancestors of the modern day wheats. Their growing had dropped significantly in the last quarter of 20th century because of change in consumer habits, nutrition and economy as well as shifting to durum and bread wheats with high efficiency and making possible to separate their hulls. Einkorn wheat (Triticum monococcum L. subsp. monococcum) which is called as Siyez in Turkey, is one of the most common primeval wheat variety. It had started to be cultivated 9900 to 10600 years ago. Einkorn first started to be grown in Karacadag, Turkey, and spread from the north of “Fertile Crescent” to the Caucasia, Balkans, and Central Europe. Today it is still being grown in the north of Turkey, northern transition areas, some Balkan countries, Germany, Italy and Spain. The most cultivated area in Turkey is in Kastamonu, especially in Ihsangazi and Devrekani district. Einkorn wheat is highly competitive thanks to having one spikelet and tight hull nature and it can be grown on poor soil with limited fertility, in arid conditions and cold climates with lower input and technology. It was known that Einkorn has high fat, protein and ash content due to morphologically hulled structure.

Material and Methods: The samples were obtained from seeds which were harvested in July 2017 at Devrekani and Ihsangazi districts. Three Einkorn (Triticum monococcum) samples from Ihsangazi, and three samples from Devrekani district were supplied. Every sample was obtained randomly from four location by the farmers. All samples (from 2 district x 3 sample x 4 location) were mixed homogeneously. The durum wheat (Triticum durum) sample (Selçuklu-97) supplied from Bahri Dagdas International Agricultural Researh Institute, Konya was used as control sample. The mineral content was measured by using the microwave digestion procedure and then by induction-coupled plasma optical emission spectrometry (ICP-OES). The micrographs obtained scanning electron microscopy (SEM) were used for comparision of the morphologies.

Result and Discussion: The Einkorn micro-texture was found to be different in terms of dimension of starch granules, protein matrix and thickness of seed layers. It was found that, the content of major and trace elements such as Fe and Zn were higher in einkorn than the durum wheat. The micronutrient malnutrition effects over two billion people especially children and woman in the developing countries in terms of impaired physical growth, learning capacity and mental development. For that reason it was proposed that many foods could be fortified through einkorn or einkorn products such as semolina, flour, germ or bulgur for the regions affected from malnutrition. Also, it could be proposed for the natural fortification as a new approach for to improve the nutritional quality of foods consumed in daily diet for todays consumers who demand clean-label and additive-free food.

Keywords: Einkorn, siyez, Triticum durum, ICP-OES, Scanning electron microscopy
Green Synthesis of Ag Nanoparticle Using Hibiscus sabdariffa and Its Antimicrobial Activity

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Introduction: Nanoparticles (NPs) synthesized by physical and chemical processes for many years have various disadvantages such as complexity of the synthesis process, use of toxic chemical agents and costly. In recent years, the use of biological extracts such as plants, algae and fungi instead of chemical agents has become the focus of attention with its advantages. In this study, the flower extract of Hibiscus sabdariffa was used for the green synthesis of Ag NP and the antimicrobial activity of the obtained NP was investigated.

Material and Methods: Briefly, 10 g dried flower of Hibiscus sabdariffa was boiled for 30 min and then it was left to cool down to room temperature. After that, the mixture was filtered using Whatman No 1 filter paper. 10 mL of filtrate was mixed with Ag NO₃ (5x10⁻³ M, 90 ml) in flask until change of color. Then, the solution was centrifuged (10,000 rpm, 10 min) and dried for characterization studies. Antibacterial activity of biosynthesized Ag NP was detected according to broth microdilution method.

Result and Discussion: The Ag NP show two absorbance peaks at 286 nm and 521 nm, which correspond to the presence of the plant extract on the NP and Ag NP, respectively. The effective diameter of the Ag NP was measured as 266 nm. This result is due to the fact that the NPs are covered with plant extracts, the acidity of the medium (pH 4.5), and tend to aggregation. The zeta potential of bio-synthesized Ag NPs was measured as -16.9 mV. According to the findings, the Ag NPs had a short-term stability. Functional groups (aromatic, alkane, acid and amine groups) that play a role as reducing and coating agents in NP synthesis were determined by FT-IR analysis. The XRD pattern shows that the crystallinity of Ag NPs. SEM image shows that the size of the Ag NPs is approximately 65 nm. The antibacterial activity of green synthesized AgNPs against two pathogens (Staphylococcus aureus and Escherichia coli) was assessed by minimal inhibitory concentration (MIC) assays. MIC values of Ag NPs detected as values of 0.3125 mg/ml and 0.00664 mg/ml against, respectively. Our results may be useful further to produce antimicrobial agent useful in a wide array of biomedical applications.

Keywords: Ag NP, Green Synthesis, Antimicrobial Activity.
Introduction: Urban trees have many benefits beyond measure. However, they are vulnerable to adverse environmental factors such as water stress, elevated temperatures, soil compaction, and limited rooting. Consequently, they can also be readily affected by many other biotic or abiotic factors such as diseases and insects. One of the primary threats to urban trees is wood decay caused by fungi. The decays reduce wood strength leading to failure or collapse of urban trees, in some instances resulting in extensive property damage or injury to people. To prevent tree failures, it is crucial to prevent wood decays and to detect and identify wood decays and the causal agent(s) as early as possible. The objectives of the present study were to bring up the impact and importance of wood decay fungi on urban trees and to review molecular methods in the identification of the decay fungi on the wood of urban trees.

Materials and Methods: In this review article, the importance of wood decay fungi on the wood of urban trees and hazard risk of trees was reviewed and treated as an essential aspect of arboriculture and overviews on the wood decay fungi commonly associated with urban trees were provided. Importance of identification of wood decay fungi, after that, the development of the identification approaches to finally advances on the molecular approaches specified to the identification of these fungi on the wood of urban trees were compiled.

Results: Different species of wood decay fungi have different colonisation strategies, growth characteristics, decay capacity, and host selectivity. Some species of *Phellinus, Ganoderma, Inonotus* among the common and dangerous decay fungi of urban trees in Europe. However, for Turkey, limited information is available for wood decay fungi associated with urban trees as only a few mycological studies mentioning the occurrence of some fungi in urban environments.

Identification of decay fungi has traditionally depended on the examination of the fungal fruit bodies developing on trees. However, such features can be found in the advanced stages of decay. Additionally, many of these are only occurs at a particular season. In the absence of fruit bodies, isolation of fungi from decayed wood can also be applied. However, these methods are not considered to be sufficient for quick and early detection of decays. Fortunately, there have been various molecular methods developed for identification of fungi in decayed wood based on DNA analyses. Besides, not being depending on finding the fruit bodies or prior isolations, these methods also provide rapid and reliable identification.

