



SEAB2018

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the 4<sup>th</sup> international  
symposium on  
euroasian  
biodiversity

# Abstract eBook

JULY 03-06  
2018 KIEV  
UKRAINE

EDITORS  
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Dear Colleagues,

*It is great pleasure that we invite you to the The 4<sup>rd</sup> International Symposium on EuroAsian Biodiversity (SEAB2018) which will be held from July 3<sup>rd</sup> to 6<sup>th</sup>, 2018 at Institute of Cell Biology and Genetic Engineering (NASU) and Taras Shevchenko National University of Kyiv, UKRAINE.*

*Symposium will include invited talks, plenary talks given by selected pioneers of biodiversity, panel discussions and oral/poster presentations. The sessions will focus on the most recent scientific findings in the area of biodiversity and its related issues. By providing a highly interactive platform, this symposium will seek the views and creative ideas on novel approaches in biodiversity research and its other field applications.*

*We look forward to your participation in the The 5<sup>th</sup> International Symposium on EuroAsian Biodiversity (SEAB2019).*

*Best Regards,*

*SEAB2018 Organization Committee*



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## SEAB<sub>2018</sub> INVITED SPEAKERS

*in alphabetical order*



- **Alexandra P. KRAVETS**
- **Speech Title:** *Epigenetic polymorphism as the main way of crops' biological diversity formation*



- **Dmitri GUDKOV**
- **Speech Title:** *Aquatic plants and animals within the Chernobyl exclusion zone: the effects of long-term radiation exposure on different levels of biological organization*



- **Dzhama B. RAKHMETOV**
- **Speech Title:** *M.M. Grishko National Botanical Garden of the National Academy of Sciences of Ukraine - an important center for conservation and enrichment of plant diversity*

*in alphabetical order*



- **Mykola KUCHUK**
- **Speech Title:** *Plant genetic modifications and biodiversity keeping in aseptic culture conditions*



- **Paraskevi KARACHLE**
- **Speech Title:** *The IUU guests: increasing, unstopped, unbounded aliens in the Mediterranean*



- **Sabri KILINÇ**
- **Speech Title:** *Pros and Cons: an ecological perception*



- **Yaroslav B. BLUME**
- **Speech Title:** *Development of potential risk assessment of the transgenic plants for the evaluation of practical perspectives for their adoption in Ukraine*



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## POSTER PRESENTATION GUIDE

Posters will be on display in the Poster Area. This year we will have three days poster session. Each poster session is divided into two time slots, as follows:

**Tuesday:** First Group: 13:00 to 15:00, Second Group: 15:00-17:00

**Wednesday:** First Group: 10:00 to 12:00, Second Group: 13:00-15:00

**Thursday:** First Group: 10:00 to 12:00, Second Group: 13:00-15:00

Authors must be present during TIME SLOTS. Posters must be posted in exact time, and they must be removed after time ended.

### Poster Size and Instructions

- One poster board is allocated to each presentation. The recommended poster size is max. 90 cm high by 60 cm wide.
- Posters must be mounted using tapes/pins provided by the organizing committee.
- Please note that there will be two poster sessions for exact day, therefore two posters will use the same board in the day, one in the morning and one in the afternoon. For this reason, be considerate and remove your poster in the designated time after your session is over, to allow enough time to the next authors to place their posters.
- Each poster presenter is required to defend his/her poster during the respective poster session.
- The title of your poster paper should be done in block letters which are AT LEAST 36-72 punto.
- All text must be easily readable from a distance of 1 to 2 meters. Make the lettering at least 1 cm high, smaller lettering will not be legible from a distance of 1 to 2 meters.
- All graphs and charts should be AT LEAST 15 x 20 cm or larger.
- It is a good idea to sequentially number your materials in the poster. This will indicate to the viewer a logical progression through your Poster Paper Presentation.
- Provide an introduction (outline) and a summary or conclusion for your Poster Paper Presentation.
- Prepare your Poster Paper Presentation carefully so that it can be used as the basis to explain and answer questions from the viewers.
- It is helpful to have copies of the written version of your paper available for those viewers who may want to study specifics of your work in more detail.



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## ORAL PRESENTATION GUIDE

### Observing Your Allotted Time

- The total time allotted to each speaker is 15 minutes. You should plan to speak for 10 minutes and leave 5 minutes for questions.
- Invited speakers have twice this time, 30 minutes in total, and they should plan to speak for about 25 min, leaving 5 min. for questions.
- There is NO EXCUSE for using more than your allotted time. Rehearse your presentation several times; projecting slides and doing anything else you would otherwise expect to do at the meeting.
- It is a discourtesy to your audience, the Session Chair and the other speakers to exceed your allotted time.
- The Session Chairs are instructed to adhere to the printed schedule for the session. With parallel sessions this is critical to the overall success of the conference.



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## GENERAL INFORMATION

### Main Venue

Educational and Scientific Center  
"Institute of Biology and Medicine".  
Hlushkova Av., 2



### Symposium Rooms

Oral presentations: Salon A, B, C, Poster presentations: Faculty Building, Floor A

### Language

English is the predominant language in symposium.

### Currency and Banks

The Ukrainian Hryvnia (code: UAH) is the currency of Ukraine. One dollar is ca. 26 UAH

### Insurance

The meeting coordinators cannot accept any liability for personal injuries, loss or damage to properties belonging to participants, either during or as a result of the symposium. Participants are encouraged to take out their own personal travel insurance.

### Name Badges and Materials

Name badges and meeting materials will be provided on-site at the registration desk. All participants are kindly requested to wear their name badge during all meeting functions and social events.

### Shopping

Most shops and department stores are open from 09.00 – 20.00 (09 am – 8 pm) Major credit cards are widely accepted.

### Weather

The climate in Ukraine during this time is variable with temperatures between 15-26°C.

### Time

Kiev is currently on Greenwich Daylight Time, 3 hours ahead on Greenwich Mean Time (GMT).

### Power

In Kiev the standard voltage is 220 V. The standard frequency is 50 Hz. The power sockets that are used are of type C / F.

03 July 2018 Address: Institute of Continuing Education. Vasytkivska st, 36	
12:00-13:00	Registration & Opening Ceremony – Address: Institute of Continuing Education. Vasytkivska st, 36
13:00-13:30	Invited Speaker: Mykola KUCHUK - <i>Plant Genetic Modifications and Biodiversity Keeping in Aseptic Culture Conditions</i>
13:30-14:00	Invited Speaker: Sabri KILINÇ – <i>Pros and Cons: An Ecological Perception</i>
14:00-14:15	Coffee break
14:15-14:45	Invited Speaker: Paraskevi KARACHLE – <i>The IUU guests: Increasing, Unstopped, Unbounded Aliens in the Mediterreanean</i>
14:45-15:15	Invited Speaker: Dzhamal B. RAKHMETOV - <i>M.M. Grishko National Botanical Garden of the National Academy of Sciences of Ukraine - an important center for conservation and enrichment of plant diversity</i>
15:15-15:30	Coffee break
15:30-16:00	Invited Speaker: Yaroslav B. BLUME - <i>Development of potential risk assessment of the transgenic plants for the evaluation of practical perspectives for their adoption in Ukraine</i>
16:00-16:30	Invited Speaker: Dmitri GUDKOV - <i>Aquatic plants and animals within the Chernobyl exclusion zone: the effects of long-term radiation exposure on different levels of biological organisation</i>
16:30-17:00	Invited Speaker: Alexandra P. KRAVETS - <i>Epigenetic Polymorphism as the Main Way of Crops' Biological Diversity Formation</i>
17:00-18:30	Social Event: Zoology Museum Visit - Address: Volodymyrska st., 60

04 July 2018 Educational and Scientific Center "Institute of Biology and Medicine". Hlushkova Av., 2			
	Salon A	Salon B	Salon C
Chairs:	Prof. Dr. Kuddisi ERTUĞRUL	Prof. Dr. Nikolai BORISJUK	Prof. Dr. Namik RASHYDOV
09:15-09:30	Ahmet AKSOY Predicting Response of an Endemic Plant Species <i>Muscari turcicum</i> to Climate Change	Celal TUNCER Fungal flora on Ambrosia beetles, <i>Anisandrus dispar</i> Fabricius and <i>Xylosandrus germanus</i> Blandford (Coleoptera: Curculionidae: Scolytinae)	Elizabeth KORDYUM Phenotypic plasticity of <i>Sium</i> L. and <i>Alisma</i> L. species under different water regimes in the biotope
09:30-09:45	Ahmet ULUDAĞ The first alien plants database of Turkey	İsmet BALIK Growth, mortality and exploitation of annular sea bream ( <i>Diplodus annularis</i> L.) in the south-eastern coast of the Black Sea, (Unye/Ordu) Turkey	Nataliia RIEZNYKOVA Farm animal biodiversity in Ukraine and its loss
09:45-10:00	Metin ARMAĞAN Ecological richness of Tunceli and Its Environs (Turkey)	İsmail KARACA Goji Berry Pests and Their Biodiversity in Isparta Province of Turkey	Oksana NEKRASOVA A GIS modeling approach to the Investigation of rare amphibians and reptiles in Ukraine under climate change

10:00-10:15	<b>Necmi AKSOY</b> A Preliminary Study of the Plant Diversity in Karadere Valley Yığılca, Düzce (Turkey)	<b>İdris ŞENER</b> Risk Assessment for Consumer Health by Determination of Heavy Metals Concentrations in Marinated and Smoked Seafood	<b>Olena NESTERENKO</b> Proteomics Approach of Crosstalk in Cell Signaling Investigation
10:15-10:30	<b>Coffee break</b>		
<b>Chairs:</b>	<b>Prof. Dr. Necmi AKSOY</b>	<b>Prof. Dr. İsmet BALIK</b>	<b>Assoc. Prof. Dr. Mesut KIRMACI</b>
10:30-10:45	<b>Elissavet GAVRIIL</b> An assessment of the adaptation of carvacrol rich wild "Oregano plants" from the eastern Aegean under field conditions	<b>Abdullah ALTUNISIK</b> Age determination in a population of Artvin Lizard, <i>Darevskia derjugini</i> (Nikolsky, 1898)	<b>Alvina VAZINA</b> Mechanism of Modification Adaptation of Biological Tissues to External Influences Investigated by Structural Methods Using Synchrotron Radiation
10:45-11:00	<b>Kuddisi ERTUĞRUL</b> Numerical taxonomy of the genus <i>Cousinia</i> Cass.(Asteraceae) in Turkey	<b>Kamil CANDAN</b> Inferring the Molecular Phylogeny of the Valentin's Lizard, <i>Darevskia valentini</i> , (Boettger, 1892) from Turkey	<b>Yusuf DURAK</b> Genotyping of Escherichia coli Strains Isolated from Clinical Samples by Pulsed-Field Gel Electrophoresis
11:00-11:15	<b>Nikolai BORISJUK</b> Diversity of Grain and Leaf Surface Aliphatic Components in Wheat	<b>Oksana NEKRASOVA</b> Current trends in the manifestation of external morphological anomalies in representatives of the herpetofauna of Ukraine under anthropogenic influence and climate change	<b>Yılmaz EMRE</b> The Effects of Dietary <i>Cyclamen graecum</i> and <i>Prospero autumnale</i> on Some Health Parameters of Fishes
11:15-11:30	<b>Tuna UYSAL</b> Phylogenetic analysis of the Turkish <i>Cousinia</i> taxa	<b>Sevinc GULDAG</b> Micropropagation of sweet orange [ <i>Citrus sinensis</i> (L.) Osbeck ]	<b>Yeşim KARA</b> Determination of Chemical Contents of Propolis Extracts Obtained from Different Regions of Denizli Province
11:30-11:45	<b>Burcu YILMAZ ÇITAK</b> An Anatomical Survey of <i>Cheirolepis</i> section of <i>Centaurea</i> genus (Asteraceae) in Turkey	<b>Olena NESTERENKO</b> Crosstalk of Osmotic and Ionizing Radiation Stress: Insights from Comparative Proteomics of Pea Seedlings	<b>Yusuf KURT</b> Age-Age Correlations and Early Selection in Genetic Improvement of Forest Trees: Diameter Growth in <i>Pinus brutia</i> Ten.
11:45-12:00	<b>Hakkı DEMİRELMA</b> Anatomical Structure of <i>Sideritis ozturkii</i> Aytaç & Aksoy (Lamiaceae) Taxon		<b>Murat ŞEVİK</b> Occurrence and genetic diversity analysis of Orf virus isolated from Cattle in Turkey
12:00-13:00	<b>Lunch - Cafe Mriya. Address: Mykhaila Lomonosova st., 69</b>		
<b>Chairs:</b>	<b>Prof. Dr. Tuna UYSAL</b>	<b>Prof. Dr. İzzet KARA</b>	<b>Assoc. Prof. Dr. Deniz İNNAL</b>
13:00-13:15	<b>Osman TUGAY</b> The Endemic Plants of Karaman (Turkey) Province	<b>Galina SHEVCHENKO</b> Genome Reparation in Plants from Chernobyl Zone	<b>Anara BABAYEVA</b> Boron containing antibiotics

13:15-13:30	<b>Necmi AKSOY</b> Shrub Vegetation of the Argözü Valley in Kibriscik, Bolu, TURKEY	<b>İzzet KARA</b> Evaluation of Content Analysis of Honey Samples Taken from Four Different Regions of Turkey	<b>Fatma KOYUNCU</b> Morphological and Biological Characteristics of Medlar ( <i>Mespilus germanica</i> ) Tree
13:30-13:45	<b>Selin GALATALI</b> Genetic Stability Determination of Cryopreserved <i>Mentha</i> spp. Using ISSR Markers	<b>Aslı ÖZTÜRK KIRAZ</b> Antioxidant Activity of Theobromine Changing by Temperature	<b>Ergun KAYA</b> Conservation of Woody Plants Germplasm Using Cryogenic Procedures
13:45-14:00	<b>Bilge TUNÇKOL</b> Grassland Communities of Küre Mountains in Bartın, Turkey	<b>İbrahim KIVRAK</b> Determination of Chemical Content of Thyme Honey by HPLC, UPLC-ESI-MS/MS and Spectrophotometric Methods	
14:00-14:30	<b>Coffee break</b>		
<b>Chairs:</b>	<b>Assoc. Prof. Dr. Bülent YORULMAZ</b>	<b>Assoc. Prof. Dr. Deniz İNNAL</b>	<b>Prof. Dr. Yeşim KARA</b>
14:30-14:45	<b>Murat BARLAS</b> Comparison of Different Versions of Saprobic Indices to Determine Water Quality of Eşen River in SW Anatolia, Turkey	<b>Güven OZDEMİR</b> Determination of Endophytic Microorganism Profiles of <i>Dianthus erinaceus</i> an Endemic Plant by DGGE	<b>Özge UĞUZ</b> Determination of the Antioxidant Content of <i>Paulownia tomentosa</i> Grows on the Soil of Denizli
14:45-15:00	<b>Raşit URHAN</b> A new record of genus <i>Zercon</i> (Acari, Zerconidae) for Turkish Fauna: <i>Zercon saphenus</i> Błaszak, 1979	<b>Nurver ALTUN</b> The Effect of Quinine, Tannic Acid and Nicotine Mixtures on Feeding and Development of Male <i>Lymantria dispar</i> L. Larvae	<b>Mehmet KARACA</b> Species List of the Iranian Zerconidae (Acari: Mesostigmata)
17:00-21:00	<b>Social Event: Boat Trip on Dnipro River - Address: Kiev River Port. Poshtova Sq., 3.</b>		

**05 July 2018 Educational and Scientific Center "Institute of Biology and Medicine". Hlushkova Av., 2**

	<b>Salon A</b>	<b>Salon B</b>	<b>Salon C</b>
<b>Chairs:</b>	<b>Prof. Dr. Ahmet AKSOY</b>	<b>Assoc. Prof. Dr. Gökhan AYDIN</b>	<b>Assoc. Prof. Dr. Metin ARMAĞAN</b>
09:00-09:15	<b>Mikail AKBULUT</b> Determination of Genetic Diversity in Some Turkish Barley Cultivars and Azerbaijani Barley Accessions with Peroxidase (POGP) Markers	<b>Ali Nafiz EKİZ</b> Diversity and Biogeography of Turkish Seed Beetles (Coleoptera: Chrysomelidae: Bruchinae)	<b>Ali Müjdat ÖZKAN</b> Fungal bioaerosols in indoor air environments of Health Services Vocational School in Marmaris, Turkey
09:15-09:30	<b>Meryem BOZKURT</b> A numerical taxonomy of the genus <i>Ornithogalum</i> from Turkey	<b>Deniz İNNAL</b> Growth and Morphometric characters of <i>Gambusia holbrooki</i> (Teleostei: Poeciliidae) in Pınarbaşı Spring Creek (Burdur, Turkey)	<b>Ataç UZEL</b> Determination of Thermophilic and Thermotolerant Fungal Biodiversity of some Hot Springs in Aegean Region and Screening of their Phytase Activities
09:30-09:45	<b>Meral APAYDIN YAĞCI</b> Trophic ecology of sand smelt ( <i>Atherina boyeri</i> Risso, 1810) as revealed by the stable carbon and nitrogen isotope ( $\delta^{13}C$ and $\delta^{15}N$ ) in Lake Eğirdir (TURKEY)	<b>Ebru Ceren FİDAN</b> Vertical Species Diversity of Ground Beetles (Coleoptera: Carabidae) in Davraz Mountain (Isparta-Turkey)	<b>Burhan KILIÇ</b> Protection of Lake Bafa Nature Park by Using the Area as an Ecotourism Route

09:45-10:00	<b>Esra MARTİN</b> Karyotypes on section Hymenostegis of <i>Astragalus</i> (Fabaceae) from Turkey	<b>Neriman Tuğba YURT</b> Distribution of <i>Glycaspis brimlecombei</i> Moore (Hemiptera: Aphalaridae) in İzmir, Aydın and Muğla Provinces, and Population Fluctuations of the Pest in İzmir Province of Turkey	<b>Sadettin ÜNSAL</b> Activity and biological effects of neem ( <i>Azadirachta indica</i> A. Juss) derived on insects and environment
10:00-10:15	<b>Mesut KIRMACI</b> Preliminary evaluation of the red list categories of Turkish <i>Riccia</i> (Marchantiophyta)	<b>Bülent YORULMAZ</b> Comparative Performance of BMWP Indices in Esen River in SW Anatolia, Turkey	
10:15-10:30	<b>Coffee break</b>		
<b>Chairs:</b>	<b>Assoc. Prof. Dr. Ergun KAYA</b>	<b>Assoc. Prof. Dr. Gökhan AYDIN</b>	<b>Prof. Dr. Mustafa DURAN</b>
10:30-10:45	<b>Mehmet Yaşar DADANDI</b> <i>Phlomis x ketenoglui</i> (Lamiaceae), a new natural hybrid of Anatolia	<b>Gökhan AYDIN</b> Comparison of Color and Attractant Traps Effect Used For Sampling <i>Epicometis</i> (Tropinota) <i>hirta</i> (Poda, 1761) (Coleoptera, Scarabaeidae, Cetoniinae)	<b>Volodymir EMELYANOV</b> Plants are able to conduct light to the rhizosphere
10:45-11:00	<b>Deniz ULUKUŞ</b> Anatomical study on the species of <i>Cousinia</i> Sect. <i>Cynaroideae</i> Bunge. (Asteraceae) and their taxonomic implications	<b>İsmail ERKAYA</b> Determining the Relationship Between Environmental and Biotic Factors and Morphometrics of Pine Processionary Moth ( <i>Thaumetopoea wilkinsoni</i> Tams, 1924) Larvae in Western Mediterranean Region	<b>Özge KILINÇARSLAN</b> Determination of Total Phenolic, Flavonoid Amounts and Antioxidant Capacity of <i>Andricus curtisii</i> (Müller, 1870) Gall
11:00-11:15	<b>Ezgin TIRPAN</b> Naturally growing macro Ascomycota in Turkey	<b>Levent BAT</b> Heavy metal contamination of <i>Pleuronectiformes</i> species from Sinop coasts of the Black Sea	<b>Şeyda KIVRAK</b> Assessment of Nutritional and Chemical Content of <i>Tuber rufum</i> by Chromatographic Systems
11:15-11:30	<b>Gürsel KARACA</b> Fusarium Species Related with Aubergine Plants Grown in the West Mediterranean Region of Turkey	<b>Leonid SVETLICHNY</b> Swimming in planktonic copepods: interspecific variations and similarity	<b>Nataliia KUTSOKON</b> Poplar and Willow Forestry in the Light of Global Climate Changes in Northern and Eastern Regions of Europe
11:30-11:45	<b>Ela Nur ŞİMŞEK SEZER</b> The apoptotic effects of <i>Vinca</i> extracts on Multiple Myeloma	<b>Oleksandra SHEVCHENKO</b> First record of oribatid mites (Acari, Oribatida) of Mizhrichynskiy Regional Landscape Park (Ukraine)	<b>Alla YEMETS</b> Obtaining of Phytopatogen-Resistant Tomato and Potato Plants with Human Lactoferrin Gene
11:45-12:00	<b>Füsun GÜLSER</b> Effects of Different Growing Media on Plant Growth of <i>Petunia</i> ( <i>Petunia hybrida</i> )	<b>Sultan ÇOBANOĞLU</b> Determined of predatory mites (Acari: Mesostigmata) from pear ( <i>Pyrus communis</i> L.) (Rosaceae) trees in Ankara-Turkey	
12:00-13:00	<b>Lunch - Cafe Mriya. Address: Mykhaila Lomonosova st., 69</b>		
<b>Chairs:</b>	<b>Prof. Dr. Füsun GÜLSER</b>	<b>Prof. Dr. Nuri BAŞUSTA</b>	<b>Assoc. Prof. Dr. Metin ARMAĞAN</b>
13:00-13:15	<b>Huseyin OZCELIK</b> A Study on Bean Bio-Diversity in Black Sea Region	<b>Deniz MERCAN</b> Determination and Distributions of Macroinvertebrate Potamofauna of Delice River (Kızılırmak)	<b>Bekir ÇÖL</b> Boric Acid Stress Induction of <i>clpP</i> gene in <i>Bacillus subtilis</i>

13:15-13:30	<b>Ramazan MAMMADOV</b> Biological activities of <i>Asparagus acutifolius</i>	<b>Gökçen BİLGE</b> Some Biological Aspects of the <i>Chlorophthalmus agassizi</i> Bonaparte, 1840 from the Southern Aegean Sea, Turkey	<b>Bircan ÇEKEN TOPTANCI</b> Protein Damaging Activities of Insecticides
13:30-13:45	<b>Osman Devrim ELVAN</b> Analysed of wildlife crimes and misdemeanors in Turkish legislation comparing with international conventions	<b>Nuri BAŞUSTA</b> Length-weight relationships and condition factor of <i>Umbrina cirrosa</i> inhabiting North-eastern Mediterranean Sea	<b>Muammer CEYLAN</b> Advantages of Temporary Immersion Bioreactor Systems for Micropropagation: SETISTM and RITA®
13:45-14:00	<b>Ömer SOZEN</b> Determination of Agro-Morphological Features Domestic White Dry Bean Genotypes Collected from Middle Kizilirmak Valley	<b>Fikret SARI</b> Effects of Paclitaxel (Taxol) and Resveratrol on Rabbit Epididymal Sperm Tail Morphology	<b>Merve SEZER</b> Potential relationship between galactarate/glucarate/glycerate transporter GarP and boron toxicity in <i>Escherichia coli</i>
14:00-14:15	<b>Secil KIVRAK</b> Long Term Conservation of <i>Musa</i> spp. Germplasm Using Cryogenic Techniques	<b>Hüseyin SARI</b> Unmanned Air Vehicles (UAV)-Based Remote Sensing in Determining Land Use and Land Use Effects: A Case Study of Tekirdağ province, Thracian Peninsula (NW Turkey)	<b>Nahide DENİZ</b> Screening of different parts of <i>Crocus pallasii</i> subsp. <i>pallasii</i> for cytotoxic activity
14:15-14:30	<b>Coffee break</b>		
<b>Chairs:</b>	<b>Assoc. Prof. Dr. Yusuf KURT</b>	<b>Prof. Dr. Serdar DÜŞEN</b>	<b>Prof. Dr. Yılmaz EMRE</b>
14:30-14:45	<b>Mehmet Gökhan HALICI</b> Molecular studies on some lichenized fungus species collected from James Ross Island (Maritime Antarctica)	<b>Yuzhen ZHOU</b> Comparative Biodiversity of Duckweeds in Central Ukraine and Eastern China and Their Potential for Remediation of Wastewater	<b>Nesrin ERİM</b> Determination of crude essential oil and mineral matter content of <i>Salvia hispanica</i> (Chia) plant grown in tissue culture
14:45-15:00	<b>Hakan ALLI</b> Wild growing <i>Agaricus</i> species in Turkey	<b>Pınar İLİ</b> Effects of Taxifolin and Trehalose on Post-Thawed Merinos Ram Semen DNA Integrity	<b>Vagif ATAMOV</b> Woody Plant Diversity of Colchis Floristic Sector of Turkey
15:00-15:15	<b>Mithat GÜLLÜ</b> Molecular studies on some <i>Acarospora</i> (Acarosporales, Ascomycota) species in Turkey	<b>Onur CELİK</b> <i>In vitro</i> propagation of two local mandarins ( <i>Citrus deliciosa</i> Ten. and <i>C. nobilis</i> Lauriro) cultivars; "Bodrum" and "King"	<b>Olha YAROSHKO</b> Transient expression gus and gfp genes in <i>Physalis peruviana</i> plants
15:15-15:30	<b>Mehmet Hadi AYDIN</b> Comparative susceptibility of some commercial potato cultivars to <i>Fusarium sambucinum</i> and <i>F. solani</i> isolates causing tuber dry rot	<b>Mustafa Numan BUCAK</b> Some Sperm Quality Parameters in Domestic Animals	<b>Adile SARI</b> New Generation of Biologically Active Molecules from Insects: Antimicrobial Peptides (AMPs)
15:30-15:45	<b>Rukiye BORAN</b> Investigation of extracellular matrix-degrading enzyme inhibition and antioxidant activity of <i>Galium aparine</i> L.	<b>M. Cengiz Deval</b> Population structure of invasive lessepsien crab <i>Charybdis longicollis</i> , infected by alien rhizocephalan <i>Heterosaccus dolfusi</i> , in the Mediterranean coast of Turkey	<b>Nurhayat ÖZDEMİR</b> <i>Bufo verrucosissimus</i> in Black Sea Region of Turkey: evidence from 16S rRNA gene and morphology

15:45-16:00	<b>Enver KENDAL</b> Assessment of genetic variability of Durum Wheat Landraces ( <i>Triticum durum</i> L.) in Southeastern Anatolia Region of Turkey	<b>Vladislav PROSVIRJAKOV</b> Efficiency of Biopag-D Disinfecting Agent as Fungicide Gender of Seeds of Spring Wheat	<b>Svetlana PCHELOVSKA</b> Presowing Radiation Exposure of Chamomilla recutita L. Seeds Effects on Flavonoid Accumulation
16:00-16:15	<b>Sedat ÇAM</b> Quantitative PCR Enumeration of vcgC and 16S rRNA Type A/B Genes as Virulence Indicators for Environmental and Clinical Strains of <i>Vibrio vulnificus</i> in Galveston Bay Oysters	<b>F. Banu YALIM</b> Quantitative and Qualitative Changes in Zooplankton Composition of Karacaören I Reservoir (Burdur, Turkey) in the last decade (2002-2013)	
19:00-21:00	<b>Social Event: Opera &amp; Ballet Show - Address: Taras Shevchenko National Opera and Ballet Theatre of Ukraine. Volodymyrska St., 50</b> <b>Name of the Show: The Marriage of Figaro by W. A. Mozart</b>		

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	Salon A	Salon B	
<b>Chairs:</b>	<b>Assoc. Prof. Dr. Ergun KAYA</b>	<b>Prof. Dr. Serdar DÜŞEN</b>	
09:45-10:00	<b>Irem AKTAY</b> Improvements in synthetic seed technology: applications for plant biotechnology	<b>Ahmet TEKELİ</b> Determination of some heavy metal contents of forage plants grown on the roadside fields of Van, Turkey	
10:00-10:15	<b>Merve DOĞAN</b> Antioxidant Activity of <i>Quercus brantii</i> L. Galls Induced by Gall Wasps	<b>Baran AŞIKKUTLU</b> Macro and Trace Element Levels of <i>Cladophora glomerata</i> (L.) Kütz., <i>Ulva compressa</i> Lin. and Water from Izmir Bay (Aegean Sea/ Turkey)	
10:15-10:30	<b>Gürkan SEMİZ</b> Prospects of Ecotourism Development from Western Part of Turkey	<b>Dilek NARTOP</b> Immobilization of Acetylcholinesterase on Novel Polymeric Nanospheres for Pesticide Determination	
10:30-10:45		<b>Elif VARHAN ORAL</b> Determinations of Metal Levels by the Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) in Hair Samples as a Biomarker for Toxicity	
10:45-11:00	Coffee break		
<b>Chairs:</b>	<b>Assoc. Prof. Dr. Mesut KIRMACI</b>	<b>Assist. Prof. Dr. Bekir ÇÖL</b>	<b>Assoc. Prof. Dr. Ahmet TEKELİ</b>
11:00-11:15	<b>Gürçay Kıvanç AKYILDIZ</b> Revealing A Species Response Curve of <i>Chironomus riparius</i> Meigen (Diptera: Chironomidae) by Using R	<b>Hilal BAKİ</b> A microsporidium from <i>Altica hampei</i> (Allard, 1867) (Coleoptera: Chrysomelidae)	<b>Özlem DEMİRCİ TURGUNBAYER</b> The Histopathological Effects of Carbaryl on the Spleen of <i>Oreochromis niloticus</i>
11:15-11:30	<b>Sinan AKTAŞ</b> Poisonous Macrofungi of Gazipaşa (Antalya/Turkey) District	<b>Esra DİBEK</b> OMP encoded genes in <i>Escherichia coli</i> and the phenotypes of the corresponding mutants under several salt, metal and antibiotics stresses	<b>Cengiz AKKÖZ</b> Some Water Quality Properties of Acı Lake (Konya/ Turkey)

11:30-11:45	<b>Mithat Evrim DEMİR</b> Life Strategy of a Hygrophytic Moss: <i>Orthotrichum sprucei</i> Mont.	<b>Mehmet MAMAY</b> Determination of Overwintering Spider (Arthropoda: Araneae) Biodiversity in <i>Pistachio</i> Orchards of the Euphrates Valley in Şanlıurfa Province of Turkey	<b>Huseyin SASI</b> Native and Alien Fish Species in Dalaman River System (Mugla, TURKEY)
11:45-12:00	<b>Mustafa KOCAKAYA</b> Ecology of <i>Cladonia furcata</i> Group Distributed In Turkey		<b>Nesrin HAŞİMİ</b> Screening Antimicrobial Activity of Some Microalgae
12:00-13:00	Lunch - Cafe Mriya. Address: Mykhaila Lomonosova st., 69		
13:00-14:00	Closing Ceremony		
20:00-00:00	Social Event: Gala Dinner - Address: Hotel "MIR". Holosiivskyi Av., 70		

### Poster presentations:

Poster Numbers	Time
From 101 to 150	03 July 2018 13:00 – 15:00
From 151 to 200	03 July 2018 15:00 – 17:00
From 201 to 250	04 July 2018 10:00 – 12:00
From 251 to 300	04 July 2018 13:00 – 15:00
From 301 to 350	05 July 2018 10:00 – 12:00
From 351 to 400	05 July 2018 13:00 – 15:00

## Predicting Response of an Endemic Plant Species *Muscari turcicum* to Climate Change

Ahmet AKSOY<sup>1</sup>, Canan DÜLGEROĞLU<sup>1</sup>, Tuna UYSAL<sup>2</sup>, Hüseyin DURAL<sup>2</sup>

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**Aim of the study:** Climate change has the potential to substantially affect the distribution of species. Predicting response of biodiversity to climate change provide useful data, in terms of planning conservation measures against extinction risk. Objectives of the study were to: (1) predict suitable habitat distribution for endangered endemic plant *Muscari turcicum* Uysal, Ertugal & Dural; (2) identify the environmental factors associated with *M. turcicum* habitat distribution; (3) projecting distribution of the species for the year 2070, in order to assess effects of the climate change.

**Material and Methods:** *M. turcicum* is an endangered species and local endemic to the Middle Taurus (Konya Province) where the species distributed rarely. Current and future potential distributions of the species were analyzed by using Maxent (Maximum Entropy) software. MIROC5 (Model for Interdisciplinary Research on Climate) climate change scenario for the year 2070, which was created based on fifth IPCC report, was used for projecting future potential distribution of the species. A total of 12 GPS records of the species' localities were obtained from field works. Including edaphic and topographic factors 13 environmental variables and 19 climatic variables used as predictors. SRTM digital elevation model used with 30 m resolution to create topographic variables.

**Results:** The jackknife evaluation results of the model indicated temperature seasonality, geological formation and precipitation seasonality as main factors influencing *M. turcicum*'s distribution. Current and future projections of the model showed that suitable habitats for the species will shift to north-western of the current habitat in the future. According to eventual models, climatic and edaphic factors constrain distribution of the species and there are more habitats suitable for *M. turcicum* different from known distribution currently. However, potential distribution area for the species will probably shrink to the north-western parts of the current habitat by 2070. Therefore, conservation measures must be taken to prevent *M. turcicum* from being affected by climate change.

**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, biodiversity, species distribution modeling, maxent

**Age determination in a population of Artvin Lizard, *Darevskia derjugini* (Nikolsky, 1898)**

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**Aim of the study:** The Artvin Lizard, *Darevskia derjugini* (Nikolsky, 1898) is found in the Caucasus region, where it has been recorded from Georgia, southern Russia, northeastern Turkey (provinces of Ardahan, Artvin, Rize, Trabzon and Giresun) and just into western Azerbaijan. Vertical distribution of this lizard is up to 1,700 m a.s.l. It is aimed to investigate longevity and mean age and age at maturity in a population of *D.derjugini*.

**Material and Methods:** A total of 14 adult specimens (7 females, 7 males) of *D.derjugini* were used in this study, which were sampled from Fındıklı, Rize (northeastern Turkey). Age was determined by skeletochronological method.

**Results:** Results of the Independent sample t-test showed that no significant difference was detected between males and females in terms mean age. The maximum observed lifespan was 5 years for males and 6 years females. Age at maturity was estimated 2 years for both sexes.

**Acknowledgements:** This study was supported by Recep Tayyip Erdogan University BAP under grant number FBA-2017-714. The animals were treated in accordance with the guidelines of the local ethics committee (decision number: RTEÜ.2016/49).

**Keywords:** Longevity, age, skeletochronology, maturity, lizard

**Boron Containing Antibiotics**

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**Aim of the study:** A number of boron containing compounds have been made available and investigated to some degree by a number of scientists for their antibacterial effects. The studies have suggested that some of the boron compounds are and can potentially be used as antibiotics in the medical sector. Some bacteria synthesize high levels of boron containing metabolites in their natural environment under specific conditions. These antibiotics include, but not limited to, Aplasmomycin, Boromycin and Tartrolone. Some of the boron-containing compounds are also used in the treatment of certain diseases such as Bortezomib (Velcade), Acoziborole (SCYX-7158), Vaborbactam (RPX7009), Benzaksoborol (AN2718), Tavaborole (Kerydin) and Epetraborole (AN3365), which have been synthetically produced. Boron, an element of highly diverse functions across many classes of living organisms, also seems to have a unique potential in drug design. Therefore, we, in this study, review and interpret some of the relevant results, efforts and approaches with the goal of scrutinizing the structural diversity of the molecules and comprehending mechanisms of action of these boron containing antibiotics and potential usages.

**Results:** Aplasmomycin is a natural ionophore and inhibits Gram-positive bacteria in vitro and *Plasmodium berghei* in vivo. Aplasmomycin was obtained from *Streptomyces griseus* strain isolated from marine sediments in Sagami Bay. Boromycin is an antibiotic derived from *Streptomyces spA-3376* strain and was shown to be active against Gram positive bacteria. The antibiotic acts as ionophores that result in the loss of potassium ions in the cell, leading to the arrest of growth in organisms and causing cell death. Exposure to boromycin causes a rapid loss of membrane potential, resulting in a decrease in intracellular ATP levels. It has also been found that boromycin inhibits HIV1 very strongly in both clinical isolates and in vitro culture media. Boromycin inhibits DNA and RNA synthesis in all *Bacillus subtilis* cells. Tartrolone is present in 2 forms: Tartrolon A and B. Of these, Tartrolon B contains boron. Tartrolone was shown to act by interfering with energy transmission and membrane integrity. Mammalian cells are particularly strongly inhibited by Tartrolone B. Bortezomib is a pyrazine and boronic acid derivative that functions as a reversible proteasome inhibitor. Bortezomib blocks 26S proteasomes, which cause the accumulation of proteins in the cell leading to eventual cell death. It is used as an Antineoplastic Agent in the treatment of Multiple Myeloma and Mantle Cell Lymphoma. Although bortezomib has been used to treat hematopoietic cancers such as myeloma, growing basic and clinical studies have shown that bortezomib is successful in treating many types of solid tumors (such as colon, lung, breast, and prostate cancers). Tavaborole exhibits antifungal activity by blocking cellular protein synthesis through the formation of cytoplasmic leucyl-aminoacyl transfer RNA (tRNA) synthetase. Tavaborole belongs to a drug class known as oxaborole antifungals. Benzoxaborole is a topical anti-fungal product candidate for the potential treatment of skin and nail infections. Vaborbactam is used as an antibacterial therapy in urinary tract infections. The mechanism of action of vaborbactam is that it acts as a beta lactamase inhibitor. Acoziborole has been used in trials regarding the treatment of Trypanosomiasis, parasitic diseases and protozoan infections. Epetraborole has been used in trials conducted for the treatment of bacterial infections, intestinal infections, urinary tract, and community-acquired infections. The molecules bust bacteria by inhibiting leucyl-tRNA synthetase, an enzyme that helps bacterial cells to correctly tag tRNA with the amino acid leucine.

**Acknowledgements:** We thank the Scientific and Technological Research Council of Turkey and Mugla SK University (BAP division) for supporting our projects.

**Keywords:** boron, antibiotic, Bortezomib, Vaborbactam, Tavaborole, Benzaksoborole

**Fungal bioaerosols in indoor air environments of Health Services Vocational School in Marmaris, Turkey**

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**Aim of the study:** In this study, it was aimed to determine the fungal bioaerosols in the indoor air environments of Health Services Vocational School and a total of 50 samples were taken from offices, classrooms, dining hall and canteen indoor air.

**Material and Methods:** In the Health Services Vocational School, 50 samples were taken from 22 indoor environments (13 offices, 7 classes, 1 dining hall and 1 canteen). The samples, petri dishes containing Rosebengal Chloramphenicol Agar (RCA), are 1.5 meters high from the ground and the lids were left open for 30 minutes.

**Results:** In this study, 27 microfungi species belonging to 12 genera were obtained. The distributions of the obtained microfungi species and genera in the sampled areas are given in table 1 and 2. *Cladosporium* was isolated from all indoor environments and it was determined to be the most dominant (43.88%) fungus genus qualitatively and quantitatively (Table 1,2). *Alternaria* (14.44%), *Acremonium* (10.55%) and *Aspergillus* (10.00%) were observed respectively. Among microfungi species, *Cladosporium herbarum* was the highest frequency (22.22%) and the most common species (Table 2). In present study, the highest fungal concentration was found in offices (46.66%), followed by classrooms (35%), dining hall (12.22%) and canteen (6.11%) (Table 1,2). It is natural that fungal concentration is high because of the higher number of samples in offices. It can also be said that living plants and soils in the pots in offices may have increased fungal concentration. The high concentration of mold (35%) in the classrooms can be related to the circulation of students and the transfer of fungal fragments to the classroom environments with their clothes and things, especially the shoes.

**Keywords:** Fungal bioaerosols, Microfungi, Microfungal contamination, Turkey

**Diversity and Biogeography of Turkish Seed Beetles (Coleoptera: Chrysomelidae: Bruchinae)**

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**Aim of the study:** Although biodiversity is a multidimensional phenomenon, the number of species dwelling in a particular area, *i.e.* species richness is one of the important criteria to understand the diversity of life. This study mainly aims to determine the seed beetle diversity of Turkey through a careful and extensive review of relevant literature covering more than a century, as well as the biogeographical patterns of seed beetle species within Turkey.

**Material and Methods:** This presentation is a consequence of an intense review of available literature on Turkish seed beetles (Bruchinae, a subfamily of Chrysomelidae). Nearly 70 references published so far and dealing with Turkish seed beetles are reviewed and all provincial records are noted. These records are marked on a Turkey map for each species. Then, biogeographical patterns are inferred for each species according to biogeographic regions determined by European Environment Agency (EAA).

**Results:** The diversity of Turkish seed beetles (Bruchinae) comprises 120 species arranged in 14 genera. The species numbers of recorded genera are as follows: *Spermophagus* (8), *Zabrotes* (1), *Acanthobruchidius* (1), *Acanthoscelides* (1), *Bruchidius* (69), *Callosobruchus* (3), *Mimosestes* (1), *Palaeoacanthoscelides* (2), *Palaeobruchidius* (1), *Pseudopachymerina* (1), *Salviabruchus* (1), *Bruchus* (27), *Caryedon* (3), and *Rhaebus* (1). The Turkish seed beetles approximately constitute 25% of the whole Palaearctic seed beetle diversity. Additionally, there are 12 species of which presence in Turkey are doubtful. According to EAA, there are three biogeographical regions in Turkey, namely Anatolian, Mediterranean and Black Sea. Anatolian sub-region houses 89 of the 120 species while there are 84 species in Mediterranean sub-region and 39 in Black Sea sub-region. The distribution data is insufficient for 14 species. Nearly 25% of species (32 species) are present in all three regions. 19 species occur only in Anatolian sub-region, while 13 species occur only in Mediterranean. 35 species occur in both Anatolian and Mediterranean sub-regions, while 4 species occur in both Mediterranean and Black Sea and 3 species occur in both Anatolian and Black Sea sub-regions. Only one species is endemic to Turkey and three species are introduced.

**Keywords:** Chrysomelidae, Bruchinae, seed beetles, diversity, Turkey.

## Antioxidant Activity of Theobromine Changing by Temperature

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**Aim of the study:** Theobromine found in cocoa beans has high content of antioxidants. Theobromine composed of blocking adenosine receptors and inhibiting phosphodiesterases so it exhibits some positive effects in different human pathologies. Further research is, required to fully understand the antioxidant benefits of theobromine.

**Material and Methods:** We have utilized B3LYP/6-31G(d,p) method to explore the structural features and molecular properties of theobromine. The geometric and electronic properties of the theobromine were investigated in gas phase at B3LYP/6-31G(d,p) basis set at different temperatures. In addition to that various molecular descriptors such as the BDE, AIP, PDE, PA, ETE theobromine have also been obtained and studied, which are relevant to show evidence of antioxidant activity.

**Results:** The antioxidant estimation of theobromine has been determined. Our calculations represented that AIP and  $\Delta E_{iso}$  are electronic properties responsible for the excellent antioxidant activity of the theobromine is similar to caffeine, which has one of the most antioxidant property found in cocoa.

**Acknowledgements:** The authors are grateful to PAUBAP (Project No. 2012BSP004), TUBITAK (Project No. 107T606) and TUBITAK ULAKBIM, High Performance and Grid Computing Center (TRUBA resources).

**Keywords:** Theobromine, density functional theory (DFT), antioxidant activity.

## **New Generation of Biologically Active Molecules from Insects: Antimicrobial Peptides (AMPs)**

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**Aim of the study:** The antimicrobial peptides (AMPs) are biologically active molecules produced by many tissues and cell types in a variety of plant and animal species, including insects that comprise about 55% of total biodiversity and approximately 85% of that from animals. AMPs due to broad range of their activity, lesser toxicity, and decreased resistance development by the target cells are considered as a promising and potential drug candidate for the future that can act against bacteria, viruses, fungi or parasites. In this study, we discussed current knowledge, recent progress, and potential applications of AMPs obtained from insects.