Discussion: Detecting decay and identification of the fungi is a must for evaluating the stability of the wood structure and predicting the probability of failure for tree risk assessments. Recent studies revealing the practicability and the reliability of the utilisation of molecular identification tools especially for specific wood decay fungi in the wood of urban trees now are guiding improved tree care programmes to prevent the development of damage or spread of infection to healthy trees in many cities in USA and Europe. Arboriculture concepts, tree risk assessments and importance wood decay fungi in urban trees cities in Turkey is also discussed.

Keywords: Wood decay fungi, Urban tree care, Arboriculture, Molecular identification, ITS PCR, Hazard Trees
Introduction: In general terms, medical plants include spice plants, aromatic plants and drugs. Spice plants consist of plants and parts of plants used to aromatized to our food. Aromatic plants can not be considered apart from medical plants due to most of the spice plants have medical features. Flowers, fruits and leaves of plants and various parts of which are used for the purpose of treatment and dried, all parts of which are used all of it or fragmented form as drugs. Medicinal and aromatic plants are consumed as spices and food as well as cosmetics, aromatherapy, herbal medicine, pharmaceutical industry and ornamental plants. Medical and aromatic plants are of great importance in terms of having an economic value and increasing product variety due to economic value increase. Majority of the people in Pakistan rely on medicinal plants to find treatment for their minor, even in some cases major diseases. There is a local market system (Pansara) specifically dealing with medicinal plants business in Pakistan and several plants are exported. The aim of the study is to reveal the current state of the world medical and aromatic plant sector and to prove the importance of foreign trade of medicinal and aromatic plants.

Material and Metod: The secondary data obtained from organizations such as the United Nations Food and Agriculture Organization (FAO), the International Trade Center (ITC), World Health Organization (WHO) etc. constituted the main material of the study. According to a World Health Organization, approximately 20,000 plant species have been used for medical purposes worldwide. While 4,000 kinds of herbal drugs are widely used, about 2,000 herbal drugs are traded in Europe. The medicinal and aromatic plant species involved in world trade are onion-tubers, tea, coffee, spices, flavorings, roots and other plant groups.

Result and Discussion: China take place on the top in the world for the last 5 years in medical and aromatic plant exports. Approximately three-quarters of the medical and aromatic plant imports are made by China. The import value of medical plant imports, which was € 1,613,075 thousand in 2010, increased to € 2,775,954 thousand in 2015 while this value was € 2,818,943 thousand in 2016. The price of medical and aromatic plants which are traded abroad are related to the socio-economic status of the suppliers in the exporting countries, especially the plant variety and processing status. In Germany, the average value of imports was $ 2,430 / ton and the export value was $ 4,580 / ton for a study conducted between 1991 and 2000. It was stated that the difference of $ 2,150 was due to processing.

Keywords: Medicinal plants, aromatic plants, drug, herbal
Biodiversity Changes in Ece Lake’s Drying Process

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Introduction: Ece lake is located in the Yeniçiftlik town (Biga, Çanakkale), a size of 9057 acres and is currently a completely dried area. The existence of lake has been known since 1530, but in 1963 lake was started to be dried by the local people to increase agricultural land. Lake was kept in water in 2004. After this date, lake is completely dried up. Thus, Ece lake is now completely out of being a lake and the villages are get title as fields. In this study, the old archives were searched and the biological diversity and ethno-biological characteristics of the region were reached and the changes in the field were compared with the current structure.

Material and Methods: The publications of old archives related to the site were collected and the information of biodiversity was searched. Scientific names of the species mentioned in the publications have been identified. The current flora specimens were collected from the site between 2006 and 2018, and dried specimens are kept in the Çanakkale Botanic Garden Herbarium (CBB).

Results: The old data relating to the flora of the site relates only to the species used. These are eel (Anguila anguila Schrank, 1798), common carp (Cyprinus carpio Linnaeus, 1758) and various ducks as animals, reed (Phragmites australis (Cav.) Trin. ex Steud.), common club-rush (Schoenoplectus lacustris (L.) Palla subsp. lacustris), waterlily (Nymphaea alba L.) and southern cat-tail (Typha domingensis Pers.) as plants. The local people hunted fish and ducks, and they got along weaving and make wrestler’s tights bag from the reeds. With the drying of lake, the biodiversity has been replaced by new ones as sunflower, corn, tomato, pepper, eggplant and rice (if there is enough water). Today, aquatic flora is seen together with winter and spring rains, then it is affected greatly by drought.

Discussion: Once upon a time, Ece lake was the largest lake in Çanakkale, but lake has been defeated in the battle between ecosystems and human benefit. Over time, aquatic fauna and flora gradually decreased due to drought. Plentiful soils of dry lake are now covered with agricultural products in the fields.

Keywords: Biga, biodiversity, Çanakkale, drying, Ece lake

1118
Evaluation of Heritage Olive Trees in terms of Visuality to the Environment

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Introduction: The olive tree has been a prized commodity to the Mediterranean Region and it’s people for 8000 years. Not only has the olive tree been the symbol of peace in different religion for centuries, the olive tree’s beauty has motivated artists through the ages. Olive images are found on ancient history vases, Etruscan friezes, Impressionist paintings and modern textiles. Olive trees have become associated with countless legends, traditions, festivals and customs. Especially heritage olive trees are natural heritages. Heritage trees are typically a large, individual tree with unique value, which is considered irreplaceable. The major criteria for heritage tree designation are age, rarity, and size, as well as aesthetic, botanical, ecological, and historical value.

Material and Methods: This study has benefited from related national and international sources (publications, reports, articles, research, etc.). In addition, photographs of the heritage (monument) olive trees which are found in different countries are given.

Results: The olive tree has high living power due to a number of adaptation abilities related to morphological development such as special leaf anatomy, massive shoot-root relationship, rooting environments and high morphogenetic regeneration potential. Our country is rich with old olive trees. Places claimed to be the registered olive tree in our country are as follows: The olive tree of 1300 years old was registered in Mersin. Olive monumental tree of 1650 years old was found in Manisa-Kırkağaç. It is known that olive tree is 3250 years old in Crete-Kavousi Village.

Discussion: Old olive trees are protected in the world as well as in our country. Old olive trees in Turkey, Cultural and Natural Heritage Protection Board “memorial tree” is registered as. Turkey is rich in old olive trees. Olive Trees provide numerous benefits for vitality. At the same time, the cultural values they carry are also important in our lives.

Keywords: Olive trees, Environment, Heritage Trees.
Introduction: Soil, water and air pollution have become very big environmental problems today. In particular, the main reasons of soil pollution are the pesticides which are chemical waste. From the beginning of the 20th century, the developing industry and technology together with the increasing world population, brought forward the intensive agricultural practices to obtain more products from the unit area. The use of pesticides is inevitable in today's modern agriculture. However, when pesticides are used, both the product's protection against disease, pests, weeds and the negative effects of pesticides on human and environment must be evaluated together. Pesticides are the chemicals which prevent, control harmful organisms or reduce the losses, are used in struggle for agricultural research and application.

Material and Methods: In this review; the effects of pesticides used in plant protection on environment, what kind of unfavourable effects that the pesticides caused on the environment have reviewed in the light of literature.

Results: Physical and biological control for the pests causing loss of yield is long, laborious and costly, as a quicker and more effective method, chemical control is also primarily applied in our country. Pesticides applied to agricultural lands; reach to air, water and soil, and from there to the other creatures living in this environment. When pesticides are used, both the protection against the disease, pests and weeds, and taking into account the adverse effects on the environment are important.

Discussion: The intensive use of pesticides is undoubtedly detrimental to the ecological nature of the end. When pesticides are used, it is important to protect both the product against diseases, harmful and weeds, and also to take into account the negative effects on people and the environment. The number of studies on pesticide residues in our country should be at the level in developed countries. The results of the projects should be published.

Keywords: Pesticides, Environment, Agriculture Environmental Impact
An Overview of Olive Mill Wastewater Problem in Turkey and in the World, Treatment Methods of it, and Alternative Approaches to Evaluation and Disposal of Olive Mill Wastewater

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Introduction: Olive oil production, an agro-industrial activity of vital economic significance to many Mediterranean countries, is unfortunately associated with the generation of large quantities of by-products such as olive mill wastewater and solid wastes, whose management, treatment and disposal raise serious environmental concerns. In this study, general considerations were made and suggestions were discussed about the olive mill waste water problem, treatment methods and alternative approaches in the evaluation and disposal of it.

Material and Methods: In this review; national and international sources (publications, reports, articles, research, etc.) are used to make general considerations and to discuss suggestions about the olive mill waste water problem, treatment methods and alternative approaches in the evaluation and disposal of it.

Results: Besides olive oil, which has a very important place in the country's economy, solid and liquid by-products such as olive mill wastewater also appear in olive oil factories. All olive producing countries acknowledge the problem of olive mill wastewater and consider various alternatives to resolve the problem but there is no commercially available treatment method. This is because of high phenol, lipid and organic acid concentrations of olive mill wastewater and phytotoxic effects of it. However, these wastes also contain valuable resources such as a large proportion of organic matter and a wide range of plant nutrients especially N and K that could be recycled.

Discussion: The treatment of olive mill wastewater is one of the areas that has been emphasized for many years and still remains pending. Considering today's conditions, we can see not only the refining process, but also how to better evaluate this waste. In this respect, firstly, analytical problems should be determined about the evaluation of land water in our country and then technological solutions should be developed. We consider that the assessment of natural resources will provide significant contributions to the health, food sectors and the environment.

Keywords: Olive Oil, Olive Mill Wastewater, Problem, Treatment Methods, Environment.
A New Record of the \textit{Micromus} (Neuroptera: Hemerobiidae) Species for the Turkish Fauna

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\textbf{Introduction:} The family Hemerobiidae is one of the most common in the Neuroptera and one of its importance in the control of small phytophagous pests. Most species are arboreal and few are associated with low vegetation. The family comprises 575 extant species belonging to 43 valid genera. Studies on the brown lacewing fauna of Turkey was followed by several neuropterologists. The next few years, local research efforts have led to the discovery of new record species for the Turkish. For example, in the recent years studies from Turkey have been recorded \textit{Micromus (Nesomicromus) angulatus} and \textit{Micromus lanosus}. Later studies focused on the species diversity at the regional of Turkey, these studies is reported 12 species of the family in South-Western Anatolia and 8 species of in North-Eastern Anatolia. A full list of species including bibliographic data is given in the most recent published checklist of the Turkish Neuroptera, was 31 species of the family Hemerobiidae recorded from Turkey. In this study, new material must be collected and studied to achieve a satisfactory level of knowledge on the geographical distribution and ecology of many poorly known species.

\textbf{Material and Methods:} In 2006 and 2007 Hemerobiidae specimens were collected from Kastamonu province of Turkey using light trap and sweeping and beating the vegetation by a net. Specimens were killed in jars that were filled with ethyl acetate, prepared and labeled according to the standard procedures for museum material.

\textbf{Results:} \textit{Micromus paganus} is Siberian fauna element, currently known throughout Europe, to Russia and the Ukrainian, Asia has spread from Siberia to Japan. Distribution pattern in Europe shows that the species may reach the southern limit of its continuous geographical range in Turkey. This is the first report for \textit{Micromus paganus} from Turkey.

\textbf{Acknowledgement:} The author is thankful to the Scientific and Technological Research Council of Turkey (TÜBİTAK) for partial support of this work under grant TBAG-105T320.

\textbf{Keywords:} Neuroptera, Micromus paganus, new records, Turkey.
A Review on Insecta Fauna of Muğla-Turkey

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Introduction: Insecta is the largest classis of Regnum Animalia both in the view of individual number and species richness. Because of this Insecta classis takes more attention than the other groups. Members of Insecta classis is very important because of their role in pollination. They have ecological and economical importance. They can be found in various niches and habitats. Some of well-known Insecta species from other countries is not found in Turkey. However, nearly 20 orders of Insecta classis have been studied regionally and nationally. Some orders have detailed studies in Turkey. The studies on subclasses Apterygota and Pterygota are not enough to reflect a general fauna composition. Although the exact number of Insecta species is not known in Turkey, approximately 20 000 Insecta species are inhabiting Turkey and nearly 4 000 of them are endemic.

Material and Methods: Muğla takes place in South-west of Anatolia and contains various habitats. Muğla is very rich of wetlands, streams and lakes. The cost of Muğla is nearly 1500 km long and takes place to Mediterranean Sea and Aegean Sea. Muğla takes nearly 1000 mm precipitation/m². The altitude ranges from sea level to 2230 meters. Also Muğla is an important agriculture area especially greenhouse, citrus fruits, olive and pomegranate farming. To determine the Insecta fauna of Muğla 34 literatures were evaluated.