**Material and Methods:** Insects can produce a variety of AMPs. AMPs are secreted from cells and tissues such as the haemocytes or the fat body of insects. We searched the literature for studies on AMPs identified from different insect species. We reviewed their results and assessed antimicrobial, antiviral, antifungal, and antitumor properties of AMPs.

**Results:** AMPs have been much more intensively studied in insects. The first insect AMP was purified from the pupae of *H. cecropia*, and since then over 150 insect AMPs have been identified, which can be classified into four groups according to their structure or function: (1)  $\alpha$ -helical peptides, (2) cysteine-rich peptides, (3) proline-rich peptides, and (4) glycine-rich peptides. Some of them have a broad range, whereas others show varying degrees of specificity towards Gram-positive or Gram-negative bacteria, fungi, parasites and even viruses. It has been argued that insect AMPs have potential applications in agriculture, disease vector control, and medicine. Their use as alternatives for conventional antibiotics in ectopic therapies, their combined use with antibiotics to restore the susceptibility of multidrug-resistant pathogens, and their use as templates for the rational design of peptidomimetic drugs that overcome the disadvantages of therapeutic peptides are considered as potential medicinal applications. It has been suggested that small peptides have been more suitable candidates for potential application of insect AMPs in medicine and chemical modifications of small peptides are necessary to generate more potent and stable peptides. These various insect AMPs as well as unknown ones should be studied more comprehensively to reveal their effects.

**Keywords:** Antimicrobial peptides (AMPs), insect, hemolymph, medicine

## **Determination of Some Heavy Metal Contents of Forage Plants Grown on the Roadside Fields of Van, Turkey**

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**Aim of the study:** This study was carried out to determine some heavy metal contents of alfalfa and trefoil grown at the fields around the main road between Van and Bitlis.

**Material and Methods:** Roadside was accepted as the beginning point and plant samples for alfalfa and trefoil were taken at 5 m, 25 m and 50 m away from roadside with five replications respectively. Heavy metal contents (Fe, Cu, Zn, Mn, Ni, Cd, Cr, Pb and Hg) determined in the plant samples changed with distance from the roadside of plant sampling positions.

**Results:** The highest Fe, Cu, Zn, Mn, Ni, Cd, Cr and Pb contents for alfalfa were determined as 256 ppm, 54 ppm, 35 ppm, 60 ppm, 5.90 ppm, 4.82 ppm, 6.09 ppm and 4.43 ppm in the samples taken within 25 m from the roadside in Dokuzagac Village, respectively. Similarly, the highest Fe, Cu, Zn, Mn, Ni, Cd, Cr and Pb contents for trefoil were determined as 200 ppm, 40 ppm, 28 ppm, 45 ppm, 4.50 ppm, 0.10 ppm, 2.75 ppm and 7.59 ppm in the samples taken within 25 m from the roadside in Atalan Village, respectively. The heavy metal contents of the forage plants generally decreased from the sampling position of 5 m to 50 m away to roadside.

**Keywords:** Heavy metal, clover, trifol, roadside

## The First Alien Plants Database of Turkey

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**Aim of the study:** Invasive alien plants consist the largest part of invasive alien species. Databases on alien species can provide information about current and historical situation and help finding out future directions as well as choosing management options. There has been no a database on alien plants in Turkey although species can be found in flora books (websites) and papers. The aim of this presentation is to introduce the results of a desktop study in alien plants in Turkey, discuss its possible implications and propose future steps.

**Material and Methods:** The data were mainly derived from *the Flora of Turkey and the East Aegean Islands* (Davis 1965–1985, Davis et al. 1988, Güner et al. 2000) and the checklist, *Türkiye Bitkileri Listesi (Damarlı Bitkiler) [List of Turkey Plants]* (Güner et al. 2012). All possible sources such as scientific journals' series such as Turkish Journal of Botany, dedicated studies, field surveys herbarium samples, and dedicated web sites such as GBIF database and Tüvives were checked to compile data. The oldest source for data used was *Flora Orientalis* (Boissier 1867–1884) and its supplement (Boissier 1888). Names of species, their botanical features, habitats and alien status were presented. Furthermore, acquis related to (invasive) alien species and biodiversity was checked thorough internet.

**Results:** The number of alien species were recorded 340, which has been increasing since then although it is the small number comparing to many countries in Europe. The main source of alien plants in Turkey is Americas. Intentionally introduced species consists vast amount of IAP. Ornamental plants pathway is reason of over 50 % of introductions. No dedicated legislation has been found on invasive alien species in Turkey. However, some documents such as National Biodiversity Strategy and Action Plan 2007, bylaw Conservation of Aquatic Areas 2014, Action Plan for Rehabilitation of Mine Areas 2014-2018 include invasive alien species. Especially measures should be taken on ornamental species. Training importers, producers, municipality authorities, hotel managers, and general public can be helpful to prevent new introductions via this pathway. ESENIAS, EPPO and CoE activities should be followed carefully and involved in all levels. The data has been archived on the Global Biodiversity Information Facility (Uludag et al. 2017a) and published at Neobiota Journal (Uludag et al. 2017b). The ultimate aim of study establishing online data base to have further contribution from scientists and general public to be able to have biological data and distribution maps. This may create awareness for (invasive) alien species, which might lead more attention in policy level and among citizens. Pest risk assessments should be done and open for public.

**Keywords:** acquis, invasive alien plants, citizen science, ornamental plants, strategy

## Determination of Thermophilic and Thermotolerant Fungal Biodiversity of some Hot Springs in Aegean Region and Screening of their Phytase Activities

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**Aim of the study:** Phytase enzyme catalyses hydrolisation reactions of phytic acid to inorganic phosphate and myo-inositol phosphates. This enzyme is widely used as a supplement for animal feed in order to improve its nutritional efficiency and reduce the phosphorous contamination in soil and water bodies. Most desired properties of phytases used as feed supplement is the high thermostability by the reason of not to be inhibited in high temperatures during the pelleting process of feeds. For this reason, it was aimed to investigate the thermophilic/thermotolerant fungal biodiversity of some hot springs in Aegean Region and to investigate phytase activities.

**Material and Methods:** Soil and sediment samples were collected from 17 different hot springs from 5 provinces (İzmir, Aydın, Denizli, Kütahya, Manisa) located in Aegean region. Potato Dextrose agar, Malt Extract agar and Rose Bengal Chloramphenicol agar were used for fungi isolation. All inoculated plates were incubated at 45°C up to 14 days. Thermophilic/thermotolerant nature of the isolates was determined by incubating the isolates at 17°C for 7 days. Identification of the isolates was done using polyphasic approach. In addition to the phenotypic characteristics of the isolates, ITS and, in some cases, the calmodulin gene sequences have also been identified. Extracellular phytase activities of the isolates were quantitatively determined using a modified ammonium molybdate method. Protein amount was determined using Bradford method and one unit of phytase activity was defined as the amount of enzyme needed to liberate 1 µmol inorganic phosphate per min under the assay conditions.

**Results:** A total of 35 fungi, 34 thermotolerant and 1 thermophilic, were isolated from the samples. All isolates were assigned to 7 different genera including *Aspergillus*, *Penicillium*, *Scytalidium*, *Acrophialophora*, *Lichtheimia*, *Myceliophthora* and *Neosartorya* after phenotypic tests and DNA analyses. *Aspergillus* was the most common genus covering 77% of isolates. A total of 21 (60%) of the isolates were obtained from Kütahya region followed by 11 isolates (31%) from Dikili region. Extracellular phytase activity was detected in 30 of 35 isolates (86%). The isolate with the highest specific activity was determined as *Aspergillus tubingensis* TEM 37 strain isolated from the Gediz hot spring in Kütahya region.

**Acknowledgements:** This project was financially supported by Scientific and Technical Research Council of Turkey (TÜBİTAK) (Project No: 116Z114).

**Keywords:** Phytase, thermophilic/thermotolerant fungi, hot springs, fungal biodiversity, Aegean region

**Mechanism of Modification Adaptation of Biological Tissues to External Influences Investigated by Structural Methods Using Synchrotron Radiation**

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**Aim of the study:** Structural biology of living tissues and mucus has been largely overlooked by researchers of the last century despite the advances of modern molecular and cell biology. We were pioneers in application of X-ray diffraction methods to studying proteoglycan structures of native mucus. A surprising experimental result was obtained from samples of highly concentrated gel of dog duodenal juice. A representative collection containing documented samples of various types of mucus and tissues collected from medical, veterinary and agricultural institutions is a characteristic feature of our methodological approach to structural research.

**Material and Methods:** In recent years we have carried out large-scale diffraction and fluorescence studies of animal and human native and oncogenically transformed epithelial tissues using synchrotron radiation. The role of calcium and other metal cations, as well as chelating agents in the nanostructure of proteoglycans was studied. Preliminary experiments have shown that this nano-invariance is observed in samples of bacterial films of *Azospirillum brasilense* Sp245 formed under extreme conditions.

**Results:** High-frequency electrosurgical welding technology for clinical application has been developed and introduced by the Paton Institute of Electric Welding. HF-welding provides a biologically stable joining of living tissues while simultaneously initiating the reparation process and bypassing the stage of tissue destruction, due to the synergic mechanical and thermal action of impulses of high-frequency electromagnetic fields, dosed according to the morphological features of the biomaterial. Proteoglycan systems are considered as polydentate ligands that form a nano-ordered tissue framework in which conformational determined elements of fibrillar protein structures of the cell cytoskeleton are coupled with conformational labile proteoglycan structures of the intercellular matrix. Proteoglycan systems of epithelial tissues can be not only a marker of the physiological status of the tissue and primary antibacterial resistance, but also a regulator that ensures adequate adaptation of biological systems to changes in external environmental parameters.

**Keywords:** X-ray diffraction, synchrotron radiation, biological tissues and mucus, HF-welding

## Obtaining of Phytopatogen-Resistant Tomato and Potato Plants with Human Lactoferrin Gene

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**Aim of the study:** Development of genetically modified potato (*Solanum tuberosum*) and tomato (*Lycopersicon esculentum*) plants with increased resistance to phytopathogenes carrying human lactoferrin gene (*hLF*).

**Material and Methods:** *Agrobacterium*-mediated transformation of different genotypes of potato (*Solanum tuberosum*) and tomato (*Lycopersicon esculentum*) with human lactoferrin gene (*hLF*). Polymerase chain reaction (PCR) with specific primers to gene of interest (*hLF*) and to marker genes. Biotests on phytopatogene resistance.

**Results:** Genetically modified lines of potato and tomato were obtained and analyzed. Transfer and incorporation of *hLF* gene into respective plant genomes was confirmed by PCR reaction with specific primers to gene of interest. Preliminary biotests on phytopatogene resistance were conducted out and higher resistance of transgenic lines to them was found.

**Acknowledgements:** This research was conducted out under the project “Application of lactoferrin gene for construction of phytopatogene-resistant plant lines from *Solanaceae* family” in the frames of complex interdisciplinary research program “Molecular and Cell Biotechnologies for the needs of medicine, industry and agriculture” of Natl. Acad. of Sci. of Ukraine (2015-19).

**Keywords:** lactoferrin gene, plant transformation, phytopatogene resistance, potato, tomato

**Macro and Trace Element Levels of *Cladophora glomerata* (L.) Kütz., *Ulva compressa* Lin. and Water from Izmir Bay (Aegean Sea/ Turkey)**

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**Aim of the study:** Most of the Earth surface is covered with water and living beings always need water to survive. Therefore, monitoring of water resources and the organisms that living in these resources is a significant issue. Algae, the primary producers of aquatic ecosystems, are important living organisms. Studies on physico-chemical properties of aquatic ecosystems are maintained for a long time in our country and in the world. In this study, macro and trace elements levels of water and algal samples taken from the Izmir Bay were investigated.

**Material and Methods:** Our study area, is located at Izmir Province and the samples were taken from the Uzbek Village beaches of the Urla District. Water and algal samples [*Cladophora glomerata* (L.) Kütz. and *Ulva compressa* Lin.] were taken in April 2014. Measurements of samples were performed with ICP-OES. According to Pearson Correlation Matrix (PCA) analysis of macro and trace elements relationships were determined.

**Results:** As a result of this work, about macro elements, the highest value in sea water for S,  $769.091 \pm 17.68 \text{ mg L}^{-1}$ , the highest value in *Cladophora glomerata* (L.) Kütz. for K,  $74.08 \pm 0.54 \text{ mg g}^{-1}$ , the highest value in *Ulva compressa* Lin. for Na,  $35.47 \pm 0.12 \text{ mg g}^{-1}$  have been measured. About trace elements, the highest value in sea water for Mo,  $0.009 \pm 0.0003 \text{ mg L}^{-1}$ , the highest value in *Cladophora glomerata* (L.) Kütz. for Fe,  $6.072 \pm 0.15 \text{ mg g}^{-1}$ , the highest value in *Ulva compressa* Lin. for Fe,  $2.003 \pm 0.05 \text{ mg g}^{-1}$  have been measured. Macro and trace elements showed positive and negative correlation with each other in Izmir Bay.

**Keywords:** Izmir Bay, Algae, Macro Element, Trace Element, PCA

## Protein Damaging Activities of Insecticides

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**Aim of the study:** Azinphos-methyl, is a broad spectrum organophosphate insecticide that was used on many crops, especially apples, pears, cherries, peaches, almonds, and cotton. Thiamethoxam is a broad-spectrum, neonicotinoid systemic insecticide which is used on cotton, tomato, cucumber, eggplants, peaches, pears, tobacco and apples for *Bemisia tabaci*, and *Agriotes* spp. This study was designed to determine the effect of different concentrations of Azinphos-methyl and Thiamethoxam on Bovine Serum Albumin (BSA) in the absence and presence of Cu (II) ions.

**Material and Methods:** Protein damaging activities of azinphos methyl and thiamethoxam were checked on bovine serum albumin (BSA) in the absence and presence of Cu (II) ions by using sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE).

**Results:** It has been found that azinphos-methyl and thiamethoxam can effectively promote damage of BSA. The damage dependence on the concentration of insecticide.

**Keywords:** Protein Damage, Genotoxicity, Azinphos-methyl, Thiamethoxam

**Boric Acid Stress Induction of *clpP* gene in *Bacillus subtilis***

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**Aim of the study:** Most bacteria respond to stress environments by inducing or repressing numerous genes. Boric acid is one of the stresses that microorganism must endure. To understand the regulatory networks that may be employed; we aimed to perform gene expression studies using *Bacillus subtilis*, a gram positive model bacterium. Using this organism has its advantages for its genome and the proteomic maps are relatively well studied. In this study, in order to shed light onto the gene expression regulated by boron, the protein extracts were obtained from the bacteria grown with varying levels of boric acid. Following the proteomics analysis of the cytoplasmic proteins, two of the regulated spots were chosen, peptide identification was carried out and mRNA levels of the *clpP* and *metK* genes were studied using RT-PCR.

**Material and Methods:** *B. subtilis* 168 strain was grown to OD 0,6 in the medium with 50 mM or without boric acid and the cell pellets were obtained by centrifugation. Total RNA isolations were performed with Ambion kit (Thermo Scientific PureLink RNA Mini Kit). *DNaseI* (Thermo Scientific) was applied to remove genomic DNA contamination. cDNA synthesis (Thermo Scientific Revert Aid First Strand cDNA Synthesis Kit) was performed using random hexamer primers from high quality and pure RNAs. Primers specific to the *clpP* and *metK* genes were designed using Primer 3 program. For housekeeping genes, *rpoB* and 16S rRNA region specific primers were also designed. RT-PCR experiments were performed using these primers. At the same time, to conduct time-dependent studies, the cells were grown in the media to OD 0,6 and then exposed to 50 mM boric acid containing media for 0, 10 and 30 minutes and the controls were done without boric acid. Total RNA isolations, cDNA synthesis and RT-PCR experiments were performed as described by the manufacturers.

**Results:** As a result of the first approach, it was observed that the level of expression of the *clpP* gene decreased and there was no difference in the expression level of *metK*. As a result of second approach of the time-dependent RT-PCR, the expression of *clpP* increased in 10 min and decreased in 30 min indicating the induction of *clpP* gene by boric acid. There was no difference in the expression level of *metK*. We suggest that *clpP* is one of the genes, that is directly or indirectly implicated in cellular response to boron stress. Because there are also similar results in the literature indicating that *clpP* gene expression was shown to be differentially regulated in *B. subtilis* under the conditions of salt stress, salicylic acid and heat shock. The *ClpP* protein, which is a part of the CtsR general stress regulator, is involved in the degradation and repair of damaged proteins. In conclusion, in this study, we show for the first time and suggest that the alteration of the expression level of this gene in *B. subtilis* may contribute to the cellular tolerance against boric acid stress.

**Acknowledgements:** This project supported by Mugla SK University (BAP division).

**Keywords:** *Bacillus subtilis*, boron, gene expression, *clpP*, *metK*

## Protection of Lake Bafa Nature Park by Using the Area as an Ecotourism Route

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**Aim of the study:** Situated on the land of Aydın and Muğla provinces, Lake Bafa which used to be connected to sea via Latmian Gulf, is a lagoon lake with a unique geographical position where nature and history meets. Lake Bafa Nature Park is an important area due to its rich biodiversity, landscape and historical attractions. Despite being a nature wonder and a natural tourist attraction, considering online user reviews about Lake Bafa Nature Park, it is observed that tourists have complained about insufficiencies such as the lack of a trekking track. This study presents a model for protection of environment and biodiversity in Bafa Lake Nature Park in Turkey by using it as an ecotourism trail.

**Material and Methods:** In parallel with the purpose of the study, firstly the characteristics of Lake Bafa were examined through the literature. The historical, cultural, local, natural and socioeconomic features were extracted. Then online reviews of tourists who had visited the area were analysed in terms of positive and negative feedbacks. Which ecotourism types could be applied and developed was discussed with a compare and contrast method. Lake Bafa Nature Park was compared with similar nature parks with rich biodiversity around the world. Lastly, as a result of all the analyses, some suggestions were asserted.

**Results:** Ecotourism is a tourism type offering a sensitive approach to natural places, a protection of welfare of local people and natural environment. As a result of literature review, online review analyses and comparisons with similar areas around the world, it is determined that Lake Bafa Nature Park can be protected and improved by using the area as an ecotourism route for especially responsible nature tourists. It can be promoted on online environment platforms where responsible tourists can be found. With activities like bird watching, canoeing, trekking and camping, Lake Bafa Nature Park can be turned into an ecotourism route which offers a unique experience for tourists who are aware of the importance sustainability of natural biodiversity areas.

**Keywords:** Bafa Lake, Ecotourism, Protection and Usage

## Grassland Communities of Küre Mountains in Bartın, Turkey

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**Aims of the study:** The aim of this study is to analyse the grassland communities of Küre Mountains in Bartın (Turkey).

**Material and Methods:** Küre Mountains National Park, which is located between Bartın and Kastamonu provinces of the Western Black Sea Region of Turkey, has characteristics of a plateau. The National Park starts from Bartın River on the west and extends approximately 300 kilometres to the Kızılırmak River on the east. This study was conducted in Bartın section (19.000 ha) of the Küre Mountains (37.753 ha). Soil types of the region are dusty clay, loam clay and loam. In this study, grassland vegetation of the National Park will be presented with 48 relevés which were taken using Braun-Blanquet method. Vegetation data consists of 654 taxa, of which 49 taxa are phanerophytes, 96 are geophytes, 53 are *chamaephytes* 306 of it are hemicryptophytes and 150 of it are *therophytes*. The mapping was developed by means of ArcGIS software. The altitude of the relevés varies between 107 m to 925 m. All of the relevés were stored into TURBOVEG and the classification was done using TWINSpan (Hill, 1979) within JUICE software.

**Results:** As a result of the classification, grassland communities on the steep and sunny slopes (*Caucalis platycarpus* group) were separated from the humid meadows (*Sophora jaubertii* group) on the first level of division. On this level, *Caucalis platycarpus* group was defined as an association. On the second level, *Trifolium echinatum* group was separated from *Sophora jaubertii* group and identified as an association. On the third level, *Psoralea bituminosa* dominated group was obtained. Besides, optimal groups were identified for the *Sophora jaubertii* dominated meadows on the fourth level of division. Consequently, 5 associations under 2 Classes and Orders were presented.

Based on the classification and ordination following classification scheme was proposed:

Class: Stellarietea mediae Tx., Lohmeyer et Preising in Tx. ex von Rochow, 1951

Order: Centaureetalia cyani Tx., Lohmeyer et Preising in Tx. ex von Rochow, 1951

Alliance: Caucalidion lappulae Tx. ex von Rochow, 1951

**Association: *Caucalido platycarpi-Trifolio arvensis* ass. nova**

Alliance: Sherardion Kropáč et Hejný in Kropáč, 1978

**Association: *Lapsanio communea-Sophoroa jauberti* ass. nova**

Alliance: Caucalidion lappulae Tx. ex von Rochow, 1951

**Association: *Medicago lupulina-Plantagini lanceolatae* ass. nova**

Class: Molinio-Arrhenatheretea R. Tx., 1937

Order: Arrhenatheretalia elatioris Pawl. 1956

**Association: *Galio odorati-Dactyllidion glomeratae* ass. nova**

**Association: *Trifolio-Bellardion trixagoi* ass. nova**

**Acknowledgements:** This study is supported by TÜBİTAK, Project number: 1140660

**Keywords:** Grassland Vegetation, Küre Mountains, National parks, Turkey

## **An Anatomical Survey of *Cheirolepis* section of *Centaurea* genus (Asteraceae) in Turkey**

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**Aim of the study:** This study includes a detailed anatomical analysis of seventeen taxa of *Cheirolepis* section of *Centaurea* genus in Turkey.

**Material and Methods:** The plant materials were collected from several localities for *Cheirolepis* section and stored in 70% ethyl alcohol. The paraffin method was applied for cross sections of vegetative organs. If paraffin method was not successful, we then cut the cross sections using a razor blade by hand or a cryostat. On average, 10 preparations were made for each type of section and 30 cell groups were measured.

**Results:** The root anatomy showed that there is a secondary root structure in *Cheirolepis* section with peridermis, cortex parenchyma, phloem and xylem. The cross sections of stems have an epidermis on the outermost surface as a protective tissue. Underneath the epidermis, there is collenchyma with several layers (from 5 to 11) in the corners. Cortex is characterized with parenchymatic cells which shapes are cylindrical. Vascular bundles are many in studied taxa. The pith region is filled with large parenchymatic pith cells. There are one, three or five large median vascular bundles of studied leaves and the other vascular bundles are smaller. The mesophyll type is equifacial but mesophyll thickness is varies in examined species.

**Acknowledgements:** We would like to thank Selçuk University Finance Unit with 15101010 project number.

**Keywords:** Anatomy, *Centaurea*, *Cheirolepis*, Turkey

## Comparative Performance of BMWP Indices in Esen River in SW Anatolia, Turkey

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**Aim of the study:** Historically, invertebrates have received considerable attention in the study of running water ecosystems. In particular, relationships between macroinvertebrate community structure and environmental variables have been the subject of numerous investigations. In this study, taxonomic composition of benthic macroinvertebrate fauna was used for calculation of the six Biological Monitoring Working Party (BMWP) versions for biological determination of water quality. Also the evaluation system of Klee was used for physical and chemical evaluation of the water quality classification.

**Material and Methods:** Eşen River is the largest river in West Mediterranean river basin of Turkey with the total length of 146 km. Benthic samples were collected from seven stations that represent the river. Macroinvertebrate communities along the stream were sampled monthly between June 2003 and June 2005, using a bottom kick net (500 µm mesh). The samples were taken from an area of nearly 100 m<sup>2</sup> in order to include all possible microhabitats at each station. In addition, macroinvertebrate samples were separated from the macrophytes and the sediment using sieves (250 µm). Collected organisms were immediately fixed in formaldehyde (4%) in the field and then transferred to 70% ethyl alcohol. The macroinvertebrates were sorted, identified to the lowest possible taxon (species, genus or families) and counted under a stereomicroscope. Simultaneous with macroinvertebrate sampling, water samples were taken and analysed for the environmental variables. All analyses were done in accordance to national standards. Water quality assessment by physical and chemical parameters was done according to Klee (1991).

**Results:** The most important pollution sources on Eşen River are over irrigation, gravel gathering, dams and extensive using of chemicals for farming in the surrounding. When physical and chemical variables were evaluated according to Klee for determination of water quality, three quality classes were found. When the BMWP versions evaluated for classification of water quality, two classes were determined. When statically methods were evaluated significant relation was determined between used BMWP versions ( $p < 0.01$ ).

**Acknowledgements:** The authors are thankful for the financial support of the Unit of Scientific Research Projects of Mugla Sıtkı Kocman University (Project No: 2003/10).

**Keywords:** BMWP Indices, Benthic macroinvertebrate, Esen River, Turkey.

**Some Water Quality Properties of Acı Lake (Konya/ Turkey)**

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**Aim of the study:** Living beings need water to sustain their lives. Usage, conservation and management of water supplies are therefore extremely important. Researches on the investigation of the physico-chemical properties of water ecosystems are frequently carried out. The purpose of this study is to investigate some water quality characteristics of Acı Lake.

**Material and Methods:** Acı Lake, which is volcanic-based and a salty water source, is an important habitat for birds and other creatures. Lake is located in Karapınar District at a distance of 108 km from Konya Province. In this study, some physical and inorganic parameters were studied between July 2014 and January 2015 in Acı Lake. During the study, the water samples were taken seasonally from three 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:** According to the measurement results of the physical and inorganic parameters, turbidity and electrical conductivity values exceeded the values specified in the regulations. High amount of salt was observed in the lake water. According to Pearson Correlation Matrix (PCA) analysis, physical and inorganic parameters showed positive and negative correlation with each other in Acı Lake.

**Keywords:** Acı Lake, Inorganic parameters, PCA, Physical parameters.

**Fungal flora on Ambrosia beetles, *Anisandrus dispar* Fabricius and *Xylosandrus germanus* Blandford (Coleoptera: Curculionidae: Scolytinae)**

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**Aim of the study:** Ambrosia beetles form a large group of small wood-boring beetles. They are very harmful on many plant species such as forest and fruit trees throughout the world. Some of the ambrosia beetle species are very serious pests of hazelnut orchards in Turkey, including *Anisandrus dispar* Fabricius and *Xylosandrus germanus* Blandford (Coleoptera: Curculionidae: Scolytinae). The fungi have a different type of relationship with ambrosia beetles species, such as symbiotic, entomopathogenic and plant pathogenic. In this study, fungal flora was investigated on these two pest species in hazelnut orchards.

**Material and Methods:** Hazelnut orchards in Samsun province in Black Sea region (Turkey) were surveyed to collect hazelnut branches attacked by *A. dispar* and *X. germanus*. The branches were dissected by pruning scissors and adults of the beetles were obtained from galleries. Female insects were examined in two sections such as mycangia and body parts during fungi isolation. In addition, diseased cadavers of the beetles were used for isolation of entomopathogenic and plant pathogenic fungi. The identifications of all the isolates obtained by both methods were made according to the macroscopical and microscopical characteristics of the fungi.

**Results:** As a result, totally 151 isolates belonging to different fungus species including *Ambrosiella hartigii*, *Acremonium* spp., *Lecanicillium muscarium*, *Paecilomyces* sp., *Beauveria bassiana*, *Metarhizium anisopliae*, *Fusarium* sp., *F. oxysporum*, *F. proliferatum*, *F. solani*, *Ophiostoma* spp., *Pestalotiopsis* spp., *Aspergillus wentii* sp., *Trichothecium* sp. and *Alternaria* sp., were isolated from females of *A. dispar* and *X. germanus*: 57 were obtained from mycangia, 70 from body parts and 24 from diseased cadavers. Especially, *A. hartigii* was found intensely from mycangia and body parts of the both beetles, and it was firstly identified as primary symbiotic fungus in Turkey.

**Keywords:** *Anisandrus dispar*, *Xylosandrus germanus*, symbiotic fungi, entomopathogenic fungi, plant pathogenic fungi, hazelnut

## Growth and Morphometric characters of *Gambusia holbrooki* (Teleostei: Poeciliidae) in Pınarbaşı Spring Creek (Burdur, Turkey)

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**Aim of the study:** The introduction of alien fishes into inland waters of Turkey has a long history beginning with the stocking of exotic Poeciliidae (*Gambusia holbrooki* Girard, 1859). In the past century this species have been stocked in both permanent and temporary waters of Turkey. Abundance and distribution of *G. holbrooki* in Turkey continues to increase steadily, and are now considered a threat factor for native fish species. Although range of distribution is high, studies on biology of *G. holbrooki* is few. The objective of this study was to provide information on the morphometric characters and some growth properties of *G. holbrooki* in Pınarbaşı Spring Creek (Burdur, Turkey).

**Material and Methods:** The study was carried out in the Pınarbaşı Spring Creek (Pınarbaşı Village, N 37°27'09.78"; E 30°03'29.44 – N 37°27'13.77"; E 30°03'03.56) in the Burdur Province within the Lake District Region in south-western Anatolia (Turkey). Fish samplings were carried out in the Pınarbaşı Springs Creek from November 2013 to October 2017 by means of electrofishing. All individuals (preserved frozen) were measured for total length (TL, in cm) to the nearest mm and weighted (W, total wet weight in g) to the nearest 0.01g. Metric characters were measured with digital slide calliper on the fish body. The total length–weight relationship was determined using the equation  $W = aL^b$ . The condition factor was calculated by the Formula Condition Factor (CF) =  $100 W/L^3$ . The scales of individuals were used for age determination. Differences between size frequency distributions of males and females were tested by Kolmogorov-Smirnov test. Growth in males and females within the same age groups was tested by Student's t test.

**Results:** The 153 individuals of *G. holbrooki* used for the age determination consisted of 124 (81,05%) females and 29 (18,95%) males. The male–female ratio for all fish combined was 0,23:1 and differed statistically from the expected 1:1 ( $P < 0.05$ ). Two age class were determined in captured specimens of *G. holbrooki*. While Growth type of males is negative allometric, growth type of females is positive allometric. The growth properties have been obtained and compared with other studies.

**Keywords:** Alien, exotic, malaria control, biodiversity, warm spring.

## **Determination and Distributions of Macroinvertebrate Potamofauna of Delice River (Kızılırmak)**

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**Aim of the study:** Benthic macroinvertebrates not only reflect biological diversity of aquatic systems where they live but also have bioecological importance in studies about determination of water quality. They are accepted as one of the biological quality elements which are used in ecologically classification of surface waters and sustainability, improvement and protection programs according to Water Framework Directive because of their indicator characteristic. Delice River which had limited studies about determination of its benthic macroinvertebrate fauna is one of important tributaries feeding Kızılırmak. Zoobenthic samples were collected between 2007, 2008, 2009 and 2013 years and investigated with the aim of determined of macroinvertebrate potamofauna and water quality of Delice River.

**Material and Methods:** Macroinvertebrate samples were collected by kick net methods from 12 stations in Delice River between 2007, 2008, 2009 and 2013 years and fixed with 70% ethanol *in situ*. Collected samples were firstly diagnosed at orfo-family level, then Gastropoda, Oligochaeta, Chironomidae and Trichoptera groups were identified at level of species and calculated values of Shannon diversity index. Also some water physico-chemical parameters (pH, temperature, dissolved oxygen, ammonium nitrogen (mg NH<sub>4</sub><sup>+</sup>-N/L), nitrate nitrogen (mg NO<sub>3</sub><sup>-</sup>-N/L)) were measured seasonally.

**Results:** Following the study, it was determined that macroinvertebrate potamofauna of Delice River was consisted of Gastropoda (54.006%) Oligochaeta (13.125%), Ephemeroptera (11.205%), Chironomidae (8.815%), Trichoptera (5.082%) and others (7.766%) taxa. 38277 individuals were collected in Delice River during the study and identified 164 species belonging to Gastropoda, Oligochaeta, Chironomidae and Trichoptera groups. The dominant species in basin-wide were determined as *Potamopyrgus antipodarum* from Gastropoda, *Limnodrilus udekemianus* from Oligochaeta, *Orthocladius (Orthocladius) thienemanni* from Chironomidae and *Hydropsyche angustipennis* from Trichoptera. Identified species were associated with water quality according to their population densities. It is considered as species diversity of Delice River zoobenthic fauna which was identified 164 species was high. Most part of identified species are alpha and beta mesosaprobic species. The highest species diversity was belong to Chironomidae family withy 100 species. Also *Orthocladius (Orthocladius) nigritus* from Chironomidae is new record for Turkey potamofauna.

**Keywords:** Delice (Kızılırmak) River, Oligochaeta, Gastropoda, Chironomidae, Trichoptera

## Immobilization of Acetylcholinesterase on Novel Polymeric Nanospheres for Pesticide Determination

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**Aim of the study:** Pesticides are widely used in agriculture to prevent harmful organisms in products, because of their high insecticidal activity. However, pesticides have toxic effects on human health and the environment. Therefore, it is important to determine the pesticides in water, soil and various food products. Enzymatic biosensors have become the most popular analytical tools for detection application in the last decade. Enzymatic detection of pesticides is mainly based on acetylcholinesterase (AChE) inhibition. AChE is crucial enzyme in the central nervous system of living organisms. Organophosphate and carbamate insecticides are the main AChE inhibitors. For this reason, the development of new methods for rapid and precise determination of these insecticides has become important. One of is the immobilization of enzymes on small size and large surface area nanospheres.

**Material and Methods:** In this paper, novel polymeric nanospheres have prepared for practically determination of pesticides. Firstly, the polymeric nanosphere including azomethine groups (L) was synthesized from tris(2-aminoethyl)amine, polymer-bound with 2,2'-bipyridine-4,4'-dicarboxaldehyde by condensation method and Pt(II)-tagged nanosphere (Pt<sup>2+</sup>L) was synthesized from tris(2-aminoethyl)amine, polymer-bound, 2,2'-bipyridine-4,4'-dicarboxaldehyde and PtCl<sub>2</sub> by template method. Secondly, the AChE enzyme was immobilized on the polymeric supports by taking the advantages of hydrogen bond / or covalent bond in the between enzyme and nanospheres (L / or Pt<sup>2+</sup>L) to improve performance on the recycling stability. Finally, the interaction between the immobilized-AChE enzymes and pesticides were investigated using UV spectra.

**Results:** The polymeric nanospheres were characterized by means of spectral measurements. The influence of temperature, pH, reusability and storage capacity on the free and immobilized AChE were examined. The results of immobilization showed that the immobilized enzymes had good storage stability and reusability. UV spectra showing the effect of immobilized-AChE and pesticides (carbofuran, methiocarb, methomyl, malathion, chlorpyrifos-methy, acephate) were obtained. The absorbance changes have shown that there is an interaction between the enzyme and the pesticide due to the enzyme-pesticide (inhibitor) compound. Consequently, we can say that used method gives good results for the practical detection of pesticides by immobilized nanosphere supports.

**Acknowledgements:** This work was supported by the Düzce University Research Fund (Project number: 2017.07.06.661).

**Keywords:** Polymeric nanospheres, AChE enzyme, pesticides.

**Anatomical study on the species of *Cousinia* Sect. *Cynaroideae* Bunge. (Asteraceae) and their taxonomic implications**

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**Aim of the study:** The present study aims to investigate the anatomical features of section *Cynaroideae*, to determine and to evaluate the usefulness of these characters for taxonomic purposes.

**Material and Methods:** The plant specimens were collected from different localities in Turkey. The specimens have been kept in Selçuk University Herbarium (KNYA). The herbarium samples were examined using Flora of Turkey under the stereo-binocular microscope. For anatomical studies, living material was kept in 70 % ethanol. The paraffin method was used for cross sections of stems and leaves. The specimens were embedded in paraffin wax and then sectioned between 5 and 10 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 binocular light microscope with a Leica DFC280 camera.

**Results:** Some anatomical characters such as size of vascular tissue, number of vascular bundle, number of cells in cortex layers and size of mesophyll layer provided information of taxonomical significance. Anatomical measurement of various tissues of the studied species were given. In stem transverse sections, species of section *Cynaroideae* have from 5 to 11 cortex layers. Leaves have upper 1-2 palisade and 1 spongy paranchyma, lower 2 palisade paranchyma. Midrib of leaves have from 5 to 11 vascular bundles.

**Acknowledgements:** 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. We also thank to "TÜBİTAK: TBAG-111T364"

**Keywords:** Asteraceae, *Cynaroideae*, Anatomy, Taxonomy

## **Vertical Species Diversity of Ground Beetles (Coleoptera: Carabidae) in Davraz Mountain (Isparta-Turkey)**

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**Aim of the study:** The aim of this study is to contribute the biodiversity and taxonomic information about the ground beetles fauna of Davraz Mountain.

**Material and Methods:** The materials of this study comprise the specimens which are collected from five different sampling areas of Davraz Mountain. The sampling areas were chosen from different altitudes which represent the different habitat types of mountain. Specimens were collected with pitfall traps, hand and aspirator. Shannon-Wiener and Simpson indices were used to estimate diversity of beetle species in the study while habitats and collected species were compared with Jaccard and Sorensen similarity indices. Each specimen was identified using the literatures of Jeannel (1941), Netolitzky (1942), Trautner and Geigenmüller (1987), Hurka (1996), Avgin (2006), Kesdek (2007) and turn into a museum material with classic preparation methods. All of the specimens are stored in Entomology Laboratory of Department of Biology in Süleyman Demirel University.

**Results:** As a result of this study, 51 different species belonging to 27 genera in 13 tribus and recorded from five different study sites in Davraz Mountain (Isparta) in 2010. Species relationships with altitude were researched and it was found that "altitude" is not a primary factor on species diversity but some species has an altitude preference. Habitats were compared with similarity (Jaccard, Sorensen) and diversity (Simpson, Shannon-Wiener) indices. It was determined that the area with highest value in terms of diversity was the 5<sup>st</sup> sampling area (summit of the mountain). According to similarity index, the most similar habitats in terms of ground beetles communities were 1<sup>st</sup> area (meadow) and 3<sup>rd</sup> area (meadow with open mixed forest) with 61% percentage. Some species have habitat specialization, the most specialization was seen on moist habitats and pine forest habitats. CCA indicates that most effective environmental variable on the ground beetle species is "sandy soil texture" factor.

**Acknowledgements:** This work was supported by the project of coded 2339-M-10 by the Scientific Research Projects Commission of Süleyman Demirel University. We would like to thank for financial support to SDUBAP.

**Keywords:** Ground Beetles, Carabidae, Davraz, Biodiversity, Fauna.

## **OMP Encoded Genes in *Escherichia coli* and the Phenotypes of the Corresponding Mutants under Several Salt, Metal and Antibiotics Stresses**

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**Aim of the study:** Bacteria are surrounded with the environments that at times are adverse and dynamically changing. The changes in every type of external measures, physically, chemically or metabolically, can and do put the certain bacteria at a risk of survival. Therefore, the bacteria have employed and acquired an array of regulatory networks and genes in order to sense, recognize, respond and adapt to these various types of threats including, but not limited to, higher levels of salt, antibiotics or any type of metals.

Our previous studies have indicated that a genomic fragment obtained via cloning from a *Pseudomonas* isolate appears to provide *E. coli* DH10b strain with higher levels of boric acid tolerance in a multi-copy situation. The recombinant plasmid was shown to partly contain the genes similar to and OmpA/MotB domain (97%) and treonin dehidrataz (98%). This finding has prompted us to look further into the first gene. Thus, the objective of the study is to examine the relationship of OMP-encoded genes of *E. coli* and various types of environmental stresses.

**Material and Methods:** The mnemonic OMP stands for outer membrane protein (or porin) and there are currently, to our knowledge, a number of thirteen OMP encoded genes in *E. coli*, namely *ompA*, *ompC*, *ompF*, *ompG*, *ompL*, *ompN*, *ompR*, *ompT*, *ompW*, *ompX*, *ompB* (*envZ*), *ompE* (*phoE*) and *ompH* (*skp*). The single mutants lacking in each gene except that of *skp* gene were obtained and their tolerance levels with respect to several salt, metal and antibiotics were evaluated by scrutinizing their growth rates on the LB agar plates containing different levels of the substances. The stress molecules were vancomycin, ampicillin, NaCl (sodium chloride), hydrogen borate, nickel, copper and cobalt. The sub-lethal concentrations were used for the experiments. The growth of the mutants was comparatively evaluated by the absence or the relative size of the colonies belonging to the particular mutant and that of the wild type strain.

**Results:** Growth phenotypes of the OMP mutants have been evaluated and found to be different among the particular mutants with respect to the stress factors. For example, *ompA* mutant was found to be sensitive to relatively higher levels of salt, nickel, copper, cobalt, but apparently not vancomycin and somewhat to ampicillin under the sub-lethal concentrations tested. We have also tested the growth of these mutants against varying levels of boric acid and compared the relative growth phenotypes of all the mutants by scoring to create a matrix and then constructing a dendrogram. Taken all together, a potential network involving the OMP gene products was interpreted and discussed.

**Acknowledgements:** We would like to thank the Scientific and Technological Research Council of Turkey and Mugla SK University (BAP division) for supporting our projects.

**Keywords:** omp, outer membrane protein, stress, bacteria, *Escherichia coli*, gene, growth phenotype.

## **An assessment of the adaptation of carvacrol rich wild “Oregano plants” from the eastern Aegean under field conditions**

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**Aim of the study:** Great variability lies among species and biotypes of the aromatic and pharmaceutical plants. The object of this study was to evaluate the adaptation of four wild species of Medicinal and Aromatic plants (MAP's), originated from the region of Ikaria, after being moved and established in a different environment. The studied MAP's were *Origanum vulgare* ssp. *hirtum* (Link) Ietswaart (Greek oregano), *Origanum onites* L. (Turkish oregano), *Coridothymus capitatus* L. Hoffmanns & Link (Spanish oregano) and *Satureja thymbra* L. All species evaluated, according to their phenological and chemotypic differentiation under field conditions.

**Material and Methods:** The study was conducted in the experimental field of the Laboratory of Agronomy in Agricultural University of Athens. In all four plant species, the characteristics of their overground part were measured in order to estimate their production and their phenological, morphological and chemotypic characteristics. Additionally, the growth rates of MAP's were determined in the experimental field via measurements every 7 to 10 days on the total plant height and on shoot length. All plant samples were collected in full bloom for determination of their essential oil concentration. The essential oil extraction was made by two methods (hydro distillation - ultrasound) and were used two types of plant material (fresh – dry matter). The qualitative and quantitative determination of the main components of the essential oil (p-cymene,  $\gamma$ -terpinene, carvacrol and caryophyllene) was conducted using gas chromatography and mass spectrometry (GC/MS). All the data were under statistical analyses.

**Results:** All species appeared to be adapted to Athens environment, because of the stability in plant and in chemical characteristics. The essential oil yield remained within the same level in all four species according to the data derived from the previous studies on the same species. Carvacrol was the dominant component in both methods of extraction. It was observed that the method of hydrodistillation for species *O. onites* and *C. capitatus* showed higher carvacrol percentage content in comparison to the ultrasound method - 92.99% and 89.14% respectively. In contrary, carvacrol content in the species of *O. hirtum* and *S. thymbra* was higher using the ultrasound method (92.90% and 58.68% respectively). In the case of using different type of plant material, it was observed that the species of *O. hirtum* and *O. onites* produced higher yields of carvacrol when fresh plant material was used with values of 93.32% and 93.05% respectively, while *C. capitatus* and *S. thymbra* had the highest carvacrol content in dry plant material (88.62% and 66.58%).