Results: For this aim, 34 literatures were evaluated and Insecta species and their distributions were noted. As a result, 676 species were reviewed belonging 10 Insecta orders. Diptera and Coloeptera orders were the most crowded taxa with the species numbers 219 and 193 following. The third crowded order was Heteroptera with 149 species.

Discussion: The distribution of the Insecta members depends on various environmental variables and habitats. The lack of a detail taxonomic survey on Insecta in and Turkey is very disappointing. All studies carries individual importance but never reflects a whole composition. To determine the Insecta fauna of Muğla and Turkey annotated catalogues of orders should be reviewed and published.

Keywords: Insecta, Muğla, Turkey
Phenological Evaluation of the Number of Fractured Crimean-Congo Haemorrhagic Fever (CCHF) Cases in Kastamonu Province

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Introduction: Crimean-Congo hemorrhagic fever (CCHF) is a tick-borne viral disease of humans that affects a wide geographic area of Africa and Eurasia, including Turkey, Iran, Pakistan, Afghanistan and Russia. Since the first detection of CCHF cases in Turkey in 2002, more than 9700 patients have been reported, with an overall mortality rate just under 5%. In this study assesses the present epidemiological situation of CCHF in Kastamon, with an updated literature review, describes national practices and summarizes lessons learned in preparation for future outbreaks.

Material and Methods: Between May 2007 and July 2016, 286 patients with high fever and hematological findings were admitted to the hospital from around Kastamon. Of these, 130 women, 156 males. Since 2003, phenological evaluation has been performed on the data from patients admitted.

Results: 11 patients in 2007; 86 patients in 2008; 11 patients in 2009; 64 patients in 2010; 23 patients in 2011; 49 patients in 2012; 34 patients in 2013; 0 patients in 2014; 3 patients in 2015; 0 patients in 2016 came to the hospital in Kastamonu. These are not according to the calendar; 17 patients in April, 74 patients in May, 95 patients in June, 63 patients in July, 29 patients in August, 6 patients in September. According to these results, the highest rate is seen in June.

Keywords: Crimean-Congo hemorrhagic fever, CCHF, Kastamonu, Turkey
Innovative Scientific and Educational Center for Protection Health of Human And Animals In Chuy Region of Kyrgyzstan

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Introduction: As a result of sharp change in the environment, new, previously unknown diseases in plants, animals and humans, called biogeocenotic pathologies, have appeared in Kyrgyzstan. Therefore, the timely study of the biogeocenotic situation (ecosystem) and early warning of its change is a very urgent task of modern science and practice. To fulfill this task, one can achieve with the creation of an innovative scientific and educational center for the protection of human and animal health (ISEC) in the republic.

Materials and Methods: The scientific research was carried out in the Chui province, in Kyrgyzstan. The content of macro and microelements and heavy metals in soil, water, plants (feed) and blood of animals was tested by atomic absorption spectrophotometry. A general clinical study of the experimental animals was carried out using common methods for veterinary medicine. The results of the study were recorded in detail and recorded in a special bound journal.

Results: As a result of sharp change of the environment new problems appeared in Kyrgyzstan, previously unknown diseases in plants, animals and humans, called biogeocenotic pathologies. Therefore, the timely study of the biogeocenotic situation (ecosystem) and early warning of its change is a very urgent task of modern science and practice. To fulfill this task, one can achieve with the creation of an innovative scientific and educational center for the protection of human and animal health (ISEC) in the republic. The Innovative Scientific and Training Center for the Protection of Human and Animal Health will be a government institution and guided in its activities by the Constitution of the Kyrgyz Republic, legal and regulatory acts in the field of education and science. ISEC is a creative community of highly professional specialists and research workers, based on professional interests and affirming the humanistic values of education and science. In the beginning, a group of scientific researchers will work to realize the purpose and objectives of this project and later hundreds of jobs are created with the creation of an innovation center in districts, regions, cities and the republic through optimization of the republican centers, organization and institutions. In the future, highly-qualified specialists, biogeocenologists, are needed for the fully-fledged work of the innovation center in Kyrgyzstan.

Discussion: The innovative scientific and educational center for protection health of human and animals has a huge socio-economic importance in terms of optimizing the ecosystem in Kyrgyzstan, as well as early warning of biogeocenotic pathologies common to humans, plants and animals. In this regard, the results of scientific research of this center can be used in medicine, agriculture, veterinary medicine, ecology, social sphere, research and educational institutions of the Kyrgyz Republic.

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Keywords. Ecology, monitoring, innovation, center, soil, water, plant, macro and microelements, biogeocenosis.
First Molecular Identification of *Myxobolus ichkeulensis* (Myxozoa) in *Mugil cephalus* (Mugilidae) off the Turkish Black Sea Coasts

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Introduction: Myxosporean parasites have a significant role as pathogens of fish in wild and cultured stocks throughout the world. The genus *Myxobolus* of the phylum Myxozoa contains more than 800 species. However, about 30 species live in marine or estuarine water. There are a few reports of *Myxobolus* species in marine fish in Turkish waters. The present study is part of an ongoing investigation into the characteristics of myxosporean parasites of different marine fish species off the Turkish Black Sea coasts.

Material and Methods: Forty freshly caught specimens of the *Mugil cephalus* (Mugilidae) were purchased from fishermen at Kızılırmak, Samsun, Turkey. All organs were also examined for plasmodia of myxosporean parasites under a stereo microscope. Plasmodia were carefully removed from the infected gills and dissected with a fine needle on a slide. Some of the spores were preserved in glycerine-jelly as reference slide preparations; others were fixed in absolute ethanol until further molecular examinations. The SSU rRNA gene of myxosporean was amplified and sequenced in both directions with the same primers at Macrogen. The obtained sequences were assembled and compared with previously published data for identification by using BLAST via Genbank.

Results: *Myxobolus* infection was found in 5 (12.5 %) of 40 *M. cephalus*. Plasmodia were located on the gill arch. Molecular analysis of the SSU rRNA gene confirmed the myxosporean species as a *M. ichkeulensis*.

Discussion: Recently, the combination of spore morphology, ultrastructure, host, and tissue specificity with molecular biological methods are principally accepted for identification of a new or existing myxosporean species and redescription of inadequately described species. So, this is the first molecular data for the validity of *M. ichkeulensis* in *M. cephalus* in Turkish waters. Moreover, this is first report of *M. ichkeulensis* in *M. cephalus* off the Turkish Black Sea coasts to date.