**Keywords:** MAP's, oregano, essential oil content, carvacrol

## Conservation of Woody Plants Germplasm Using Cryogenic Procedures

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**Aim of the study:** It is estimated that 10% of all woody species, i.e., trees and shrubs, are threatened in many different parts of the world. The cryopreservation procedures are based on the storage of explants at cryogenic temperatures, such as the one of liquid nitrogen (-196 °C), where the metabolism within the cells is suspended; thus, the time for these cells is theoretically "stopped". This work aimed to compare the advantages of different cryogenic procedures on different woody plant species for example *Citrus* spp., *Eucalyptus* spp., *Nandina* spp., *Sequoia sempervirens* (D. Don.) Endl. and *Fraxinus excelsior* L.

**Material and Methods:** Cryopreservation represents the only safe and cost-effective option for long-term conservation of germplasm of all plants, generatively or vegetatively propagated woody and herbaceous species. Classical cryopreservation techniques, such as classical slow-cooling, at a cooling rate of 2°C/min until it reached -70°C, the cryo-vial was finally moved into a liquid nitrogen tank at a temperature of -196°C, which are based on freeze-induced dehydration, are mainly employed for freezing undifferentiated cultures and apices of cold-tolerant species. New cryopreservation techniques, such as vitrification, droplet vitrification, encapsulation/dehydration and encapsulation/vitrification, PVS2 vitrification solution, liquid, hormone-free MS medium containing in w/v, 13.7% sucrose, 30% glycerol, 15% ethylene glycol and 15% dimethylsulfoxide- DMSO which are based on vitrification of internal solutes, are successfully employed with all explant types, including cells suspensions and calluses, apices, and somatic and zygotic embryos of temperate and tropical species.

**Results:** There are a lot of successful uses for long-term conservation of woody plant species via different cryogenic procedure, such as slow cooling for *Fraxinus excelsior* L. (83%), dehydration and direct immersion in liquid nitrogen for *Citrus* spp. (93.3%), droplet vitrification for *Eucalyptus* spp. (85%), PVS2 vitrification and droplet-vitrification for *Nandina* spp. (47% and 50% respectively), vitrification for *Sequoia sempervirens* (D. Don.) Endl. (22%). The development of cryopreservation protocols is significantly more advanced for endangered and threatened plant species. Even though its routine use is still limited, there are a growing number of examples where cryopreservation is employed on a large scale for different types of materials, including seeds, dormant buds, pollens, biotechnology products, and apices sampled from *in vitro* plantlets of vegetatively propagated species. Because of its high potential, it is expected that cryopreservation will become more frequently employed for long-term conservation of plant genetic resources.

**Acknowledgements:** This study was supported by the Mugla Sitki Kocman University Scientific Research Projects Coordination Unit (Mugla, Turkey, MSKU-BAP 16/021). The Republic of Turkey Ministry of Food, Agriculture, and Livestock is acknowledged for providing the plant material.

**Keywords:** Droplet-vitrification, Encapsulation-Vitrification, Slow cooling, PVS2 vitrification.

**Assessment of genetic variability of Durum Wheat Landraces (*Triticum durum* L.) in Southeastern Anatolia Region of Turkey**

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**Aim of the study:** Diversity of genetic resources is very important for both protection of nature and improve agricultural. Moreover, local resources play a major role on the origin plants which is common in any specific region. As in other crops, genetic resources in wheat show a serious decline due to changing market conditions, monoculture in agriculture, abandonment of rural population and abandonment of traditions, changes in the nature (such as climate change) and the introduction of new varieties. Increasing the country's wheat production and reducing its dependence on abroad will only be possible with the conservation and use of landraces.

**Material and Methods:** The landraces of durum wheat in Southeastern Anatolia Region of Turkey is very important to develop of new varieties which have high quality, resistant to disease, tolerant to stress conditions in breeding program. There has been no serious screening of the region with the political events that has been going on in the region for about 35 years. Local durum wheat populations have been collected and purified (140 lines) from mountainous areas where technological (new varieties, seedlings, combine harvesters) have not been used extensively due to political events and the geographical structure of the region.

**Results:** In the study, we examined some quality parameters and nutrient content of seed in durum wheat landraces. According to analysis of variance, highly significant differences ( $P < 0.05$  or  $P < 0.01$ ) were determined for more quality parameters and nutrient content of seed. The superiority of the genotypes was determined by the first two principal components (IPC1 and IPC2) and to create a two-dimensional GGE biplot. The results of the study indicated that majority of landraces can be used as parents to improve the quality and nutrient content of seed of durum wheat varieties. The study indicated that GGE biplot can be used to evaluate the genotypes as graphically to select the best genotypes for parents to use in breeding program.

**Acknowledgements:** This research was supported by Mardin Artuklu University (MAU-BAP-17-KMYO-15). We want thanks to GAP International Agricultural Research Center, Department of wheat breeding program and Karamanoğlu Mehmetbey University, Department Engineering of Food for project contributions and support.

**Keywords:** Biodiversity, Landraces, Durum wheat; GGE biplot.

## Phenotypic plasticity of *Sium* L. and *Alisma* L. species under different water regimes in the biotope

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**Aim of the study:** System's stability is conditioned by lability of its components. In biology, this is phenotypic plasticity, i.e. a genome competence to change its expression and form different phenotypes in a response to environment fluctuations. Phenotypic display of changes in gene expression is already determined at the transcription level and involves an extremely wide range of traits. We studied certain structural and functional traits of *Alisma plantago aquatica* L. (monocotyledons), *Sium latifolium* L. and *S. sisaroides* DC. (dicotyledons) under changes in the soil moisture in the natural and experimental conditions as a water is a key factor for plant survival.

**Materials and Methods:** *A. plantago aquatica* (Alismataceae) and close related species *S. latifolium* and *S. sisaroides* (Apiaceae) are native throughout Ukraine. They are perennial herbs, flower in June–August and bear fruit in August–September. We investigated: *A. plantago aquatica* and *S. latifolium* aerial-aquatic plants growing in coastal water of the river Psjol in Poltava region of Ukraine, and *A. plantago aquatica* and *S. sisaroides* terrestrial plants growing on the riverside. The distance between plants, growing in water and on the bank is only 1–5 m that makes possible to sharply determine an action factor – the water content in the soil. Material was collected in the natural and experimental conditions. The primary treatment of samples has been made at the sampling, then the samples were examined in the laboratory by using the methods of cell and molecular biology.

**Results:** It was established that terrestrial plants differed from aerial-aquatic ones with the higher levels of reactive oxygen species (ROS) and lipid peroxidation and thereafter with increasing the general antioxidant and superoxide dismutase activity. Enhanced production of ROS, malonic dialdehyde, and lipofuscin compounds may be evidence of the accelerated senescence of terrestrial plants. In terrestrial plants, it was also determined the higher level of aquaporin mRNA that indicates a possible increase in these proteins in the plasmalemma. Fruits of *S. sisaroides* plants contained fully differentiated embryos, which were twice the size of embryos of *S. latifolium* and also they had some different components of the phytohormone spectra that ensured their rapid germination during short periods of sufficient soil moisture. In spring, the high plasticity of the micromorphological and physiological features, the level of aquaporin gene expression and synthesis of heat shock proteins (HSP) in investigated plants under the changes in water regime in nature and experiments Aerial-aquatic and terrestrial plants respond to reduced or excessively increased soil moisture with the changes in the root anatomy. Under water-logging, adventive roots with aerenchyma formed in terrestrial plants simultaneously with alcohol dehydrogenase (ADH) synthesis as in aerial-aquatic ones (Kordyum et al., 2017). The ADH level positively correlated with high HSP70 synthesis. At the same time, the level of aquaporin mRNA and ROS decreased. The obtained data help to explain the wide distribution of *investigated species* in the environment and implement the ideas about ecological significance of plant phenotypic plasticity.

**Acknowledgements:** This research was funded by the M.G. Kholodny Institute of Botany of the National Academy of Sciences of Ukraine

**Keywords:** plant, plasticity, drought, water-logging, micromorphology, physiology

### Karyotypes on section *Hymenostegis* of *Astragalus* (Fabaceae) from Turkey

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**Aim of the study:** The chromosome numbers of genus *Astragalus* (Fabaceae) section *Hymenostegis* which grows naturally in Turkey are determined; *Astragalus zohrabi*, *A. sosnowskyi*, *A. velenovskyi*, *A. trifoliastrum* and *A. uraniolimneus* are  $2n = 16$ , *A. hymenocystis* is  $2n = 18$  and *A. lagopoides*, *A. hirticalyx*, *A. vaginans*, *A. gueruenensis*, *A. ciloensis* are  $2n = 48$  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 *Hymenostegis*.

**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 section *Anthylloidei* are determined  $2n=16$  and  $2n = 48$ . *A. tortuosus* DC. is the species that the only can not be studied in terms of karyology although many methods of germination have been tried. Among the taxa in the *Hymenostegis* section, the smallest and chromosome size was found in *A. persicus* with 1.59  $\mu\text{m}$  and the largest chromosome size was found in *hymenocystis* subsp. *confiniorum* 5.13  $\mu\text{m}$ . The smallest value for total haploid chromosome length was in *A. sosnowskyi* with 21.10  $\mu\text{m}$  and the highest value was in *A. lagopoides* with 69.43  $\mu\text{m}$ . The smallest value for arm ratio length was *A. persicus* with 1.00  $\mu\text{m}$  and the highest value was in *A. persicus* with 2.00  $\mu\text{m}$ . The smallest relative length were found in *A. persicus* with 2.35  $\mu\text{m}$  and the highest value is in *A. zohrabi* with 17.48  $\mu\text{m}$ . Total lengths of somatic chromosomes were 2.59-5.13  $\mu\text{m}$  in *A. hymenocystis* subsp. *confiniorum*, 1.82-4.25  $\mu\text{m}$  in *A. lagopoides*, 1.67-4.44  $\mu\text{m}$  in *A. hirticalyx*, 1.08-2.71  $\mu\text{m}$  in *A. persicus*, 1.83-4.02  $\mu\text{m}$  in *A. zohrabi*, 1.80-3.60  $\mu\text{m}$  in *A. chrysostachys*, 2.00-3.25  $\mu\text{m}$  in *A. sosnowskyi*, 2.48-4.45  $\mu\text{m}$  in *A. velenovskyi*, 2.28-4.12  $\mu\text{m}$  in *A. trifoliastrum*, 1.44-3.27  $\mu\text{m}$  in *A. vaginans*, 2.43-3.64  $\mu\text{m}$  in *A. uraniolimneus*, 1.55-3.28  $\mu\text{m}$  in *A. gueruenensis* and 1.37-3.40  $\mu\text{m}$  in *A. ciloensis*.

**Acknowledgements:** The projects (project no: KBAG-113Z899 and TBAG-110T911) were carried out by financial support of TÜBİTAK. We would like to thank TÜBİTAK for financial support to our investigations.

**Keywords:** *Hymenostegis*, *Astragalus*, Fabaceae, Karyotype, Turkey

## The apoptotic effects of *Vinca* extracts on Multiple Myeloma

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**Aim of the study:** *Vinca* L. (Apocynaceae) genus is represented by seven species, spreading in Europe, North Africa and Southwest Asia. *Vinca* alkaloids anti-cancer, anti-hypertensive and anti-diabetic roles are known. Multiple myeloma is the second most common haematological malignancy characterized by the proliferation of monoclonal plasma cells in the bone marrow. Many of the agents used in treatment today are either plant derived natural products or derivatives of natural products. In the present study we aimed to reveal the apoptosis inducing effects of two *Vinca* extracts on multiple myeloma, in vitro.

**Material and Methods:** For this aim, ARH-77 and RPMI-8226 multiple myeloma cell lines were grown under the required conditions for RNA extraction. To determine the apoptotic effects of extracts, the IC<sub>50</sub> doses of *Vinca* extracts were applied and RNA extractions were performed. After RNA extraction was performed followed by cDNA synthesis. The expression levels of apoptotic gene regions were evaluated via Real Time PCR. PCR amplifications were performed using Biorad CFX Connect system. The data was analysed by comparative CT method and the fold change was calculated by  $2^{-\Delta\Delta CT}$  method.

**Results:** In order to determine the expression level of pro-apoptotic and anti-apoptotic genes in treated multiple myeloma cells, the mRNA levels of Mcl-1, Bax/ Bcl-2, Apaf, p53, p73, HRK, BAK, DFFA and caspase-3 were evaluated via qRT-PCR. According to our results, extract applications up-regulated the pro-apoptotic proteins like Bax, Apaf, p53 HRK, BAK, DFFA, caspase-3, and down-regulated anti-apoptotic proteins, such as Bcl-2 and MCL-1. In conclusion, when we evaluate Real Time PCR data as a whole, it turns out that the extracts have different but positive effects in terms of apoptotic gene expressions.

**Acknowledgements:** We would like to thank BAP (Scientific Researching Projects) Foundation of Selçuk University for financial support (Project number 15101005).

**Keywords:** Apoptosis, endemic, multiple myeloma, periwinkle.

## Naturally growing macro Ascomycota in Turkey

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**Aim of the study:** Ascomycota Caval.-Sm. is a phylum/division within the kingdom Fungi. The most prominent feature of this phylum is the 'ascus' structure in which 'ascospores' are present. Members of macro Ascomycota are located in the subdivision of Pezizomycotina. There are currently a number of 64163 Ascomycota species reported in the world and of which a number of 18000 species are known to produce the Ascocarps. These species live as saprophytic (*i.e. Hypoxylon fragiforme*), mycorrhiza (*i.e. Tuber aestivum*) or parasitic (*i.e. Cordyceps militaris*). The aim of this study is to examine the characteristics of the macro Ascomycota species growing naturally in Turkey.

**Material and Methods:** All the taxonomic studies conducted to the date in our country constitute the main materials of our study. The studies, articles and checklists of the macro Ascomycota species identified by the mycologists were examined.

**Results:** This study examines and reviews the macro Ascomycota biodiversity in our country and discusses the characteristics of naturally grown Ascomycota members. An example of economically important mushroom *Morchella* sp. is known as "*Kuzu Göbeği*" by the local people in our country and it is exported abroad every year in the amounts of tens of tons. In addition, there are poisonous species such as *Gyromitra esculenta*. In this study, as a result of reviewing all of the appropriate studies, a number of 128 genera and 261 species of macro Ascomycota were seen to be present in Turkey. Some of the interesting features of these species found in our country are discussed in terms of the properties including ecological requirements, edibility, morphology and identification stages.

**Acknowledgements:** We would like to thank all mycologists who have contributed to determine the macro Ascomycota of our country.

**Keywords:** Ascomycota, Macrofungi, Biodiversity, Taxonomy, Turkey.

## **Determinations of Metal Levels by the Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) in Hair Samples as a Biomarker for Toxicity**

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**Aim of the study:** Heavy metal exposure can cause to toxicity and can have significant threats to the human health and all living organisms. Effects of this toxicity can be determined by some biological markers such as tooth, hair, and fingernail samples. Analyzing the trace metals on hair samples has some advantages in comparison with using blood or urine samples. The simplicity of matrix, presence of high concentration of trace elements, easy collection, storage and analysis are advantages of using hair samples in trace metal determination.

**Material and Methods:** In this study, metal analyses were done in hair samples which were collected from colored (10 people) and uncolored (10 people) hairs in Diyarbakir, Turkey and metal concentrations in hair samples were compared. The hair samples (approximately 1 g) were taken from the points in nape which are near scalp area by cutting with steel scissors. Hair samples were washed according to the International Atomic Energy Agency to remove external contamination. The washed samples were dried in an oven at 110 °C about 16 hours. 0.2 g of dried hair samples was treated with nitric acid-hydrogen peroxide mixture (3:1) in closed vessels in a microwave oven system. Trace element analyses were carried out by using inductively coupled plasma-mass spectrometry (ICP-MS) technique.

**Results:** Concentrations of calcium and copper elements were found to be considerably higher in colored than uncolored hair samples. The accuracy of the method was evaluated by applying spike method to samples. There was a good agreement between added and found analyte content. The values of R were found to be higher than 0.99.

**Keywords:** Human Hair, Biomarker, Metal analysis, ICP-MS.

## Quantitative and Qualitative Changes in Zooplankton Composition of Karacaören I Reservoir (Burdur, Turkey) in the last decade (2002-2013)

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**Objective:** This study evaluated the qualitative and quantitative changes in the zooplankton composition during the last 10 years based on extensive planktonic studies carried out in Karacaören I Reservoir (KIR) in 2002.

**Material and Methods:** Zooplankton samples were collected by a quantitative type plankton net (with mouth opening diameter 17 cm and 55 µm mesh size) with horizontally and vertically at three stations of KIR monthly between August 2013 and July 2014. The samples were preserved with 4% formaldehyde solution. The samples were examined under stereo zoom and light microscope for zooplankton species composition. Zooplankton species were identified using the appropriate literature. Zooplankton abundance (ind/m<sup>3</sup>) was determined in a Sedgewick-Rafter counting chamber using with a binocular microscope under 100X magnification.

**Results:** Totally 45 zooplankton taxa were identified 32 taxa of Rotifera, 10 taxa of Cladocera, 2 taxa of Copepoda and 1 taxon of Cnidaria. Rotifera represented the highest abundance group with 90.1% of the total zooplankton abundance, followed by Cladocera (6.6%) and Copepoda (3.3%). The highest density of rotifers was recorded in January with 2908112 ind/m<sup>3</sup> and the lowest value in October with 122184 ind/m<sup>3</sup>. As for cladocerans, the highest density was March with 355147 ind/m<sup>3</sup> and the lowest value in November with 2564 ind/m<sup>3</sup>. For copepods, the highest density was recorded in May with 271732 ind/m<sup>3</sup> and the lowest value in October with 734 ind/m<sup>3</sup>. In the second ten-year periods of reservoir holding the water in 1992, it was determined that the total number of zooplankton taxa (Rotifera, Cladocera and Copepoda) decreased to from 58 to 44, the big size cladocera taxa disappeared and the density of rotifer increased. Both these situations are known as a result of trophic level increase in the aquatic ecosystems or predation by zooplanktivorous predators e.g. the big-scale sand smelt. In this process, it has been determined that invasive zooplanktivorous species like a cinidaria (*Craspedacusta sowerbyi*) and a zooplanktivorous fish (*Atherina boyeri*) of has introduced into the ecosystem.

**Acknowledgements:** The study has been supported by the Republic of Turkey Ministry of Food, Agriculture and Livestock, General Directorate of Agricultural Research and Policies with the project number TAGEM/HAYSUD/2013/A11/P-02/7.

**Keywords:** Rotifera, Cladocera, Copepoda, Karacaören I Reservoir, Burdur, Turkey

## Effects of Different Growing Media on Plant Growth of Petunia (*Petunia hybrida*)

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**Aim of the study:** The objective of this study was to investigate the effects of different growing media on plant growth of petunia (*Petunia hybrida*).

**Material and Methods:** The experiment was conducted in a randomized experimental design with three replication in a chamber room under controlled conditions at Department of Soil Science and Plant Nutrient Laboratory. Petunia (*Petunia hybrida*) were used as experiment plant in this study. Seven different media (soil, 3:1 soil: barnyard manure (BM1), 2:1 soil: barnyard manure (BM2), 3:1 soil: peat (P1), 2:1 soil: peat (P2), 3:1 soil: sugar beet pulp (SBP1), 2:1 soil: sugar beet pulp (SBP2) were used as plant growing media. Soil and organic materials were mixed according to volume basis. The experiment was ended after three months following transplanting of seedlings. Plant growth criterias and flowering criterias were determined in harvested plants.

**Results:** The highest stem diameter, flower primary diameter, flower stalk diameter, primer branch number, plant fresh and dry weight means were obtained as 7.00 mm, 8.91 cm, 3.59 cm, 6.33 number, 48.47 g and 4.52 g in soil: peat (2: 1) growing media while the highest plant length, secondary branch number and flower number means were found as 27.43 cm, 24.67 number and 24.67 number in soil: peat (3: 1) growing media respectively. The lowest plant length, stem diameter, branch number, flower number, plant fresh and dry weight means were determined as 8.33 cm, 2.60 mm, 2.00 number, 2.50 number, 0.93 g and 0.12 g in soil: barn manure (2:1) growing media respectively.

**Acknowledgements:** This study was financially supported by Van YYU Scientific Research Project Coordination Unit (Project no: FHD-2017-6147).

**Keywords:** Petunia (*Petunia hybrida*), growing media, plant growth.

## Morphological and Biological Characteristics of Medlar (*Mespilus germanica*) Tree

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**Aim of the study:** Medlar (*Mespilus germanica* L.) has been cultivated for over thousands of years in temperate zones of Anatolia. The medlar, called as 'Muşmula', 'Beşbüyük' or 'Döngel' (in Turkish), is botanically classified as a pome and produces edible fruits. *Mespilus germanica* L. belongs to Rosaceae family and it grows mainly in frost-free areas, and on rocks and poor soils. The fruit of medlar are used as a nutrition material by the local customer and are consumed by the local people as marmalade. The medlar fruit is also used as treatment of constipation and diuretic. This study was carried out to investigate of some biological and morphological properties of different organs and tissues of medlar.

**Materials and Methods:** Stages of seasonal growing cycle with biological properties of medlar tree was observed and identified by microscope. The developmental differences were evaluated from the bud swelling to fruit maturity of leaf, flowers and fruit growth. Also, the anatomical structure of 1-year-old shoot was investigated. For this purpose transverse section taken from 1 year old shoots with razor blade were stained with safranin or methylene blue. Temporary preparations were examined under light microscope and photographed by Olympus CX 21 with Hitachi camera attachment.

**Results:** *Mespilus germanica* L. is a spiny shrub that grows to height of 4-6 m. Medlar trees have almost 3-4 cm width simple leaves which are hard, dark green, bottom face is so feathered and light green. Flowering period was observed from end of the April to beginning of the May. The flowers were hermaphrodite and self-fertile, five-piece, white-pink color, and each bud had one flower. Flowers were borne terminally and short lateral shoots. Fruit are climacteric, dark brown in round or oval shapes and five calix leaves on the bottom side. It is one of the latest maturing fruit, and the ripening occurs in late October before frosts in Turkey. The wood of *M. germanica* is diffusing porous with growth rings. Fine textured and very hard, it has numerous pores. The sclerenchymatic tissues were scattered in cortex.

**Keywords:** *Mespilus germanica*, Muşmula, fruit, anatomy

## Effects of Paclitaxel (Taxol) and Resveratrol on Rabbit Epididymal Sperm Tail Morphology

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**Aim of the study:** Paclitaxel (taxol) is a chemotherapy drug and resveratrol is a phytoalexin which found in many plants. Chemotherapy drugs cause sperm abnormalities which were found to be in head, mid-piece, and tail. Sperm morphology is well correlated with the fertilization and alterations in the sperm tail are important because of the quality of sperm movement. The aim of the study was to investigate the rabbit epididymal sperm tail morphology to test whether resveratrol protects the sperm tail morphology from paclitaxel destructive effects.

**Material and Methods:** The experimental design consisted of four treatment groups as follows: Control (C), administered 40 ml saline; paclitaxel (P), administered 5 mg/kg/day paclitaxel in 40 ml saline; resveratrol (R), administered 4 mg/kg/day resveratrol in 40 ml saline; paclitaxel+resveratrol (P+R), administered 5 mg/kg/day paclitaxel+4 mg/kg/day resveratrol in 40 ml saline. All administrations were intravenous (IV) and continued once a week for 8 weeks. Epididymal sperms were pooled from rabbits (n=32), evaluated at 37 °C, and diluted in Tris-based extender. Samples were cooled to 5 °C and frozen in 0.25 mL French straws using liquid nitrogen. Frozen straws were then thawed individually at 37 °C for 25 s in a water bath for evaluation. Toluidine Blue (TB) stain was used to investigate the sperm tail morphology. At least total randomly selected 200 sperm from two slides were checked. All % values were expressed as the mean±standard deviation. Statistical analyses were performed to evaluate the % values of the groups showing the sperm tail abnormalities.

**Results:** The % values of C, P, R, and P+R groups were 13.3±0.8, 21.5±2.7, 10.8±2.9, and 16.4±2.0, respectively. When the groups were examined statistically, it was found that the % values differed from each other (p<0.001). The % value in P group was significantly different from those in C, R, and P+R groups. In addition, the % values in R and P+R groups were significantly different from each other. We conclude that paclitaxel administration leads to tail abnormalities in epididymal sperm cells and resveratrol administration is useful to prevent the sperm tail abnormalities caused by paclitaxel administration. It is clear that the use of chemotherapy drugs results in decrease of the sperm morphology quality and the fertilization possibility. Sperm is an important genetic resource for each species. Hence, sperm morphology abnormality as well as DNA damage should be prevented to ensure fertilization and to conserve both intraspecific and biological diversity.

**Acknowledgements:** The study was supported by Selçuk University Scientific Research Projects (BAP) (Project No: 12102013).

**Keywords:** Rabbit epididymal sperm, paclitaxel, resveratrol, tail abnormalities, sperm morphology.

OP-140

**Comparison of Color and Attractant Traps Effect Used For Sampling *Epicometis (Tropinota) hirta* (Poda, 1761) (Coleoptera, Scarabaeidae, Cetoniinae)**

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**Aim of the study:** Aim of the study was to find out comparison of color and attractant traps effect used for sampling *Epicometis (Tropinota) hirta* (Poda, 1761) (Coleoptera, Scarabaeidae, Cetoniinae). Besides effects of color traps, light blue, dark blue and white, were also determined to each others.

**Material and Methods:** Ten attractive traps were placed on the cherry branches which are approximately 2 m high from the ground to the purpose of sampling of the adults of *Epicometis (Tropinota) hirta* (Poda, 1761) (Coleoptera, Scarabaeidae, Cetoniinae) on the cherry orchard in Atabey district, Isparta province, Turkey. Three different colors, light blue, dark blue, and white, 10 pieces for each ones, were set up for three cherry orchards in Atabey, Pembeli and İslamköy. The ratios of *E. hirta* adults sampling from attractant and color traps were compared during the blooming period.

**Results:** It was found out that the number of individuals caught with color traps was found higher than individuals caught with attractant traps and differences was found out statistically significant. It was also determined to effect of the color traps to eachother during the sampling adults of *E. hirta*. Light blue color traps were sampled more adults than dark blue color traps

**Keywords:** Isparta, Apple Blossom Beetle, cherry, attractant traps, color traps, White, light blue, dark blue

**Some Biological Aspects of the *Chlorophthalmus agassizi* Bonaparte, 1840 from the Southern Aegean Sea, Turkey**

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**Aim of the study:** There is very little scientific information on the deep-sea fishes and their environment from the Aegean Sea. Given paucity of information on the biological features of shortnose greeneye (*Chlorophthalmus agassizi*), the aim of this study is to improve knowledge about the age structure, longevity, condition factor, growth and size-depth distribution relationships of this poorly known by-catch species from the southern Aegean Sea.

**Material and Methods:** All individuals were captured during year of 2007 at seasonal intervals (January, April, July, October) via using a commercial bottom trawl (between 296 and 603 meters) with a cod-end mesh size of 24 mm in southern Aegean Sea (off the Sığacık Bay) (Fig. 1). Bottom trawl operations was conducted in daylight and in three sections, between 296-398, 402-503 and 498-603 meters to compare of the depth and length relationship of the species. Fishes were weighed, measured (Total and fork lengths), the otoliths were aged whole. Total length-fork length (TL-FL) relationship was determined by the method of least squares to fit a simple linear regression model. The von Bertalanffy growth function ( $L_t = L_\infty [1 - e^{-k(t-t_0)}]$ ) was used to estimate growth parameters, longevity ( $t_{max} = 3/k$ ) and growth performance index ( $\Phi' = \log_{10} k + 2\log_{10} L_\infty$ ) were calculated. Length-weight relationship of fishes ( $W = aL^b$ ) were detected for all specimens and condition factor ( $K = 100 * (W/L^3)$ ) was calculated for age groups and seasons. *C. agassizi* is a synchronous hermaphroditic species, thus all analyses were carried out for the entire population.

**Results:** A total of 872 specimens were collected. The total lengths and weights ranged (mean  $\pm$  SD) from 6.40 to 17.90 cm (11.66 $\pm$ 2.22) in TL and 1.59 to 48.75 g. (16.10 $\pm$ 8.51), respectively. Age (n=823) was determined by examining whole sagittal otoliths and ranged from 0 to 9 years. The mean fish size is increased with the depth, which supports the "bigger-deeper" phenomenon. Parameters of the von Bertalanffy growth curves were  $L_\infty = 20.07$  cm,  $k = 0.187$  year<sup>-1</sup>,  $t_0 = -1.176$  years,  $t_{max} = 16.01$  years, the growth performance index was  $\Phi' = 3.88$ . The weight-length relationship calculated as,  $W = 0.0025 TL^{3.393}$  ( $r^2 = 0.98$ , n=872), showing a positive allometric growth [ $p < 0.05$ ,  $t_{cal}: 23.709$ ,  $t_{0.05(871)}: 1.960$ ]. The highest average condition factor values were found in spring (0.69) and ninth age group (0.83). *C. agassizi* has a deep-related distribution: its size increased with depth and the highest number of specimen was collected between 402 and 503 meters. The growth of the species was most rapid during the first year and *C. agassizi* is a species with a relatively long lifespan. Average condition values were increase with the ages. The length-weight relationship was similar to those in the Mediterranean Basin. According to scientific literature *C. agassizi* was consumed by several predators therefor, it has an important role in to the trophic level of the deep-water environment.

**Keywords:** Shortnose greeneye, age and growth, condition factor, weight-length relationship, Sığacık Bay.

## Revealing A Species Response Curve of *Chironomus riparius* Meigen (Diptera: Chironomidae) by Using R

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**Aim of the study:** The tolerance values of benthic macroinvertebrates against environmental parameters are quite essential in monitoring studies because of they are used as bioindicator species. However, in order to be able to determine the tolerance value against an environmental variable, we need to know the optimal range for that environmental parameter. In this study, “goeveg” which is an R library and its function “specresponse” were used to reveal a response curve and estimate the tolerance values of *Chironomus riparius* Meigen.

**Material and Methods:** The study covers a period of two years and samples from 30 different sampling sites selected from the Büyük Menderes Basin were collected seasonally. The library “goeveg” and its function “specresponse” were used to create a response curve of *C. riparius* to selected environmental parameters. The function “specresponse” fits species response curves to visualize species to environmental gradients or ordination axes. It is based on Logistic Regression using Generalised Linear Models (GLMs) or Generalized Additive Models (GAMs) with integrated smoothness estimation. The function was used to draw response curves of *C. riparius*. Canonical Correspondence Analysis (CCA) was also applied by using “vegan” library. Afterwards, response curve values were fitted on the CCA.

**Results:** In this report, the water surface temperature was used as an environmental parameter for the analyses. *Chironomus riparius* were identified at 22 of 30 sampling sites during different periods of time during the study. The water surface temperature obtained during the study varies between 13.3°C and 28.1°C. GLM with 2 degrees fitted for *C. riparius* to determine of tolerance values against water surface temperatures. The water surface temperature obtained during the study varies between 13.3°C and 28.1°C. As a result of the analyses made, the optimum water surface temperature value for *Chironomus riparius* was determined as 20°C. Probability of occurrence was found in the range of 80%.

**Keywords:** Water surface temperature, Büyük Menderes basin, tolerance value, vegan package

## Determination of Endophytic Microorganism Profiles of *Dianthus erinaceus* an Endemic Plant by DGGE

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**Aim of the study:** Endophytic microorganisms colonize inner plant tissues, sometimes in high numbers, without damaging the host or eliciting strong defence responses. In recent years it has been shown that endophytic microorganisms are prolific sources of many bioactive secondary metabolites. Therefore, this study was aimed to evaluate the bacterial and the fungal endophyte diversity of *Dianthus erinaceus*, an endemic plant species by culture independent DGGE method.

**Material and Methods:** The endophytic bacterial and fungal community structures in the roots of the plant were revealed using 16S rDNA, ITS DGGE fingerprinting and phylogenetic analysis. Plant samples were collected from Kemalpaşa district of İzmir province and brought to the laboratory at the same day. The surfaces of the roots were subjected to sterilization and checked for their sterility. Following total DNA isolation from plant samples, recovery of 16S rDNA and ITS DGGE of the amplicons from the gel and sequence analysis were performed.

**Results:** A total of 6 bacterial and 7 fungal phylotypes were obtained from *D. erinaceus* roots. Phylotypes were compared with NCBI-GeneBank database in terms of their similarities to the bacterial and fungal sequences. It has been determined that the majority of the dominant endophytic bacterium diversity in root parts of plant specimens is constituted by Protobacteria phylum and subfilums. Three of the 6 bacterial phylotypes were assigned to uncultured *Nitrosomonas* sp, and 3 of were assigned to uncultured bacteria. A total of 6 fungal phylotypes were found to be associated with Ascomycota (2 *Alternaria* sp., 4 uncultured fungi) and 1 with Basidiomycota (*Bjerkandera* sp.) genera.

**Acknowledgements:** This research was financially supported by Ege University Scientific Projects Foundations (Project No: 2016 FBE 012).

**Keywords:** Endemic plants, endophytic microorganisms, DGGR, *Dianthus erinaceus*

## **Prospects of Ecotourism Development from Western Part of Turkey**

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**Aim of the study:** The geographic structure and natural richness of Turkey is an important subject in terms of nature tourism. It is also a very important issue to be able to protect this richness that is present in the course of tourism, energy and mining activities and transfer them to future generations. In this context, it becomes a necessity to use natural or environment friendly applications with all activities. Ecotourism is new subject in Turkey. The content of ecotourism and its activities are not understood completely neither bureaucratic nor local environments. Therefore, it was aimed to determine the sources of ecotourism in Western Anatolia.

**Material and Methods:** In this study, Western Anatolia was evaluated in terms of ecotourism potential. Possible alternative sources have been identified and how these resources will be sustainably exploited.

**Results:** At the end of this study, suggestions were presented to uncover appealing elements and provide sustainability. The proper planning for the widespread development of ecotourism activities in Western Anatolia and the organization of the local people and the various levels of society for this will ensure a significant share of the income from the increasingly accelerated alternative tourism activities in the world.

**Acknowledgements:** This work is supported by the Scientific Research Projects Council of Pamukkale University (PAU-ADEP- 2018KRM002-013).

**Keywords:** Ecotourism, sustainable, West Anatolia, Local people

## Genome Reparation in Plants from Chernobyl Zone

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**Aim of the study:** After 32 years from Chernobyl nuclear explosion, flora is still abundant in the Exclusion zone, evidencing the adaptation of plants to chronic radiation and heavy metals in the soil. Active vegetation in Chernobyl evidence that plant genome is somehow protected from the damage caused by genotoxins. One of the immediate targets of radiation is the genetic material, DNA, and radiation is known to cause its single and double strand breaks. Therefore, DNA-protective mechanisms are of special interest. The main objective of our study is to reveal the mechanisms of genome protection in plants from Chernobyl zone.

**Material and Methods:** we used *A.thaliana* seedlings from Chernobyl zone and performed growth tests on the medium with radiomimetics (bleomycin) and heavy metals (Cd, Pb) in order to reveal the sensitivity of certain plant lines to genotoxins. qPCR was applied to investigate the expression rate of genes involved in DNA repair. Viability assays were performed to investigate the damage of cells in growth zones of root.

**Results:** Our investigations show that some 7-day seedlings of *Arabidopsis thaliana* from Chernobyl zone tolerate DNA damaging agents such as bleomycin and heavy metals (Cd, Pb) better than control plants from non-polluted areas. qPCR reactions have revealed up-regulation of genes involved in DNA damage response (DDR), signal transduction pathways which sense DNA breaks and initiate cellular responses. Interacting signaling pathways of DDRs activate DNA repair, cell-cycle checkpoints and cell death to remove or tolerate lesions in genetic material. In our experiments, expression of *ATR/ATM* kinases was increased after bleomycin treatment suggesting role of *ATR/ATM*-dependent pathway in genome stabilization under above conditions. Downstream expression of *CycB1:1* gene means involvement of cell cycle regulation in plants grown in chronic radiation environment. Several DNA repair pathways are known to exist in plants, among them homologous recombination (HR) and non-homologous end joining (NHEJ) play the key role. Our experiments have shown involvement of both NHEJ and HR in the stabilization of plant genome in Chernobyl zone. In the set of experiments we have shown that *A. thaliana* roots respond differently to radiation and heavy metal stress and the stress affect differently growth processes in root zones.

**Acknowledgements:** Our research was supported by IRSES Grant 612587, Maria Curie Actions

**Keywords:** DNA damage and repair, DNA damage response, Chernobyl

## ***Fusarium* Species Related with Aubergine Plants Grown in the West Mediterranean Region of Turkey**

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**Aim of the study:** Aubergine is one of the common vegetable plants grown in Turkey. Among the diseases decreasing yield and quality of aubergine, root rot and wilt diseases caused by *Fusarium* species are especially important. *Fusarium*s are soil borne plant pathogens and different species can cause disease on aubergine plants. *F. oxysporum* f.sp. *melongena*, a specialized pathogen of aubergine is especially significant. Fungus penetrates from the roots and invades vascular tissues and blocks water and nutrient transport. The aim of this study is to determine the *Fusarium* species causing disease on aubergine plants in the West Mediterranean region of Turkey.

**Material and Methods:** Aubergine fields in Antalya, Burdur and Isparta provinces located at the West Mediterranean region of Turkey were surveyed during 2016-2017 vegetation periods and samples from the plants showing wilting symptoms were taken to the laboratory. Root and stem sections including healthy and infested tissue with brown discoloration were cut into small pieces and surface disinfested with 1% sodium hypochloride for 2-3 minutes. After washing a few times with sterile distilled water, tissue pieces were blotted dry and transferred to petri dishes with Potato Dextrose Agar. Growing *Fusarium* colonies were transferred to Potato Sucrose Agar (PSA) and Synthetic Nutrient Agar (SNA) plates and identified according to their colony morphology and color on PSA and morphological features like conidial dimensions, shape, presence of chlamidospores, etc. on SNA. Selected isolates belonging to different species were grown on SNA for one week. Spore suspensions with  $2 \times 10^6$  conidia/ml concentration were prepared by scraping conidia into sterile distilled water and aubergine seedlings with 3-4 leaves were inoculated by root dipping method. Seedlings were then transferred to pots with sterile growing mixture with soil:torf:perlite:sand (2:1:1:1). Control plants were dipped into sterile distilled water. After inoculation for 21 days, plants were evaluated for wilting symptoms.

**Results:** As a result of the isolations made from the diseased aubergine plants, 25 *Fusarium* isolates belonging to seven species were obtained. *F. oxysporum* was the most common species, followed by *F. equiseti*. Other *Fusarium* species isolated from the aubergine plants were *F. avenaceum*, *F. culmorum*, *F. sambucinum*, *F. semitectum* and *F. solani*. In the pathogenicity test, all 16 *Fusarium* isolates used in the trial caused slight or severe wilting symptoms on the aubergine plants. Only one of the *F. oxysporum* isolates caused severe wilting on the plants while some isolates belonging to *F. equiseti*, *F. sambucinum* and *F. semitectum* also caused severe symptoms. *F. solani*, *F. avenaceum* and *F. culmorum* isolates used in the pathogenicity trial caused slight symptoms.

**Acknowledgements:** This study was supported by the Council of Higher Education with project number "ÖYP05268-DR-14".

**Keywords:** *Solanum melongena* L., root rot, wilt, *Fusarium* spp.

## Wild growing *Agaricus* species in Turkey

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**Aim of the study:** *Agaricus* L. is a genus that contains edible and poisonous species that are globally recognized. This genus is comprises about 300 species worldwide and is characterized by fleshy structure, chocolate color spore print, having rings and saprophytic property. *Agaricus* sp. is known in our country as "Çayır mantarı, İçi Kızıl". The aim of this study is to examine the characteristics of the *Agaricus* species growing naturally in Turkey.

**Material and Methods:** The specimens belonging to *Agaricus* genus obtained from the field studies constitute the main materials of this study. Photographs of the collected specimens were taken and their ecological and morphological characteristics were recorded. Microscopic features were also examined and compared with existing literature information to obtain species list.

**Results:** This study aimed to examine *Agaricus* sp. biodiversity and the properties of the members of naturally grown *Agaricus* genus in Turkey. In this context, we conclude that there are 40 species belonging to the genus *Agaricus* in our country. Some of the interesting features of these species found in our country are discussed in term of the properties including ecological requirements, edibility, morphology and identification stages.

**Acknowledgements:** We would like to thank Muğla S. K. University Scientific Research Projects (BAP 17/102).

**Keywords:** *Agaricus* L., Macrofungi, Biodiversity, Taxonomy, Turkey.

**A microsporidium from *Altica hampei* (Allard, 1867) (Coleoptera: Chrysomelidae)**

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**Aim of the study:** The aim of the study was to determine the presence of microspore pathogen in *Altica hampei*.

**Material and Methods:** *Altica hampei* adults were collected from Ordu, Turkey in the year 2017. A total of 300 beetles were dissected and examined under the light microscopy at a magnification from 100x to 1.000x. 155 of them were found to be infected by the microsporidian pathogen. When the microsporidian pathogens were observed, it photographed and measured using Nikon Eclips E-400 and Nikon Eclips Ci microscope with digital camera DS-fi 2. Its different life stages were searched. Life cycles of the microsporidian pathogen were also studied with Transmission electron microscopy. Infection rate was calculated. Besides, presence of pathogen was also recorded as in male and female insects to compare the infection between both sexes.

**Results:** A new microsporidian pathogen infecting *Altica hampei* is reported for the first time in Turkey. Total infection rate of microsporidian pathogen was 51.6%. Mature spores are ovoidal and fresh spores are measured  $4.5 \pm 0.2 \times 2.2 \pm 0.2 \mu\text{m}$ . Spores were observed in fat body, gut, gonads, hemolymph and malpighian tubules. Life cycles of the microsporidian pathogen were also studied with Transmission electron microscopy. Mature spores have isofilar polar filament. The polar filament has 12-14 coils. Most of microsporidian pathogen genera have a potential for biological control. This microspore pathogen may be an important biological control agent.

**Acknowledgements:** The authors are grateful to Giresun University for finance support as a scientific research project FEN-BAP-A-140316-39 in Turkey.

**Keywords:** *Altica hampei*, microsporidium, TEM, biological control.

## Anatomical Structure of *Sideritis ozturkii* Aytaç & Aksoy (Lamiaceae) Taxon

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**Aim of the study:** The present anatomical study on *Sideritis ozturkii* Aytaç & Aksoy taxon is a part of a postgraduate thesis. The purpose of the present study is to investigate the anatomical structure of the endemic *Sideritis ozturkii* Aytaç & Aksoy taxon of *Sideritis* L. genus of Lamiaceae family.

**Materials and Methods:** The material required for the anatomical study to be conducted was collected from Kızıldağ in the district of Derebucak of the Province of Konya. The "Flora of Turkey and The East Aegean Islands" (Davis 1988) was used for the diagnosis of the flora sample collected. For being used for the anatomical study, the root, stem and leaves of *Sideritis ozturkii* Aytaç & Aksoy taxon were stored in 70 % alcohol for use for anatomical studies. The anatomical studies were completed at five stages. These stages include in order dehydration, paraffin impregnation, paraffin embedding, cross section and staining. The methods of Algan (1981) were followed during the anatomical studies.

**Result:** As a result of the anatomical studies conducted, the cross-sections of the root, stem and leaves of *Sideritis ozturkii* Aytaç & Aksoy taxon and the cellular parts of plant tissues were examined. The width and length of the tissues the cross-sections of which were taken were measured and photographed and the data obtained was provided in a tabulated form.

**Acknowledgements:** We would like to thank BAP (Coordination Office for Scientific Research Projects) for supporting this study with the project no: 17201005.

**Keywords:** *Sideritis*, Anatomy, Endemic, Konya, Turkey.

## **A Study on Bean Bio-Diversity in Black Sea Region**

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**Aim of the study:** Black Sea region is one of the regions which has a rich plant diversity arising from conventional agricultural understanding and geographical and ecological diversities. Particularly, bean is found a common usage area in the region. Although it entered into our country after 1750s, it showed a rather rich variation in the region. Besides, the common usage of local materials on particularly dry bean among farmers makes the region of local population richness more important. Also, there is a matter on bean similarly, and the usage of variation on breeding studies will contribute to develop new varieties.

**Material and Methods:** In the study, 15 provinces, and 47 districts, and 154 villages which are within the boundaries of the region are visited, and 224 local dry bean populations are picked. Picked dry bean populations are classified into genotypes regarding seeds' shapes and color, and 311 local dry bean genotypes are formed. Even the seeds' shapes and color of the picked dry beans' populations show the richness of the region with regard to dry bean diversity.

**Results:** In the result of describing 311 genotypes regarding plant height, it is found that 57 genotypes are dwarf, and 124 genotypes are semi-dwarf, and 130 genotypes are climbing. Also, in the result of describing 311 genotypes, it is found that while 181 genotypes have white seed color, the other 130 genotypes have colorful seeds' types. It is found that 82 genotypes are brown, 28 genotypes are grey, 10 genotypes are black, 6 genotypes are violet, 2 genotypes are dark yellow, 1 genotype is red and 1 genotype is green among 130 genotypes which have colorful seed types. In the conclusion of this study, it is determined that commercial types hardly ever are entered into the region even dry bean is grown by every farmers in the small areas in the region. It is concluded that dry bean is one of the most important field crops like wheat, corn, and soybean in the region.

**Keywords:** Black Sea Region, Dry bean, Bio-diversity, Genotypes, Seeds

**Unmanned Air Vehicles (UAV)-Based Remote Sensing in Determining Land Use and Land Use Effects: A Case Study of Tekirdağ province, Thracian Peninsula (NW Turkey)**

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**Aim of the study:** This study aims to determine the effects of some lands situated within the borders of Tekirdağ province on land use. The study, employing the unmanned air vehicles (UAV)-based remote sensing methods, calculated the areas and volumes of the mines and erosion sites involving soil loss in in the first place.

**Material and Methods:** In this way, changes in topography were analyzed. For this, the amount of soil moved away from the environment was also determined by using soil thickness and bulk density in mines and erosion lands. Then, based on the obtained data, a relationship was established between land use capability (LUC) classes and soil types of the lands where these areas spread. Geographic information systems (GIS) techniques were used in the maps of the study and spatial measurements.

**Results:** In the end, it was found out that the studied mines and erosion areas are on the class II and class III lands and located on brown forest soil and grumusol great soil groups. It was also seen that total area of the quarries examined in Tekirdağ province in 2017 is approximately 206 ha; volume loss from its ordinary topography is 92,710,871 m<sup>3</sup>; and the amount of soil moved away from the environment is 4,622,000 tons. The studied erosion area was found to have an area of 2,825 m<sup>2</sup> and a volume loss of 25,036 m<sup>3</sup>. This study indicated that the spatially produced data through the unmanned air vehicles (UAV)-based remote sensing methods allow determining and mapping the volume of changed topography and the area affected in an environment in a reliable manner.

**Keywords:** Tekirdağ, Mines, Erosion, GIS, Remote sensing.

## **Native and Alien Fish Species in Dalaman River System (Mugla, TURKEY)**

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**Aim of the Study:** Dalaman River is a main river, located in West Mediterranean Basin, in Southwestern part of Turkey. The river has two HES (Hydro Electrical) Dam Lake and one has aquaculture activities for trout. The biodiversity fish species of freshwater systems are degraded by many human activities. The introduction of alien species, which was previously unknown, in natural water could harm native fish in many natural waters around the world. The aim of this study was to determine native and alien fish species in Dalaman River System (Mugla, Turkey).

**Material and Methods:** This study was carried out between February, 2012 and March, 2013, to determine native and non-native fish species inhabited in Dalaman River system. Fish samples were collected by electrofishing, seine net and angle from Dalaman River and HES Dam Lake. The total length (TL±1 mm) and body weight (W±0.1 g) of all caught fish were measured.

**Results:** It was determined that caught fish species belonging to 11 species and 5 families (Salmonidae, Cyprinidae, Poeciliidae, Anguillidae, Cichlidae, Gobiidae) were identified. The fish found as *Oncorhynchus mykiss* (Walbaum, 1792), *Cyprinus carpio* (L. 1758), *Squalius fellowesii* (Günther, 1868), *Capoeta bergamae* Karaman, 1969, *Anguilla anguilla* (L., 1758), *Gambusia affinis* (Baird & Girard, 1853), *Carassius gibelio* (Bloch, 1783), *Petroleuciscus smyrnaeus* (Boulenger, 1896), *Barbus pergamonensis*, Karaman, 1971, *Alburnus escherichii* Steindachner, 1897, *Knipowitschia caucasica* (Berg, 1916) and *Tilapia zillii* (Gervais, 1848). *A. escherichii*, *K. caucasica* and *Tilapia zillii* are new records from the River. *P. smyrnaeus* is one of endangered species in Anatolia.

**Acknowledgement:** This study has been sponsored by Mugla Sıtkı Kocman University through the University grant no 11/66-BAP.

**Keywords:** Fish fauna, Dalaman River, Native, Alien, HES, Mugla

## **Improvements in Synthetic Seed Technology: Applications for Plant Biotechnology**

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**Aim of the study:** Synthetic seed technology is one of the most important applications of plant tissue culture, as it combines the advantages of clonal propagation with those of seed propagation (i.e., storability, easy handling and transport, use of sowing equipment, protection against diseases and pests). Nowadays, the use of alginate hydrogels in biotechnology and pharmaceutical industry is widespread due to the unique properties they possess such as high biocompatibility and biodegradability. The inert environment within the polymer network of alginates allows for the entrapment of a wide range of bioactive substances, cells and drug molecules, with minor interactions between them and the biopolymer. Furthermore, the physical and chemical properties of alginates (e.g. porosity, degradability) can be easily modified in mild conditions. The purpose of this work is to describe on prospects and limitations of synthetic seed technology for plant biotechnology.

**Material and Methods:** In the most general encapsulation technique, an appropriate sterile solution (in common, 3%) of Na-alginate in pure water or, more often, in a nutritive medium (containing or not growth regulators) is mixed with the explants inside a small glass container, working under the sterile air of a laminar-flow hood. From this container, the explants are sucked with a pipette (whose tip have been trimmed to obtain a 2- 4 mm hole) together with the Na-alginate solution. The Na-alginate is then released drop-by-drop (each drop containing a single explant) into a sterile solution of the complexing agent (a di- or tri-valent metal salt, such as calcium chloride or calcium nitrate). Alternatively, the explant is directly inserted into the forming drop before its detachment from the tip and its falling down into the complexing agent. In both techniques, an ion-exchange reaction occurs in 20-30 minutes, during which calcium replaces the sodium and the beads gel completely. After bead hardening, the synseeds are then collected with a sieve and washed with sterile water.

**Results:** Although of more recent development if compared to other categories of plants, the synthetic seed technology is today an important tool, available to breeders and scientists, for the propagation *in vitro* of ornamental species, including trees, shrubs and cut flowers. Protocols of encapsulation have been already optimized for various explants from numerous ornamental species, achieving high synseed conversion rates, relatively short germination times and the production of high-quality plantlets. In addition, it must be underlined that the synthetic seed technology has greatly contributed to a further improvement of cryopreservation procedures. This biotechnologically advanced approach to the ex-situ plant conservation has to be considered of strategic importance for the long-term preservation of endangered and valuable germplasm from economically important ornamental species.

**Acknowledgements:** This study was supported by the Mugla Sitki Kocman University Scientific Research Projects Coordination Unit (Mugla, Turkey).

**Keywords:** Micropropagation, Na-alginate, plant tissue culture, synseed.

**Growth, Mortality and Exploitation of Annular Sea Bream (*Diplodus annularis* L.) in the South-Eastern Coast of the Black Sea, (Unye/Ordu)Turkey**

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**Aim of the study:** The aim of this study is to determine the growth and mortality rates and exploitation of annular sea bream (*Diplodus annularis* L.) from the south-eastern coast of the Black Sea.

**Material and Methods:** A total of 295 *D. annularis* specimens were collected from Unye (Ordu/Turkey) coast of the south-eastern Black Sea using artisanal fishing gear from January 2015 to November 2017. Growth was described by the standard form of the von Bertalanffy growth equation. The growth performance index ( $\Phi$ ) was computed by formula:  $\Phi = \text{Log } K + 2 \text{ Log } L_{\infty}$ . The annual instantaneous total mortality coefficient (Z) was estimated from length-based catch curves. The annual natural mortality rate (M) was estimated using Pauly's empirical equations taking the mean ambient temperature of 17,7<sup>o</sup> C. The instantaneous fishing mortality coefficient (F) was calculated as:  $F = Z - M$  and the exploitation rate (E) was estimated as the proportion of fishing mortality relative to total mortality, that is,  $E = F/Z$ .

**Results:** Total length and weight of specimens ranged between 13.3 and 23 cm and 50.3 and 225.4 g. Length-weight relationship was  $W = 0.0554 * TL^{2.66}$  ( $r^2 = 0.8952$ ). The growth was assumed to follow the von Bertalanffy growth function with asymptotic length ( $L_{\infty}$ ) and the growth coefficient (K) estimated at 24.15 cm total length and 0.490 year<sup>-1</sup> respectively. The growth performance index ( $\Phi'$ ) and longevity ( $t_{\text{max}}$ ) as 2.456 and 6.12 year, respectively. Instantaneous rate of total mortality, natural mortality and fishing mortality were estimated as 1.75 year<sup>-1</sup>, 0.96 year<sup>-1</sup> and 0.79 year<sup>-1</sup>, respectively. The current exploitation rate (E) was calculated as 0.45. Results from the study indicated that there is no overexploited on the *D. annularis* population in the south-eastern coast of the Black Sea.

**Acknowledgements:** This study was supported by the Scientific Research Fund of Ordu University with the project number TF-1464.

**Keywords:** Black Sea, *Diplodus annularis*, growth, mortality, fisheries.

**Determining the Relationship Between Environmental and Biotic Factors and Morphometrics of Pine Processionary Moth (*Thaumetopoea wilkinsoni* Tams, 1924) Larvae in Western Mediterranean Region**

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**Aim of the study:** The aim of this study is to investigate which environmental parameters affect the larval morphology of forest pest pine processionary caterpillars and observe the differences between different sites.

**Material and Methods:** In Spring 2017, 15 overwintering nests of pine processionary larvae (*Thaumetopoea wilkinsoni*) were collected from 15 different red pine trees (*Pinus brutia*) from 7 study sites representing Western Mediterranean Region. These sites were chosen in terms of altitude and habitat differences. 105 nests in total were brought to Entomology Laboratory of Department of Biology in Süleyman Demirel University in 3 L containers. Larvae from every nest were counted and 150 larvae from each site sampled for morphometric studies. Larval length and width, head length and width, length/width ratios and larval dry weight were measured as morphometric characters. Environmental parameters like temperature, moisture, altitude and biotic parameters like tree height, tree diameter, nest number on one tree, nest size, larva number in one nest were compared with morphometric measures. Comparisons and relationships were made into graphics by Matlab 2015 software.

**Results:** As a result of this study, it was determined that some parameters do not affect the larval morphometry significantly however it was found that head morphology is varying with altitude and larva number in a nest is directly proportional with larval length.

**Keywords:** Pine Processionary Moth, Morphometrics, *Thaumetopoea wilkinsoni*.

## **Evaluation of Content Analysis of Honey Samples Taken from Four Different Regions of Turkey**

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**Aim of the Study:** We set out to make their content analysis of honey samples obtained from different regions of Turkey in this investigation.

**Materials and Methods:** Honey samples were taken from Servergazi, Sarayköy (Denizli), Muğla and Konya regions. It's ready to be analyzed in the lab. According to Singleton, 1965; and Gomes, 1999 methods, were evaluated by HPLC device. Structural analysis of the content was carried out by FT/IR spectrometry with a Zn Se ATR accessory. All infrared spectra were acquired using a Perkin Elmer BX FTIR spectrometer (Perkin-Elmer Norwalk, CT, USA) equipped with a mercury cad detector and KBr optics. Solid samples were pelletized with KBr and read on a Perkin Elmer FTIR at 4 cm<sup>-1</sup> intervals at 4000-400 cm<sup>-1</sup>. Liquid samples were read at 4 cm<sup>-1</sup> intervals at 4000-600 cm<sup>-1</sup> in the FTIR device using ATR (Attenuated Total Reflection).

**Results:** Content analyzes were done on honey samples. According to this result, total antioxidant values, total phenolic substance (TPC) and Fourier Transform Infrared (Kızılötesi) Spektroskopisi (FT-IR) spectral analysis results were obtained. The values for scavenging DPPH radical for the honey were Muğla Doğanköy honey 1,32 µmol TE/g, Konya honey 1,63 µmol TE/g, Sarayköy honey 1,91 µmol TE/g and Servergazi honey 7,25 µmol TE/g, respectively.

**Keywords:** Honey, Antioxidant, Phenolic content, FT IR (Fourier Transform Infrared), DPPH

## Goji Berry Pests and Their Biodiversity in Isparta Province of Turkey

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**Aim of the study:** Goji berry has an important place in terms of Turkish economy. Goji Berry from China originated here from all over the world. Goji Berry which has recently begun to be recognized in Turkey, draws attention with benefits. Very cold and very hot climates, which can be adapted to the Goji Berry can be grown almost anywhere in smoothly in Turkey. One of the most important landmarks that make the Goji Berry agriculture in Turkey, their precious fruit species grown in difficulty in the inner region and the transition region is that it can be grown in the ideal manner. For this reason, the determination of insect biodiversity in a goji berry orchard is the aim of this study.

**Material and Methods:** The study was be conducted in a Goji berry orchard (2 da) in the province of Isparta, Turkey. There were used the sticky (yellow and blue color), bait and pitfall traps for collecting of insect. At the same time, trees were checked by eye. The orchard was visited each week and the traps were changes each visit and brought to the laboratory. Insect numbers in the traps brought to the laboratory were recorded by counting. The experiments were carried out during the period from blooming to harvest for 2017-2018 years. Insect samples were sent to taxonomists to identification.

**Results:** As a result, 4 thrips species (*Frankliniella occidentalis* (Pergande), *Thrips tabaci* Lindeman, *Thrips pillichii* Priesnier, *Aeolothrips* sp.), 3 hemipter species (*Dolycoris baccarum* L., *Rhynocoris iracundus* (Poda) and *Liorhyssus hyalinus* (F.)) One Coleoptera (*Tropinata hirta* (Poda)), One mite (*Tetrahychus urticae* Koch) and some Diptera samples were collected. In addition, fluctuation graphics of thrips populations were drawn.

**Acknowledgements:** The authors thank to Dr. Ekrem Atakan (Çukurova University, Agricultural Faculty, Plant Protection Department, Adana, Turkey) for the determination of *Thrips* species, Barış ÇERÇİ (Kökner 4, Tarçın Sokak, Koru Mahallesi, Ardıçlı Evler, Esenyurt, İstanbul, Turkey) for the determination of hemipters, Dr. Derya ŞENAL (Bilecik Şeyh Edebali University, Agricultural Faculty, Plant Protection Department, Adana, Bilecik, Turkey), for the determination of coccinellids.

**Keywords:** *Lycium barbarum*, pests, sticky trap, pitfall trap

## Determination of Chemical Content of Thyme Honey by HPLC, UPLC-ESI-MS/MS and Spectrophotometric Methods

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**Aim of the study:** Honey is the most common bee product and a beneficial nutrient that formed by chemical transformation of nectar, which is absorbed by bees from flowers and fruit buds, through invertase enzyme in a specific organ “honey stomach” of bees and placed in honeycomb cells in the hive. The content and variety of vitamins, phenolic compounds and free amino acids gives information about the origin and quality of flower honeys. In this study, free amino acids, phenolic compounds and water-soluble vitamin content of thyme honey supplied from Datça-Muğla were determined by UPLC-ESI-MS/MS, and sugar profile was determined using HPLC-RID instrument.

**Material and Methods:** Honeys samples were analysed according to AOAC methods diastase activity, electrical conductivity, proline content, pH, free acidity and moisture content. Three replicate analyses were performed for each honey sample. The chromatographic analyses for determination of total monosaccharides content of honey samples were carried out a refractive index detector (RID) in the Agilent high performance liquid chromatograph (HPLC) equipped with, and evaluated with the ChemStation Software. The chromatographic separation of sugars was achieved in an amine column, using acetonitrile/water (84:16) as mobile phase, at a flow rate of 1.0 mL/min. and refractive index detection. UPLC device was used to determine water soluble vitamin, phenolic structure compounds and free amino acid content. To determine the vitamin content in the samples, 5 g of honey was dissolved in 50 mL of ultra-distilled water. The solutions were extracted with separation funnel by 50 mL of ethyl acetate, and then the water phase was thoroughly separated after 180 min. Then separated water phase was extracted two more times with the same procedure with ethyl acetate. Then the organic phase was evaporated completely from the water phase with rotary evaporator under vacuum at 36°C. The water phase residue was filtered using PTFE-20/25 0.20 µm and injected to UPLC-ESI-MS/MS.

**Results:** Phenolic compounds, free amino acids and water-soluble vitamins have been identified in thyme honeys collected in Datça region of Muğla. Analyses of vitamins, phenolic compounds and free amino acid content can be used to distinguish thyme honey of Datça from other honeys. According to the sugar profile of thyme honey the fructose/glucose ratio was 1.29 and the maturated honeys did not contain sucrose. In the UPLC-ESI-MS/MS instrument, 32 of phenolic compounds and 20 of free amino acids were identified. In the thyme honey analysis, 21 of phenolic compounds and 20 of amino acids were detected. In addition, 67.00 mg/kg Nicotinamide, 14.82 mg/kg Nicotinic acid, 34.83 mg/kg Pyridoxine and 16.04 mg/kg Riboflavin were found in thyme honeys.

**Acknowledgements:** The thyme honeys used in the study were supplied from honey producers from the Muğla - Datça region.

**Keywords:** Thyme honey, phenolics, amino acids, sugar profile, UPLC-ESI-MS/MS

## **Risk Assessment for Consumer Health by Determination of Heavy Metals Concentrations in Marinated and Smoked Seafood**

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**Aim of the study:** In this study, the aim is to determine the concentrations of various heavy metals found intensely in processed seafood such as Cu, Sn, Zn, Cd, Pb and Fe and then to make a risk assessment for consumer health.

**Material and Methods:** Within the scope of this study, 9 different processed seafood types (smoked mackerel, marinated and dried mackerel, marinated octopus tentacles, marinated octopus salad, marinated squid salad, marinated and dried mackerel, marinated and smoked anchovy, smoked salmon and smoked bonito) were purchased from markets in Mugla province chosen by random sampling method. The samples were dissolved with nitric acid and hydrogen peroxide by microwave digestion system (Milestone ETHOS Easy®). Element concentrations in the samples were specified with Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS, Agilent 7700 with auto-sampler). Risk assessment for consumer health was conducted via estimated daily intake amount (EDI) and target hazard quotient (THQ).

**Results:** The obtained EDI results did not exceed the limits of tolerable intake amounts. THQ value was determined as <1 hence it was found that there was not any risk for consumer health.

**Acknowledgements:** This study was supported by The Department of Scientific Research Project Office in Mugla Sitki Kocman University (Project No: 16/162).

**Keywords:** Seafood, Heavy metal, THQ, EDI, Risk assessment

**Inferring the Molecular Phylogeny of the Valentin's Lizard, *Darevskia valentini*, (Boettger, 1892) from Turkey**

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**Aim of the study:** We aimed to search the phylogenetic relationship for populations of *D. valentini* (Boettger, 1892) which is distributed in Turkey based on both mitochondrial (12S rRNA and COI) and nuclear (MC1R) markers and to investigate dispersal range of the genetically lineages.

**Material and Methods:** A total of 70 *D. valentini* samples were used. All DNA sequences were aligned separately for each gene using MAFFT v7. The number of haplotypes, haplotype diversity, and nucleotide diversity were calculated in DnaSP v5. The most suitable model of DNA substitution was chosen using jModelTest v2. Phylogenetic analyses were performed with the Neighbor Joining (NJ), Maximum Likelihood (ML) and Bayesian Inference (BI) methods using MEGA v7, RAxML v7, and MrBAYES v3 respectively, using the suitable models of evolution for each gene regions. The genealogical relationships among the 12S, COI and MC1R haplotypes, separately, were constructed using TCS v.1.21.

**Results:** In total, 348 bp of 12S rRNA, 626 bp of COI, 584 bp of MC1R were obtained. For 12S, 9 haplotypes were detected and parsimony informative sites were 9. For COI, 37 haplotypes were detected and parsimony informative sites were 77. Phylogenetic analyses (NJ, ML and BI) produced trees with similar topologies including two well supported clades with high bootstrap and pp values. Additionally, the first clade includes two genetically lineages which are represent *D. v. valentini* and *D. v. lantziyreni* (Darevsky and Eiselt, 1967), respectively. Samples collected from Sivas, Tokat, Erzincan, Gümüşhane and Bayburt provinces are sister clade with Kayseri which is type locality of *D. v. lantziyreni*. On the other hand, the second clade including Erzurum, Ağrı and Van samples seems entirely to new genetically lineages. In conclusion, this study disclosed and constructed molecular phylogeny of the species and the results showed that the genetic separation between clades can be derived from geographical barrier systems locating into Anatolia and it needs to revise its taxonomical nomenclature.

**Acknowledgements:** This study was based on Kamil Candan's Ph.D. Thesis and was supported by Dokuz Eylül University with project number 2017.KB.FEN.039.

**Keywords:** *Darevskia valentini*, Phylogeny, Systematic, Lizard, Biogeography, Anatolia

## Numerical Taxonomy of the Genus *Cousinia* Cass.(Asteraceae) in Turkey

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**Aim of the study:** This study aims to investigate the morphological variation and phenetic relationships of *Cousinia* Cass. taxa in Turkey.

**Material and Methods:** Plant samples were collected from different localities in Turkey during 2012-2014. The samples were dried according to standard herbarium techniques and stored at the Selçuk University Herbarium (KNYA). For numerical analysis, 66 characters for 40 *Cousinia* taxa were selected and used in this analysis. Numerical data were scored and the dendrogram was constructed by these data to show the relationship among the taxa. In addition, the principal component analysis (PCA) was used to demonstrate the presence of morphological variation.

**Results:** The phenetic relationships and morphological variations among *Cousinia* taxa were determined by the numerical analysis. The dendrogram obtained from numerical analysis showed that most of the taxa are clearly differentiated from the others by morphological characters. According to this phenogram, *Cousinia* taxa are basically divided into two main groups. In the first group (A) contains fewer species with deltoid-lanceolate appendaged phyllaries. The second group (B) which has the majority of species, was composed by the taxa with unappendaged phyllaries. Thus, the genus *Cousinia* could be distinguish taxonomically into two subgroups based on phillary structures PCA analysis shows that *Cousinia* taxa have 95% of morphological variation. According to three-dimensional graphic constructed by PCA, *Cousinia* taxa have big variation and genetic diversity. *C. weshenii* are the most distinct species of the genus.

**Acknowledgements:** We thanks TUBITAK (Project number: TBAG-111T364) for their financial support.

**Keywords:** Phenetic relationships, principal component analysis, Turkey

## Heavy Metal Contamination of Pleuronectiformes Species from Sinop coasts of the Black Sea

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**Aim of the study:** In the Turkish Black Sea coasts fish is particularly consumed because of high protein supplies, essential amino acids, vitamin, and mineral content. Fish are exposed to contaminants such as heavy metals in polluted waters. Heavy metals from the anthropogenic activities are continually entered into the marine ecosystem. The Black Sea are contaminated by industrial, domestic and agriculture wastes, metal ions, and organic and inorganic compounds, paints and petroleum products. Heavy metals are major health risks owing to their toxicity, bio-accumulation, bio-magnification and long-persistence in the food chain. For example mercury, cadmium and lead are highly toxic and may be reason mental and central nervous system detriment. It is therefore necessary to detect and observe metal amounts in seafood, because metal ions can readily accumulate in fish more than those in other foodstuffs. Non-essential metals are toxic to fish even at very low concentrations, while essential elements become toxic at relatively high concentrations. Heavy metals occur in nature at low concentrations and the increase of their concentration indicates the environmental pollution. The aims of the study are to determine heavy metals in Pleuronectiformes species from Sinop coasts of the Black Sea and determine the health risks due to the consumption of contaminated fish.

**Material and Methods:** Pleuronectiformes species *Scophthalmus maximus* (Linnaeus, 1758) belonging to Scophthalmidae family, *Arnoglossus laterna* (Walbaum, 1792) belonging to Bothidae family and *Pegusa lascaris* (Risso, 1810) belonging to Soleidae family were collected from Sinop coasts of the Black Sea in fishing season of 2016. Heavy metals (Hg, Cd, Pb, Cu and Zn) in edible tissues were determined by ICP-MS (Agilent 7700x). Standard reference material TORT-3 lobster hepatopancreas for metals was used to determine the reliability of the analysis. The daily and weekly intakes of the metals from the consumption of the fish samples were also estimated for adults, and hazard index (HI) in fish samples were calculated to determine the health risks due to the consumption of contaminated fish.

**Results:** The limit values given by the international and national organizations did not exceed in the muscle tissues of turbot, Mediterranean scald fish and sand sole. Overall Zn was detected in higher concentrations in all species followed by Cu, Pb, Hg and Cd. The results obtained from the analyses of the maximum levels of the metals except Hg were found in turbot. The highest Hg ( $0.021 \pm 0.007 \mu\text{g g}^{-1}$  wet wt.) was found in sand sole. However, the high amounts of Cd, Pb, Cu and Zn in turbot were  $0.011 \pm 0.004$ ,  $0.07 \pm 0.005$ ,  $1.32 \pm 0.28$  and  $14 \pm 3 \mu\text{g g}^{-1}$  wet wt., respectively. The EDIs and EWIs of the metals were estimated taking into account the mean of metal in all fish samples and the mean consumption of fish per day/week for adults. These results are normally significantly lower than the recommended values of FAO/WHO. Estimated HIs of all the considered metals were below the value of 1, therefore the metals in fish samples do not toxic any apparent threat to the population and these fishes are healthy for consumption.

**Acknowledgements:** This work was carried out at the Department of Hydrobiology, Fisheries Faculty, University of Sinop.

**Keywords:** *Scophthalmus maximus*, *Arnoglossus laterna*, *Pegusa lascaris*, heavy metals, Black Sea

## Swimming in Planktonic Copepods: Interspecific Variations and Similarity

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**Aim of the study:** Copepods the most numerous aquatic invertebrates have a large morphological and behavioral diversity which is based on a single principle of movement in water with the help of rhythmic strokes of mouthpart or thoracic limbs "like rows". The purpose of this work was to summarize the data obtained by the author during 1984 - 2014 in the Department of Animal Physiology of the Institute of Biology of Southern Seas, NASU, to identify the scale patterns of interspecific variations in the mechanical parameters of the copepods swimming at steady cruising and unsteady jumping types of row locomotion.

**Material and Methods:** The frequency of locomotor patterns, circular velocity of the limbs, speed of the body, drag force, energy of locomotion in free swimming and tethered adult females and males of 15 calanoid and cyclopoid species with the body length of 0.05-0.54 cm were measured with the help of high-speed (1200 - 4000 fps) filming and video recording and tensometric method.

**Results:** In copepods the parameters of locomotion are due to body length (L) and mass (M). During cruising at constant temperature of 20°C integral drag force (R) created by mouthpart limbs changed within the limits of 0.01 - 0.5 dynes in proportion to  $L^{2.1}$ , which corresponds to the Hill's rule, limbs beat frequency decreased from 80 to 12 Hz in proportion to  $L^{-0.4}$ , average body speed increased in the range 0.15 - 0.4 cm s<sup>-1</sup> in proportion to  $L^{0.6}$ , while power (N) scales as  $M^{0.87}$ . During escape jumps by the thoracic limbs integral value of R increased from 0.8 to 100 dynes proportionally with  $L^{2.08}$ , distance of one locomotor act scales as  $L^{1.14}$ , whilst maximum instantaneous speed increased from 18 to 120 cm s<sup>-1</sup> as  $L^{0.77}$  and N as  $M^{0.8}$ . The frequency of kicks during escape jumps consistent with "ideal" Strouhal number of about 0.2, suggesting that copepods are optimally designed for rapid escape jumps. Net cost of transport ( $C_t$ ) during escape swimming reduced from 773 to 28 cal g<sup>-1</sup> km<sup>-1</sup> in proportion with  $M^{-0.44}$ . The  $C_t$  values obtained for jumping copepods were 4-5 times higher than those for cruising ones and are close to  $C_t$  of jumping decapods and flying insects, being extrapolated to their body mass.

**Acknowledgements:** This work is based on laboratory studies carried out in the Department of Animal Physiology and Biochemistry of the Institute of Biology of the Southern Seas and supported by the National Academy of Sciences of Ukraine

**Keywords:** Copepoda, Swimming, Mechanical parameters, Scale changes

## Determination of Genetic Diversity in Some Turkish Barley Cultivars and Azerbaijani Barley Accessions with Peroxidase (POGP) Markers

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**Aim of the study:** Barley (*Hordeum vulgare L.*) is cultivated almost everywhere in the world and it is one of the first crop domesticated by humans. Fertile Crescent was suggested as one of areas where it was domesticated. Barley is World's most important fourth grain after wheat, rice and maize in terms of production and cultivated area. Barley is used in animal nutrition and malting industry. Determination of the genetic relationship among the collections of barley accessions is useful for evaluating germplasm, maintaining genetic diversity in the appropriate range and planning of crossings in breeding programs. Molecular markers have been used extensively and effectively by plant researchers in plant breeding and genetic resource assessments. The aim of this study was to estimate genetic diversity in Turkish barley varieties and Azerbaijani barley accessions.

**Materials and Methods:** Azerbaijani barley accessions were obtained from National Genetic Institute of Azerbaijan and Turkish varieties were obtained from Central Research Institute of Field Crops, Ankara. DNA were isolated from young leaves of barley seedlings grown for a week in a half strength Hoagland medium or from seeds for non-germinating ones. Primers were designed based on the rice peroxidase cDNA sequence. 9 different POGP primers were used to amplify DNA from 95 barley samples and the resulting bands were evaluated. The data were analyzed using NTSYS-pc version 2.1 computer program and genetic similarity matrices were constructed between the samples. By using similarity matrix, genetic relationship between barley cultivars were determined by UPGMA, Neighbor Joining and Principal Component Analysis (PCA).

**Results:** In this study, 9 different peroxidase gene (POGP) markers were used to determine genetic diversity in 63 Turkish cultivars and 32 Azerbaijani barley accessions and they produced a total of 237 DNA bands. Of the 237 bands, 105 of them (% 96) were found to be polymorphic in 95 barley genotypes. The genetic similarity coefficient ranged from 0,54 to 0,95 among genotypes according to the UPGMA dendrogram which was produced by using Dice's coefficient. Minimum genetic distance was found between Arpa77 and Cəlilabad 19. The most distant genotype to all others was Yerçil. According to the dendrogram which was produced by neighbor joining method, the genetic similarity coefficient ranged from 0,00 to 0,65 among genotypes. Azerbaijani genotypes and Turkish cultivars were clustered separately indicating their different origin. Considering the results obtained in this study, we conclude that POGP primers are reliable enough to detect genetic similarity and differences among barley cultivars or accessions.

**Acknowledgement:** This work was supported by Research Fund of the Erciyes University. Project Number: FBY-11-3700.

**Keywords:** Barley, POGP, genetic diversity

**Trophic ecology of sand smelt (*Atherina boyeri* Risso,1810) as revealed by the stable carbon and nitrogen isotope ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ) in Lake Eğirdir (TURKEY)**

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**Aim of the study:** The present aimed to determine the role of sand smelt (*Atherina boyeri*) in Lake Eğirdir, a freshwater lake, using stable isotope analysis ( $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$ ). This euryhaline species is rarely present in fresh waters, but lately it has been widely distributed in freshwater systems. The sand smelt was introduced into Lake Eğirdir the lake almost fifteen years. The sand smelt is an opportunistic species feeding on benthic and zooplanktonic invertebrates.

**Material and Methods:** A total of 17 specimens with  $7.69 \pm 1.07$  TL and  $3.26 \pm 1.29$  g) were analyzed for stable carbon and nitrogen stable isotope. We collected the sand smelt species at four sites during spring and fall of 2010. The contribution of prey items to the tissue of sand smelt was analyzed with SIAR, IsoSource and Bugalho et al., (2008) mixing model.

**Results:** The  $\delta^{13}\text{C}$  ( $-18.46 \pm 1.11$ ) and  $\delta^{15}\text{N}$  ( $11.83 \pm 0.61$ ) did not change much over the entire lake and season. The trophic position of the sand smelt were at higher in food webs with a second highest trophic position of  $3.51 \pm 0.19$  following *Sander lucioperca*, top species with a  $3.89 \pm 0.13$  trophic position. IsoSource, SIAR, Bugalho et al (2008) mixing models indicated that invertebrates contributed to the diet of the sand smelt most (IsoSource: average 46%, 44-48 min-max, Bugalho et al., (2008) min-max 44-49%, SIAR: mean 26%; min-max: 12% -39%). As a result of analysis by taking average values of all stations and seasons, it was determined that the group of invertebrates in which the average of crabs and crayfish were included as a food sources in the models had a contribution rate of 40 to 60% to the diet of *Atherina boyeri*. The belief of that sand smelt reduces the eggs of fishes in the Lake is not supported by the stable isotope data, a conclusion derived from little contribution of fish eggs revealed from stable isotope mixing models.

**Acknowledgements:** This study was supported by the Republic of Turkey's Ministry of Food, Agriculture and Livestock, General Directorate of Agricultural Research and Policies (TAGEM/HAYSÜD/2010-09-01-01). We would like to express our thanks to the Fisheries Research Institute, Eğirdir and all the members of the project team for their help during field study.

**Keywords:**  $\delta^{13}\text{C}$ ,  $\delta^{15}\text{N}$ , Lake Eğirdir, Sand smelt, *Atherina boyeri*

## Ecological Richness of Tunceli and Its Environs (Turkey)

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**Aim of the study:** Tunceli is located on Anatolian diagonal in Eastern region of Turkey. Tunceli consists of many large and small valleys created by the rivers of Munzur, Pülümür, Tahar, Perisuyu and their tributary. The mountains of Munzur, Sultanbaba, Buyerbaba, Yılanlı, Pülümür, Düzgünbaba, Hel-Yel-Zel, Kırklar etc. have been formed the geography of Tunceli area. The altitudes change between 1500 and 3000 m. Tunceli, a protected natural life area, take shape 75% from the mountains, 25% from the plateaus and 5% from the lowlands. Approximately 1700 taxa (18% endemic) were found in Flora of Tunceli. Different ecosystems are one of the roots of this richness. The ecosystem types in Tunceli have been tried to be determined by this study.

**Material and Methods:** In this study, about 3400 plant samples from 620 different localities were collected within the borders of Tunceli province by the 65 times fieldwork during the vegetation seasons in 2014 and 2015, and photos were taken in their natural habitats, GPS coordinates were taken with their localities and habitat information. The observations were made about ecosystems and habitats during the fieldworks and also the notes were taken.

**Results:** Steppe vegetation is dominant in the region because of Iran-Turanien. The appearance of steppe has with the gramineous, wooded or chamaephytic character. In the gramineous steppe, there are mainly like *Alyssum*, *Aethionema*, *Stipa* and *Bromus* etc. genus belonging families of Brassicaceae and Poaceae. In the chamaephytic steppe, there are the species of *Thymus*, *Cirsium*, *Onopordum*, *Astragalus* and *Acantholimon* along with cushion plants like *Onobrychis* and *Acantholimon*. The subalpine meadows containing genus of *Aethionema*, *Allium*, *Astragalus*, *Bromus* and *Campanula* etc. are on the high mountain level. The forests in this area play a limited role and are quite destroyed. *Pinus sylvestris*, *Juniperus oxycedrus* and *Juniperus excelsa* are dominant species of coniferous. The oak forests have also been destroyed. Six different ecosystems including Forest Ecosystem (Leaf, Gallery and Coniferous), River Ecosystem, Steppe Ecosystem, Grassland Ecosystem, Rock Ecosystem and Wetland Ecosystem have been observed as a result of the field studies carried out within the province of Tunceli.

**Acknowledgements:** This study is based on field studies as part of "Biodiversity Inventory and Monitoring Works on Terrestrial and Inland Water Ecosystems of Tunceli Province" carried out by the Tunceli Office of Turkish Republic of Forestry and Water Affairs, General Directorate of Nature Conservation and National Parks. I would like to thank the aforementioned institution, A.H. Gürsönmez and M. Özel.

**Keywords:** Tunceli, Ecosystem, Eastern Anatolia, Plant, Turkey.

## Comparison of Different Versions of Saprobic Indices to Determine Water Quality of Eşen River in SW Anatolia, Turkey

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**Aim of the study:** Freshwater ecosystems, especially rivers are most threatened ecosystem in the world. In ideal conditions, the quality of running waters should be assessed by the use of physical, chemical and biological parameters in order to provide a complete spectrum of information for appropriate water management. In particular, relationships between macroinvertebrate community structure and environmental variables have been the subject of numerous investigations. In this study, benthic macroinvertebrate fauna was used for calculation of the five Saprobic Index (SI) versions for biological determination of water quality. Also the evaluation system of Klee was used for physical and chemical evaluation of the water quality classification. The relations between used methods and environmental variables were evaluated.

**Material and Methods:** Benthic samples were collected from seven stations that represent the river. Macroinvertebrate communities along the stream were sampled monthly between June 2003 and June 2005, using a bottom kick net (500 µm mesh). Collected organisms were immediately fixed in formaldehyde (4%) in the field and then transferred to 70% ethyl alcohol. The macroinvertebrates were sorted, identified to the lowest possible taxon (species, genus or families) and counted under a stereomicroscope. Simultaneous with macroinvertebrate sampling, water samples were taken and analysed for the environmental variables. Water quality assessment by physical and chemical parameters was done according to Klee (1991). Eşen River is the largest river in West Mediterranean river basin of Turkey with the total length of 146 km.

**Results:** In this study, a total of 111 benthic macroinvertebrate taxa consisting of 48 genera and 63 species, which belong to classes Turbellaria, Gastropoda, Bivalvia, Hirudinea, Malacostraca and Insecta were identified. Of these, 86%, 84 (96 taxa) belong to Insecta. The most important pollution sources on Eşen River are over irrigation, gravel gathering, dams and extensive using of chemicals for farming in the surrounding. When physical and chemical variables were evaluated according to Klee for determination of water quality, three quality classes were found. When the SI versions evaluated for classification of water quality, five classes were determined. When statically methods were evaluated highest relation was determined between RSI and SSI versions (0,799) ( $p < 0.05$ ).

**Acknowledgements:** The authors are thankful for the financial support of the Unit of Scientific Research Projects of Mugla Sıtkı Kocman University (Project No: 2003/10).

**Keywords:** Sabroby Indices, Benthic macroinvertebrate, Eşen River, Turkey.

**A Numerical Taxonomy of the Genus *Ornithogalum* from Turkey**

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**Aim of the study:** The aim of this study is to determine the phenetic relationships between the taxa of the genus *Ornithogalum* L.

**Material and Methods:** Plant samples were collected from different localities in Turkey. The samples were dried according to standard herbarium techniques and stored at the Selçuk University Konya Herbarium (KNYA). For numerical analysis, 111 characters for 61 *Ornithogalum* taxa were selected and used in this analysis. Numerical data were scored and the dendrogram was constructed by these data to show the relationship among the taxa. In addition, the principal component analysis (PCA) was used to demonstrate the presence of morphological variation.

**Results:** As a result of numerical analyses, it is found that the Turkish *Ornithogalum* taxa are clustered in five subcategory and both of them, *Ornithogalum* and *Myogalum* are seen more close comparing to remaining subgenera. Moreover, *Beryllis* is the farthest subgenera within the genus. Our findings indicate to some important diagnostical characters in classification of Turkish *Ornithogalum* species that they are mainly noted as bulb, leaves, scape and raceme, respectively.

**Acknowledgements:** We thanks TUBITAK (Project number: 110T948) and S.Ü. BAP (Project number: 13401070) for their financial support.

**Keywords:** Phenetic relationships, principal component analysis, Turkey.

**Population Structure of Invasive Lessepsien Crab *Charybdis longicollis*, infected by Alien Rhizocephalan *Heterosaccus dollfusi*, in the Mediterranean coast of Turkey**

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**Aim of the study:** Aim of the present study is to provide first scientific data on; reproduction (spawning period and size at maturity) of the *C. longicollis*'s, demographics (size structure and abundance trends), age and growth, and prevalence of the alien rhizocephalan on its hosts. Moreover, the survey data compared with the populations of *C. longicollis* located different parts of the Mediterranean Sea.

**Material and Methods:** Field surveys were carried out on the R/V "Akdeniz Su" during night times within the framework of a monthly sampling program of the trawling grounds of Antalya Bay, eastern Mediterranean. Subsamples of ~10 kg of *C. longicollis* were selected randomly and the specimens were transported in an ice box for further laboratory work. Following examinations carried out in laboratory: *i*) determination of sex using the sexual apertures and size (CW, carapace width) of all crabs, and records of ovigerous female (Ov; bearing eggs), *ii*) the presence of the parasite in non-externae-bearing (MM, infected and morphological modified) by the modification of the shape of the abdomen and abdominal appendages, and *iii*) the presence of parasite and number of externae-bearing (EP, externally parasitized). The maximum width of the 5<sup>th</sup> abdominal segment (5AW) and chela length (ChL) of individuals were also measured with a vernier caliper to the nearest 0.1 mm. During the period of maximum reproductive activity (between April and May) were evaluated to determine the size at first maturity. Growth patterns were determined using two different methods. The instantaneous natural mortality coefficient (M) was computed using the empirical model.

**Results:** During the surveys, a total of 820.1 kg of *C. longicollis* were caught with a total trawling time of 39.2 h. Monthly BI value fluctuated between 66.7 kg km<sup>-2</sup> (June) and 704.2 kg km<sup>-2</sup> (October), with a mean of 259.7±56.9 kg km<sup>-2</sup>. Highest and lowest BI values detected in autumn and in spring, respectively. Nearly half of the total biomass (46.6%) in the studied area of the Antalya Bay constitutes by *C. longicollis*. Male specimens (n=9131, 12-56 mm) were bigger than females (n=6320, 14-48 mm) ( $p<0.01$ ). The prevalence of *H. dollfusi* in the population was varied between 7.3% (January) and 43.1% (December) with a mean of 26.3 ±10.2%. Infestation in males (35.0±16.9%) was much higher than the females (12.2±4.6%) ( $F=109.4$ ,  $p<0.01$ ), and sex detected to be a significant factor on the infestation ( $F=20.3$ ,  $p<0.01$ ). Multiple infestation were not common in the population of *C. longicollis* in Antalya Bay. The identified age groups (modal groups) and their abundance, resulting from the analysis of the monthly length–frequency distribution of *C. longicollis* showed that males and females of *C. longicollis* exhibited a maximum of four and three modal size groups per year, respectively.

**Acknowledgements:** This study was partially financed by the Akdeniz University Scientific Research Projects (2011.02.0121.022).

**Keywords:** *Charybdis longicollis*, invasive crab, *Heterosaccus dollfusi*, lessepsien

## Advantages of Temporary Immersion Bioreactor Systems for Micropropagation: SETIS™ and RITA®

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**Aim of the study:** *In vitro* propagation methods provide an important alternative for plant mass propagation. Although the cultivated plant species are still known to be relatively recalcitrant to tissue culture, successful protocols of micropropagation, organogenesis, and somatic embryogenesis have been reported from various explant types. *In vitro* culture systems based on liquid culture medium are considered to be more effective than semi-solid culture medium systems due to better accessibility of medium components for the plant tissue, ease of handling, and possibility to scale and automate. Temporary immersion bioreactor systems have been shown to offer technological and quantitative benefits such as higher proliferation rate and reduction of production cost. This work aimed to describe advantages of micropropagation protocols developed using two different temporary immersion bioreactor systems, SETIS™ and RITA®.