Keywords: *Myxobolus ichkeulensis*, *Mugil cephalus*, molecular identification, Turkish Black Sea coasts
Introduction: The typical zooplankton assemblage in fresh water ecosystem commonly consists of Protozoa, Rotifera, Copepoda and Cladocera. Rotifera is always the dominant group among the others, depending on the physicochemical and biological properties of the aquatic ecosystem. Rotifera can be found in various aquatic habitats such as lakes, pools, streams and puddles and provide food for vertebrate and invertebrate animals. The diversity and abundance of a zooplanktonic assemblage often differ from reservoir to reservoir, from location to location within each reservoir, from geographical region to region and also with time and are structured by fish predation, competition, aquatic macrophytes and physical, chemical and biological factors. For this reason, in order to understand the productivity of an aquatic environment, the Rotifera species and its abundance must be well examined and determined. A number of studies have been carried out to examine the distribution and diversity of Rotifera species in inland waters in Turkey. This study was conducted to identify the Rotifera fauna of Kadıköy reservoir located in Keşan District of Edirne province, Turkey and to reveal the species composition and richness.

Material and Methods: The Kadıköy Reservoir is located 20 km far to the south-east of Keşan district in Edirne province, Turkey (40° 48'51''N, 26° 47'43''E). Sampling were carried out at monthly intervals from March 2010 to February 2011 in three different stations in reservoir. Zooplankton samples were collected with a Hensen type plankton net (mesh size 55 μ, mouth diameter 15 cm, length 75 cm). To determine other physical-chemical features of the water, sampling was made by a Ruttner water sampler. The values were measured in laboratories of Trakya University Technology Research Development Application and Research Center.

Results and Discussion: The minimum and maximum values of the physical-chemical parameters measured in the Kadıköy Reservoir were as follows; water temperature 2,00-29,00 (°C); DO 3,40-15,73 (mg/l); pH 7,53-8,63; conductivity 388,00 -613,67 (µS/cm); NO₂-N 0,00-0,09 (mg/l); NO₃-N 0,00-9,89 (mg/l); PO₄-P 0,000- 0,068 (mg/l); SO₄ 0,43- 1,60 (mg/l); Salinity 0,070- 0,100 (%); Chloride 18,99- 33,32 (mg/l); total hardness 11,00- 30,00 (FS); Ca 24,53- 61,70 (mg/l); Mg 9,93- 44,83 (mg/l). Rotifera species in the Kadıköy reservoir were evaluated both qualitatively and quantitatively. A total of 33 Rotifera species were determined in the qualitative evaluation of plankton samples. The quantitative evaluation of the samples revealed an average value of 70472 ind/m³ in the reservoir. While the maximum organism was found in spring (83458 ind/m³) at 1st station (81819 ind/m³) and in May (100901 ind/m³). The lowest value found in winter (53934 ind/m³), 3rd station (60383 ind/m³) and in February (46203 ind/m³). When we evaluate the species identified in the reservoir, the distribution of the individuals that make up the Rotifera fauna and physical-chemical parameters as a whole, it has been concluded that Kadıköy reservoir is in meso-eutrophic character in terms of zooplankton.

Keywords: Rotifera, species diversity, water quality, reservoir.
Anatomical Properties of Some Woody Species in Ecological Conditions of Central Anatolia

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Introduction: Adaptability of plants against to the high temperatures and drought stress, increases the possibility of their individual or mass survival. The high temperatures in the Central Anatolian region, combined with the low rainfall leads to the development of plant forms, which an increased survival ratio. Specifically adapted to the scarce water conditions of the vegetation period, some species, which can survive on these conditions, adapted to this zone. On the other hand, those, which unable to adapt, have moved away from the region. The use of drought tolerant woody species that have been well adapted to this area that are not found naturally in this region and vice-versa, increases the possible success of these plantations to the adverse conditions in this region. The anatomical characteristics is also another aspect for adaptation of these species to extreme conditions. In this study, the anatomical characteristics of Populus euphratica Oliv. and Amygdalus arabica L. were determined. Thus, durability against drought stress and negative effects of wind stress studied via the anatomical characteristics of this species.

Material and Methods: Permanent slides were prepared from cross sections of branch and stem specimens of the species, which were collected from the study area. On these slides, 30 measurements for each anatomical property were made with photomicroscope. However, a maceration method was used to detect fiber morphology, and a scanning electron microscope (SEM) was used to determine the structure of the piths in the trachea.

Results: As a result of this study, anatomical structures of these species, which grow in the arid region, were revealed. In both species, the diameter of the trachea, lumen width and wall thickness differ compared to similar species with different life form. Long fibers were detected in the fiber structure, thick wall and thin lumen width were observed. Piths in the trachea were found to be less in number but increased in size, when compared to similar species.

Discussion: In this study, while the number of vessels per mm² was higher under drought stress, this numbers were fewer in humid environments. Also, it was determined that the trachea characteristics of both species were similar in arid conditions, when compared to other ecological conditions. In both species, wide wall thickness and narrow lumen width played an active role in water transport in arid areas. The anatomical structures of these species have been determined to be resistant to adverse conditions of this area, thus, this phenomenon contributed their survival capacity. It is also possible to use them in future plantations due to their resistant body structures and narrow vessels, which ensure safe transport of small quantities of water in areas under the risk of such desertification.

Keywords: Ecological wood anatomy, Populus euphratica Oliv., Amygdalus arabica L., Konya-Karapınar, pith membranes.
The characteristics of the development of the Varroa destructor mite in local bee colonies
Apis mellifera intermissa in the semi-arid zone of Algeria

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Introduction: Varroosis is a parasitosis of the adult bee and its brood, caused by a parasitic external parasitic mite, Varroa destructor Anderson and Trueman, 2000. Varroa is responsible for an epizootic in Apis mellifera since its transfer from the Asian bee, Apis cerana, its original host. The parasitic mite Varroa destructor is currently considered one of the main threats to beekeeping in the world and in Algeria.

Varroa has existed in Algeria since 1984. This mite has caused a lot of damage in the apiaries of the country, despite the treatments performed by beekeepers. However, few studies have been done on the development of this parasitosis on the Algerian local bee.

This study aims to determine the trends of Varroa destructor populations in local bee colonies that are not subjected to treatment in the semi-arid zone of Algeria. The results have important implications for establishing control measures and their rational application, since treatments are often used without being preceded by parasitological examination.