**Material and Methods:** In this study RITA® and SETIS™ Bioreactor Systems were compared two culture systems: semi solid and temporary immersion. Solid medium culture experiments were performed using Magenta™ vessel GA-7-3 and B-cap (Sigma-Aldrich®). Each Temporary Immersion Bioreactor Systems (TIS) was connected to a bottle containing 250 mL of liquid medium and the cultures were subjected to 6<sup>h</sup>/8<sup>min</sup>, 8<sup>h</sup>/8<sup>min</sup>, 16<sup>h</sup>/8<sup>min</sup>, 8<sup>h</sup>/16<sup>min</sup>, and 16<sup>h</sup>/16<sup>min</sup> immersions in liquid medium. The cultures were incubated at 23±2°C, under a 16<sup>h</sup> photoperiod, with light provided by cool daylight fluorescent lamps (50 μmol-1 m<sup>-2</sup> s<sup>-1</sup>). Multiple shoot clusters were transferred to MS medium supplemented with different concentrations of oxines for rooting of the shoots. Rooted shoots were acclimatized under greenhouse conditions by transferring them into 250-mL plastic pots and gradually decreasing the relative humidity. Statistical analysis of the nonparametric data (frequencies) was carried out either by the chi-square test to make comparisons between two percentage values or the test for homogeneity ratios. Significant differences of treatments were selected using a nonparametric statistical test, the post hoc multiple comparisons test, to compare multiple percentage values. Discrete data were subjected to ANOVA to compare means followed by the least significant difference test at P ≤ 0.05. Data of all accessions for each cultivar were evaluated together.

**Results:** Recently developed techniques, TIS, Temporary Immersion Bioreactor Systems provide a new approach in mass propagation of plants. In fact, TIS bioreactor system not only combines the advantages of liquid and semi-solid cultures, but also decreases to minimum the difficulties of such classic propagation techniques. The main reason for the efficacy of temporary immersion systems is probably that they combine ventilation of the plant tissues, and intermittent contact between the main part or the entire surface of the explants and the liquid medium. These two characteristics are not usually combined in other liquid culture procedures.

**Acknowledgements:** This study was supported by the Mugla Sitki Kocman University Scientific Research Projects Coordination Unit (Mugla, Turkey, MSKU-BAP 17/057).

**Keywords:** Liquid culture, RITA®, SETIS™, TIS.

## Antioxidant Activity of *Quercus brantii* L. Galls Induced by Gall Wasps

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**Aim of the study:** *Quercus brantii*, belongs to the Fagaceae family, is a species of oak native to Western Asia, including Iran, Iraq, Syria, and Turkey. The galls develop on plants owing to induction by several different organisms: microorganisms, nematodes and acarids. *Andricus* is a genus of gall wasps in the family *Cynipidae*. Oak gall wasps (*Hymenoptera:Cynipidae: Cynipini*) is the second largest insect group with 1300 identified species preferring different oak species for gall formation. In this study, we aimed to determine the antioxidant activity of *Quercus brantii* galls induced by *Andricus quercustozae* and *Andricus cecconii*.

**Material and Methods:** The gall samples were collected from Şirvan/Siirt in November 2016. The dried and powdered plant material was extracted by methanol. Total phenol and flavonoid contents, of the samples were determined. The total phenol and flavonoid content of the extracts were determined as micrograms of gallic acid and quercetin equivalents, respectively. DPPH free radical scavenging activity, cupric reducing antioxidant capacity (CUPRAC) and ABTS radical cation decolorization methods were carried out to determine the antioxidant activity. BHT, BHA and ascorbic acid were used as positive controls.

**Results:** Both of the extracts exhibited strong antioxidant activity in all test systems. The extract of *A. quercustozae* gall showed 96% inhibition ratio at 20 µg/ml concentration in DPPH test system and 98% inhibition ratio at 2.5 µg/ml concentration in ABTS test system. On the other hand, the extract of *A. cecconii* gall showed 90% inhibition ratio at 50 µg/ml concentration in DPPH test system and 97% inhibition ratio at 25 µg/ml concentration in ABTS test system. The total phenol content of the extracts were found to be higher than their flavonoid content.

**Acknowledgements:** The research was funded by grant: Batman University Scientific Research Projects Coordination Unit (8.001Project number).

**Keywords:** Gall, *Quercus brantii*, *Andricus*, Antioxidant activity

**Life Strategy of a Hygrophytic Moss: *Orthotrichum sprucei* Mont.**

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**Aim of the study:** *Orthotrichum* (*Orthotrichaceae*) is the richest genus and represented 35 taxa in Turkish bryoflora. One of them *Orthotrichum sprucei* was collected two different localities. The first locality which was our study area is an under the Çine Dam. The epiphytic taxa generally prefers riverine formations. Habitat of this genus is affected from severe ecological fluctuations. This hygrophytic species tend to regenerate and expand population on tree trunks which exposed to repetitive floods. Regeneration activity and capacity of this species is studied.

**Material and Methods:** Study was carried on *Orthotrichum sprucei* (*Orthotrichaceae*). All life cycles and affected conditions are observed on its natural habitat for 15 months.

**Results:** Counting, observation and analysis of *O. sprucei* population on its natural habitat shows us its adaptation methods to fluctuated conditions. Studies indicates *O. sprucei*'s high regeneration capacity and production of vegetative propagules to increase reproduction capacity.

**Keywords:** moss, bryophyte, life strategy, *Orthotrichum*

## **Molecular Studies on some Lichenized Fungus Species Collected from James Ross Island (Maritime Antarctica)**

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**Aim of the study:** James Ross Island is one of the lichen rich islands of Antarctica because of its large deglaciated area and over 140 species of lichenized fungi were reported from the island. Because of its rich lichen biodiversity, we decided to study the lichenized fungi of James Ross Island more in detail and we used molecular techniques in addition to morphological characters as molecular studies carried on Antarctic lichens are relatively rare when compared with other biogeographical regions of the world.

**Material and Methods:** Samples of lichens were collected especially from 18 different localities in James Ross Island, Antarctica. The external morphology has invariably been studied under dissecting binocular microscope. The anatomy of the thallus and apothecia were studied under compound microscope. The asci and ascospores were taken observed from the sections when sections were mounted in water and shapes, sizes were recorded. Chemistry of the specimens includes colour spot tests. DNA isolation was performed by using Qiagen DNeasy plant mini kit. PCR analysis was performed by using ITS (ITS1 and ITS4) primers. The phylogenetic analysis were performed by using the Maximum Likelihood method of the Mega 6 (Molecular Evolutionary Genetics Analysis) software program.

**Results:** After studying the lichens of James Ross Island, I identified five species: *Lecanora polytropa* (Hoffm.) Rabenh., *Lecidea lapicida* (Ach.) Ach., *Parvoplaca athallina* (Darbishire) Arup, Søchting & Frödén, *Physconia muscigena* (Ach.) Poelt and *Rhizocarpon geminatum* Körb. They were all reported from Antarctica before but they have few molecular data on these species in GeneBank. Future studies on Antarctic lichenized fungi biodiversity will benefit the results of this study.

**Acknowledgements:** The first author thanks to Erciyes University for their financial support to his Antarctic Expedition.

**Keywords:** Polar biodiversity, lichens, fungi.

**Molecular studies on some *Acarospora* (*Acarosporales*, *Ascomycota*) species in Turkey**

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**Aim of the study:** This study aimed to examine the phylogenetic relationships of some species belonging to genus *Acarospora* A.Massal., which has a wide distribution in Turkey.

**Material and Methods:** Samples of lichens belonging to genus *Acarospora* were collected from different parts of Turkey. Total DNA was extracted from apothecia by using the DNeasy Plant Mini Kit (Qiagen) according to the manufacturer's instructions. PCR analysis was performed by using ITS (ITS1 and ITS4) and mtSSU (mrSSU1 and mrSSU3R). ITS and mtSSU sequence results of lichen samples were analysed by using Clustal W option in the BioEdit program. The phylogenetic analysis of lichen samples belonging to genus *Acarospora* were performed by using the Maximum Likelihood method of the Mega 7 (Molecular Evolutionary Genetics Analysis) software program.

**Results:** *Acarospora* was recently established to accommodate a monophyletic group of crustose lichens of Acarosporaceae. Members of this genus usually have well developed thalli which are crustose, squamulose or lobate. In this study, numbers of samples belonging to this genus collected from Turkey. After morphological examinations; molecular analyses of ITS nrDNA and mtSSU were carried in the samples. A total of 8 species of *Acarospora* were collected from different parts of Turkey: *A. bullata* Anzi, *A. impressula* Th. Fr., *A. macrospora* (Hepp) Bagl., *A. nitrophila* H. Magn., *A. oligospora* (Nyl.) Arnold, *A. placodiiformis* H. Magn., *A. veronensis* A. Massal., *A. versicolor* Bagl. & Carestia. In this presentation we will discuss the morphological and ecological characters of these species along with distributional data of the species in Turkey.

**Keywords:** Lichens, ITS nrDNA, mtSSU, biodiversity, *Acarospora*, Turkey.

## Comparative Susceptibility of some Commercial Potato Cultivars to *Fusarium sambucinum* and *F. solani* Isolates Causing Tuber Dry Rot

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**Aim of the study:** Potato (*Solanum tuberosum* L.) and its products are known to be the most important source of food for the human beings. Dry rot is caused by a number of *Fusarium* species affecting sprouting and emergence at the beginning of the season, which results in yield loss and damage to the quality of daughter tubers, especially during storage. *F. sambucinum* Fuckel (*F. sulphureum* Schlecht)- teleomorph *Giberella pulicaris* (Fr.) Sacc.- is the most common pathogen worldwide causing dry rot of stored tubers. The objectives of this study were: (1) to identify the *F. solani* and *F. sambucinum* isolates obtained from potato dry rot, (2) to identify the virulence of these isolates by comparison with each other, and finally (3) to test some commercial potato varieties for their tolerance to *F. sambucinum* and *F. solani* isolates causing potato dry rot in Turkey.

**Material and Methods:** Potato cultivars tested in this study are provided by the various agricultural companies. The strains of *F. sambucinum* (Fs2, Fs3 and Fs4) and *F. solani* (Fs1) are used in this study. All *Fusarium* isolates were initially identified according to their morphological and microscopic characters and then, identification of the isolates was further confirmed by molecular approach. The experiment was set up at room temperature of 15-20°C in separate plastic boxes with sufficient relative humidity for five weeks. Every treatment was repeated for four times (one tuber x one wound). After incubation period, tubers were cut through the inoculation site and the depth and width of the rot area were measured. Parameters of dry rot caused maximal width (w), depths (d) were noted, and tubers were calculated by applying the following formula (Lapwood et al. 1984). Penetration (mm):  $[w/2 + (d-6)]/2$ . Cultivar's susceptibility to *F. sambucinum* (Fs2, Fs3, Fs4) and *F. solani* (Fs1) was estimated according to this scale: Less or moderately susceptible: mean penetration  $\leq 12$  mm; Susceptible:  $12 \text{ mm} < \text{mean penetration} < 15 \text{ mm}$ ; Highly susceptible: mean penetration  $\geq 15$  mm.

**Results:** The resulting dendrogram (Figure 2) showed that the analyzed ITS gene region represented the variability to differentiate from the isolate of *Fusarium* spp obtained from NCBI. Analyzed isolates formed two main branches. First main branch was consisted of investigated F1 and *F. solani* isolates obtained from NCBI. The second main branch was built up by the investigated F2, F3 and F4 and *F. sambucinum* isolates obtained from NCBI. The disease reactions of the varieties against *Fusarium* isolates appear to be statistically significant at the level of 1%. Susceptibility of Potato varieties to *F. sambucinum* (Fs2, Fs3, and Fs4) and *F. solani* (Fs1) isolates had different grades with average lesion sizes ranging from 10.73 to 21.06 mm. Obtained results revealed that Broke, Marabel and Madeleine had a less or moderately susceptible dry rot potential classification, whereas Musica, Melody, Vr.808, Surya, Alonso, Alegra, Borvira, Soraya had a high dry rot potential. The cultivars of Hermes, Opal, Claire, Orchestra, Rossetta and Desire were also susceptible in terms of dry rot

**Keywords:** *Fusarium sambucinum*, *Fusarium solani*, Potato dry rot, Susceptibility, Molecular detection

**Species List of the Iranian Zerconidae (Acari: Mesostigmata)**

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**Aim of the study:** Species of zerconid mites (family Zerconidae) are free-living predators and spread in the Palaearctic and Nearctic regions. On the contrary of some other mesostigmatic families, members of the family Zerconidae are little known in Iran. As a contribution to the knowledge of Iranian Zerconidae, current species list of the family is presented herein.

**Material and Methods:** In this study, all literatures of the Iranian Zerconidae which were published between 1979 and 2018 years, were evaluated. Besides species diversity, habitat information were provided for each species. Also, distribution maps and keys to the Iranian Zerconidae species were updated.

**Results:** The family Zerconidae is currently represented by only 2 genera, *Prozercon* and *Zercon*, and 14 species in Iran in limited systematic and taxonomic papers. Up to now, the following species have been reported from the country: *P. bircanae*, *P. dominiaki*, *P. iranensis*, *P. norae*, *P. cf. tragardhi*, *Z. adoxyphes*, *Z. berlesei*, *Z. colligans*, *Z. Michejdai*, *Z. notabilis*, *Z. ozkani*, *Z. turcicus*, *Zercon* sp.n.1 and *Zercon* sp.n.2. Zerconidae reports have been given from the following nine provinces of the country: Chaharmahal and Bakhtiari, East Azerbaijan, Fars, Hamadan, Khuzestan, Kohgiluyeh and Boyer-Ahmad, Lorestan, Mazandaran, West Azerbaijan. There is not presented any distribution records of zerconids in the remaining 22 provinces in the country. Since this vast country is still understudied in terms of Zerconidae systematic, with local faunistic investigations (especially in forestland areas) further new species, new records and number of genera of zerconids in Iran are anticipated.

**Acknowledgements:** This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Keywords:** Zerconid mites, habitat, distribution maps, key, Iran.

## **Preliminary Evaluation of the Red List Categories of Turkish *Riccia* (Marchantiophyta)**

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**Aim of the study:** This research was planned in order to preliminary evaluation of the red list criteria and categories of Turkish *Riccia*. We hope that this study will serve as a valuable contribution to the knowledge of the nature conservation surveys of Turkish *Riccia* and bryophytes.

**Material and Methods:** The materials of this study were collected between 2012-2015 during the revisional project on Turkish *Riccia* species supported by TÜBİTAK (TBAG, grant no. 111T872). All locality data (habitat, abundance, extent of occurrence, population size, rarity etc.) needed for the evaluation of IUCN categories were recorded during the field trip. The IUCN categories and criteria for allocating species to each category were used in IUCN version 3.1 published in 2001 and second edition in 2012 with the application guidelines for bryophytes (Hodgetts, 2015). A, B and D were used as main criterion. Because of this, criterion C and E were not included in our study.

**Results:** In the present study, 26 taxa (24 species and 2 varieties) belonging to the genus *Riccia* known from Turkey were interpreted with IUCN categories and evaluated as one taxon regionally extinct, 2 taxa critically endangered, 3 taxa vulnerable and 5 taxa endangered. At the end of the present study, it has been determined that habitat losses are the most important threatening factor and conservation strategies are proposed for each species.

**Acknowledgements:** We wish to thank to TÜBİTAK (The Scientific and Technical Research Council of Turkey; TBAG 111T872) and ADÜ BAP (FEF 18 018) for financial support of project.

**Keywords:** *Riccia*, Marchantiophyta, Redlist, Conservation, Turkey

## Ecology of *Cladonia furcata* Group Distributed In Turkey

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**Aim of the study:** The *Cladonia* genus is classified within the Cladoniaceae family (Lecanorales ordo and Ascomycota divisio). The genus contains a large number of secondary metabolites (lichenic acids) which are very important from a systematic point of view. Here we looked at the morphological, anatomical and ecological characters traditionally used to distinguish species in this complex.

**Material and Methods:** The samples were collected in field studies conducted in different localities, ecological characteristics were noted, according to the diagnosis made and herbarium brought morphological and anatomical features images taken in the microscope. Important characters in the genus systematics; the anatomy and morphology of primer and seconder thallus, the surface anatomy, branching and morphology of the podetia, the vegetative propagules carried, the conidium properties, and the secondary compounds contained.

**Results:** The *Cladonia furcata* complex here treated comprises *C. furcata* (Huds.) Schrad, *C. rangiformis* Hoffm., *C. scabriuscula* (Delise) Leight. and *C. subrangiformis* L. Scriba ex Sandst. The morphological and anatomical characteristics of each species were determined. Differences with other similar species in the genus are discussed. The ecological characteristics of the environment in which they are collected are compared with previous records, both from our country and from outside of our country. This study contributed to the determination of lichen diversity of our country.

**Acknowledgements:** This study was supported by TUBITAK (code 212T037) project.

**Keywords:** Cladoniaceae, *Cladonia*, *furcata* group, systematics

## Determination of Overwintering Spider (Arthropoda: Araneae) Biodiversity in Pistachio Orchards of the Euphrates Valley in Şanlıurfa Province of Turkey

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**Aim of the study:** Turkey is an important producer of pistachio (*Pistacia vera* L.) nuts. Turkey is the third biggest producer of pistachio after Iran and USA. Southeast Anatolian Region, including Euphrates Valley in Şanlıurfa Province, supplies 90% of the pistachio production of Turkey. Euphrates Valley has a special role for cultivation pistachio in Turkey. Unfortunately, there are many pests in the pistachio orchards that affect pistachio cultivation negatively. It is known that many spider species are living predatory on insect pests in the nature. In this study, it is aimed to determine the overwintering spider (Arachnida: Araneae) biodiversity by artificial overwintering shelters in pistachio orchards of the Euphrates Valley in Şanlıurfa Province of Turkey.

**Material and Methods:** This study was carried out in five pistachio orchards located in Euphrates Valley in Şanlıurfa Province of Turkey during 2017-2018 winter periods. For this purpose; five pistachio orchards from different locations were selected in the Euphrates Valley and artificial overwintering habitats were designed on ten trees in each garden. Artificial overwintering shelters were established as wrapping five linen fabric and five corrugated cardboard to each selected tree's trunk in order to enable overwinter of spiders. Artificial overwintering shelters were remained in the orchards from the end of September till the beginning of February. After the traps collected, spider species were categorized according to their taxonomic groups and stored appropriately till defined by experts.

**Results:** As a result of the study, totally 20 species belonging to 20 genera and 12 families of Araneae order were determined in artificial overwintering shelters in pistachio orchards of the Euphrates Valley in Şanlıurfa Province of Turkey. These species were determined according to the families as *Hypsosinga pygmaea* (Sundevall, 1831) (Araneidae), *Clubiona* sp. (Clubionidae), *Lathys ankaraensis* Özkütük, Marusik, Elverici & Kunt, 2016 (Dictynidae), *Micaria rossica* Thorell, 1875, *Nomisia* sp., *Synaphosus* sp. (Gnaphosidae), *Oecobius aculatus* Simon, 1870 (Oecobidae), *Palpimanus gibbulus* Dufour, 1820 (Palpimanidae), *Philodromus buxi* Simon, 1884 (Philodromidae), *Prodidomus redikorzevi* Spassky, 1940 (Prodidomidae), *Neon* sp., *Pseudicius palaestinensis* Strand, 1915, *Thyene imperialis* (Rossi, 1846) (Salticidae), *Scytodes kinzelbachi* Wunderlich, 1995 (Scytodidae), *Xysticus cristatus* (Clerck, 1757) (Thomisidae), *Enoplognatha mandibularis* (Lucas, 1846), *Latrodectus tredecimguttatus* (Rossi, 1790), *Neottiura bimaculata* (Linnaeus, 1767), *Steatoda paykulliana* (Walckenaer, 1806) and *Theridion betteni* Wiehle, 1960 (Theridiidae). Also, apart from Araneae order, *Glyppus* sp. (Solifugae: Glyppidae) was determined in artificial overwintering shelters in pistachio orchards of the Euphrates Valley in Şanlıurfa Province of Turkey. As a result of the study, Theridiidae, Salticidae and Gnaphosidae families were come to the fore in terms of species richness.

**Keywords:** Spider fauna, Araneae, Pistachio, Overwintering, Euphrates

## Some Sperm Quality Parameters in Domestic Animals

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**Aim of the study:** This study was aimed at summarizing of some sperm quality parameters and relationships between some additives and sperm parameters during semen liquid storage or after freeze-thawed process. These parameters are getting more important for predicting semen functional quality for in vivo and in vitro fertilisation.

**Materials and Methods:** Sperm cells are cryopreserved in frozen or unfrozen state for artificial insemination. Before using semen, it is necessary to determine the acceptable sperm quality rates in randomly selected samples of ejaculates. Some techniques of sperm quality parameters include CASA sperm motility, fluorescent staining by microscopic or flow cytometric procedures, DNA fragmentation, DNA integrity, Homologous hemizona binding assay, electron microscopic evaluation, oxidative stress parameters. We have been studying at cryobiological issues of domestic animal sperm such as bovine, ram, goat, rabbit, poultry for several years. For obtaining the best quality parameters, some additives (lycopene, cysteamine, ellagic acid, Ebselen, fetuin, taxifolin hydrate etc.) are added to cryopreservation extender in our last projects.

**Results:** In this study, we performed the analysis of the sperm quality parameters, focussing on some critical points at performing techniques. We also tried to explain effects of some additives on sperm quality parameters.

**Acknowledgements:** We benefited from the experiences gained from the TUBITAK projects at preparing this study (TUBITAK) (Project No: 1120845 and Project No: 1140642).

**Keywords:** Additives, Sperm, Cryopreservation, Quality parameter

## Occurrence and Genetic Diversity Analysis of Orf Virus Isolated from Cattle in Turkey

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**Aim of the study:** Orf virus (ORFV) is the etiological agent of contagious pustular dermatitis that mainly occurs in small ruminants such as goats and sheep. In this study, role of ORFV infection in cattle that presented vesicles, papules and proliferative scabby lesions on teats and back was investigated by molecular detection methods.

**Material and Methods:** Vesicular fluid and scab samples were collected from cattle in three epidemiologically independent herds in the Afyonkarahisar, Isparta and Konya Provinces during the months of June and August 2017. Total DNA was extracted from samples by using a commercial DNA extraction kit. First, presence of lumpy skin disease virus (LSDV) and bovine herpesvirus 2 (BHV-2, known as the causative agent of pseudo-lumpy skin disease) were investigated by real time PCR and PCR, respectively. Then, samples tested for the presence of ORFV by PCR using primers specific to envelope gene (B2L). Genetic characterization of the ORFV field isolates was conducted by sequencing B2L gene segment.

**Results:** ORFV DNA was detected in investigated samples whereas LSDV and BHV-2 DNA were not detected. The analysis of the B2L gene sequences revealed that the amino acid homology between the isolates in the present study was 100%, whereas the similarity with other Parapoxvirus isolates ranged from 69.1% to 100%. The isolates in the present study shared 100% sequence identity at the nucleotide and amino acid level when compared with previously characterised Turkish isolates from goats in 2016. It can be speculated that local ORFV field isolate might have been transmitted from goats to cattle. To the best of my knowledge, this is the first report on the presence of the ORFV infection in cattle in Turkey.

**Keywords:** Orf virus, Cattle, PCR, Genetic characterization, Turkey

## Potential Relationship between Galactarate/Glucarate/Glycerate Transporter GarP and Boron Toxicity in *Escherichia coli*

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**Aim of the study:** The physiological basis and molecular mechanisms regarding boron toxicity have not yet been fully elucidated. The effects of Boron and related molecules on the cellular systems and living organisms should be further investigated using current genomics approaches in order to reveal molecular mechanisms pertaining to this ubiquitous and enigmatic element. *Escherichia coli* K-12 is one of the best characterized organisms in molecular biology and having the entire genomic sequence and genome-wide mutant line of this strain widely enables its effective use in the studies especially towards understanding specific gene(s) and phenotype(s) relationships. The aim of this study is, therefore, to test some of the mutants of *E. coli* under varying levels of boron stress and attempt to interpret the potential relationship between boron toxicity and one of the identified candidate genes encoding galactarate/glucarate/glycerate transporter, GarP.

**Material and Methods:** We conducted screens using some of *E. coli* gene mutants. First, a number of 179 mutants were prepared from glycerol stocks in deep well plates. Then, these mutants were inoculated with a 96 well replicator on LB-agar plates containing 6 different boron concentrations ranging from 0 to 120 mM boric acid and kanamycin (Kan) and sensitivities were determined at different concentrations of boron. Classical microbiology and molecular methods were applied. Then, boron tolerance spot test was applied to further test the sensitivity levels of the selected mutants, which were grown overnight in LB-agar-kanamycin (50 µg/ml), serially diluted (1/1, 1/2, 1/4, 1/8 and 1/16) after the OD600 value was brought to 0.5 (1/1 dilution). The mutants were incubated on LB-agar-kanamycin (50 µg/ml) medium containing boric acid at different concentrations (0, 25, 50, 80, 100, 120 mM). Following screens, spot tests and MIC determinations, growth curves were also applied to validate the results. Additionally, the mutant was complemented with the plasmid-encoded gene.

**Results:** *Escherichia coli* K-12 wild type cells were shown to tolerate up to 100-120mM of boric acid in LB-Kan medium. Nonetheless, the results repeatedly showed that the growth of delta *garP* mutant was inhibited by the presence of 80mM boric acid compared to the corresponding wild type. Additional results obtained from two other experimental approaches including boron tolerance spot tests and determination of MIC (Minimum Inhibitor Concentration) values confirmed the tolerance levels. The *garP* mutant and the wild type have the MIC values of 70mM and 100mM boric acid, respectively. The complementation of the *garP* mutant by a plasmid-encoded *garP* gene restored the ability of the mutant to grow in higher concentration of boron. Thus, taken all together, we suggest that the activity of *garP* gene has a relationship with the phenotype of boron toxicity or sensitivity in *E.coli*. GarP is a member of the MFS (Major Facilitator Superfamily) transporter family. In a study conducted by others, where the genes responsible for the intrinsic multidrug resistance of *E.coli* were investigated, one of the genes reported was *garP*, which was found to be more susceptible to chloromphenicol than its wild type. Therefore, the finding of our study is evidence linking this gene to a specific stress factor and potential involvement of GarP in boron response in bacteria is new and significant information that will contribute to the field and the literature.

**Acknowledgements:** This study is supported by The Scientific and Technological Research Council of Turkey (TÜBİTAK, project no 114z987).

**Keywords:** Boron stress, gene, *E.coli*, sensitivity, *garP*

***Phlomis x ketenoglui* (Lamiaceae), a New Natural Hybrid of Anatolia**

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**Aim of the study:** Purpose of this study is to introduce a new natural hybrid to science and propose a conservational status to new taxon.

**Material and Methods:** Plant specimens were collected from nature both hybrid and its parents. This specimens were made herbarium material and preserve in Erciyes University herbarium. Taxa were identified mainly by Turkish, Russian, Iranian and Palestine Floras. Morphological characters were used to identify species and hybrid and these characters were also use to describe new taxon.

**Results:** Genus *Phlomis* L. has the highest hybrid number among Lamiaceae family in Turkish flora that has 13 hybrids. *Phlomis x ketenoglui* is being described in this study as a new natural hybrid that belongs to subgenus *Gymnophlomis* of section *Phlomis*. Hybrids mostly have intermediate morphological characters between their parents. *P. x ketenoglui* also has intermediate characters such as plant length, leaf dimensions, indumentum of leaves, number of verticillasters, calyx shape and calyx teeth dimensions. These intermediate characters are also diagnostic characters of hybrid that differentiate the new hybrid from its parents. *P. x ketenoglui* has the highest individual number among the other hybrids of *Phlomis*. The flowering time of *P. x ketenoglui* is not the same as those of its parents

**Acknowledgements:** We thank Erciyes University Research Found (97-056-18) for financial support.

**Keywords:** *Phlomis*, hybrid, new taxon

## A Preliminary Study of the Plant Diversity in Karadere Valley Yiğilca, Düzce (Turkey)

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**Aim of the study:** The aim of this study is to determine the floral diversity of Karadere Valley in Yiğilca, Düzce (Turkey).

**Material and Methods:** Karadere Vadisi Düzce is located to the south of the Yiğilca district center and on the northern slope of the Köroğlu Mountains. A part of the study area is located within the boundaries of Bolu province. In the study area the lowest elevation is 250 m in Geriş Village and the highest elevation is 1750 m in Gurbet Kayasi. The research area is under the influence of the Eu-Euxine and Sub-Euxine subflora zones in the Euro-Siberian Flora region. 1828 specimens were collected from the research area during field trips in 2017 and 2018.

**Results:** 72 families, 157 genera and 236 taxa were identified. The study area is in the A3 square according to the Flora of Turkey's grid system. Four of the identified plants are new record for A3 square. The 9 of the taxa are endemic, and endemism ratio is 3.81%. Distribution of plants in the study area according to phytogeographical regions are as follows: Euro-Siberian elements: 85 (36%), Irano-Turanian elements: 3 (1.27%), Mediterranean elements: 19 (8.1%). The rates of cosmopolitan and phytogeographically unknown species are 130 (55.1%). The largest family is *Fabaceae (Leguminosae)* with 15 genera, the family including the most species is *Fabaceae (Leguminosae)* with 25 taxa and the largest genus is *Veronica* with 6 taxa. The plant life forms of Raunkiaer systems that are identified in the study area included 38 (16.1%) Phanerophytes, 11 (4.6%) Chamaephytes, 44 (18.6%) Hemicryptophytes, 20 (8.5%) Geophytes, 23 (9.7%) Therophytes, and 100 (42.4%) taxa life forms are unknown.

**Acknowledgements:** This study was supported by Scientific Research Project Coordination Unit of Duzce University, Project number: DÜBAP 2017.02.02.572

**Keywords:** Flora, Raunkiaer, Karadere Valley, Yiğilca, Düzce

## Shrub Vegetation of the Argözü Valley in Kibriscik, Bolu, TURKEY

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**Aim of the study:** The object of this study is to analyse the shrub vegetation of Argözü Valley in Kibriscik, Bolu (Turkey).

**Material and Methods:** The study area is located in Euxine province of Euro-Siberian Flora Region and on the southern slopes of Koroglu Mountains. Study area is covered with andesite, tuff and agglomerate materials which are elements of the Koroglu volcanic massif. The climate of the region changes from less rainy Mediterranean to rainy Mediterranean type. Annual precipitation varies from 700 mm to 1200 mm depending on altitudinal zones and mean annual temperature is 11°C. For vegetation analysis, a total of 46 sample plots were taken from shrub vegetation of the study area. Vegetation data were classified using TWINSpan (Hill, 1979) under JUICE software and indirect ordination analysis were applied to the data.

**Results:** As a result of classification and ordination, two shrub communities were defined. According to this definition, following scheme were proposed for shrub communities.

Upper Class: *QUERCO-FAGEA* Fukarek-Fabijanik 1968

Class: *QUERCETEA PUBESCENTIS* Doing Kraft ex Scamoni & H.Passarge 1959

Order: *QUERCO CERRIDIS-CARPINETALIA ORIENTALIS* Akman, Barbero & Quézel 1980

Alliance: *QUERCION ANATOLICAE* Akman, Barbero & Quézel 1979

Assosiation 1: *Junipero-Palieretum spinae-christi* Ass. nov.

Assosiation 2: *Junipero oxycedri-Quercetum pubescentis* Türe, Tokur and Ketenoğlu 2005

The first shrub community is new. The second shrub community was first determined by Türe et al. in Bozüyük, Eskişehir in Turkey. *Junipero- Palieretum spinae-christi* and *Junipero oxycedri-Quercetum pubescentis* associations are related to the Central Anatolian steppes located on the south slopes in the submontan zone of the research area. These societies represent the steppe black pine (*Pinus nigra*) and downy oak (*Quercus pubescens*) forest that show a regressive succession, deteriorated by grazing and anthropogenic factors in Central Anatolia. The shrub communities have a rich diversity of species in the study area. Since the shrub vegetation is also an important shelter and food source for the forest fauna, the conservation of these areas will also indirectly protect the fauna diversity in the area.

**Acknowledgements:** This study was supported by Scientific Research Project Coordination Unit of Duzce University, Project number: DÜBAP2012.02.02.117.

**Keywords:** Shrub, Communities, Koroglu, Kibriscik, Bolu, Turkey

## The Effect of Quinine, Tannic Acid and Nicotine Mixtures on Feeding and Development of Male *Lymantria dispar* L. Larvae

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**Aim of the Study:** *Lymantria dispar* is a polyphage herbivore. It causes ecological and economic damages to the forests. Many plants produce secondary metabolites and these chemicals can act as repellents or toxins against herbivores. So, in this study, The effects of secondary metabolite mixtures on food consumption and development of male *L. dispar* larvae were investigated.

**Material 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:** 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 (315.33 ± 1,34; 51.24 ± 0.87; 11.49 ± 0.85; 6.74 ± 0.21), T1 (257.03 ± 2.14; 37.31 ± 0.90; 5.35 ± 0.34; 7.36 ± 0.37), T2 (216.48 ± 1.82; 30.39 ± 0.80; 3.58 ± 0.26; 8.26 ± 0.29), N<sub>1</sub> (353.89 ± 2.29; 45.70 ± 0.50; 12.33 ± 0.40; 9.46 ± 0.32), N<sub>2</sub> (256.99 ± 2.10; 53.01 ± 1.40; 11.73 ± 0.52; 13.64 ± 0.42), K1 (279.71 ± 2.47; 42.27 ± 1.00; 9.34 ± 0.32; 6.46 ± 0.28), K2 (319.50 ± 2.34; 41.02 ± 0.96; 7.57 ± 0.35; 10.44 ± 0.59), T1-N1 (349.22 ± 1.82; 42.21 ± 0.51; 9.38 ± 0.28; 8.38 ± 0.30), T1-K1 (282.41 ± 3.02; 41.36 ± 0.98; 7.27 ± 0.34; 6.39 ± 0.42), T2-N2 (110.79 ± 1.41; 28.42 ± 1.07; 7.39 ± 0.42; 12.32 ± 0.38), T2-K2 (308.48 ± 2.22; 35.99 ± 0.50; 8.25 ± 0.36; 9.61 ± 0.36), T2-N2-K2 (224.42 ± 2.98; 27.74 ± 0.49; 7.54 ± 0.25; 10.22 ± 0.41), T1-N1-K1 (323.97 ± 1.88; 38.31 ± 0.44; 8.24 ± 0.29; 7.24 ± 0.31).

**Acknowledgements:** This work was supported by Research Fund of the Recep Tayyip Erdogan University. Project Number:2011.102.03.5.

**Keywords:** *Lymantria dispar*, Secondary metabolite, Feeding, Development

## Length-Weight Relationships and Condition Factor of *Umbrina cirrosa* Inhabiting North-Eastern Mediterranean Sea

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**Aim of the study:** Shi drum, *Umbrina cirrosa* (Linnaeus, 1758) is Atlanto-Mediterranean and distributed from Bay of Biscay to Senegal. It lives in small groups or solitary in various habitats, rocky, soft and hard flat bottoms to depth of 50 m. There is no more biological data for *U. cirrosa* from the North-eastern Mediterranean Sea. In this study, total length-weight relationships and condition factor of shi drum were examined for the first time in a population of the North-eastern Mediterranean Sea.

**Material and Methods:** *Umbrina cirrosa* individuals were captured by gillnets between May 2017- April 2018 at a depth of 15 m from Mersin Bay. Fish samples were transported to the ecophysiology laboratory in Faculty of Fisheries, Firat University where they were identified, sexed and photographed. Each fish was measured for total length to the nearest 0.1 cm and weight (W) to the nearest 0.1 g. Data were subjected to statistics analysis by using the IBM SPSS Statistics ver. 22.0.

**Results:** A total of 218 (115 male and 103 female) *U. cirrosa* were collected. Minimum-maximum length and weight of caught fishes were determined as 13.5-26.7 cm and 19.12-214.04 g for females and 13.8-26.8cm and 21.48-201.75 g for males respectively. Total length-weight relationships of *U. cirrosa* were found as  $W=0.0028*TL^{3.42}$ ,  $R^2=0.989$ ,  $SEb=0.024$  for combined sexes,  $W=0.0029*TL^{3.414}$ ,  $R^2=0.988$ ,  $SEb=0.037$  for females and  $W=0.0028*TL^{3.423}$ ,  $R^2=0.998$ ,  $SEb=0.031$  for males. 95 % Confidence intervals for *b* value for combined sexes were 3.371-3,466. According to *b* values, combined sexes, females and males showed a positive allometric growth (t-test:  $p < 0.05$ ). Condition factors were  $0.923\pm 0.063$  for all specimens,  $0.930\pm 0.009$  for females and  $0.917\pm 0.008$ .

**Acknowledgements:** This work was supported by Scientific Research Projects Coordination Unit of Firat University. Project Number: SUF.17.06.

**Keywords:** Length-weight relationship, condition factor, shi drum, *Umbrina cirrosa*, Mersin Bay

## Diversity of Grain and Leaf Surface Aliphatic Components in Wheat

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**Aim of the study:** Plant lipid components play important role in human nutrition and as protectors against various environmental stresses. The cuticular waxes, a mixture of different fatty acid derivatives, and phenolic lipids alkylresorcinols, are important components of cuticle makeup both in vegetative and reproductive organs in wheat. Wheat alkylresorcinols have anti-microbial activities and the potential to lower risk of some chronic diseases, such as cancer, obesity and diabetes. The major function of cuticle waxes is in protection against water loss. This work was aimed to study alkylresorcinols in selected wheat cultivars grown at diverse geographic locations and to investigate the contribution of cuticle waxes to wheat drought tolerance.

**Material and Methods:** The biodiversity of alkylresorcinols was estimated in selected local commercial wheat varieties cultivated in Ukraine, Kazakhstan, China and Australia. The cuticle composition was analysed in Australian wheat cultivars with contrasting levels of drought tolerance. Gas Chromatography coupled with Mass Spectroscopy (GC-MS), was used as the main method to analyse both classes of these aliphatic compounds. The complementing characterization of surface waxes was performed using Scanning Electron Microscopy (SEM). The molecular background of cuticle composition in relation to drought was probed by structural and functional characterization of several transcription factors in terms of sequence polymorphism, differential expression, interaction with promoter elements of downstream genes and their influence of cuticle biochemical composition.

**Results:** Analysis of bran alkylresorcinols in local wheat varieties cultivated in Europe (Ukraine), Asia (Kazakhstan, China) and Australia, revealed the major fatty acid components previously characterized for North European varieties. However, the total amounts and the relative ratio of the alkylresorcinol components have shown significant variability between the analysed cultivars. Analysis of Australian wheat varieties with different levels of drought resistance and glaucousness demonstrated considerable variation between genotypes in cuticle composition and structure. We identify  $\beta$ -diketones as the main determinant of a glaucous phenotype, and some other components like alkanes, that contribute to tissue water conservation. Further, we have demonstrates drought-inducible expression of four genes encoding MYB transcription factors, with *TaMYB74*, *TaMYB31*, and *TaMYB24* operating as activators of cuticle biosynthesis. Functional DNA elements responsive to MYB were localized in the promoter region of the gene coding for *SHN1*, which was previously shown to influence cuticle composition and drought tolerance. Overexpression of the *TaSHN1* in wheat affected composition of both cutin and cuticle waxes, as well as transgenic lines performance under controlled greenhouse conditions. Overall, our results extend the knowledge on biodiversity and regulations of aliphatic components in wheat and could potentially be used for improving crop's nutritional value and drought tolerance.

**Acknowledgements:** Participation of NB, AP and AS in this work was partially supported by an individual grant provided to NB by the Huaiyin Normal University, China.

**Key-words:** wheat bran, alkylresorcinols, cuticle waxes, glaucousness, drought tolerance

### Screening of different parts of *Crocus pallasii* subsp. *pallasii* for cytotoxic activity

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**Aim of the study:** *Crocus* is represented by 36 species in 71 taxa in Turkey. Thirty-five of these are endemic to Turkey. *Crocus* plants have been used since the earliest years in the alternative medicine for the treatment of diseases. *Crocus pallasii* subsp. *pallasii* belongs to the genus *Crocus*. This study has been designed to evaluate the cytotoxic activities of corm and aerial parts (leaves and flowers) of *Crocus pallasii* subsp. *pallasii* (methanolic and aqueous extract).

**Material and Methods:** The corms and aerial parts of *Crocus pallasii* subsp. *pallasii* were air-dried, powdered and extracted with water and methanol solvents in our laboratory. Possible cytotoxic activities were measured using the brine shrimp lethality test. *Artemia salina* is a simple marine organism that can be used to determine toxicity through the prediction of the medium lethal concentration (LC<sub>50</sub>). The *A. salina* eggs were left to incubate under artificial light for 24-48 h at 28 °C in artificial seawater (3.8 g sea salt was dissolved in 100 mL water). In each experiment, 0.5 mL of plant extract (1000, 500, 100, 50 and 10 ppm) was mixed with 4.5 mL of brine solution. After incubation, the active nauplii were collected with a Pasteur pipette. The ten brine shrimp larvae were added to the test tubes containing the brine solution and extracts. After 24 h, the number of survivors was counted for each concentration of the extracts and controls. To determine the LC<sub>50</sub> values, the data was analyzed using the EPA Probit Analysis Program (version 1.5)

**Results:** The brine shrimp is a practical and economic preliminary cytotoxicity method for the investigation and assessment of toxicity. In the toxicity evaluation of plant extracts using the brine shrimp lethality test, IC<sub>50</sub> values lower than 1000 µg/mL are considered to be bioactive. The lethality of the methanol extracts of corms and aerial parts were 10.749 and 283.241 µg/mL, respectively and the lethality of the water extracts of corms and aerial parts were 3.508 and 643.652 µg/mL, respectively. All extracts of *Crocus pallasii* subsp. *pallasii* showed cytotoxic activity in brine shrimp. This significant lethality of *this plant* extracts can be the source of potential cytotoxic components in this species which needs to be further investigated.

**Keywords** Brine shrimp, *Crocus pallasii* subsp. *pallasii*, Cytotoxic.

## **Determination of Crude Essential Oil and Mineral Matter Content of *Salvia hispanica* (Chia) Plant Grown in Tissue Culture**

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**Aim of the study:** We have started this study to determine the crude essential oil content, mineral matter capacity of Chia seeds, which have a great prescription in human health and nutrition.

**Material and Methods:** *Salvia hispanica* seeds from Bolivian origin were planted in MS medium supplemented with 0.4 mg l<sup>-1</sup> GA<sub>3</sub> and 10 mg l<sup>-1</sup> AA in the BIYOM (Plant Genetics and Agricultural Biotechnology Application and Research Center) of the University of Pamukkale. In vitro germination was completed and transferred to small containers 2 weeks after germination: soil, sand and perlite in volume ratio of 1: 1: 1, volume / volume / volume. the development process lasted about 10 months. The plant was pulverized in the plant physiology laboratory (Waring commercial blender, USA). The powdered seeds were mixed with methanol (MERCK, Germany) (1:10) and left in a water bath (Nucleon Su Banyosu) for 5-6 hours. It was evaporated with a rotary evaporator (IKA RV10).

**Results:** In the results of mineral matter content analysis of *Salvia hispanica* plant seeds used in this study; phosphorus content have been found 10200.00 mg/kg, potassium content 7361.00 mg/kg, magnesium content 3823.00 mg/kg, zinc content 114.80 mg/kg and iron content 75.27 mg/kg. As a result, the most abundant mineral substance found as phosphorus. % crude essential oil content of *Salvia hispanica* plant seeds used in this study; Linoleic Acid Methyl Ester (Omega 3 group) 64.019, Linoleic Acid Methyl Esterium (Omega 6 group) 17.594, Palmitic Acid Methyl Esterium (Saturated) 9.123, Oleic Acid Methyl Esterium (Omega 9 group) 6.484, Stearic Acid Methyl Esterium (Saturated) 2.264, Palmitoleic Acid Methyl Esterium (Omega 7 group) 0.245, Myristic Acid Methyl Esterium (Saturated) 0.081 and the most abundant fatty acid Linolenic Acid Methyl Esterium (Omega 3 group).