Material and Methods: This study was conducted in an apiary in the semi-arid region of Djelfa. The 20 colonies were treated once with Apivar® in summer 2014 to put the Varroa populations at the same level. The population dynamics of the mite were studied from a low and estimated Varroa number for all colonies. The study was conducted over 12 months (April 2014-April 2015). It is a question of following the evolution of the dynamics of the populations of bees and varroa through a regular count which is carried out each month at the level of the colonies.

Results: We have shown in this study that the population of Varroa increases in the absence of treatment, the high temperatures and the decrease in the number of brood cells did not have a negative influence on the development of the mite in the colonies. In the absence of treatment, the number of varroa greatly exceeds 3000 after one year of treatment.

Discussion: The population of the parasite approximately follows the development of its host. These two factors are influenced by the seasonal variations. Our results show that the summer period is an opportunity for the beekeeper to treat and eliminate the maximum of varroa because of the decrease of the brood.

Keywords: Varroa destructor, honey bees, dynamic of population, Algeria
Contributions to subfamily Otitinae (Diptera: Ulidiidae) of Turkey

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Introduction: The family Ulidiidae belongs to the superfamily Tephritoidea. Adults are generally found on plants (living and dead), and excrements. Some species prefer damp and marsh-like places. The larvae generally eat feces, and decomposing material, as well as living plant tissue. In this study, specimens were collected from different cities in Turkey during the years 1992-2006. Seven species of 4 genera belonging to Otitinae (Diptera: Ulidiidae) were identified. The distributions of these species are mapped. Also wing photographs of species that given in this study are provided.

Material and Methods: In this study, 40 females and 33 males belonging to Dorycera, 18 females and 18 males belonging to Otites, 2 females and 3 males belonging to Ceroxys, 19 females and 26 males belonging to Herina, totally 159 specimens, were collected in Adana, Ankara, Antalya, Denizli, Hatay, Isparta, Karaman, Kastamonu, Kayseri, Kırklareli, Kırşehir, Kocaeli, Konya, Mersin, Muğla, Niğde, Osmaniye, Sivas, Uşak and Yozgat between the years 1992 and 2006 by the second author. They were collected using by a sweeping net (40 cm diameter). All specimens are kept at the Zoology Museum of Gazi University (ZMGU). Specimens were collected from diverse areas characterized by different geographical and climatic features, and habitats with different altitudes. The specimens were identified according to related literature; Hennig 1939; Merz 1996, 2002 and Kameneva 1996. For taking wing photos, wings were placed between a cover glass and microscope slides. Then, photos were taken with a digital camera using a stereomicroscope.

Results: Dorycera caucasica from Kayseri; Dorycera maculipennis from Antalya, Hatay, Isparta, Karaman, Kayseri, Konya, Muğla and Uşak; Dorycera pictipennis from Adana, Antalya, Kayseri, Sivas, Mersin, Niğde and Osmaniye; Otites caph from Adana, Ankara, Antalya, Kocaeli and Muğla; Otites formosa from Ankara, Kastamonu and Yozgat; Ceroxys urticae from Kayseri; Herina lugubris from Adana, Antalya, Denizli, Isparta, Kırklareli, Kırşehir, Kocaeli, Konya, Mersin, Muğla and Yozgat were identified.

Discussion: The specimens belong to Ulidiidae collected during various field studies within different regions of Turkey at different times were evaluated. As a contribution to Turkish fauna, 159 specimens were identified. Dorycera pictipennis was locally endemic in southern Anatolia (Amanos or Nur Mountains), but with this study, the specimens from Adana, Sivas, Antalya, Niğde, Kayseri and Mersin expand the distribution towards the central Anatolia and represent a new province records. Until this study, Dorycera maculipennis was reported from two provinces (Amasya and Bursa) in Turkey. With this study, distribution of Dorycera maculipennis in Turkey is expanded to the southern and southwestern of Anatolia (Isparta, Konya, Uşak, Kayseri, Muğla, Hatay, Antalya and Karaman). Otites caph had been recorded only from Bursa. The materials from Ankara, Kocaeli, Adana, Antalya and Muğla extend the distribution in Turkey further to the south. Dorycera caucasica, Ceroxys urticae, Herina lugubris, and Otites formosa are newly recorded for the Turkish fauna.

Acknowledgement: This study is part of a Master’s thesis by Seda Mesci titled “Faunistic and Systematic Evaluation of Family Platystomatidae and Otitidae (Diptera) at the Zoological Museum of Gazi University”.

Keywords: Diptera, Ulidiidae, Otitinae, first record, Turkey
Using Natural Adsorbents as Filtration Material in Aquaculture

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Introduction: In water both Ammonia (NH₃) and ammonium ion (NH₄⁺) are present and their sum is known as Total Ammonia Nitrogen (TAN) and their proportions vary with pH and temperature. Ammonia (NH₃) is toxic to fish and their presence in water is important in aquaculture practices. There are various methods of ammonium removal from wastewater. They mainly include ion exchange and adsorption, biological technology, air stripping, breakpoint chlorination, chemical precipitation, reverse osmosis, microwave radiation and supercritical water oxidation. In this study, we aimed to determine the effects of natural adsorbents, zeolite and bentonite, as filtration material in aquaculture.

Material and Methods: In this research three trial groups (zeolite (Z: 7 g/l), bentonite (B: 7 g/l), zeolite+bentonite (Z+B: 3.5 g/l+ 3.5 g/l)) with 3 repetitions were created. Experimental groups were prepared by adding 2 liters of water and NH₄Cl to each bottle to give an NH₄⁺ amount of 10 mg/l. After that, zeolite, bentonite and zeolite+bentonite were added to the bottles as 7 gram per liter. Water temperature, pH and NH₄ values were determined during the trial period. During the study ammonia (NH₃ and TAN (Total Ammonium Nitrogen)) levels were calculated from NH₄⁺, water temperature and pH values.

Results: At the end of the experiment, TAN, NH₃ and pH values were calculated 8.20±0.209, 9.431±0.214, 8.398±0.121; 0.337±0.008, 0.461±0.006, 0.345±0.004; 8.129±0.003, 8.209±0.008, 8.131±0.006 for Z, B, Z+B, respectively. There were difference in TAN, NH₃ and pH values between the experimental groups (p<0.05).

Discussion: Removal of ammonia is required due to its extreme toxicity to most fish species. Zeolite and bentonite are natural adsorbent used for removal ammonia in aquaculture. When the data obtained in the experiment are evaluated, it was determined that zeolite, have the best values in the same conditions like temperature, pH, initial concentration, particles size and amount. An increase in the pH values was also detected in 3 experimental groups, but it was determined that this increase did not exceed the optimum values for aquaculture.

Keywords: aquaculture, filter materials, ammonia, adsorption
Introduction: The Black Sea receives a variety of hazard compounds from agricultural, mining, livestock and other anthropogenic activities via direct dumping from major rivers. As a result water quality of the Black Sea, has been severely damaged by eutrophication and pollution. Non-essential metals such as mercury, arsenic, cadmium and lead, among others, have taken major importance, since their anthropogenic contribution outweighs the one which is provided through life span and likewise because they display several harmful properties through different levels along the food chain. This study was carried out to provide information on heavy metal levels in the muscles of commercial demersal fish species available in Sinop fish markets and to evaluate the possible risk associated with their consumption. The concentrations of mercury (Hg), arsenic (As), cadmium (Cd), lead (Pb), copper (Cu) and zinc (Zn) were determined in the muscles of scorpionfish (*Scorpaena porcus*) from Sinop coasts of the Black Sea.

Material and Method: A total of fifty specimens were purchased during the fishing season in 2016. The total lengths (cm) and the body weights (g) of each fish individuals were measured and then were washed with deionized water, sealed in polyethylene bags and kept in a freezer at -21°C until metal analysis. All plastic and glassware used were rinsed and soaked in 10% (v/v) HNO$_3$ overnight. They were rinsed with deionized water and dried prior using. All acids and oxidants were of high quality from Merck, Germany. The samples digested with Suprapur® HNO$_3$ using a microwave digestion system (Milestone Systems, Start D 260) for analysis. Fish muscles were analysed by an ICP-MS, Agilent Technologies, 7700X and analytical quality was checked with certified reference material NRCC-TORT-2 lobster hepatopancreas.

Results: The recovery percentages results ranged from 96% to 104%. The heavy metal amounts found in the edible part of scorpionfish varied for Hg: Nd-0.012, As: 0.06-0.09, Cd: Nd-0.01, Pb: Nd-0.02, Cu: 0.05-0.14 and Zn: 0.9-3.22 mg/kg wet wt. The levels of the metals in scorpionfish were lower than the limits permitted by European Community Regulation (EU) and Turkish Food Codex (TFC).

Discussion: The Estimated Weekly Intakes (EWI) of the metals through consumption of *S. porcus* by Turkish people in Sinop coasts of the Black Sea were quite below the permissible tolerable daily intake for 70 kg person set by FAO/WHO. Therefore, it can be concluded that no problems on human health would be raised at present from the consumption of scorpionfish from the Sinop fish markets.

Key words: heavy metal, estimated weekly intakes (EWI), Black Sea, *Scorpaena porcus*
Effect of Salt Stress to Germination and Seedling Growth in Sorghum×Sudangrass

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Introduction: Salinity is a major abiotic stress factor leading to crops yield and quality failure. In recent years, the responses of some forage pea cultivars to salinity have studied but the studies about sorghum×sudangrass are insufficient. The objective of this study was to identify the changes on germination and growth parameters of Sorghum×Sudangrass (Sorghum bicolor × Sorghum sudanense) cultivar called greengo under salinity stress.

Material and Methods: The salinity stress applications were made in petri dishes with sixteen NaCl concentrations (0, 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300 mM). The experiment was designed in randomized plots with ten replications. In the study, the values of germination rate, mean germination time (day), the length of radicula and plumula, radicula fresh and dry weight, plumula fresh and dry weight were determined. The data were analysed with Kruskal-Wallis non-parametric test and Dunn comparison test to determine difference in germination rate. In other parameters which showed homogeneity were analysed with Tukey comparison test.

Results: In the study, salt stress caused significant differences (p<0.001) in all parameters. NaCl effected the parameters positively or negatively depend on application doses.

Discussion: In the study The negative effects of salt application usually occurred in salt doses of over 220 mM. The results of the present study indicated that the sorghum×sudangrass cultivar can be cultivated on salinity soils which contain less than 220 mM NaCl.

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Keywords: Fodder crop, forage crop, NaCl stress, salinity
Metal levels in two fish species from Eastern Mediterranean Coast of Turkey

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Introduction: Metals are serious pollutants of major concern due to their toxicity, persistence, and non-degradability in the aquatic environment. Mercury is one of the most studied metals in environmental and human health researches. Cr is classified as priority pollutants by the United States Environmental Protection Agency with a carcinogenicity classification A (human carcinogen), while Cd and Pb are classified in the same list with a carcinogenicity classification B. Fish can accumulate metals both through the food chain and from water; thus, this mechanism causes adverse effect on human health. The aims of this study are to determine the metal levels (Cu, Zn, As, Cd, Pb and Cr and Hg) and to evaluate the potential risk for human consumption in two edible fish species from Eastern Mediterranean coasts.

Material and Methods: Fish samples (sea bass and gray mullet) were collected from Dalyan, Fethiye, Antalya, Mersin, and Iskenderun in 2013. Muscle tissues were freeze dried, homogenized and then digested in a microwave digestion system. All analyses were performed using Atomic Absorption Spectroscopy (AAS) with background correction. An inter-calibration biota sample was used as a control for the analytical methods.

Results: The results revealed that the ranking order of metal concentrations were; As > Zn > Cu > Hg > Cr > Pb > Cd. The maximum levels of As (363 mg/kg dry weight dw), Hg (1.2 mg/kg dw) and Pb (0.12 mg/kg dw) were measured in sea bream samples in Iskenderun which has one of the most polluted coastal waters of Turkey.

Discussion: Metal levels in fish were compared with the recommended limits suggested by different authorities. The measured Cd, Pb and Hg concentrations in fish muscle tissue were found below the guideline limits that permitted by FAO (Food Agriculture Organization) and Turkish legislation.

Keywords: Fish, Metal, Eastern Mediterranean Coast of Turkey
Introduction: Studies to determine the diversity of macrofungi of our country have been continuing. Research to determine the biological activity and chemical composition of the identified fungi has also increased. Fungi being one of the most biodiverse groups of organisms in the world are increasingly importance in the food industry, medicine and pharmacology. Some species are consumed by being made culture as collected from the natural habitat. Fungi, which have a low ratio of carbohydrate and cholesterol and a high ratio of protein and vitamin, have become an an important food source, especially for dieters. Research has shown that fungi contain mono- and polyunsaturated fatty acids such as linoleic acid and oleic acid that can not be produced by humans. Laetiporus sulphureus (Bull.) Murrill (Fomitopsidaceae) which may be the saprophyte and parasite is an edible macrofungi when young. The aim in this study is to determine total protein and vitamin A, C, E values of Laetiporus sulphureus.