**Acknowledgements:** This work is Pamukkale University is Supported by the Scientific Research Centre (BAP). Project No: 2017FEBE47

**Keywords:** *Salvia hispanica*, Oil content, Omega 3 group, Omega 6 group, Palmitic Acid, Mineral matter

### Screening Antimicrobial Activity of Some Microalgae

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**Aim of the study:** Nowadays, existence of resistance against antibiotics brings research of new drugs with activity against resistant pathogens. Secondary metabolites are known to have many biological activities such as antioxidant, antimicrobial, anticancer etc. Microalgae are known to produce secondary metabolites. Here we searched the antimicrobial activity of methanol extracts from *Stigeoclonium tenue* (C. Agardh) Kützing, *Chlorella vulgaris* Beyerinck [Beijerinck] and *Chroococcus limneticus* Lemmermann which were obtained from fresh water.

**Material and Methods:** Microalgae samples were isolated from Kabaklı Pond (37° 55' 23N, 40° 17' 40E, Diyarbakır, Turkey.) and identified according to Prescott (1973). The isolated microalgae were grown in 250 ml erlenmeyer flasks which contain 150 ml of BG-11 medium under condition of 25 °C, 12:12 hour light-dark and 3000 lux white light intensity. Every day all flasks were shaken by hand. At stationary phase the species were harvested and sonicated on ice with methanol for their extracts. The antimicrobial activity of the extracts was evaluated according to inhibition zone diameter by disc diffusion and minimum inhibitory concentration (MIC). The MIC values were determined by broth dilution methods. Five different microorganisms, including Gram positive (*Streptococcus pyogenes* ATCC19615, *Staphylococcus aureus* ATCC 25923) and Gram negative (*Pseudomonas aeruginosa* ATCC 27853, *Escherichia coli* ATCC 25922) bacteria and yeast (*Candida albicans* ATCC10231) were used.

**Results:** The extracts possess antimicrobial activity in different ranges. *The C. vulgaris, S. tenue and C. limneticus* exhibited strong, moderate and weak antimicrobial activity, respectively. The inhibition zone diameter of *C. vulgaris* range from 21mm to 28 mm at 400 µg/per disc. At the same conditions results of *S. tenue* range from 12 mm to 19 mm. *C. limneticus* exhibited weak antimicrobial activity whose inhibition zone diameters were between 19-12 mm. The best activity was recorded by *C. vulgaris* against *S. aureus* with 28 mm ± 0.1 and inhibition zone diameter and 75 µg/ml MIC value. The results obtained are promising in terms of using microalgae extracts as a source of new antibiotic compound.

**Acknowledgements:** This Project has supported by Dicle University, Coordinatorship of Scientific Research Projects (DUBAP) Fen.17.020

**Keywords:** Antimicrobial activity, microalgae, *Stigeoclonium tenue*, *Chlorella vulgaris*, *Chroococcus limneticus*.

## Poplar and Willow Forestry in the Light of Global Climate Changes in Northern and Eastern Regions of Europe

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**Aim of the study:** Forestry using fast-growing species of poplars and willows is a promising way to produce biomass for green energy, wood and various wooden products. Poplars and willows can also provide ecosystem services such as soil erosion protection, phytoremediation, soil fertility, biodiversity, and increased buffering capacity towards climate uncertainties. In addition, poplars and willows are of social-economic importance because they can support rural societies and reduce poverty in low income countries. Understanding the possible effects of global climate changes (GCC) on forestry with fast-growing trees is important to secure the future sustainability of forest resources and to minimize the risk of economic investments. This review aims to analyse the effects of GCC on poplar and willow forestry and propose possibilities for adapting their cultivation with specific focus on some northern and eastern regions of Europe.

**Material and Methods:** Projected changes in climate and their effects on forest biomass production are described by means of changes in temperature, moisture, greenhouse gas emissions, atmospheric ozone concentrations, UV-B radiation, salinity, and the frequency of cyclones. Some of these are likely to affect tree growth negatively, while others are expected to enhance productivity. Water shortage is the most important limiting factor for plant productivity in most temperate climates. Cyclones, rising atmospheric ozone and soil salinity are depressing growth too. But in the case of elevated CO<sub>2</sub> or temperature, opposite effects were described. Literature studied demonstrated that in temperate and boreal zones, warming and increasing CO<sub>2</sub> concentrations are likely to enhance productivity, but only if adequate amounts of nutrients (mainly N), water and other resources are supplied to the trees, which will require additional expenses. To overcome the water shortages in dry climates, more capital and technological investments will be also needed for artificial irrigation and the protection of plantations from attacks of insects and pathogens that are expected in a drier and warmer climate.

**Results:** Most probably poplars and willows are able to profit from the higher CO<sub>2</sub> concentrations and increasing temperatures in the future if they are intensively managed, planted in regions with high incident radiation and supplied with sufficient amounts of nutrients and water. In northern regions of Europe, e.g. large parts of Sweden, poplar and willow forestry is limited mainly by low temperatures and relatively short growth periods, which are likely to change due to anticipated GCC. Possibilities for adapting poplar and willow forestry to future climate changes in northern and eastern regions of Europe may include tree breeding with exploiting of highly variable and adaptive genetic resources within the *Populus* and *Salix* genera, the use of GM-technologies which are well developed to poplars, the application of appropriate agronomic measures such as mixed planting, the application of agroforestry systems, and other suitable methods.

**Acknowledgement:** N.K. is grateful to Swedish Institute (SI) for financial support of this work through the Visby Programme Scholarship for PhD and Postdoctoral Research Studies in Sweden (2017-2018).

**Keywords:** global climate changes, *Populus*, *Salix*, short rotation forestry, biomass.

### **Farm Animal Biodiversity in Ukraine and Its Loss**

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**Aim of the study:** The problem of biodiversity loss is actual for rather long time ago, but it is almost admitted, that wild nature is the most valuable one, and worth saving more. It is truth, of course, but domesticated varieties loss is available as well and even in more rapid rates. So, the problem should be revealed and found ways for its resolving.

**Material and Methods:** Analytical, axiomatic, hypothesis-deductive, empirical, synthetic, elementary-theoretical, of induction and summarizing methods.

**Results:** Biodiversity loss is inevitable loss at all levels: species, breed, and especially gene. On outstanding gene pool conservationist I.V.Guziev's survey, only for the last century, in Ukraine disappeared 16 breeds and breeding groups with their valuable genes: four horse breeds (tarpan, nogaiska, striletska, hermano-bessarabian), four breeds of pigs, three cattle breeds, three sheep breeds and two goat breeds with their valuable genes of adaptation to local conditions, stress, heat and disease resistance, special taste of production. V.S.Kozyr's investigation showed, that during 35 years in Grey Ukrainian population there were lost certain alleles (O', E'I', BPQA'D', G2Y2E', BGKY2E'OG'', G2Y2I', B), which logically pulled reduction in meat and milk production, body becomes narrower, tender and tenses. In general, Grey Ukrainian is a breed, that characterizes with feed unpretentiousness, ease of maintenance, growth during all the life, high broth, skin, meat quality, high percent of fat and protein in milk, good ratio of fat and protein in milk, good maternal qualities. Bulls' live weight on insufficient feed was 1200 kg. This row of breeds' unique traits can be continued, but now this breed is going to disappear. In Ukraine there is only 954 animals of the breed at two farms. At the base of the breed there were created native Simmental, Ukrainian Beef, Lebedyn. Other unique breed of Ukraine is Brown Carpathian. It is adapted to local mountainous conditions of Transcarpathian region. High altitude doesn't cause aeroembolism for the animals. Genetic research on 7 (Red Polish, Gallovey, Grey Ukrainian, Brown Carpathian, Whiteheaded Ukrainian, Yakutian, Holstein) breeds (MAS-selection) on CSN3, BLG, GH, LEP, PIT-1, MSTN showed, that Brown Carpathian is characterized with the most valuable ratio of genes, associated with yield and protein content. Today this breed enumerates not more, than 100 pure-bred animals and no official herds, only small private holders. Officially in Ukraine there are some more autochthonous breeds: Red Steppe, Ukrainian Whiteheaded and Lebedyn. But there should be done strict surveys on pure animals availability, as because of need to meet hard market demands, these breeds were diluted with high-productive commercial breeds – Swiss, Holstein, Angler, and so on. So, in Ukraine there can be hardly found some authentic breeds, which Ukraine can boost at international exhibitions, as good-conformed Holstein, beautiful Swiss and other international breeds are in each country and have more possibilities to lead selection and have superior animals. At international exhibitions local autochthonous breeds are of special proud of owners, as only they have such animals with so special colour pattern, or hair distribution or so on. But Ukraine would like to uniform all animals at Holstein template to have nothing special.

**Keywords:** biodiversity, loss, autochthonous breeds, genetic value, Ukraine.

**Distribution of *Glycaspis brimlecombei* Moore (Hemiptera: Aphalaridae) in İzmir, Aydın and Muğla Provinces, and Population Fluctuations of the Pest in İzmir Province of Turkey**

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**Aim of the study:** The aim of this study was to investigate the distribution of *Glycaspis brimlecombei* Moore (Hemiptera: Aphalaridae) in İzmir, Aydın and Muğla provinces which are located in the Eagean Region of Turkey in 2015-2016. Population fluctuations of the pest were also determined at İnciraltı location in İzmir, by weekly counts

**Material and Methods:** Leaf sampling method was used to count the eggs, live nymph, mature and parasitized individuals of the pest. Visual control method was used for monitoring the populations of the pest and sweep net sampling method for collecting mature *G. brimlecombei*, and its parasitoids and predators.

**Results:** As a result of the survey, first individuals of *G. brimlecombei* were seen in early May. Population of the pest reached maximum level in mid-July, and population density was higher at sea sides compared to the continental parts. Parasitoid *Psyllaefagus bliteus* (Hymenoptera: Encyrtidae) and predator *Anthocoris nemoralis* (Hemiptera: Anthocoridae) as more common species were determined in İzmir, Aydın and Muğla provinces.

**Acknowledgements:** We are grateful to Dr. Christian RIEGER (Lenbachstraße 11 72622, Nürtingen, Germany) and Barış ÇERÇİ (Kökнар 4, Tarçın Sokak, Kору Mahallesi, Ardıçlı Evler, Esenyurt, İstanbul, Türkiye) for the determination of hemipters, Dr. George JАPOSHVILI (Institute of Entomology Agricultural University of Georgia) for the determination of hymonopters and Dr. Derya ŞENAL (Bilecik Şeyh Edebali Üniversitesi, Ziraat ve Doğa Bilimleri Fakültesi, Bitki Koruma Bölümü, Bilecik, Türkiye) for the determination of coccinellids.

**Keywords:** Eucalyptus; *Glycaspis brimlecombei*; *Psyllaefagus bliteus*; *Anthocoris nemoralis*

***Bufo verrucosissimus* in Black Sea Region of Turkey: evidence from 16S rRNA gene and morphology**

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**Aim of the study:** The common toads of western palearctic consist of four species; *Bufo bufo*, *Bufo eichwaldi*, *Bufo spinosus* and *Bufo verrucosissimus*. *Bufo bufo* is widespread in Europe and found through much of Turkey. According to the literature, *Bufo verrucosissimus* inhabits the Caucasus and northeastern Turkey, but the distribution range was in doubt. The aim of this study is to verify the existence of this species in Black Sea Region of Turkey.

**Material and Methods:** We studied 48 individuals from 16 different localities in Turkey for DNA sequence analyses on 547 bp of the mitochondrial 16S rRNA region. We also used *Bufo verrucosissimus* samples and outgroups from GenBank to see the phylogenetic tree of *Bufo* samples in Turkey. Haplotype networks were constructed by PopART 1.7. We implemented Bayesian analyses in MrBayes version 3.2.6 for a given model of sequence evolution. Models of evolution were applied to individual molecular partitions and determined for 16S ribosomal RNA by MrModeltest version 2.3 for Bayesian analyses. The best substitution model (SYM+G) for 16S ribosomal RNA was selected using the Akaike information criterion in MrModeltest. One independent run of four Markov chain Monte Carlo (MCMC) chains were executed for 1 million generations, with a sampling interval of 1000 generations. 31 different characters from 130 individuals (68 females+62 males) were used for the morphological analysis of two species determined according to the molecular results. Independent samples t test was done to compare the means between the species on the variables and discriminant analysis to classify the individuals into groups. All the analysis were performed by SPSS 21.

**Results:** Our molecular results show that all the studied populations in Turkey were in the same clade except Artvin individuals. However, they were on the same clade with *Bufo verrucosissimus* samples supplied from GenBank. In conclusion, *B. verrucosissimus* inhabits only Artvin city (near Georgia) when considering the rest of the other samples in Turkey. According to the morphologic results, we observed significant differences in terms of parotoid angle, parotoid divergence, MT size, MT length, MT width, tympanium diameter, length of forelimb, length of tarsus and the width of parotids. For instance, *B. verrucosissimus* samples have wider parotid angle and narrower parotids than the *B. bufo*, But *B. verrucosissimus* samples have bigger values than *B. bufo* in terms of MT size, MT length and width.

**Acknowledgements:** This study was supported by TÜBİTAK under project number 114Z823. We thank Ö. Özkan and E. Kizilhan for help with laboratory process.

**Keywords:** *Bufo bufo*, Common toad, Turkey, Caucasus, distribution

***In vitro* propagation of two local mandarins (*Citrus deliciosa* Ten. and *C. nobilis* Lauriro) cultivars; “Bodrum” and “King”**

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**Aim of the study:** Mandarin is divided into four groups; regular mandarin (*Citrus reticulata* Blanco), Satsuma (*C. unshiu* Marc.), King (*C. nobilis* Lauriro) and mediterranean mandarin (*C. deliciosa* Ten.). *C. deliciosa* cv. “Bodrum” is also known under many other regional names, but the most common one is the Mediterranean mandarin. This mandarin variety is known to have been growing in the Mediterranean basin since the very early 1800s. It is a distinctive variety in both tree and fruit characteristics. *C. nobilis* cv. “King” also known as the mandarin orange or king mandarine, is a small citrus tree with fruit resembling other oranges. Mandarins are usually eaten plain or in fruit salads. Most of the existing citrus collections are conserved in field gene banks in different citrus growing countries. Such collections are vulnerable to biotic and abiotic hazards. Ageing seeds of *Citrus* species are recalcitrant and lose viability within a short time. Therefore, it is needed to develop *in vitro* propagation protocols for specific cultivars and the aim of the present study was to develop an efficient protocol for *in vitro* clonal mass multiplication of this citrus cultivars “Bodrum” and “King”.

**Material and Methods:** After the surface sterilization (*Citrus deliciosa* Ten. and *C. nobilis* Lauriro) seeds were surface sterilized by soaking in 70% ethanol for 5min, 10% H<sub>2</sub>O<sub>2</sub> for 5min and disinfected by 10min treatment with 10% commercial bleach, with consecutive rinses in sterile dH<sub>2</sub>O after each step. The seeds (peeled seeds coat) transferred to germination media (germination media: MS medium supplemented with 0.1µM gibberellic acid and 20g L<sup>-1</sup> sucrose). During germination, the seeds were kept at 27±2°C in the dark (The culture conditions; 27±2°C temperature, 16-h photoperiod, with light provided by cool daylight fluorescent lamps 50µmol<sup>-1</sup>m<sup>-2</sup>s<sup>-1</sup>). Experiments were repeated at least three times, and percentage of the shoot tips showing no contamination was recorded 4 weeks later.

**Results:** Studies on the regeneration systems of *Citrus* spp. reported so far had shown the critical effect of cytokinin concentration and type or cytokinin-auxin ratios in regeneration from various types of explants. Use of seeds as the explants was found to be an effective method for *in vitro* clonal multiplication of *C. deliciosa* Ten. and *C. nobilis* Lauriro. We studied the germination response of seeds of this species cultured on MS medium supplemented with 0.1µM gibberellic acid and 20g L<sup>-1</sup> sucrose. Germination was evaluated four weeks after the *C. deliciosa* Ten. and *C. nobilis* Lauriro seeds were transferred to germination medium. Seeds that produced at least one morphologically normal seedling were considered germinated. Seedlings derived from germinated seeds had well-formed shoots and roots and were easily acclimated to greenhouse conditions.

**Acknowledgements:** This study was supported by the Mugla Sitki Kocman University Scientific Research Projects Coordination Unit (Mugla, Turkey, MSKU-BAP 16/021).

**Keywords:** Citrus seeds, germination, gibberellic acid, MS medium.

## **Analysed of Wildlife Crimes and Misdemeanors in Turkish Legislation Comparing with International Conventions**

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**Aim of the study:** The aim of this study is to reveal crimes, misdemeanors on hunting and wildlife in Turkey. Additionally, to compare Turkish legislation with international conventions which is party and then to bring forward conclusions and recommendations.

**Material and Methods:** In this study, Turkish land Hunting Law, Forest Law, Environmental Law, Animal Protection Law and Aquaculture Law will be examined regarding to the illegal wildlife and hunting actions. Otherwise compare to this provisions with the some international conventions accepted by Turkish government. This conventions are, The Council of Europe's Convention on the Conservation of European Wildlife and Natural Habitats (Bern), The Convention on Wetlands (Ramsar), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), International Convention for the Protection of Birds (Paris) and Convention on Biological Diversity.

**Results:** International conventions affected to Turkish wildlife and hunting legislation regarding with prohibitions.

**Acknowledgements:** İstanbul University- Academic Research Unit

**Keywords:** wildlife, crime, middemeanor, Turkey, Legislation, convention

## The Histopathological Effects of Carbaryl on the Spleen of *Oreochromis niloticus*

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**Aim of the study:** It is aimed to determine possible alterations in spleen histology of *Oreochromis niloticus* individuals exposed to certain concentrations of carbaryl standart with light microscope at 7th, 14th and 21st days.

**Material and Methods:** The analytical standard of carbaryl was used for the study. 1/10 of LC<sub>50</sub> value of carbaryl for *O. niloticus* was used as test concentration. The test design was static renewal. 15 individuals in each of three replicates were used per groups. Test duration was 21 days. Test groups were control, acetone control and exposure (850 µg/L carbaryl standart) groups. At 7th, 14th and 21st days of the experiment 5 fish were taken randomly from each exposure and control groups. The fish were immediately sacrificed by decapitation. Spleen samples were removed and immediately fixed with 10% formalin solution for 24 hrs at +25 °C. After fixation, samples were washed under the tap water for 1 night for removing the fixative from the tissue. After wise, the samples were dehydrated with increasing grade of ethanol (30, 50, 70, 80, 90, 96 and 100%). Then, the samples were cleared with xylene and embedded in parafin. 5 µm sections were cut by microtome. After cutting, the sections were stained with Hematoxylin-Eosin and examined with a light microscope. The histopathological alterations were photographed.

**Results:** At the end of 7<sup>th</sup> day, picnosis and hyperplasia were observed in some regions of the spleen of the fish exposed to 850 µg/L carbaryl. Few melanomacrophage centers were also determined. The severity of histopathological alterations in the spleen tissue of *O. niloticus* individuals exposed to carbaryl for 14 days increased with the time. On day 14, the number of picnotic nuclei in the spleen of *O. niloticus* individuals increased, at the same time necrosis began to appear in the spleen tissue and the frequency of cloudy swelling increased. The most dramatic changes were observed on day 21 when carbaryl exposure was the longest. After 21 days, the severity of necrosis in the spleen was striking. The picnotic nuclei spread throughout the tissue and the density of melanomacrophage centers increased.

**Acknowledgements:** This study was supported by The Scientific and Technical Research Council of Turkey (TUBITAK) under grant number 114-Z-730

**Keywords:** Histopathology, *Oreochromis niloticus*, spleen, melanomacrophage centers, carbaryl.

**Determination of Total Phenolic, Flavonoid Amounts and Antioxidant Capacity of  
*Andricus curtisii* (Müller, 1870) Gall**

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**Aim of the study:** Various degenerative disorders implicate a deficient natural antioxidant defence as their etiological or pathological factor. Plant-based antioxidants potentiate body's antioxidant defence and are relatively safe. The cynipid galls are of great medicinal value and have widely been used in folklore medicines mainly as astringent and against inflammation. Pharmacological evaluation of the galls has deciphered them to be astringent, antiparkinsonian, antitremorine and antidiabetic. In this study, we aim to determine antioxidant capacity and total phenolic-flavonoid amounts of *Andricus curtisii* asexual gall extracts.

**Material and Methods:** The oak gall specimens on their host were collected from Uşak, Turkey between 2017 and 2018. After collection, the galls were kept in laboratory and checked for emerged adults. The extracts of galls were prepared with the ethanol and water. DPPH radical scavenging method was used to determine antioxidant activity of *A. curtisii* gall. Total phenolic and total flavonoid amounts were carried out respectively, Folin-Ciocalteu method and the aluminium chloride colorimetric method.

**Results:** The results of this study showed that the highest antioxidant activity, total phenolic content and total flavonoid content were exhibited by the extracts obtained from water extract. The gall extract was found to contain a large amount of polyphenol and possess a potent radical scavenging power. The amount of total phenolics varied in different accessions and ranged from 203.93 to 271.43 mg GAE/g of gall extract. The water extract of *A. curtisii* (40 mg QE/g) have the highest total flavonoid content in quercetin equivalents. In direct proportion, the highest antioxidant activity was also observed in water extracts (IC<sub>50</sub>: 13.05±1.104). These results indicate that *A. curtisii* can be used as natural antioxidant source in various area.

**Keywords:** Secondary metabolites, oak gall, Cynipini, Cynipidae.

## A GIS Modeling Approach to the Investigation of Rare Amphibians and Reptiles in Ukraine Under Climate Change

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**Aim of the study:** Rare and protected species are particularly vulnerable to habitat changes (e.g., mires, virgin forests, wetlands, wet meadows, etc.) due to climate and themselves may be affected by changes in temperature and/or precipitation. Our study aimed at predicting possible changes affecting habitats of such species, exemplified by amphibians (*Epidalea calamita* (Laurenti, 1768)) and reptiles (*Vipera* [Pelias] *berus nikolskii* Vedmederja, Grubant et Rudaeva, 1986). A GIS-based approach was employed using a variety of corresponding algorithms (e.g., GARP, BIOCLIM, DOMAIN or Maxent) that relate observed presences of a species to values of environmental variables at those sites or projected environmental parameters and highlight suitable for the species' areas.

**Material and Methods:** The database on *Epidalea calamita* consisted of 963, including 38 for Ukraine, georeferenced point data and 101, including 75 for Ukraine for *Vipera* [Pelias] *berus nikolskii*, respectively. The resulting habitat suitability grids were clipped in SAGA GIS to the boundaries of Ukraine and analyzed concerning their level of similarity/correlation. The GIS-modeling and processing of data was accomplished in SAGA GIS, QGIS, Maxent, DivaGis with using the spatial resolution of 2.5 minutes ( $18.6 \times 18.6 = 344 \text{ km}^2$  at the equator). 19 bioclimatic variables from the WorldClim database were employed (contemporary climate and forecasts for 2000, 2030, and 2050; climate changes up to + 1°C rise in temperature were simulated in DivaGis).

**Results:** The GIS-modeling found that for most terrestrial species in the Polissya (i.e. the northern forested zone in Ukraine), areas of their home ranges will be reduced up to 50% in the near future (and much more by 2050) due to predicted climate changes involving rising temperatures and lesser precipitation. For example, the GIS model built for the amphibian species (*E. calamita*) shows that alongside with the predicted climate changes, areas of favorable (in terms of the bioclimate) habitat suitability exceeding 0.5 will be reduced. Compared with the current situation, by 2030 this area may shrink by almost 40%. In fact, prospects for the species may be even worse (a reduction of up to 70%) because only one third of the area now occupied by the species in Ukraine will continue to maintain by 2050 more or less optimal bioclimatic conditions. The same applies to the reptile species, the Nikolsky viper, inhabiting the Ukrainian Forest-Steppe Zone. Biotopes of this species are largely associated with moist forested areas. Predictions assume that higher temperatures and less precipitation may reduce areas of suitable habitat by almost 1.5 times by 2030, and by 2050 - by 2.3 times.

**Acknowledgements:** Publications are based on research supported by a grant from the State Fund For Fundamental Research (SFFR F76/15-2018).

**Keywords:** global climate change, rare animals, Ukraine.

## **Current Trends in the Manifestation of External Morphological Anomalies in Representatives of the Herpetofauna of Ukraine under Anthropogenic Influence and Climate Change**

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**Aim of the study:** Current climate changes and growing anthropogenic pressure significantly alters wildlife habitats. This leads to extinctions or accelerated adaptation to changing conditions by which large numbers of abnormal phenotypes may appear in the population. In this respect certain species of amphibians and reptiles surviving under severe anthropogenic conditions may be indicators of this phenomenon as well as indicators of the environment of poor quality. Our aim was to summarize and analyze data on anomalies in representatives of the herpetofauna of the Middle Dnieper collected for half a century.

**Material and Methods:** Our dataset resulted from field research and monitoring surveys conducted in the Middle Dnieper area in 1996-2017. An account was taken of various external morphological anomalies in model amphibian species (*Pelophylax esculenus* complex; 1751 specimens) and reptiles (Lacertidae; 97 specimens) both from the wild and collections of the National Museum of Natural History at the National Academy of Sciences (NMNH), II Schmalhausen Institute of Zoology (IZANU) and Zoological Museum of the Taras Shevchenko National University of Kyiv (KNU).

**Results:** The largest number of amphibian anomalies was found to occur within Kyiv City. Before 2002 there were only single records of such anomalies (Nekrasova, 2002), however in the coming 15 years certain populations in the city were found to hold up to 64.8% abnormal individuals (blue coloring in *Pelophylax ridibundus* (Pallas, 1771)). Among the variants of abnormal coloring, 4 main types have been identified: albinism (leucism), flavism, blue color and their variations. There is an increase in the spectrum of variants of amphibian anomalies. Before 2002 there was an average of 2.5% (n = 1302 specimens) of individuals with recorded anomalies. By 2017 the number of anomalies throughout the city increased up to 20% on average (n = 449 specimens). The same applies to lizards of the Middle Dnieper. For instance, in *Lacerta viridis* (Laurenti, 1768) anomalies were found in 21.1% (n = 97 specimens) individuals. Earlier, more than 50 years ago, until 1966 (museum collections) anomalies of the dorsal part of the head were not recorded. Apparently there is a trend towards an increase in numbers of individuals of amphibians and reptiles with abnormal manifestations, which may be an indication of the gradually deteriorating environment. This problem requires further research and continuous monitoring. There is also a need to study in this respect other representatives of the biota.

**Keywords:** anomalies, amphibians, reptiles, Ukraine.

## Proteomics Approach of Crosstalk in Cell Signaling Investigation

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**Aim of the study:** Due to the worldwide adverse contamination of environment it is important to study molecular mechanisms of a plant's perception of separate stress factors and their combinations. The primary focus of this research is on understanding of signaling pathways and their crosstalk, thus elucidating specific and nonspecific components of plant adaptation responses to salt and radiation stresses. Crosstalk refers to the phenomenon when one or more components of different signal transduction pathways interact. We used morphometric indexes and proteomics approach to study how pretreatment with ionizing radiation affects pea seedlings reaction on osmotic stress. The aim of our study was to assess the proteome changes of pea seedlings during two days after stress treatments or their combination (ionizing radiation with salinity stress) to understand the phenomenon of crosstalk.

**Material and Methods:** Firstly, we studied morphometric changes in *Pisum sativum* L. seedlings divided in 4 groups: 1) control plants, 2) treated by water solution of sodium chloride in 0.22 M/l, 3) treated by  $\gamma$ -rays in dose 10 Gy, and 4) salt stress applied after  $\gamma$ -rays impact. Roots were used for physiological measurements and proteins extraction. We demonstrated different growth reactions of roots for all experimental groups. After some doses of radiation and salt seedlings had higher growth speed, in comparison with the group after irradiation only. This may indicate to resistant influence of salt treatment. Upon phenol-based extraction, pea proteins were profiled by 2-DE (IPG strips within pH 4-7, narrow-range 7 cm). Software-assisted analysis of Colloidal Coomassie-stained gels revealed quantitative and qualitative differences between protein spots belonging to all investigated groups. Majority of the differentially abundant spots were identified by LC-MS/MS mass-spectrometry and followed by sequence database search.

**Results:** Key proteins included: Pyruvate dehydrogenase E1 component subunit beta (mitochondrial), L-ascorbate peroxidase (cytosolic), Lipoxygenase etc. that are involved in the pathway of some compounds biosynthesis or are the parts of metabolism. The analyzing of proteomic data, using advanced bioinformatics tools helps to accumulate, integrate and interpret functional information. This molecular approach could allow objective insights into biological diversity processes to abiotic stress factors. Proteomic data might also allow us to substantially contribute to the understanding of physiological reactions, including crosstalk of signal systems, likely leading to future biotechnological applications.

**Acknowledgements:** This work was supported by grants IRSES GA-2013-612587 «Plant DNA tolerance». We thank our colleagues from Plant Science and Biodiversity Centre of Institute of Plant Genetics and Biotechnology (Slovak Academy of Sciences), especially to Katarina Klubicova and Viera Majercikova for advice and support.

**Keywords:** Pea, proteins, crosstalk, stress factors.

## First Record of Oribatid Mites (Acari, Oribatida) of Mizhrichynskyi Regional Landscape Park (Ukraine)

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**Aim of the study:** The aim of research was to study distribution of oribatid mites in the zone of mixed forests in Ukraine (also known as Polyssia). Oribatid species of Northern Ukraine are arguably less studied compared to those of Crimea, Eastern Ukraine or Transcarpathia. Conversely, their diversity in forest ecosystems is known to be rather high. The chosen area of research is associated with Desna River, a major and unregulated tributary of Dnieper River. Data on oribatid diversity from forests of Northern Ukraine is important for comparative analysis with data from Chernobyl exclusion zone.

**Material and Methods:** Samples of soil, litter, lichens, bog tussocks, animal wool and feces, and mosses were collected in Mizhrichynskyi Regional Landscape Park, Chernihiv region of Ukraine (N 51°03', E 30°46'). Sampling was conducted in July 21, 2017. The mites were extracted with Berlese funnels in 70 % ethanol and mounted on slides in Hoyer liquid, species identified with keys (Key..., 1975; Pavlichenko, 1994; Sergienko, 1994; Weigmann, 2009), given according to (Subias 2004, online version 2012).

**Results:** Samples of July 21, 2017 contained the following oribatid diversity (\*new for Ukrainian Polyssia, \*\* new for the fauna of Ukraine): *Achipteria coleoptrata*, *Adoristes poppei*, *Brachychochthonius subcrucoides*, *Carabodes coriaceus*, *Carabodes subarcticus*, *Ceratozetes mediocris*, *Ceratozetes peritus*, *Ceratozetes sellnicki*, *Chamobates cuspidatus*, *Chamobates subglobulus*, *Eremaeus silvestris*, *Galumna lanceata*, *Galumna obvia*, *Gustavia microcephala*, *Gymnodamaeus bicostatus*, *Haffenrefferia gilvipes*, *Hermaniella dolosa*, *Heminothrus peltifer*, *Licnodamaeus licnophorus*, *Limnozetes ciliatus*, \*\**Limnozetes rugosus*, *Liochthonius brevis*, *Liochthonius hystricinus*, *Liochthonius plumosus*, *Malaconothrus egregius*, *Metabelba papillipes*, *Micreremus gracilior*, *Micropoppia minus*, \**Microzetorchestes emeryi*, *Oppiella nova*, \**Oribatella berlesei*, *Oribatella reticulata*, *Oribatula tibialis*, \**Phauloppia lucorum*, *Peloptulus phaenotus*, *Pergalumna nervosa*, *Protokalumma aurantiaca*, *Punctoribates punctum*, *Punctoribates zachvatkini*, *Quadroppia quadricarinata*, *Scheloribates latipes*, *Scutovertex sculptus*, *Spatiodamaeus subverticillipes*, *Steganacarus carinatus*, *Tectocephus sarekensis*, *Trichoribates trimaculatus*, *Xenillus tegeocranus*, *Xiphobates kieviensis*. Both aquatic oribatid species of the genus *Limnozetes* were found in one sample of bog tussocks. The estimated oribatid diversity, however, is more than a hundred species.

**Acknowledgements:** The author is grateful to the initiative "Emerald-NATURA 2000 in Ukraine" for contributing to material collection, and to Andryi Sahaydak, director of Mizhrichynskyi Regional Landscape Park for organizing the field trips.

**Keywords:** oribatid mites, fauna, mixed forests, species diversity, Ukraine

## **Determination of Agro-Morphological Features Domestic White Dry Bean Genotypes Collected from Middle Kizilirmak Valley**

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**Aim of the study:** The aim of this study is to demonstrate as the qualitative and quantitative agro-morphological variability of 334 white domestic bean genotypes collected from 8 cities and 27 districts in the Middle Kızılırmak Valley boundaries. On the other hand, we aimed to use the promising genotypes in breeding programs.

**Material and Methods:** As a result of 45 days of surveillance, the materials collected from the area were separated according to genotypes. The bean material was planted at a distance of 50 cm and a length of 5 meters so that each of the genotypes as one row in the farmer's land located in the central district of Kirsehir. The morphological characterization of each genotype was performed according to the identification criteria established by the International Plant Genetic Research Institute (IBGRI).

**Results:** As a result of morphological characterization, 334 genotypes were found to be dwarf, 161 of them were semi-dwarf and 161 of them were in the form of climbing. However, genotypes have been found to have a large variation in seed shape. Genotypes were circular, elliptical, elliptical, and kidney-shaped. In addition, the agronomic characteristics of 334 white domestic dry bean genotypes with morphological characterization and the minimum and maximum values of each agronomic feature were determined. In the genotype of 334 white domestic dry beans, the length of the plant is 31.6-193.2 cm, the height of the first pod is 5.4-82.2 cm, the number of pods is 7-76, the number of seeds is 14-199, the seed yield per plant is 3.02-96.83 g and 100-seed weight is 24.35-41.58 g. As a result of the research, promising genotypes were identified, especially from the perspective of breeding. The selection of these genotypes should be continued.

**Acknowledgements:** This work was supported by the Ahi Evran University Scientific Research Projects Coordination Unit. Project Number: ZRT.A4.18.004

**Keywords:** Middle Kizilirmak valley, dry beans, selection, genotype, breeding.

## The Endemic Plants of Karaman (Turkey) Province

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**Aim of the study:** The aim of the study is to determine the endemic plants of Karaman (Central Anatolia) province.

**Material and Methods:** As a result of the botanical trips, 1200 plant specimens were collected between 2015-2017. The research area is in the C4 square according to the Grid system. The collected plants were dried according to common herbarium technics. The dried specimens were identified with the help of Flora of Turkey and East Aegean Islands.

**Results:** As a result of the examination of 1200 plants specimens which were collected from the research area between 2015-2017, 977 taxa have been determined. With literature records, 301 of total 977 taxa are endemics. 207 of the total taxa are new records for Karaman Province. The some endemic species in Karaman are below; *Aethionema karamanicum* (Karaman Kayagülü), *Alkanna dumanii* (Paşa Havacivaotu), *Alkanna hispida* (Killı Havacivaotu), *Alkanna saxicola* (Kaya Havacivaotu), *Allium goekyigitii* (Gökyiğit Soğanı), *Allium tauricola* (Toros Soğanı), *Alyssum lycaonicum* (Konya Kuduzotu), *Anthemis fimbriata* (Saçaklı Papatya), *Asperula stricta* subsp. *latibracteata* (Berit Belumotu), *Astragalus amoenus* (Zarif Geven), *Astragalus nydeggeri* (Karaman Geveni), *Astragalus vestitus* (Kılbasan Geveni), *Bupleurum lycaonicum* (Koru Şeytanayağı), *Bupleurum sulphureum* (Ters Şeytanayağı), *Campanula isaurica* (Ermenek Çanı), *Centaurea isaurica* (Dik Sarıbaş), *Centaurea pinetorum* (Barama Otu), *Cicer isauricum* (Geyiktuzu), *Cousinia davisiana* (İç Kızan), *Cousinia ermenekensis* (Ermenek Kızanı), *Crocus biflorus* subsp. *isauricus* (İbradı Çiğdemi), *Crocus danfordiae* (İnce Çiğdem), *Crocus karamanensis* (Karaman Çiğdemi), *Cyclamen cilicium* (Şeytan Kabalağı), *Dorycnium pentaphyllum* subsp. *haussknechtii* (Gervenük), *Dorycnium sanguineum* (Kızıl Kaplanotu), *Ebenus cappadocica* (Peri Geveni), *Ebenus hirsuta* (Altınbaş Geveni), *Ebenus plumosa* var. *speciosa* (Tarla Geveni), *Erodium absinthoides* subsp. *absinthoides* (Yavşan İğneliği), *Eryngium kotschyi* (Deve Elması), *Eryngium isauricum* (Gelenkeri), *Ferula lycia* (Bozkır Çakşırı), *Fritillaria acmopetala* subsp. *wendelboi* (Sarı Duguk), *Fritillaria aurea* (Damalı Lale), *Geranium lasiopos* (Leylekayağı), *Gladiolus anatolicus* (Ekinçiçeği), *Haplophyllum myrtifolium* (Murt Sedosu), *Haplophyllum vulcanicum* (Dağ Sedosu), *Helichrysum plicatum* subsp. *isaurica* (Savran), *Hyacinthella lazulina* (Gök Sümbül), *Inula sarana* (Yar Andızotu), *Iris germaniaca* (Göksüsen), *Iris schachtii* (Kır Süseni), *Iris sprengeri* (Benli Kurtkulağı), *Iris stenophylla* subsp. *stenophylla* (Gök Navruz), *Isatis ermenekensis* (Ermenek Çiviti), *Linum ciliatum* (Koraş Keteni), *Muscari aucheri* (Gök Müşkürüm), *Muscari bourgaei* (Top Müşkürüm), *Muscari racemosum* (Müşkürüm), *Pimpinella isaurica* subsp. *isaurica* (Hanifecikotu), *Ranunculus dissectus* subsp. *ermenekensis* (Has Kebikeç), *Rhaponticoides aytachii* (Ay Tülüşahı), *Silene ermenekensis* (Ermenek Nakılı), *Verbascum isauricum* (Göksu Sığırkuyruğu), *Viola isaurica* (Balkusan Menekşesi), *Viola ermenekensis* (Ermenek Menekşesi).

**Acknowledgements:** We thank to “EMS” for financial support. We also thank the Curators of ANK, GAZI, HUB and ISTE, who allowed us to study their specimens.

**Keywords:** Endemic, Plant diversity, Karaman.

## Determination of the Antioxidant Content of *Paulownia tomentosa* Grows on the Soil of Denizli

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**Aim of the study:** *Paulownia tomentosa*, which adapts to the land of Denizli, has a rapid growth feature. Our plant, rich in antioxidant content, is found in a group of medical and aromatic plants. In this study, it was aimed to determine the antioxidant content of the *Paulownia tomentosa* tree.

**Material and Methods:** The leaves and flower parts of the *Paulownia tomentosa* tree grown in the Denizli province, which we used in our research, are also growing at the campus of Pamukkale University. The vegetative parts of the plant are collected in certain periods (leaves, flower parts) in April-May 2016. The collected material was dried at 24±2°C under Plant Physiology laboratory conditions. Extraction work was carried out after drying. The leaves and flowers parts of the plant were milled and powdered with the help of a blender (Waring commercial blender, USA). Powdered leaves and flowers were weighed on a precision scale (Grecisa XW210A) and mixed with methanol (MERCK, Germany) (1:10) and left in the water bath (Nucleon Water Bath) for 5-6 hours. The extract was evaporated using the rotary evaporator (IKA RV10). Petri dishes were frozen at -20° C and used for the lyophilizer (Labconco Freezone 6 USA).

**Results:** *Paulownia tomentosa* (Thunb.) Sieb. & Zucc. Ben.Steud. the antioxidant content analysis of leaf and flower methanolic extract of the tree was carried out. According to this, in the general antioxidant content of the plant, the amount of catechin in leaf and flower, respectively; 24035,902 µg/g (leaf), 13837,144 µg/g (flower), the amount of chlorogenic acid; 34,863 µg/g, 82,260 µg/g, the amount of caffeic acid; 1132,779 µg/g, 879,437 µg/g, the amount of coumaric acid 140,695 µg/g, 88,726 µg/g, the amount of quercetin; 58,961 µg/g, 124,579 µg/g, the amount of luteolin; 102, 166 µg/g, and 144,570 µg/g, respectively. It is a tree species that can be used in pharmacological applications and adaptation studies.

**Acknowledgements:** This work is Pamukkale University is Supported by the Scientific Research Centre (BAP). Project No: 2017FEBE046.

**Keywords:** *Paulownia tomentosa*, Antioxidant content, DPPH, Alternative tree.

## Transient Expression *gus* and *gfp* genes in *Physalis peruviana* plants

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**Aim of the study:** The aim of research was to detect *Agrobacterium*-mediated transient expression to identify the optimal conditions for transient expression of the transferred genes into *Physalis peruviana* plants.

**Material and Methods:** The object of the research was plants of *Physalis peruviana*. The seeds were germinated in the glass flasks on MS medium. The 2-monthage plants were transferred into the pots with soil and were grown in the greenhouse. After 2 weeks of growing in greenhouse, plants were infiltrated with lines of *Agrobacterium rhizogenes* (strain A4) and *A. tumefaciens* (strain GV 3101). Lines of *A. rhizogenes* carried the following constructions: pICH 5290 (*gfp* gene), pICBv19 (*gus* gene). *A. tumefaciens* carried the construction pCB131 (*fbpB* ( $\Delta$ TMD)::*gfp* gene, *fbpB* gene codes the tuberculosis antigen Ag85B). Infiltration of *Agrobacterium* suspensions was conducted for both pure lines and lines mixed with *A. tumefaciens* (GV 3101) which carried construction pICH 6692. Construction pICH 6692 contained gene of p19 protein – suppressor of gene silencing. Infiltration of whole plants was carried out in a vacuum chamber, under pressure 0,1 mPa. Transient expression of *gfp* gene began in 3 day after infiltration. Detection was carried out every day during eighteen days. Fluorescence of *gfp* was observed under UV light (400 nm) in dark room. Detection of *gus* genes was carried out by histochemical assay on 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup> days (GUS activity) by Jefferson.

**Results:** *Gfp*- and *gus*-positive results were obtained for all infiltrated plants. Separate areas with green fluorescent were detected. Maximum of *gfp* expression was observed between 5<sup>th</sup> – 12<sup>th</sup> days after infiltration. According to the results of *gus*- and *gfp*- activity, the most suitable for infiltration were young leaves with intensive growth (2-nd, 3-rd and 4-th from the plant apex). Fluorescence was weak when pCB 131 was used. In this case, zones of necrosis on the 5<sup>th</sup> day appeared. It might be caused with some toxic effects of tuberculosis proteins. There was no significant difference in expression levels of genes neither with the suppressor of gene silencing nor without it. It was shown the possibility of transient expression using the constructions (pICH 5290 and pICBv19) with reporter genes in *Physalis* plants. In future we plan to continue use the transformation protocol for production pharmaceutical proteins.

**Keywords:** *Physalis*, *Agrobacterium*, transient expression, *gus*, *gfp* genes.

## Effects of Taxifolin and Trehalose on Post-Thawed Merinos Ram Semen DNA Integrity

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**Aim of the study:** Cryopreservation of sperm is a safe, cost-efficient, and long-term storage technique for conservation of species. However, cryopreservation induces sperm DNA damage and this damage significantly effects fertilization. For this reason, many detection methods have been developed to determine the damage on DNA, and many precautions have been taken to reduce these damages. The aim of current study was to evaluate the protective effects of taxifolin and trehalose on post-thawed ram semen DNA integrity using COMET (single-cell gel electrophoresis or SCGE) and TUNEL (Terminal deoxynucleotidyl transferase dUTP nick end labelling) assays.