Material and Methods: Laetiporus sulphureus specimens used in the study were collected from different localities during the field trips in Tokat province. The samples brought to the laboratory were washed and then dried and pulverized with the aid of a disintegrator. The amounts of vitamins A, C and E in fungal samples were analyzed using an HPLC. Total protein was determined by Dumas protein analysis method.

Results: The total protein of Laetiporus sulphureus in dried samples used as research material was determined as 68.11%. The amounts of vitamins also were determined 121.64 μg g⁻¹, 547.38 μg g⁻¹, 0.084 μg g⁻¹ for A, E and C respectively.

Discussion: In this study, it was found that Laetiporus sulphureus, an edible macrofungus, contains significant amounts of protein, vitamin A, E and C. This wild macrofungi can be an important food source for humans. It has been collected and consumed naturally in some regions in our country. Although the number of naturally grown edible fungi is quite high, very few of them are known and consumed by humans.

Keywords: HPLC, Laetiporus sulphureus, Macrofungi, Total protein, Vitamins
Qualitative Determination of Biodegradation in Diesel Contaminated Water and Soil Samples from Newly Isolated \textit{Bacillus} sp. Strains

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Introduction: Petroleum contamination resulting from leaking above ground and underground storage tanks, spillage during transport of petroleum products, abandoned manufactured gas sites and various industrial processes is hazardous to soil and water ecosystems. The process of bioremediation is defined as the use of microorganism to detoxify or remove pollutants such as petroleum hydrocarbons. The technology relies upon microbial enzymatic activities to transform or degrade to the complete destruction of contaminants, especially petroleum hydrocarbons such as diesel oil. The aim of this study was qualitative determinate of biodegradation in diesel contaminated water and soil samples from newly isolated \textit{Bacillus} sp. strains.

Material and Methods: Soil samples were collected from 30 different cities of Turkey. \textit{Bacillus} sp. were isolated from non-contaminated soil samples and characterized according to Bergey’s Manual of Determinative Bacteriology. These strains were screened for bacterial oil degradation using 7% diesel as sole carbon sources in Bushnell-Hass(HB) agar medium. The plates were incubated at 37˚C for 7-17 days. After the incubation, only diesel degrading bacteria remained on the surface of the plates. The best well diesel degrading strains were selected and, identified by 16S rRNA microbial gene sequence. These strains were qualitative determined for their ability to biodegradation in water and soil the presence of 7% diesel and 10% BH medium. After growth, gram-stain characteristics for all bacteria were observed.

Results: In this study, 135 \textit{Bacillus} sp. were isolated, 20 \textit{Bacillus} sp. strains showed diesel biodegradation. Evaluating the potential degradation capacity of the bacteria in soil samples, four \textit{Bacillus} sp. were selected as well-growth strain. These strains were named as \textit{Bacillus} sp. ET18, ET30, ET106, ET202. The phylogenetic tree on 16S rRNA microbial gene sequence determined by BLAST analysis that 99% of ET30, ET106, ET202 isolates showed sequence similarity with \textit{Bacillus cereus}, ET18 showed with \textit{Bacillus subtilis}. These bacteria were qualitative determined for biodegradation. After the three weeks incubation period, bio-abilities of bacteria were performed on the basis of turbidity in water samples while color change in soil samples. While, the best growth was determined qualitatively with \textit{Bacillus cereus} ET202 for soil sample, \textit{Bacillus subtilis} ET18 was for water samples. Gram-stain characteristics showed that the bacterial shapes were rounded.

Discussion: The quantitative analysis of biodegradation, highest degradation was recorded by \textit{Bacillus cereus} ET202 and \textit{Bacillus subtilis} ET18 isolates. These isolates can be used potentially to decontaminate diesel spillage from water and soil. Further studies related to degradation of hydrocarbons are needed.

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Keywords: \textit{Bacillus}, Diesel, Bioremediation, Isolation
Heavy Metal Contamination of Irrigated Areas and Accumulation by Some Species of Dytiscidae (Coleoptera)

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Introduction: Heavy metals or metalloids are the most common contaminants of today’s world. Industrialization, intensified agriculture and increasing population have been lead to increasing the contamination of soils, sediments, waters and foods. Accumulation of these toxic metals/metalloids often results in ecosystem malfunction. When they enter to food web, cause food contamination, thus threat to human health. In this study, we bioassessed the heavy metal accumulation with some Dytiscidae species.

Material and Methods: In the present study, sixteen heavy metal/metalloids accumulation in two species (Ilybius fuliginosus and Rhantus suturalis) was evaluated. For this purpose specimens were collected from Aksaray and Kütahya province (Turkey) between June-July 2007. The first studied area coordinate is 39°10'728"N 29°35'377"E and has 1023 m altitude. Ilybius fuliginosus was collected from Çavdarhisar dam, which built on Bedir stream, Kütahya. The second studied area coordinate is 38°23'07"N 34°03'56"E, and has 1038 m altitude. Rhantus suturalis was collected from Uluırmak regulator, which is 7 km far from Mamasın dam in Aksaray. Both of the dams have been using for irrigation in the region. Collected samples were preserved in 70 % ethanol. Measurements of heavy elements were made with Energy Dispersive X-Ray Fluorescence (EDXRF) spectrometer.

Results: Sixteen heavy metal/metalloids (Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Br, Rb, Sr, Pb) were measured. The results showed that between sixteen elements Ca, V and Cr were accumulated in Ilybius fuliginosus higher degree than Rhantus suturalis and their concentration are 92, 14,5 and 7,2 respectively. The rest of the studied elements were also high concentration in Ilybius fuliginosus, but they were nearly same degree with Rhantus suturalis.

Discussions: The waters, which the insects were collected, used for irrigation. Obtained results are a bit high from national water standard. Measured results for Ilybius fuliginosus are Pb 1,5; As 0,5; Cu 0,8; Cr 7,2; Co 2,5. This mean that water and sediment contaminated with toxic metals and thus, insects accumulated these metals in high level than their environments.

Keywords: Dytiscidae, Ilybius, Rhantus, Heavy metal/metalloid, Contamination