**Material and Methods:** Semen samples were collected using artificial vagina from Merinos rams, pooled and divided eight equal parts. Groups were allocated as: glycerol 5% (GC); glycerol 5% + 10 µM taxifolin (G5T10); glycerol 5%+ 100 µM taxifolin (G5T100); glycerol 5% + 500 µM taxifolin (G5T500); glycerol 3% + 60 mM trehalose (G3TRE); glycerol 3% + 60 mM trehalose + 10 µM taxifolin (G3TRET10); glycerol 3% + 60 mM trehalose + 100 µM taxifolin (G3TRET100); glycerol 3% + 60 mM trehalose + 500 µM taxifolin (G3TRET500). The diluted samples were cooled to 5 °C and frozen in 0.25 mL French straws, being stored in liquid nitrogen. Frozen straws were thawed for 25 second in a water bath. Sperm DNA damage was investigated using neutral COMET assay and amount of DNA fragmentation was determined by TUNEL assay using a commercial kit (In Situ Cell Death Detection Kit, POD, Roche, Indianapolis, USA). The percentages of TUNEL-positive cells and the cells with DNA damage in randomly selected 200 sperm from two different slides were determined in each sample using light microscopy. All values were expressed as the mean±standard deviation. Mann-Whitney U test was performed to evaluate the % values of the groups statistically for both assays.

**Results:** For TUNEL and COMET values of the groups, it was found that there were statistically significant differences between some of the groups. In light of these differences, some extenders containing trehalose (60 mM) and different doses of taxifolin (10, 100, and 500 µM) and glycerol (3 and 5%) were effective to prevent double-strand DNA breaks or DNA fragmentation. However, supplementation of glycerol (5%) and taxifolin (10 µM) together was more effective to prevent both double-strand DNA breaks and DNA fragmentation, whereas supplementation of glycerol (5%) and taxifolin (500 µM) together was the most effective to prevent DNA fragmentation. It was concluded that supplementation of taxifolin in semen extenders may provide a dose-dependent protection against sperm DNA damages in cryopreservation. Nevertheless, further analyses are needed to assess the protective effects of different cryoprotectants on DNA integrity of Merinos ram sperm during cryopreservation.

**Acknowledgements:** This study was financed under the project supported by the Scientific and Technological Research Council of Turkey (TUBITAK) (Project No: 1140642).

**Keywords:** Ram semen, cryopreservation, taxifolin, trehalose, DNA damage.

**Investigation of extracellular matrix-degrading enzyme inhibition and antioxidant activity of *Galium aparine* L.**

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**Aim of the study:** Extracellular matrix (ECM) is the largest component of the dermis, and is constructed of different fibers such as fibrin, elastin, hyaluronic acid, type I and type III collagen. Breakdown and disorganization of collagen, elastin and hyaluronic acid are the main characteristics of skin aging. In addition, oxidative stress plays an important role in human skin aging and dermal damage. Inhibition of these enzymes or *oxidative damage* by natural product may be an encouraging approach to prevent skin aging. In the study, we investigated collagenase, hyaluronidase, elastase inhibitions and antioxidant effect of *Galium aparine*.

**Material and Methods:** *G. aparine* whole plant which was collected from Adana, Turkey, in Aug 2016, and identified at department of Biology, Ege University, Turkey. The extracellular matrix degrading enzyme inhibition potential was determined in vitro with the inhibition of collagenase, hyaluronidase and elastase enzymes. The antioxidant activity was established using DPPH (2,2-diphenyl-1-picrylhydrazyl radical), hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) scavenging inhibition and  $\beta$ -carotene/linoleic acid bleaching assays.

**Results:**The results showed that GA possessed antioxidant properties including DPPH scavenging (IC<sub>50</sub>: 564  $\mu$ g/ml), H<sub>2</sub>O<sub>2</sub> radical scavenging (IC<sub>50</sub>: 14 mg/ml) and  $\beta$ -carotene/linoleic acid bleaching (IC<sub>50</sub>: 436  $\mu$ g/ml) activities. The highest ECM-degrade enzyme inhibition was demonstrated against elastase (68.3%). The results suggest that GA can be used for skin aging treatments

**Acknowledgements:** We thank Dr. Volkan Eroglu for help during the identification of plant sample.

**Keywords:** *Galium aparine*, anti-collagenase, anti-hyaluronidase, anti-elastase, antioxidant

### **Biological Activities of *Asparagus acutifolius***

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**Aim of the study:** The *Asparagus* genus including over 250 species of both food and medicinal interest as well as contains flavonoids and other phenolic compounds which possess strong antioxidant properties. *Asparagus acutifolius* L. belongs to genus *Asparagus* and this plant is a native plant species widely distributed throughout the Mediterranean areas. The young shoots of this species are consumed as vegetables in West Anatolia, Turkey. This plant is used as diuretic, and antineuralgic in traditional medicine. The aim of this study was to determine differences in the total phenolic, flavonoid, tannin content, antioxidant capacity and cytotoxic activity of different part of *A. acutifolius*.

**Material and Methods:** The fruits and leaves of *Asparagus acutifolius* were air-dried, powdered and extracted with water in our laboratory. The antioxidant capacities of the *A. acutifolius* were evaluated by DPPH free radical scavenging and  $\beta$ -carotene/linoleic acid methods. In DPPH, 1 mL of the different concentrations of the extracts were mixed with 4 mL of methanolic DPPH solution. After 30 minutes, the absorbance of each extract was measured at 517 nm. For  $\beta$ -carotene method, the  $\beta$ -carotene stock solution was prepared (0.2 mg  $\beta$ -carotene was dissolved in chloroform and 0.02 mL of linoleic acid and 0.2 mL of 100% Tween 20 was added). The chloroform was evaporated using a rotary evaporator and 100 mL of ddH<sub>2</sub>O was added to the remaining residue. The extracts were mixed with this emulsion and the initial absorbances were immediately measured with a spectrophotometer at 470 nm. The reaction mixture was incubated at 50 °C for 2 hours and then the absorbance of this mixture was measured again. In addition, total phenolic, flavonoid and tannin contents were determined with absorbances were measured at 760, 415 and 500 nm respectively. The possible cytotoxic activity of *A. acutifolius* was evaluated using the brine shrimp lethality test

**Results:** In the present study, among the different parts of extracts of *A. acutifolius* evaluated. The DPPH radical scavenging capacity for the leaves was higher than the fruit. The water extracts of fruits and leaves showed the strong total antioxidant activity (over 85 %) and these extracts as effective as the standard (BHT, 93%). The leaves extract of *A. acutifolius* possessed highest total phenolic (24.92 mgGAE/g), flavonoid (21.8 mg QEs/g) and tannin (25.91 mgCE/g) content compared to fruit extracts. The lethality of water extract of fruits and leaves of *A. acutifolius* were 310.324 and 236.454  $\mu$ g/mL respectively and all extracts possessed high cytotoxic activities against brine shrimp. The data from this study could provide useful information for potential use of this plant in our diet and for further studies in this species.

**Keywords:** Antioxidant activity, *Asparagus acutifolius*, DPPH.

**A new record of genus *Zercon* (Acari, Zerconidae) for Turkish Fauna:  
*Zercon saphenus* Błaszak, 1979**

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**Aim of the study:** Soil mites belonging to genus *Zercon* collected from litter, soil, lichen and moss of different habitats of Isparta province are investigated in order to contribute of Turkish zerconid fauna and to contribute the zerconid mite fauna of world. The new record for Turkish fauna, the species *Zercon saphenus* Błaszak, 1979, was defined according to the samples collected from Isparta province and its geographic distribution was given.

**Materials and Methods:** Samples with mites were placed into plastic bags, labelled and transferred to the laboratory. They were placed into combined Berlese funnels and mites were separated. 60 % lactic acid was used for bleaching and cleaning of the samples. Microscopic analyses were mainly made in environments containing glycerine. After the analysed and identified of samples were photographed with a microscope and their shapes were drawn and different body parts were measured. Then, the samples were put in stock bottles containing 70 % alcohol and 1- 3 drops glycine and labelled.

**Results:** As a result of the analysis of the samples, 86 females, 64 males, 45 deutonymphs and 23 protonymphs specimens of *Z. saphenus* were identified. Samples were analysed under light microscope, their shapes were drawn, measures of their various body parts were made their geographic distributions were given and according to the literatures are discussed. In this study, It was determined this species spread in Tunisia before and is recorded from Turkey for the first time. Also, deutonymphs and protonymphs specimens of *Z. saphenus* have been identified as new records from Turkey to world mite fauna.

**Keywords:** Acari, *Zercon saphenus*, Systematic, Isparta, Turkey.

## Poisonous Macrofungi of Gazipaşa (Antalya/Turkey) District

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**Aim of the study:** To identify poisonous species in the research area and introduce these species to the public.

**Material and Methods:** The study material consists of macrofungi samples collected during the autumn, winter and spring seasons between October 2006 and October 2009, when precipitation is abundant. The morphological, ecological and habitat characteristics of the macrofungi were recorded and they were photographed in their habitats. The collected samples were brought to the laboratory and the descriptions of the species were determined as a result of the studies on the mushroom samples. Spore prints were obtained. As a result of the obtained data, the species were identified with the help of field and laboratory studies with relevant literature. Kreisel (1969), Watling (1973), Phillips (1981), Moser (1983), Grünert and Grünert (1984, 1991), Breitenbach and Kränzlin (1983, 1986, 1991, 1995, 2005), Pegler (1987), Hennig and Kreisel (1987), Dähncke (1988), Bresinsky and Besl (1990), Ellis and Ellis (1990), Tröger and Hübsch (1990), Dähncke (1993), Jordan (1996), Smith and Smith (1996), Winkler (1996), Gerhardt (1997), Pace (1998).

**Results:** At the end of this study, 13 poisonous macrofungi species have been identified. These species belong to Ascomycota and Basidiomycota divisions. Identified species and their syndromes: *Gyromitra esculenta*, *Helvella lacunosa*, *Sarcosphaera coronaria* (Gyromitra syndrome), *Amanita verna*, *Lepiota clypeolaria*, *Lepiota subgracilis* (Phalloides syndrome), *Amanita pantherina* (Pantherina syndrome), *Amanita strobiliformis*, *Amanita vaginata*, *Tricholoma pardinum*, *Hypholoma fasciculare* (Gastrointestinal Syndrome), *Ampulloclitocybe clavipes*, *Tricholoma equestre* (Coprin syndrome).

**Acknowledgements:** This research was financially supported by the Selçuk University Scientific Research Projects Coordinating Office (SÜ-BAP- 2006/06401046).

**Keywords:** Poisonous, macrofungi, syndrome, Gazipaşa, Antalya.

**Quantitative PCR count of *VCGC* and 16S rRNA Type A/B genes of *Vibrio vulnificus* in Galveston Bay oysters**

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**Aim of the study:** Galveston Bay oysters were monitored using a combination of quantitative PCR assays for the virulence correlating gene (clinical variant, *vcgC*) and 16S rRNA type A/B (type A = environmental, type B = clinical).

**Material and methods:** Oyster samples collected in 2009 and 2010 from a reef, Galveston, TX, USA, called 'Sammy's Reef' were homogenized and then diluted 1:10 (vol:vol) with alkaline peptone water, incubated at 35°C for 24 hours. 3% CTAB (cetyltrimethylammonium bromide) method was used for DNA extraction. Quantitative RT-PCR assays (SYBR Green) for 16S rRNA type A/B and the virulence correlating gene (*vcgC*) were used to determine the seasonal occurrence of clinical vs environmental strains of *V. vulnificus* in oysters rather than monitoring individual isolate cultures for virulence genes. Regression analyses ( $p > 0.05$ ) and two sample T-test ( $p > 0.05$ ) were conducted with STATA 13.1 (StataCorp).

**Results:** Using the combination of *vcgC* and 16S rRNA type B gene, indicative of clinical strains, was suitable for these gene enumerations as shown by the strong correlation ( $R^2 = 0.98$ ,  $p < 0.001$ ) and their relative proportion (up to 93.8% and 94.3%, respectively) to *vvhA* genes used for species identification and total counts of all strains of *V. vulnificus*. A strong seasonal shift of *V. vulnificus* strain types was observed. The number of environmental strains (16S rRNA type A) was high from April to mid-June as salinities ranged from 22 to 27 PSU and temperatures were between 20 to 28°C with peak gene quantities of  $16,812 \pm 56$  CFU/g. When temperatures reached to  $\geq 30^\circ\text{C}$  from mid-June to September and salinities increased above 27 PSU, the number of clinical isolates (16S rRNA type B; *vcgC*) predominated with peak quantities around  $32,868 \pm 287$  and  $32,360 \pm 178$  CFU/g, respectively. This study and others precisely show that temperature and salinity play a crucial role on selection of clinical vs environmental strains of *V. vulnificus*. Our data has implications for increase of more virulent strains of Vibrios due to global warming which was already observed in other bacteria.

**Acknowledgements:** This study was supported by Texas A&M University at Galveston, USA

**Keywords:** *Vibrio vulnificus*, oyster, seasonal variation, *vcgC*, 16S rRNA type A/B

**Determined of predatory mites (Acari: Mesostigmata) from pear (*Pyrus communis L.*) (Rosaceae) trees in Ankara-Turkey**

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**Aim of the study:** Approximately one-fifth of the total fruit production belongs to pome fruits in Turkey. Pear (*Pyrus communis L.*) (Rosaceae) has cover 18% of this production. Turkey has ranked 6th in the world's total pear production. Pear orchards are spread out all around Turkey even wild pear cultivation is widely carried out in Ankara.

**Material and Methods:** The pear is the most produced fruit after apple among all the pome fruits. The samples were done by monthly interval in Ankara (Ayaş, Beypazarı, Çubuk, Gölbaşı, Kahramankazan and central of Ankara) from April to November during 2012-2014 years.

**Results:** 9 beneficial mite species were identified; *Typhlodromus (Anthoseius) psyllakisi* (Swirski & Ragusa) (Acari: Phytoseiidae), *Typhlodromus (Anthoseius) bagdasarjani* (Wainstein & Arutunjan), *Typhlodromus (Anthoseius) kerkirae* (Swirski & Ragusa), *Paraseiulus subsoleiger* (Wainstein), *Paraseiulus triporus* (Chant & Yoshida-Shaul), *Kampimodromus aberrans* (Oudemans), *Euseius finlandicus* (Oudemans), *Euseius stipulatus* (Athias-Henriot) and *Blattisocius tarsalis* (Berlese) (Acari: Ascidae) were determined as predatory mites.

**Acknowledgement:** This work was supported by the University of Ankara, the Coordination of Scientific Research Projects (BAP-12B4347011).

**Keywords:** Ankara, Pear, Phytoseiidae, Predatory mites, Turkey.

## Long Term Conservation of *Musa* spp. Germplasm Using Cryogenic Techniques

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**Aim of the study:** *Musa* spp. are the fourth most important global food commodity after rice, wheat and corn in terms of gross value of production. Numerous developments in the past decade have changed the scenario for genetic conservation of *Musa* spp., particularly the establishment of INIBAP (International Network for the Improvement of Banana and Plantain). Cryopreservation is a part of biotechnology. Biotechnology plays an important role in international plant conservation programs and in preservation of the world's genetic resources. The aims of this study were to develop a cryogenic procedure (dehydration/cryopreservation) for the conservation of *Musa velutina* and *M. acuminata* seeds.

**Material and Methods:** After the evaluation of results from the preliminary dehydration trial, each of dehydration times were tested for cryopreservation of *M. velutina* and *M. acuminata* seeds, in order to obtain seeds with moisture contents (MCs) between 30 and 15%. For cryostorage, the seeds were placed in 1.5 ml cryovials, five seeds per cryovial, which were directly plunged into liquid nitrogen. After at least 24 hr of storage at -196°C, the seeds were rewarmed by waiting of the cryovials in laminar flow hood at room temperature for 15 min. Then, embryos were excised from the seeds were transferred to the germination medium, under the climatic conditions. Excised embryos from seeds of *M. velutina* and *M. acuminata* were germinated *in vitro* by placing them to petri dishes on semi-solid (1.5 gL<sup>-1</sup>phytagel; 4 gL<sup>-1</sup> agar) MS medium supplemented with 0.1uM Gibberellic acid (GA<sub>3</sub>) and 20 gL<sup>-1</sup> sucrose maintained under the standard culture conditions. During germination, the embryos were kept at 27±2°C in the dark (The culture conditions; 27±2°C temperature, 16-h photoperiod, with light provided by cool daylight fluorescent lamps 50 μmol<sup>-1</sup>m<sup>-2</sup>s<sup>-1</sup>). Germinability was evaluated six weeks after recovering of embryos from liquid nitrogen. Embryos which produced at least one morphologically-normal seedling were considered germinated. Percentages of germination and the average numbers of seedlings per embryos were calculated on the basis of 10-15 seeds per treatment, and each experiment was repeated at least three times. Levels of germination were compared by multiple X<sup>2</sup> test using by SPSS and statistical analysis performed by ANOVA, followed by LSD test at P ≤ 0.05.

**Results:** Initial moisture content (MC) of *M. velutina* and *M. acuminata* seeds (respectively, 48.6% and 45.3%) and moisture content of embryos of *M. velutina* seeds (52.5%) was high for cryopreservation. After nine hours in the laminar flow hood moisture content of seeds was quite reduced to about 15% and 11.4%. The moisture content of *M. velutina* seeds was decreased under 20% end of the fifth hour but the moisture content of embryos was decreased rapidly under 20% end of the seventh hour. Effect on germination rates of different periods of dehydration, followed or not by direct plunging of *M. velutina* and *M. acuminata* seeds into liquid nitrogen. The best results for *M. velutina* obtained from 8 hour dried seeds (84.3% germination rate; MC: 16.7%) and for *M. acuminata* obtained from 5 hour dried seeds (64.2% germination rate; MC: 16.3%).

**Acknowledgements:** This study was supported by the Mugla Sitki Kocman University Scientific Research Projects Coordination Unit (Mugla, Turkey, MSKU-BAP 17/135).

**Keywords:** Cryopreservation, dehydration, moisture content, *Musa acuminata* Colla., *M. velutina* H. Wendl. and Drude.

## Assessment of Nutritional and Chemical Content of *Tuber rufum* by Chromatographic Systems

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**Aim of the study:** *Tuber rufum* is an edible mushroom distributed throughout the world. Mushrooms are a good source of vitamins, proteins and minerals. Although mushrooms have low amount of oil, the proportion of polyunsaturated fatty acids is high. In addition to their nutritional value, they are also preferred due to their flavour and aroma. In recent years, mushrooms have begun to be seen as treatment agents as well as being food. Therefore, in many countries, further research is being conducted on the identification of bioactive components of mushrooms. The aim of this study was to investigate the fatty acid, phenolic, amino acid, mineral and vitamin content of *T. rufum* using chromatographic methods.

**Material and Methods:** An ultra performance liquid chromatography (UPLC) (Acquity UPLC, Waters Co.) with electrospray ionization (ESI) and tandem mass spectrometry (MS/MS) (Xevo TQ-S MS/MS, Waters Co.) and C<sub>18</sub> column (Acquity UPLC BEH C<sub>18</sub> 100mm x 2.1mm, 1.7µm particle size) was used in the elucidation of phenolic compounds and free amino acids. Identification of compounds is based on retention time and mass transitions of analytes. The Waters MassLynx and TargetLynx software were used in the execution of data analysis and quantitation. For the assessment of metal content, mushroom sample was cleaned, and then sample was washed with ultrapure water. Sample (0.2 g) was weighted and mixed with nitric acid (3 mL), hydrochloric acid (0.5 mL), and H<sub>2</sub>O<sub>2</sub> (0.5 mL), then extracted with microwave at a 1200W power. Then, it was added to flask (20 mL) by completing volume with ultrapure water. Mushroom sample was analysed using an Agilent 7700x ICP-MS. For the determination of fatty acids composition, methyl esters of fatty acids were prepared by addition of KOH dissolved in methanol. After sample preparation, a quadrupole mass spectrometer and a DB-1 capillary column (30m x 250µm x 0.25µm) column were used for the GC/MS analyses of the methyl derivatives of fatty acids.

**Results:** In this study, individual phenolic compounds of *T. rufum* were determined using UPLC-ESI-MS/MS. 32 of phenolic compounds were identified and 21 of them were detected and quantitated in *T. rufum*. Among phenolic compounds, *p*-hydroxy benzoic acid was the most abundant one (10.97 ± 0.10 µg/g) in *T. rufum*. Essential and nonessential amino acids such as Ile, Leu, Lys, Met, Ala, Arg, Asn were found in the studied mushroom and total amino acid content was 457.48 ± 3.27 mg/100 g. The mineral and heavy metal contents were tested out for 23 metals and minerals. In the present study, Na, Mg, Al, P, K, Ca, Cr, Mn, Fe, Ni, Cu, Zn, Cd, Sn, and Se were identified in *T. rufum*. Potassium (K) was the most abundant mineral (17057.36 ± 10.74 mg/kg). Linoleic acid (C18:2n6c), palmitic acid (C16:0) and oleic acid (C18:1n9c) were detected as major fatty acids in *T. rufum*. Myristic acid was found to be minor component. Results of the analysis revealed that *T. rufum* is good source of nutrients such as phenolic compounds, vitamins, minerals, fatty acids, essential and nonessential amino acids.

**Acknowledgements:** The present study was supported by Muğla Sıtkı Koçman University Scientific Research Projects Unit (Project No: 17/189).

**Keywords:** *Tuber rufum*, nutrition, phenolics, vitamins, amino acid, UPLC-ESI-MS/MS.

## Genetic Stability Determination of Cryopreserved *Mentha* spp. Using ISSR Markers

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**Aim of the study:** Plant cryopreservation involves long term storage of plant tissues (meristems, shoot tips, seeds etc.) in liquid nitrogen (LN) at -196°C. *Mentha* spp. is a popular medicinal herb that can be used in numerous forms (ie, oil, leaf, leaf extract, and leaf water) and its oil is one of the most important and widely used essential oils, mostly because of its main components menthol and menthone used for flavouring pharmaceuticals and oral preparations. Aim of this study was to determine genetic stability confirmation of long term conserved *Mentha* spp. cultivars using ISSR primers.

**Material and Methods:** *In vitro* grown *Mentha* spp. cultivars were cryopreserved via droplet-vitrification which is one-step freezing and PVS2-based technique of cryopreservation. The genomic DNA isolation was achieved via CTAB method by grinding leaf samples collected from *Mentha* spp. microshoots before and after cryopreservation. For genetic stability analysis, leaf samples of each *Mentha* spp. cultivars were used from untreated shoots, PVS2 treated shoots, and cryopreserved shoots. ISSR-PCR DNA amplifications were carried out using six ISSR primers and PCR reactions were performed in a 25 µl reaction mixture, containing PCR Buffer (1xfinal concentration), 2.5 mM MgCl<sub>2</sub>, 0.4 mM of each dNTP, 0.4mM ISSR primer, 50 ng genomic DNA and 2U Taq DNA polymerase. Amplification conditions were as follows: Samples were pre-denaturated for 3min at 95°C followed by 35 cycles of 15sec denaturation at 95°C, 30 sec annealing at 55°C, 3min extension at 68°C and a final extension for 10min at this temperature. After separation on 1,5% agarose gel, DNA fragments were scored by their presence (1) or absence (0) and cluster analysis was obtained to draw dendrograms, with the UPGMA from the similarity data matrices using Jaccard's coefficient.

**Results:** Genetic stability during cryopreservation will allow the reproduction of conserved plant germplasm that is genetically identical and phenotypically similar to the mother plant. The total of 52 reproducible bands, ranging from 200bp to 2900bp, were scored and, 65.4% of genetic stability was detected from cryopreserved peppermint cultivars respectively.

**Acknowledgements:** This study was supported by the Mugla Sitki Kocman University Scientific Research Projects Coordination Unit (Mugla, Turkey, MSKU-BAP 17/135). The Republic of Turkey Ministry of Food, Agriculture, and Livestock is acknowledged for providing the plant material.

**Keywords:** Cryopreservation, Genetic stability, ISSR PCR, *Mentha* spp.

## Micropropagation of sweet orange [*Citrus sinensis* (L.) Osbeck]

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**Aim of the study:** Sweet orange [*Citrus sinensis* (L.) Osbeck] originated from south East Asia, but is consumed all over the world as an excellent source of vitamin C, a powerful natural antioxidant that builds the body immune system. Important phytochemicals like limonoids, synephrine, hesperidin flavonoid, polyphenols, pectin, and sufficient amount of folacin, calcium, potassium, thiamine, niacin and magnesium are also present. These biologically active compounds prevent arteriosclerosis, cancer, kidney stones, stomach ulcers and reduction in cholesterol level and high blood which promote human health. Tissue culture and micropropagation protocols have been described for a number of citrus species and explant sources. The environmental conditions and composition of culture media are known to be crucial for the growth of tissue cultures. Current work aimed to develop an efficient micropropagation protocol for sweet orange.

**Material and Methods:** Fruit from field-grown sweet orange [*C. sinensis* (L.) Osbeck ] trees were used as the source of seeds. Seeds were extracted by manual extraction, and they were surface sterilized by soaking in 70% ethanol for 5min and disinfected by a 5min treatment with 10% H<sub>2</sub>O<sub>2</sub> and a 15min treatment with 20% commercial bleach (at 2% active chlorine, Domestos, Unilever, London, UK), with consecutive rinses in sterile dH<sub>2</sub>O after each step. Surface-sterilized seeds were germinated *in vitro* in Petri dishes (100×15mm) on semisolid (1.5gL<sup>-1</sup> phytagel and 3.5gL<sup>-1</sup> agar) MS medium supplemented with 0.3μM gibberellic acid and 20gL<sup>-1</sup> sucrose (germination medium). The seeds were kept at 27±2°C with a 16-h photoperiod, under white cool fluorescent light of 50μmol<sup>-1</sup>m<sup>-2</sup>s<sup>-1</sup>. More than 50 seeds were used for *in vitro* germination trials. Experiments were repeated at least three times, and percentage of the shoot tips showing no contamination was recorded 4 weeks later.

**Results:** A successful micropropagation protocol includes a series of stages, each with a specific set of requirements. These are Initiation of aseptic cultures, shoot multiplication, rooting of microshoots hardening and field transfer of tissue culture raised plants. The seeds of *C. sinensis* (L.) Osbeck were cultured on MS medium, which germinated after six days of inoculation. All the plantlets developed with normal roots and shoots. The plantlets measured about 14 cm height having 4 cm long root after three weeks of culture. The overall germination percentages of the seeds were 81%.

**Acknowledgements:** This study was supported by the Mugla Sitki Kocman University Scientific Research Projects Coordination Unit (Mugla, Turkey, MSKU-BAP 16/021).

**Keywords:** Germination, *in vitro* propagation, MS medium, Rutaceae.

## **Activity and Biological Effects of Neem (*Azadirachta indica* A. Juss) derived on Insects and Environment**

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**Aim of the study:** In the next 20–30 years, pesticides actually in use will probably lose their effects. In particular, alert concerns the main resurgent mosquito-borne diseases, including malaria, dengue, yellow fever, as well as the very recent Zika virus outbreaks. In these cases, the two aspects of resistance can synergise each other, amplifying the danger. Indeed, insecticide resistance has developed in mosquito vectors and antimicrobial drug resistance in pathogens. Researchers are looking for novel active substances and adapting strategies. Plant-derived natural products are considered valuable sources of novel bioactive substances. Neem (*Azadirachta indica* A. Juss, Meliaceae) has been used extensively against an array of pest species the recent years as a plant biopesticide. Nevertheless, the amount of information on the activity, use, and application of neem products for the control of disease vectors and human and animal pests is limited. Additional research is needed to determine the potential usefulness of neem products in vector control programs. Here it is reviewed, synthesized, and analyzed published information on the activity, modes of action, and other biological effects of neem products against environmental insects of medical and veterinary importance.

**Material and Methods:** In this review, it is summarised the results on insecticides obtained in the last 20 years by a network focused on neem, including biopesticide utilisations and environmental impact. This study was compiled from the 85 references.

**Results:** *A. indica*, contains at least 35 biologically active principles. Azadirachtin is the predominant insecticidal active ingredient in the seed, leaves, and other parts of the neem tree. Azadirachtin and other compounds in neem products exhibit various modes of action against insects such as antifeedancy, growth regulation, fecundity suppression and sterilization, oviposition repellency or attractancy, changes in biological fitness, and blocking development of vector-borne pathogens. Neem products are degradable in the environment and are relatively safe to nontarget organisms. No cases of resistance to neem products have been reported. Lack of resistance is due to the complexity of the contained components and multiple modes of action in insects.

**Acknowledgement:** Autor thanks to Selçuk university BAP Office for supporting this study.

**Keywords:** Neem, *Azadirachta indica*, Neem-derived pesticides, Plant biopesticide, Biological activity, Health evaluation.

**Phylogenetic analysis of the Turkish *Cousinia* taxa**

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**Aim of the study:** The main aim of this study are to examine the phylogenetic relationships of the Turkish *Cousinia* Cass. taxa using the ITS (Internal Transcribed Spacer) DNA sequences.

**Material and Methods:** A total of 37 taxa were analysed for ITS (ribosomal DNA). Sequences were edited visually with BioEdit and aligned with the MEGA 7 and refined by hand. For the matrice generated from dataset, Parsimony and Bayesian analyses were conducted. Phylogenetic trees were constructed with PAUP and MrBayes. Phylogeography analysis was performed to reveal the relationships of taxa through the network analysis.

**Results:** The results strongly suggest that the *Cousinia* in Turkey is monophyletic (BS: 100%, PP: 1.0) in contrast to the first phylogenetical studies of the genus. Particularly, phylogenetical analyses confirms the sectional division of cousins and is displays considerably suitability with the relationships in Flora of Turkey, with together some minor exceptions. Additionally, the ITS patterns connected with evolutionary story of them are largely coincide with the geographical distribution except for a few exceptions.

**Acknowledgements:** We thanks TUBITAK (Project number: 111T364) for their financial support.

**Keywords:** *Cousinia*, phylogeny, Turkey.

## Woody Plant Diversity of Colchis Floristic Sector of Turkey

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**Aim of the study:** The Blacksea Region of Turkey is under the influence Euro-Siberian Floristic Region. The east part of this region (between Ordu Melet River and Artvin) is rainier and called Colchis Sector. The aim of this study is to determine the Woody Plant Diversity of this sector in Turkey.

**Material and Methods:** The materials of the study are consisting of the plant samples which were collected with field surveys of different project during 2014-2016 and determined by the current literatures.

**Results:** 292 woody plant taxa were determined in the Colchis Sector in Turkey. 13 (4.5%) of these woody plant taxa are Gymnosperm while 279 (95.5%) of them are Angiosperm. The richest families in total woody taxa numbers are *Rosaceae*, *Fabaceae*, *Salicaceae*, *Ericaceae* and *Aceraceae*. The total taxa numbers of these 5 families are more than 50% of the total woody plant taxa number. The taxa numbers of the richest genera such as *Salix*, *Rosa*, *Sorbus*, *Acer* are between 11-23 and this is 29.5% of the total woody taxa. 105 (36%) of these taxa are tree, 128 (44%) shrub and 59 (20%) are semi-shrub. 222 (76%) of total woody plant taxa are deciduous while 70 (24%) of them are evergreen. Even though this part of Turkey is under the influence of the Colchis sector of Euro-Siberian floristic region there are some woody taxa of the other floristic regions or sectors such as Euxine 20.2%, Hyrcanian-Euxine 1.8%, Iran-Turanian 10.1% and Mediterranean 2.4%.

**Keywords:** Colchis, Woody plant, Flora, Diversity, Turkey

## Plants are Able to Conduct Light to the Rhizosphere

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**Aim of the study:** The first chemiluminescence radiation of onion roots was discovered by Prof. A.G. Gurvich. As a result of experiments was concluded that the frequency of mitoses of the middle part of roots grew due to the radiation in the ultraviolet region of the spectrum, which came from the apex of another root directed in the horizontal plane. The spectral composition of radiation in the range 190 - 325 nm was determined later in the experiments of the G.M. Frank. Gurvich's research was continued by the scientific group of Prof. B.N. Tarusov at the Department of Biophysics of the Moscow State University. The results shown the ability of living cells to chemiluminescence with intensity of ten to power of negative fifteen till sixteen ( $10^{-15}$ -  $10^{-16}$ ) impulses (counts) per minute. Dependence of changes in the spectral characteristics of chemiluminescence light of various biological objects of tissues was shown. Analyzed light intensity and its depending on the state and ontogenetic phase of investigated objects. Results of investigation showed that the chemiluminescence spectrum of isolated roots ranges from 400 to 700 nm, which coincides green - red areas of the spectrum. D. Mandoli and W. Briggs discovered the ability of oat, bean and corn sprouts fragments, which irradiated of coherent red light (laser  $d = 1$  mm, wave length  $\lambda = 632$  nm) to conduct green rays through plant tissues with almost no energy consumption. The percentage of light conduction depended on the angle of seedlings illumination and the species of plants. Light spread along the tissues by internal reflection. They were able to produce coherent green light rays at a distance of not less than 20 mm through fabrics with almost no power consumption. Kiang San et al. studying fragments of sections of 18 species of herbaceous plants. They showed the ability of the fibers of the vascular system to conduct light in the region of 710 -940 nm.

**Material and Methods:** To test the assumption about the light conductivity of the Highest Plants, on the basis of the chemiluminescope device CMLM-1 C, which by means of a photoelectron multiplier (wave length  $\lambda = 200 - 650$  nm) located in a light-proof chamber, it is possible to measure the luminescence which is inherent in all living biological systems of any-the level of the organization, a model system was developed where the conductivity of the entire plant was recorded outside the root system.

**Results:** In experimental work we developed the model system, which help to show the ability of living plants of bean (*Phaseolus vulgaris*) to conduct light through the organs and the root system into the rhizosphere. Experimental results on the light conduction through the whole plants and their individual parts were obtained. The number of quanta fixed by the electronic photomultiplier increased with increasing the angle of illumination of the bean plants to 45 degrees above the horizon line. The intensity of rhizospheric light fixed within ten to power of negative fourteen till ten ( $10^{-14}$ - $10^{-10}$ ) luxes. With increasing intensity of the radiation source, the number of quanta passed through the root system has always increased. Lighting of bean plants by different spectra demonstrated an increase in the intensity of rhizospheric radiation in the following order: red green, blue, white, ultraviolet. Experiments showed that 2 hours after stress, irradiation of beans plants with a dose of 50 Gy, increase in conductivity of light beyond the root system of bean plants occurred more than 5 times. The ability of 22 species of different taxonomic plants groups, were able to conduct light through whole plants and roots to the rhizosphere. Mechanisms of light conduction by capillary-porous structures of the vascular system of plants are theoretically substantiated. The concept of the signal role of endogenous and rhizospheric light is theoretically justified. The hypothesis of using rhizospheric light in photosynthesis of soil algae is proposed.

**Keywords:** plants able to conduct light.

## Efficiency of Biopag-D Disinfecting Agent as Fungicide Gender of Seeds of Spring Wheat

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**Aim of the study:** Biotechnological research is recognized in our republic as priority. Protection of cereals from diseases transmitted with seed material, new means to which the pathogen resistance has not yet been developed, is a guarantee of high and high-quality yield. The main goal of our work was to test the Biopag-D preparation as a disinfectant. This preparation contains polyhexamethyleneguanidine hydrochloride (PGMG GC), which is a new generation of polymer fungicide.

**Material and methods:** Tests were carried out on the experimental field of the EI "GSAU" on spring wheat of Daria variety and in the laboratory of innovative research in plant protection. Scheme of experience: 1. Control - without the use of plant protection products. 2. Standard - Maxivit, VR (2.0 l / t) seed treatment before sowing. 3. Biopag-D, BP (1.0 l / t) seed treatment before sowing. First of all phyto-examination of seeds was carried out, the development of diseases was carried out according to generally accepted methods, as well as accounting of yield data.

**Results:** The average values, obtained during the field trials of disinfectants in the 31st stage of development of culture, showed that the use of Biopag-D influenced the formation of an additional number of productive stems, increasing them in comparison with the control by 21 pieces/m<sup>2</sup>. In this case, the length of the shoots increased by 2 cm, the length of the roots by 3.1 cm, the mass of the roots by 1 g. The number of diseased plants was decreased by 14.0%. The average yield data for two years of research showed that the application of Biopag-D increased the number of productive stems by 43 pieces/m<sup>2</sup>, the weight of 1000 grains by 1.3 g, the biological yield by 1.6 c/ha. At the same time, the number of productive stems and crop yields also increased with respect to the reference version by 11 pcs/m<sup>2</sup> and 0.4 c/ha. Application of fungicide Biopag-D allowed to obtain net income in the amount of \$ 14.3 from 1 ha. The recoupment of costs in this case was 1.3 times.

**Acknowledgements:** It was found that the Biopag-D preparation positively influenced the germination capacity of the crop, with respect to the variant without the disinfectant, protected the crops from external seed and soil infection and guaranteed an economically justified reliable crop increment.

**Keywords:** Spring wheat, fungicide, disinfectant, Biopag-D, seeds.

## Genotyping of *Escherichia coli* Strains Isolated from Clinical Samples by Pulsed-Field Gel Electrophoresis

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**Aim of the study:** *E. coli* is one of the hundreds of bacteria that cause sickness in humans. Those are often multi-resistant and can generally cause several intestinal and extra-intestinal infections such as urinary tract infections, meningitis, peritonitis, mastitis, septicemia and Gram-negative pneumonia. With the more frequent use of invasive devices in hospital care, these types of nosocomial infections have increased, particularly in seriously ill patients. In order to decrease transmission of bacterial strains between patients and to study the epidemiology of these bacteria, it is of great importance to develop rapid and specific methods to be able to subtype on strain-level.

**Material and Methods:** In this study, a total of 47 *Escherichia coli* strains isolated and identified from various clinical samples were investigated to determine their genetic relationships. Pulsed-field gel electrophoresis method (PFGE) was used to characterize the genetic relationship and diversity of *E. coli* isolates. Currently, Pulsed field gel electrophoresis (PFGE) is often considered the "gold standard" of molecular typing methods for bacterial pathogens.

**Results:** The phylogenetic dendrogram of strains were established according to PFGE profiles obtained after restriction with *Xba*I. At a similarity level of 80 %, the results of PFGE separated the *E. coli* strains into 39 distinct groups representing 4 subtypes. Based on the result obtained from study it was concluded that PFGE analyze revealed very high genetic diversity among strains and was shown to possess high discriminatory power in typing clinical isolates.

**Keywords:** Clinical samples, *E.coli*, Pulsed-field gel electrophoresis.

## The Effects of Dietary *Cyclamen graecum* and *Prospero autumnale* on Some Health Parameters of Fishes

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**Aim of the study:** A number of synthetic feed additives are used to improve the growth performance and health parameters of fish in aquaculture industry. As a result of these products being residue in the fish, the use of natural plants as a feed additive has started to be preferred in recent years. Many studies have shown that medicinal herbs used as anti-bacterial and anti-fungal, enhance growth performance, immune system, and disease resistance in fish. The aim of this study was to evaluate effects of dietary Greek cyclamen (*Cyclamen graecum*) and autumn squill (*Prospero autumnale*) extract on some health performance of rainbow trout (*Oncorhynchus mykiss*) and European seabass (*Dicentrarchus labrax*).

**Material and Methods:** *Cyclamen graecum* (C) and *Prospero autumnale* (P) were collected from Antalya and Denizli provinces. Test diets were prepared including control (C) and with 0.05% (C0.05), 0.1 (C0.1) and 0.2% (C0.2) for both of *C. graecum* and *P. autumnale* extracts. Seven test groups with three repetitions were established for each fish species. The white blood cells (WBC), the red blood cells (RBC), hemoglobin (Hb), hematocrit (PCV), lymphocyte (LC) and neutrophil counts (NC) of the blood samples that taken from the fishes in the test groups at the end of the study for two months were made in the veterinary blood count device. For histological analyzes, liver tissue samples were taken from the fishes, than fixed with 4% formaldehyde and applied standard histological processes. Tissue preparations were examined under light microscope and taken their photographs. Both one-way and two-way ANOVA was used for statistical analysis.

**Results:** The WBC of rainbow trout fed with P0.2 diet were found to be significantly lower than those fed with other diets, except feeding with P0.05 and P0.1 diet ( $P < 0.05$ ). While Hb and PCV values of P0.2 group were significantly lower than those from C0.2 group ( $P < 0.05$ ), there were no significant differences among values of the RBC, LC and NC ( $P > 0.05$ ). The WBC of European sea bass fed with C0.05 diet are significantly lower than those from fish fed with C0.1 and C0.2 diet ( $P < 0.05$ ), but the Hb level of the C0.2 group was significantly lower than that of the control group ( $P < 0.05$ ). The LC levels of P0.2 group were significantly lower but NC values also were higher than those from all other groups ( $P < 0.05$ ). There was no difference between WBC and PCV values ( $P > 0.05$ ). General evolution in the liver tissues of fish from test group and the structural differences between the groups were examined separately and no pathological disorder was observed between the groups in terms of liver microscopy. In conclusion, it was found that *Prospero* groups were more effective than that of *Cyclamen* groups in terms of blood parameters but similar to control group. Although it is known that medicinal herbs have a positive effect on growth, immune and disease resistance of fish, the effects of these herbs on fish may vary depending on the herbicide, the active ingredient, the method of administration, the dosage and the fish species. For this reason, more detailed research are necessary in this regard.

**Acknowledgements:** The study has been supported by TAGEM with the project number TAGEM/HAYSUD/2015/A11/P-01/7.

**Keywords:** *Cyclamen graecum*, *Prospero autumnale*, haematological parameters, histological parameters, fish health, *Dicentrarchus labrax*, *Oncorhynchus mykiss*

## Determination of Chemical Contents of Propolis Extracts Obtained from Different Regions of Denizli Province

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**Aim of the study:** In our study, it was determined the propolis content that different regions of Denizli. Propolis is a substance of honeybee origin with known chemical content effects. Its chemical composition varies by geographic location, climatic zone and local flora. The purpose of this study is; Servergazi and Sarayköy propolis content analysis, and use this content for therapeutic purposes.

**Material and Methods:** Propolis is resinous material collected by honey bees. (*Apis mellifera* L.) from *Cactaceae* tree species. Samples of raw propolis was collected from located in Servergazi (South of Denizli) and Sarayköy (West of Denizli) Autum 2017 and stored at 4 °C until used. The solvent (ethanol) extract was prepared from propolis. Antioxidant properties of propolis was evaluated by (DPPH) and caroten assays. The Total phenolic content of extracts was determined using to the Folin-coicalteu method as gallic acid equivalents. The total phenolic compounds were evaluated by reserve-phase high liquid chromatography (HPLC, Shimadzu Prominence, Tokyo, Japan).

**Results:** The evidence about the chemical contents activity of propolis and its relationship with total polyphenol content, and especially flavonoid concentration, is numerous. Propolis may be used as functional foods because of their naturally high content potential. Servergazi propolis DPPH value 232, 7782 µmol TE/g was measured while Sarayköy propolis DPPH value 11.43 µmol TE/g was measured. As a results, the highest phenolic content was found in 223,102 µmol TE/g in Sarayköy propolis extract.

**Keywords:** Antioxidant activity, Total phenolic content, Propolis, Chemical content

**Age-Age Correlations and Early Selection in Genetic Improvement of Forest Trees:  
Diameter Growth in *Pinus brutia* Ten.**

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**Aim of the study:** Selection and breeding of plant species require observing and detecting genetically the best individuals for a “desired character”. This process is relatively easy in short-lived agricultural crop species. However, forest tree species are long-lived, and it requires many years to detect and evaluate the desired character, which is usually “wood volume”. One way to maximize genetic gain is first to determine genetic and phenotypic correlations among different ages. The main purpose of this study is to find genetic and phenotypic correlations among different ages for diameter growth in *Pinus brutia* (Turkish red pine), and then to predict the optimal age for early selection.

**Material and Methods:** The study includes six natural populations (and 10 mother trees within each population) of *P. brutia* from two altitudinal transects extending from the Mediterranean coast to the Taurus Mountains (up to 1100 m). They were first grown in a forest nursery and transferred (as 1+0 seedlings) to two common garden experimental sites (Duzlercami and Kepez) in southern Turkey. The test sites were established in 1979 by the second author. The dbh (diameter at breast height) at different ages (13, 15, 19, 21, 23, 25, and 27) was determined from wood samples taken with increment core in 2004. The dbh of 35-year-old trees were measured in 2012. Totally, we collected data from 852 trees in the two experimental sites. Basic genetic parameters necessary for the calculation of genetic and phenotypic correlations were determined by using appropriate ANOVA models. Subsequently, genetic and phenotypic correlations for diameter growth and optimum age for early selection were estimated by employing relevant population genetics methods. Statistical analysis was performed by using SAS 9.3 program.

**Results:** *Pinus brutia* exhibits relatively large diversity both within and between populations in various plant characters. For dbh character of *P. brutia*, we found that family means heritability steadily increased from 0.21 to 0.28 through the measurement ages. The observed genetic and phenotypic age-age correlations were always positive and were rather high (most > 0.90). Both genetic and phenotypic age-age correlations showed gradual declines as age interval increased between any given pairs of measurement ages. For example, genetic age-age correlations between dbh13 and dbh15 ( $r = 0.95$ ) was much higher than that of dbh13 and dbh35 ( $r = 0.82$ ). Selection efficiencies based on age-age correlations (and estimated by Lambeth’s prediction equations) in *P. brutia* indicated that for rotation ages of 40 and 90 years, the optimum selection ages would be 4 and 6 years, respectively. Our results show that, in order to maximize genetic gain per year in genetic improvement of *P. brutia*, the best genotypes (i.e., best families) regarding diameter growth (either at dbh or ground level) can be detected and selected as early as at age 4 years in common garden experimental sites.

**Acknowledgments:** This study is supported by The Scientific and Technical Research Council of Turkey (Project No: 1120251), including a post-doc scholarship for Dr. Yusuf KURT. Southwest Anatolia Forest Research Institute in Antalya provided logistic support for the field works. We are grateful for the contributions of all involved persons and institutions.

**Keywords:** Diameter growth, indirect selection, optimum selection age, Turkish red pine.

## Comparative Biodiversity of Duckweeds in Central Ukraine and Eastern China and Their Potential for Remediation of Wastewater

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**Aim of the study:** Duckweed is a group of aquatic plants with the potential of wastewater remediation and fast accumulation of biomass. The accumulated biomass, rich in cellulose, starch and protein, can be used for biofuel, bio-fertilizer, animal feed and human food. Characterization of natural biodiversity of duckweed species is essential for the germplasm preservation and various practical applications. Here we investigate the duckweed biodiversity in central Ukraine and eastern China and studied their ability to remove nitrogen and phosphorus nutrients from local municipal and industrial wastewater.

**Material and Methods:** The duckweed samples were collected in lakes and ponds in central Ukraine and eastern China and the species biodiversity was evaluated by genotyping, using chloroplast (*atpF-atpH* and *psbK-psbI* spacers) and nuclear 5S ribosomal DNA (rDNA) markers. The sequences of PCR amplified chloroplast DNA fragments were used primarily for species identification, while the sequences of 5S rDNA spacer were applied for characterization of ecotypes biodiversity. To test the ability of duckweed to accumulate nutrients from local municipal and industrial wastewater, four duckweed species (*S. polyrhiza*, *L. punctata*, *L. aequinoctialis*, and *L. turionifera*) were used to treat influent and effluent of the local municipal and industrial wastewater treatment plants for 3 weeks. Water samples were taken at different time points to check the total nitrogen (TN) and total phosphorus (TP) concentrations.

**Results:** The duckweed species collected in Ukraine were identified by genotyping as *Spirodela polyrhiza*, *Lemna minor*, *L. trisulca* and *Wolffia arrhiza*, while the population in eastern China is represented by *S. polyrhiza*, *L. aequinoctialis*, *L. turionifera*, *W. globosa* and *Landoltia punctata*, with the *S. polyrhiza* as a clear dominant duckweed species. Analysis of the 5S rDNA spacers showed a very high level of sequence conservation between the ecotypes of *S. polyrhiza*, in contrast to significant sequence diversity revealed for ecotypes of *L. aequinoctialis* and *W. globosa*. Isolates of *S. polyrhiza*, *L. aequinoctialis*, *L. punctata* and *L. turionifera* from eastern China, selected for wastewater remediation experiments, demonstrated high efficiency in removing nitrogen and phosphorus nutrients from local municipal and industrial wastewaters. By the end of the tests in 15 days, duckweed removed up to 98% of TN and up to 96% of TP from the municipal influent wastewater. The obtained data suggest that *S. polyrhiza* and *L. aequinoctialis* are preferred species for the treatment of local municipal wastewater with the moderate concentrations of nitrogen and phosphorus, while *L. punctata* and *L. turionifera* are more efficient species for the remediation of local industrial wastewater with high nitrogen and low phosphorus concentrations.

**Acknowledgements:** This work was supported by Natural Science Foundation of Jiangsu Province (BK20131213), the Foundation of Key Jiangsu Collaborative Innovation Centre of Regional Modern Agriculture & Environmental Protection (No. HSXT2-320) and the Foundation of Jiangsu Key Laboratory for Biomass-based Energy and Enzyme Technology (No.JSBEET1303).

**Keywords:** Duckweed, Biodiversity, Genotyping, 5S rDNA, Water Remediation

## **Crosstalk of Osmotic and Ionizing Radiation Stress: Insights from Comparative Proteomics of Pea Seedlings**

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**Aim of the study:** Crosstalk refers to the phenomenon when one or more components of different signal transduction pathways interact. The purpose of this study is to investigate the effect of stressors and their combinations on pea seedlings at the molecular level, qualitative and quantitative changes in the spectrum of plant proteins. Due to the worldwide adverse contamination of environment it is important to study molecular mechanisms of a plant's perception of separate stress factors and their combinations. The primary focus of this research is on understanding of signaling pathways and their crosstalk, thus elucidating specific and nonspecific components of plant adaptation responses to salt and radiation stresses. We used morphometric indexes and proteomics approach to study how pretreatment with ionizing radiation affects pea seedlings reaction on osmotic stress. The aim of our study was to assess the proteome changes of pea seedlings during two days after stress treatments or their combination (ionizing radiation with salinity stress) to understand the phenomenon of crosstalk.

**Material and Methods:** After studying morphometric changes in *Pisum sativum* L. seedlings divided in 4 groups (control plants, treated by water solution of sodium chloride in 0.22 M/l, treated by  $\gamma$ -rays in dose 10 Gy, and salt stress applied after  $\gamma$ -rays impact) roots were used for physiological measurements and proteins extraction. We demonstrated different growth reactions of roots for all experimental groups. After some doses of radiation and salt seedlings had higher growth speed, in comparison with the group after irradiation only. This may indicate to resistant influence of salt treatment. Upon phenol-based extraction, pea proteins were profiled by 2-DE (IPG strips within pH 4-7, narrow-range 7 cm). Software-assisted analysis of Colloidal Coomassie-stained gels revealed quantitative and qualitative differences between protein spots belonging to all investigated groups. Majority of the differentially abundant spots were identified by LC-MS/MS mass-spectrometry and followed by sequence database search.

**Results:** After analysis we found a few key proteins included: Translation elongation factor EF-2 subunit, Phosphoglycerate kinase, 14-3-3-like protein, Elongation factor 1-beta etc. that are involved in some compounds biosynthesis or are the parts of metabolism. The analyzing of proteomic data, using advanced bioinformatics tools helps to accumulate, integrate and interpret functional information. We observed the modification of expression of some identified proteins. Their significant role in the stress signals transduction and in the processes of forming an active response to the adverse factors is confirmed by concentration fluctuations between groups. The largest number of proteins has changed in response to the combined effect of ionizing radiation and salinity.

**Keywords:** *Pisum sativum* L., stress factors, ionizing radiation, proteins, crosstalk.

**Presowing Radiation Exposure of *Chamomilla recutita* L. Seeds Effects on Flavonoid Accumulation**

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**Aim of the study:** Presowing radiation exposure of seeds is offered to apply as modification factor of secondary metabolites accumulation in medicinal plants. Aim of studying was to choose doses of both gamma- and X-ray exposure of *Chamomilla recutita* L. seeds that would lead to increasing synthesis of secondary metabolites and biomass.

**Material and Methods:** Both X- and gamma-radiation exposure of seeds, extraction of flavonoids, spectrophotometry assessment of flavonoid extracts, qualitative and semi-quantitative high effective liquid chromatography.

**Results:** Presowing radiation exposure of *Chamomilla recutita* L. seeds increased both flavonoid production over control and yield of pharmacologically valuable raw material – inflorescence number per square. Chromatographical analyses indicated stable qualitative composition of *Chamomilla recutita* L. ethanol extracts; the exposure did not lead to synthesis of *de novo* components. Obtained data validate approach to apply presowing radiation exposure of *Chamomilla recutita* L. seeds (5-50 Gy dose rate) as modification factor increasing both its productivity and pharmaceutical value of medicinal plants.

**Keywords:** *Chamomilla recutita* L., stimulating productivity, flavonoids, presowing exposure.

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## Endemic Amphibians of Turkey

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**Aim of the study:** Unlike the species that spread everywhere, endemic species are living that exist only in one geographic region. Amphibians occupy nearly every available habitat on earth except for the open oceans, distant oceanic islands, and the frozen reaches of the Arctic and Antarctic. We aim to give an up to date species list of endemic amphibians of Turkey.

**Material and Methods:** The checklist of the endemic amphibians has been prepared by compiling all existing literature about Turkey and amphibians are described along with their distinctive characters and illustrations.

**Results:** In this study, it has been revised list of amphibian species living in Turkey. According to the literature survey it was determined that a total of 11 amphibian species are endemic in Turkey. In addition to this, revisions and conducted studies on these species have also been investigated.

**Keywords:** Biodiversity, amphibians, endemic, Turkey, systematic.

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**Intersexual differences in head morphology of *Ommatotriton vittatus* (Southern Banded Newt)**

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**Aim of the study:** The difference in body size between male and female individuals of the same species is a key feature that leads to significant biological insights. Aim of this study is to understand whether head characters differ between female and male individuals of Southern Banded newt.

**Material and Methods:** A total of 20 adult specimens (10 females, 10 males) of *O. vittatus* were used in this study, which were collected in Tarsus, Mersin (mid-south of Turkey). To quantify intersexual differences in head morphology, 9 variables (head length, head width, head height, diameter of the eye, orbit-naris distance, interorbital distance, internarial distance, eye-snout distance, intercanthal distance) were measured with dial calipers to the nearest 0.1 mm.

**Results:** The results have suggested that there is a significant difference between the sexes in terms of five out of nine characters in this newt.

**Acknowledgements:** All experiments were performed in accordance with the Turkish law and with permission for animal experiments of the local ethics committee of the relevant university (approval reference number: 2015/71). This study was supported Recep Tayyip Erdoğan University BAP under grant number 2016.53007.102.03.01.

**Keywords:** sexual dimorphism, head, morphometry, amphibian, Turkey

## A Preliminary Study on the Woody Flora of Kavaklı Nature Protection Areas in Yenice Forests (Karabük, Turkey)

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**Aim of the study:** The aim of this study is determine woody taxon in Kavaklı Nature Protection Areas in Yenice Forests in Karabük. Kavaklı national park is 100 forest hotspots in world. The other aim of this study is these taxa are categorized according to Raunkiaer life form. The other aim of select this studies area is old growth forests are keep going life cycle on this area.

**Material and Methods:** Due to the Euro-Siberian and Mediterranean phytogeographical influence of the area, various vegetation types have been formed in the region. According to the grid system used in the field of research books by Davis Flora of Turkey it is located within the A3-A4 frames. The samples gathered in the interval vegetation period were diagnosed according to the book Davis İn Turkey of Flora and the determination of the woody taxa of the field was completed. Furthermore, the defined woody taxa were classified according to the method of Raunkier life forms. These operations were performed in Herbarium of Duzce University.

**Results:** According to the determinations made, 98 taxa belonging to 33 family were identified from the area. Their distribution according to plant geographical regions; the 51 (52.04 %) plant taxa are wide distribution, 28 (28.57 %) taxa are Europe-Siberian, 11 (11.22 %) taxa are Euxine 8 (12.25 %) taxa are the Mediterranean. 5 endemic taxa have been identified. Life forms of plants in the study have been determine; 51 taxa mesophanerophytes (52.4%), 29 taxa micro phanerophytes (29.59%), 3 taxa nano phanerophytes (3.06%) and 12 taxa chamaephytes (12,24%) and 3 (3.06%) taxa are liana. Rosaceae 20 taxa (20.41%), Fagaceae 8 taxa (8.16%), Betulaceae are 7 taxa (7.14%) Oleaceae are 5 taxa (5,1%), Ericaceae are 4 taxa (4.08 %), Sapindaceae are 4 taxa (4.08%) were the most common families in terms of woody flora. The most widely distributed woody flora in the study area; there are 7 (25%) *Quercus* taxa, 5 (17.86%) *Sorbus* taxa, 4(14.29%) *Acer* taxa and 4 (14,29 %) *Pyrus* taxa. *Abies nordmanniana* ssp. *equi-trojani*, *Genista vuralii*, *Euonymus latifolius* ssp. *caucensis*, *Lonicera orientalis* and *Quercus macranthera* ssp. *sypsiensis* are an endemic species in study area. *Taxus baccata* and *Corylus colurna* have monumental value in this area.

**Acknowledgements:** This study was supported by the Tema Foundation Turan Demiraslan scholarship.

**Keywords:** Kavaklı, Yenice, Karabük, Woody flora, Endemic, Monumental Tree.

**Identification of a *Peziza* species based on ITS Gene Sequence and Current Status of *Peziza* Genus in Turkey**

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**Aim of the study:** During the ongoing activities to assess the biodiversity and distribution of Macrofungi of Turkey, a sample was collected from a forest, primarily composed of “*kayın*” trees (*Fagus orientalis*, Lipsky) in Domaniç region of Kütahya. The particular sample did not consist of any observable spores. For this reason, it was not possible to carry out species identification by classical taxonomy. In this study, we aimed to identify this species via molecular approach by analyzing the DNA sequence of the Internal Transcribed Spacer (ITS) region. Furthermore, we attempt to review the current status of *Peziza* species found in Turkey by providing an updated list and their geographical distribution.

**Material and Methods:** First, DNA isolation from the selected macrofungi sample was carried out using the Qiagen Plant Mini Kit. The genomic DNA was analyzed with agarose gel electrophoresis. DNA template was used in PCR reactions with the universal primers of ITS1F and ITS4. Amplified ITS product was purified with Promega PCR Purification Kit and sequenced using Sanger Dideoxy approach (Macrogen, the Netherlands). Sequencing results were analyzed by Bioedit and BlastN (NCBI) to find closely related sequences. A phylogenetic tree was constructed using the sequence of the sample and the sequences obtained from the GenBank with the programs of MEGA 5 and Raxml. Also, to compile the *Peziza* species in Turkey, the relevant macrofungi literature was reviewed.

**Results:** As a result of molecular identification, BlastN analysis revealed that the ITS gene of the macrofungi sample is 99% identical to the sequences of *Peziza arvernensis* and *P. varia* found in the GenBank, indicating a possible misidentification and confusion in the databases. Then, a phylogenetic tree consisting of a number of ITS gene sequences belonging to these two species showed that the species is certainly *P. arvernensis*. We also point out by examining available literature that there are currently a number of 25 *Peziza* species present in Turkey, namely *P. ammophila*, *P. arenaria*, *P. arvernensis*, *P. badia*, *P. cerea*, *P. depressa*, *P. domiciliana*, *P. echinospora*, *P. eruciformis*, *P. fimeti*, *P. granularis*, *P. lobulata*, *P. michelii*, *P. micropus*, *P. moravecii*, *P. phyllogena*, *P. pseudoviolacea*, *P. punctispora*, *P. repanda*, *P. ripensis*, *P. saniosa*, *P. succosa*, *P. varia*, *P. vesiculosa* and *P. violacea*.

**Acknowledgements:** We would like to thank TÜBİTAK (The Scientific and Technical Research Council of Turkey) for supporting the project (110R019) financially.

**Keywords:** Macrofungi, diversity, genus, *Peziza*, ITS gene.

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### ***In vitro* Genotoxicity of Ozone vs. Sodium Hypochlorite by Comet Assay**

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**Aim of the study:** This study aimed to compare the *in vitro* genotoxicity of gaseous ozone (O<sub>3</sub>) and sodium hypochlorite (NaOCl), on human lymphocytes using Alkaline Comet Assay (Single cell gel electrophoresis). Microbial diversity in infected root canals has been widely investigated and NaOCl seems to be the gold standard for the endodontic irrigation thanks to its ability to destroy the broad spectrum of microbes. However, its different complications such as tissue toxicity, allergic potential are reported. O<sub>3</sub> is a novel disinfectant used in endodontics that significantly reduces the bacterial population in the root canal. However, the genotoxic effects have not been investigated yet.

**Material and Methods:** Lymphocytes were isolated from healthy individuals, one male and one female aged 27 and 28, respectively. O<sub>3</sub> was applied directly into the whole blood at 7 different application time (12 s, 18 s, 24 s, 60 s, 120 s, 180 s, 240 s) with a flow rate of 140 ppm in air at 2 L/min and one group was left without application as control. NaOCl was applied in three different concentrations (1%, 2.5%, 5%) each for one min. and one group was left without application as control. Following the applications, all samples were incubated at 37°C for two hours. The comet assay was conducted under alkali conditions according to Singh et al. 1988. The slides were prepared in duplicate *per* treatment and lysed in a precooled lysis solution at 4°C for 75 min. following equilibration in an alkaline electrophoresis buffer. Electrophoresis was performed at 25 V and 300 mA for 20 min. After electrophoresis, the slides were neutralized, stained with ethidium bromide and photographed using a fluorescence microscope. Images were analysed using Open Comet. Tail DNA percentage parameter was chosen to demonstrate DNA damage.

**Results:** Statistical analysis was performed using IBM SPSS Statistics 20.0 (IBM Corporation, Armonk, NY, USA). Statistical comparisons of the results were performed by one-way analysis of variance (ANOVA). Statistical significance was set at  $p < 0.05$ . The results showed that 2.5% (Mean Values  $2.18 \pm 0.34$  SE) and 5% (Mean Values  $4.33 \pm 0.44$  SE) NaOCl showed significant DNA damage compared to 1% concentration (Mean Values  $1.03 \pm 0.11$  SE) and control group (Mean Values  $0.52 \pm 0.03$  SE) ( $p < 0.001$ ). Although 1% NaOCl showed a slight increase DNA damage, there was no statistically significant difference compared to the control ( $p > 0.05$ ). O<sub>3</sub> also demonstrates a nonsignificant DNA damage compared to the control ( $p > 0.05$ ). In conclusion, the present study indicates that NaOCl can induce DNA damage in concentrations over 1% whereas O<sub>3</sub> did not cause any genotoxic effects on lymphocytes. Since DNA damage is an important stage in events up to cancer, these results can be a useful sign for potential health risks in dental practice.

**Keywords:** Ozone, Sodium Hypochlorite, Comet Assay, DNA Damage, Genotoxicity

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## Accumulation of Se, Ge and Mo by Biomass of Cultivated Culinary-Medicinal Mushrooms

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**Aim of the study:** In recent years, some mushrooms species have received special attention as sources of physiologically important essential elements (such as Cu, Fe, Zn, Cr, Se, Mo, Mn etc.). Due to the efficient mechanism of accumulation (which can certainly pose a risk to human health if wild mushrooms grow at anthropogenic contaminated territories), enrichment of mushroom biomass with biologically active microelements that have known therapeutic properties is promising. The aim of the research was to determine the sorption capacity of the *Pleurotus* species biomass to the nutrient additives of the three mineral elements – Se, Ge and Mo.

**Material and Methods:** To study the levels of mineral elements (Se, Mo and Ge) accumulation by mushroom biomass, pure cultures of *Pleurotus ostreatus* (Jacq.) P. Kumm., *P. florida* Singer, and *P. eryngii* (DC.) Quél. were used. The disks of mycelium with a diameter of 0.5 cm were placed in a sterilized liquid nutritive medium (yeast extract, with addition of K<sub>2</sub>SeO<sub>4</sub>, Na<sub>2</sub>MoO<sub>4</sub>•2H<sub>2</sub>O, GeO<sub>2</sub>, in three concentrations) and grown at 25 ± 0.5 C°. Dry control samples and samples enriched with mineral elements were evaluated using inductively coupled plasma-mass spectrometry (ICP-MS analyzer Element-2, Germany).

**Results:** For all tested strains high sorption properties were identified. The accumulation of these elements was directly correlated with added concentrations. In view of the fact that selenium compounds are highly toxic, in the cultural experiments we have used low concentrations of additions - 10, 25 and 50 mg/l. *P. ostreatus* (strain 198) most actively accumulated Se. At the maximum concentration of selenium, its content in biomass increased to 826.2 compared to 0.393 mg/kg dry mass in control. The maximum level of germanium sorption was noted in *P. eryngii* - 797.67 (control - 0.223), and in *P. ostreatus* (strain 551, control - 0.543) - 788.33 mg/kg dm. The bioaccumulation factors (BAF) were respectively 3577, and 1452. Accumulation of Mo was not so intensive. High levels were observed in *P.ostreatus* (198) – up to 387.2 and in *P. florida* – up to 361.2 mg/kg dm. BAFs for Mo were in the range of 46.7 – 162.3. Enrichment of mushroom biomass with valuable micro-and macro elements in combination with high content of vitamins, enzymes, and other biologically active substances potentially has to increase the pharmacological action of culinary-medicinal mushrooms. However, further studies are needed to test the bioavailability and effectiveness of such enriched fungal products.

**Acknowledgements:** The authors would like to thank Department of Mycology of M.G.Kholodny Institute of Botany of the National Academy of Sciences of Ukraine) for kindly provided strains of *Pleurotus* spp. from the collection of cultures IBK.

**Keywords:** medicinal mushrooms, accumulation, essential elements.

**Anatomical and Palynological Features of *Cousinia wesheni* Post. (Section, *Pugioniferae* Bunge., Asteraceae)**

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**Aim of the study:** The genus *Cousinia* Cass. comprises approximately 690 species throughout the world and nearly all of them occur in the central and southwestern Asia. 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 species of these are endemic to 26 (Davis 1975). In this study goals to investigate the anatomical and palynological properties of *C. wesheni* Post. species belonging section *Pugioniferae*, to determine and to evaluate the utility of these characters for systematic purposes.

**Material and Methods:** The plant specimens were collected from type locality in Turkey. The specimens have been stored in Selçuk University Herbarium (KNYA). 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 stems and leaves. The specimens were embedded in paraffin wax and then sectioned between 5 and 10 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 binocular light microscope with a Leica DFC280 camera. For 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:** Taxonomical significance were observed from transverse sections of leaves such as size of vascular tissue, shape and number of vascular bundle. 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 wesheni* has 7-11 layers cortex cells. In leaves transverse section, It has a single layer upper and lower epidermis cells, and also it has 2 layers palisade and 2 layers spongy parenchyma. Pollen shape of *C. wesheni* is subprolate. Aperture types of *C. wesheni* is tricolporate. As a result of SEM studies, pollen ornamentation was determined as verrucos-perforate.

**Acknowledgements:** We would like to thank the curators of herbaria AEF, ANK, E, G, GAZI, HUB, ISTE, ISTF, K and LE for permitting the examination of *Cousinia* specimens. We also thank to "Selçuk University, BAP-17201021" and "TÜBİTAK: TBAG-111T364".

**Keywords:** Asteraceae, *Cousinia wesheni*, Anatomy, Palynology.

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## Antioxidant Activity of Syringic Acid Changing by Temperature

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**Aim of the study:** Syringic acid is a kind of phenol found in various plants and soyabean meal. It has been used in Chinese and Indian medicine for treating diabetes, phthisis and cough, sucking blood, continuous sweating, asthma, weak and blood deficiency, infantile malnutrition, pulmonary tuberculosis, scald, etc. Further research is, required to fully understand the antioxidant benefits of theobromine.

**Material and Methods:** We have utilized B3LYP/6-31G(d,p) method to explore the structural features and molecular properties of Syringic Acid. The geometric and electronic properties of the syringic acid were investigated in gas phase at B3LYP/6-31G(d,p) basis set at different temperatures. In addition to that various molecular descriptors such as the BDE, AIP, PDE, PA, ETE syringic acid have also been obtained and studied, which are relevant to show evidence of antioxidant activity.

**Results:** The antioxidant estimation of syringic acid has been determined. Our calculations represented that AIP and  $\Delta E_{iso}$  are electronic properties responsible for the excellent antioxidant activity of the syringic acid. Also, in our results, electronic properties of the syringic acid is changing by the temperature.

**Acknowledgements:** The authors are grateful to PAUBAP (Project No. 2012BSP004), TUBITAK (Project No. 107T606) and TUBITAK ULAKBIM, High Performance and Grid Computing Center (TRUBA resources).

**Keywords:** syringic acid, density functional theory (DFT), antioxidant activity.

**Antioxidant and Phenolic Characterization with HPLC of Various Extract of *Verbascum glomeratum* L.**

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**Aim of the study:** *Verbascum* L. is the largest genus of the family Scrophulariaceae, with about 2500 species worldwide. The generic name of *Verbascum* is believed to be a corruption of *barbascum*, from the Latin *barba*, meaning a beard, referring to the shaggy appearance of the genus. The genus *Verbascum* is represented by 232 species, 196 of which are endemic, in the flora of Turkey. *Verbascum* L. species have been used since ancient times in traditional medicine thanks to their bioactive compounds. This study was aimed to determine the some biological activities of various solvent (ethanol and acetone) extracts, which obtained from *Verbascum glomeratum*.

**Material and Methods:** *Verbascum glomeratum* were collected Pamukkale University's around at Denizli province, Turkey in spring 2017. The antioxidant activity were determined by using various methods (DPPH, ABTS, FRAP,  $\beta$ -Carotene–linoleic acid, phosphomolibdenum methods). Total flavonoid, phenolic and tannin amount were investigated and also, phenolic compounds of ethanol extract were determined by HPLC method.

**Results:** Generally, the acetone extract has shown higher antioxidant effect. In  $\beta$ -caroten/linoleic acid, FRAP and posphomolybdenum assay, acetone extract have higher antioxidant activity than ethanol extract. According to DPPH method ethanol extract has higher radical scavenging activity while acetone extract is more effective by ABTS method. The flavonoid and phenolic content of acetone extract is higher as compared to ethanol extract, which is richer in polyphenols. The highest total tannin content was observed in ethanolic extract. The phenolic compounds contained in the *V. glomeratum* ethanolic extracts were characterized using HPLC methods. Of the 14 standard phenolics analyzed, 14 were identified in the extracts. Fourteen peaks were observed from the HPLC results, which represented fourteen types of phenolic acids compounds in *V. glomeratum*. Epicatechin (2742,09  $\mu\text{g/g}$ ) and 2,5 dihydroxy (2544,96) were the most abundant phenolic constituents in the extracts and were readily identified by comparison with authentic standards.

**Keywords:** Antioxidant, *Verbascum glomeratum*, HPLC

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## Initial Screening the Anti-Inflammatory Effect of *Thymbra capitata* (L.) Cav. Essential Oil in Caco-2 Cells

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**Aim of the study:** *Thymbra capitata* in Turkey produces essential oils of interest for the food and fragrance industries and it has also medicinal value. This species has been used in popular medicine because of its antiseptic properties and as a condiment for the elaboration of diverse traditional products in Mediterranean cuisine. Its essential oil has been studied as an antifungal. In the present study, the essential oil isolated from *T. capitata* was tested for its anti-inflammatory effects on selected pro-inflammatory and anti-inflammatory genes using Caco-2 cell line.

**Material and Methods:** The essential oil was extracted by steam-hydrodistillation and its chemical composition analyzed by GC-MS. The major components of the essential oil were  $\alpha$ -terpineol, camphor and 1,8-cineole, respectively. The human epithelial colorectal adenocarcinoma cells line (Caco-2) was purchased American Tissue Culture Collection. Caco-2 cells were grown in monolayer culture in DMEM medium containing 10% FBS, 1% penicillin/streptomycin at 37°C in a humidified atmosphere comprised of 95% air and 5% CO<sub>2</sub>. Cell viability was assessed using WST. The crystal violet staining method was used to investigate the cytotoxicity of essential oil in Caco-2 cells. EC<sub>50</sub> was found to be 60 µg/ml essential oil for Caco-2 cell line. This dose was applied to the cell for 24 hours, and the cells were harvested for further studies. Total RNA from Caco-2 was isolated using RNeasy Plus Universal Mini Kit (Qiagen) and was reversely transcribed using Easy Script cDNA Synthesis Kit. The expression of selected pro-inflammatory and anti-inflammatory genes (IL6, IL1-b, FOXP3 and IL10) were determined with Quantitative Real Time PCR (qRT-PCR) at mRNA level using SYBR Green qPCR Master Mix in an Exicycler 96 Real Time Quantitative Thermal Block PCR System (Bioneer, Daejeon, Korea) and normalized accordingly with ACTB (beta-actin gene).

**Results:** IL6, IL1-b, FOXP3 and IL10 genes mRNA expression levels were increased 1.7, 1.02, 1.4 and 1.8 times in Caco-2 cells as a result of 60 µg/ml essential oil treatments, respectively. It was found that the essential oil isolated from *T. capitata* did not significantly elicit the IL6, IL1-b, FOXP3 and IL10 genes expression. These initial observations suggest that this agent might not be a better anti-inflammatory agent for colon cells. Further detailed studies should be carried out to elucidate the exact mechanism of *T. capitata* essential oil in Caco-2 cell line.

**Acknowledgements:** This work is supported by the Scientific Research Projects Council of Pamukkale University.

**Keywords:** *Thymbra capitata*, Caco-2, anti-inflammatory, essential oil

PP-111

## Initial Screening the Anti-Inflammatory Effect of *Thymbra capitata* (L.) Cav. Essential Oil in Caco-2 Cells

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**Acknowledgements:** This work is supported by the Scientific Research Projects Council of Pamukkale University.

**Keywords:** *Thymbra capitata*, Caco-2, anti-inflammatory, essential oil

PP-112

## Sequence Diversity of the Gene Coding for Drought Related Transcription Factor WRKY in Selected Ukrainian Wheat Cultivars

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**Aim of the study:** Drought is one of the stress factors that have great impact on crop development and productivity. Limited water availability significantly reduces yield of major crops, such as bread wheat (*Triticum aestivum* L.) in many regions all over the world. Therefore, increasing drought tolerance is a big challenge faced by the wheat researchers and breeders. The aim of this study was to investigate sequence polymorphism of genes coding for transcription factor WRKY2, which was previously shown to impact drought tolerance, in order to reveal alleles related to the stress response in selected Ukrainian wheat varieties.

**Material and Methods:** Genomic DNA isolated from three drought tolerant wheat varieties (Astarta, Odeska 267 and Podolianka) and two susceptible varieties (Darunok Podillya and Poliska 90) registered in Ukraine, were used as templates to amplify *TaWRKY2* gene fragments by PCR. Specific primer pairs for amplification of *TaWRKY2* gene fragments were designed based on the coding and genomic sequences available for wheat (GenBank accessions EU665425.1 and NMPL02154244.1, respectively). Prior to sequencing, the generated DNA fragments were cloned into the PCR cloning vector pMD-19 (Takara). The obtained sequences were analyzed with the CLC Main Workbench (Version 6.9.2, Qiagen) software.

**Results:** Using the specifically designed PCR primers, the whole genomic fragments of the *TaWRKY2* gene were amplified for 5 Ukrainian bread wheat varieties with contrast drought tolerance. Alignment of the obtained variety-specific *TaWRKY2* sequences revealed at least 2 indels and 3 single nucleotides polymorphic sites (SNPs) both in coding and noncoding intron regions of the gene variants in the analyzed wheat varieties. Detected sequence variations in the gene exons might result in changed amino acid sequence and therefore altered protein structure of the transcription factor, which could subsequently influence the regulation of downstream gene involved in drought responses. The generated data may be further applied to study molecular mechanisms of drought tolerance in wheat, as well as for the development of new molecular markers for marker assisted breeding. The fine regulation of protein activity may apply as well as preferable allele combination for stable grain yield.

**Acknowledgements:** Participation of AS and MB in this work was partially supported by an individual grant provided to MB by the Huaiyin Normal University, China.

**Keywords:** common wheat, drought tolerance, *TaWRKY2*, marker assisted breeding, food security

PP-113

## Exploring the Quorum-Sensing Inhibitory Potential of zinc borate and its Antibiofilm Activity against Oral Pathogens

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**Aim of the study:** Due to the increasing antibiotic resistance, there is a growing interest in the development of new strategies against pathogen microorganisms. The present study was conducted to investigate the effect of zinc borate on the biofilm formation of oral pathogens *Candida albicans*, *Staphylococcus aureus* and *Streptococcus mutans* and the inhibition of quorum sensing (QS).

**Material and Methods:** Anti-QS and violacein inhibition activities were determined using *Chromobacterium violaceum* CV026 and *C. violaceum* ATCC 12472, respectively. The swimming and swarming motility were assessed with *Pseudomonas aeruginosa* PA01. Antibiofilm activity was evaluated by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-tetrazolium bromide (MTT) assay and also monitored by Scanning Electron Microscopy (SEM).

**Results:** At the concentration of 25 mg/ml, zinc borate showed promising anti-QS activity on *C. violaceum* CV026 with zone of pigment inhibition 13 mm. 100 mg/ml of zinc borate inhibited swarming and swimming motilities of *P. aeruginosa* PA01 by 40.29% and 38%, respectively. Violacein production was inhibited by 100% at concentrations above 0.78 mg/ml zinc borate treatment. The highest biofilm inhibition was observed against *S. aureus* with 22.58% ratio at 0.5 mg/ml concentration. The study results revealed out that the zinc borate efficiently inhibited QS activity and the violacein pigment production. It is thought that the antibiofilm activity obtained in the study is related to this QS inhibition effect. This mechanism of action should be revealed in further studies.

**Acknowledgements:** This study is a part of the PhD thesis of Semih Ayrikçil.

**Keywords:** Zinc borate, anti-quorum sensing, antibiofilm, oral pathogen

PP-114

## Antibacterial, Antibiofilm and Quorum Sensing Inhibitor Capacities of Hemostatic Agent: Medcell

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**Aim of the study:** The current study is aimed to investigate the biological activities of absorbable hemostatic dressing Medcell in the view of antibacterial, antibiofilm and quorum sensing inhibitory potentials.

**Material and Methods:** The antibacterial and antibiofilm activities of Medcell have been investigated against oral pathogens; *Streptococcus mitis*, *S. oralis*, *S. parasanguinis*, *S. sanguinis* and *S. sobrinus*. Agar well diffusion and crystal violet assays were used for determine the antibacterial and antibiofilm activities. To investigate the anti-quorum sensing activity, Medcell was screened using three biomonitor strains; *Chromobacterium violaceum* CV026, *C. violaceum* CV12472 and *Pseudomonas aeruginosa* PA01.

**Results:** According to the analysis results, Medcell did not show antibacterial activity against tested bacteria. On the other hand, the highest biofilm inhibition activity was observed against *S. sobrinus* as 97.90%. Anti-quorum sensing activity tests against CV 026 revealed out that Medcell did not have an effective anti-quorum sensing activity. In addition, Medcell did not inhibited violacein pigment production of CV 12472 and swarming/swimming motilities of *P. aeruginosa* PA01 strain.

**Acknowledgements:** This study was supported by the Scientific Research Project Unit of *Gazi University*, through the Grant number 03/2016-12.

**Keywords:** Medcell, antibacterial, *Streptococcus*, antibiofilm, anti- quorum sensing

PP-115

**ESENIAS: an Active Network in Europe**

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**Aim of the study:** Invasive alien species (IAS) are one of the main drivers of biodiversity loss and increasing problem worldwide. Many initiatives have been working on IAS with different approaches and in varying levels. Regional networks are smaller but active and efficient ones. The aim of this paper is to introduce ESENIAS (East and South European Network for IAS) and its activities since 2010 in order to get colleagues joined this effort to conserve biodiversity in our region and worldwide

**Material and Methods:** Documents have been published mainly by ESENIAS, web page of network and the other IAS documents and networks were reviewed.

**Results:** Organizations/initiatives are mostly supported by other powerful mother organizations; but, ESENIAS has not connected any mother group except establishment stages that were directly supported by European Environment Agency. All activities have been done volunteer based. Later on funding by European Economic Area was for a work under a project, ESENIAS-TOOLS, East and South European Network for IAS – A tool to support the management of alien species in Bulgaria (2015-2017). The project was focused on Bulgaria but data and database created for all ESENIAS region, which has been enlarging including Ukraine that is 12<sup>th</sup> member. This year ESENIAS will organize its 8<sup>th</sup> workshop, which has been organized since establishment. In addition, ESENIAS collaborates and cooperates with many institutions, EPPO, JRC, networks/initiatives, DIAS, NOBANIS, EASIN, and universities from member and non-member countries. Proceedings of workshops and symposia organized, and documents including factsheets and a book have been published so far. ESENIAS will keep similar activities and further mapping and risk assessments of IAS for the region are among targets of ESENIAS.

**Keywords:** Invasive Alien Species, East Europe, South Europe, Balkans

**Early Development of *Echinochloa crus-galli***

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**Aim of the study:** *Echinochloa crus-galli* is a widely distributed species, which is originated from tropical Asia. It is a main weed in many crops as well as problematic in natural and semi-managed habitats. Its invasion in Europe has extended from the Mediterranean Basin, where it has been naturalized for long time, to northern latitudes, probably due to global warming. Models to predict weed phenological stages are useful tools for Decision Support Systems, either for integrated weed management or for preventing new introductions. The aim of the current study is to analyze the emergence and early development characteristics of *E. crus-galli* in varying latitudes.

**Material and Methods:** Local populations from different crops was studied in pot experiments in Denmark, Germany, Greece, Italy, Iran, Latvia, Norway, Poland, Portugal, Spain, Sweden and Turkey by members of the EWRS working group Germination and Early Growth. Two populations, one from spring barley in Norway and the other from maize in Italy, were used as common populations. The number of local populations varied from one to three. Freshly harvested *E. crus-galli* seeds were sown in October-November 2015 and plant development was followed year long. Soil disturbance and fertilization was performed in parallel with local applications and at some locations pots were irrigated if needed. Destructive counts for emerged plants were done every two-three days, but three plants were preserved in each pot for monitoring the development using the BBCH scale. Percentage of emergence and time for the plants to reach key growth stages were analysed.

**Results:** The emergence varied significantly between locations. Higher emergence percentages were shown by the Norway population in Northern latitudes (47-63% in e.g. Denmark, Norway, Sweden, Poland), and by the common Italian population in Southern latitudes (37-47% in Iran, Italy, Spain). Emergence percentages did not differ between the different populations in each site, although the Norwegian common population usually emerged some days earlier (2-7) than the other populations. *E. crus-galli* showed quite high plasticity in the emergence depending on the biotype. Climate of origin and the original habitat (crop type) significantly conditioned the percentage of the emergence, but not the emergence rate. There were significant differences in the time required to reach BBCH12 (two leaves unfolded) or BBCH23-25 (3-5 tillers) among sites, but in most cases not among populations. The data will be further used to develop models of early development for *E. crus-galli*.

**Keywords:** Modelling, emergence, BBCH

PP-117

**Diagnosis of Honeybees' American Foulbrood's Causative Agent *Paenibacillus larvae* from Suspicious Brood, Honey and Honeybee by Molecular and Conventional Methods in Turkey**

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**Aim of the study:** In Turkey, diagnosis of American Foulbrood Disease (AFB) is carried out with conventional bacteriological methods according to the "Laboratory Method Unification Manual" of Ministry of Food, Agriculture and Livestock. Diagnosis with conventional culture method is time consuming and expensive. In some countries and laboratories, molecular methods recommended by OIE could be used for faster results. This research was aimed to compare conventional methods, PCR and Real Time PCR in order to detect the AFB causative agent *Paenibacillus larvae* from different samples.

**Material and Methods:** A total of 96 samples were taken from different origins including larval broods, honey broods and phenomenal amounts of harvested broods and adult bees. Samples were initially examined by culture methods using various media. At the same time DNA isolation was performed from the same samples. Afterwards, species specific PCR and Real Time PCR methods were performed.

**Results:** A total of 12 samples were found positive with conventional culture methods, 16 were positive with PCR and 25 were positive with Real-Time PCR. All samples found positive with culture method were also found to be positive with both PCR methods. According to these findings an AFB suspicious sample can be considered as negative if it is also was found negative with molecular methods. If it is found to be positive with molecular methods, it would be appropriate that the sample should be examined and results should be evaluated with culture methods.

**Acknowledgements:** This research was financially supported by Ministry of Food, Agriculture and Livestock (Project No: TAGEM-HS-10-13-01-170) and Ege University Scientific Projects Foundations (Project No: 2016 Fen 010).

**Keywords:** Honeybee, American Foulbrood, PCR, Real-Time PCR, *Paenibacillus larvae*

PP-118

## Bioprospecting of Thermophilic and Thermotolerant Fungi from a Mushroom Farm Compost in İzmir Region Regarding to their Phytase Activities

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**Aim of the study:** Phytase is an industrially important enzyme and primarily produced from microorganisms especially filamentous fungi. Phytic acid is the primary storage form of phosphorus in cereals. Phytases are phosphohydrolases that initiate the step-wise removal of phosphate from phytate. Thermostability is a major feature of phytase enzymes used in the feed industry. In recent years there is an increasing interest to thermostable phytases. Thermophilic fungi constitute a natural source for thermophilic phytases and are found in various places in nature including composts. Starting from this point, thermophilic fungal microflora of mushroom farm compost in İzmir and their phytase activities were investigated.

**Material and Methods:** Thermophilic and thermotolerant filamentous fungi were isolated from compost samples in a mushroom farm in İzmir province, Turkey using Potato Dextrose agar (PDA), Malt Extract agar (MEA) and Rose Bengal Chloramphenicol agar (RBCA). Isolates were evaluated regarding to their temperature requirements by incubating at 17°C for 7 days. Identification of the isolates was done using polyphasic approach and phenotypic tests, ITS region sequence analysis and calmodulin gene sequence analysis were performed. Extracellular phytase activities of the isolates were also evaluated quantitatively using a modified ammonium molybdate blue method. Protein analysis was done by Bradford method. One unit of phytase activity was defined as the amount of enzyme needed to liberate 1 µmol inorganic phosphate per min under the assay conditions.

**Results:** A total of 15 fungi were isolated from the compost sample. It was determined that 14 of the isolates were thermophilic and 1 of them was thermotolerant. According to the taxonomic studies, isolates were assigned to 5 different genera including *Thermomyces*, *Aspergillus*, *Scytalidium*, *Humicola* and *Penicillium*. The most prevalent genus was *Thermomyces* with 5 isolates (33%). Fourteen of the 15 isolates showed extracellular phytase activity (93%). As a result, compost samples were found to be rich sources of phytase-producing thermophilic fungi.

**Acknowledgements:** This project was financially supported by Scientific and Technical Research Council of Turkey (TÜBİTAK) (Project No: 116Z114).

**Keywords:** Phytase, thermophilic/thermotolerant fungi, compost, fungal biodiversity

**Antioxidant and DNA Cleavage Protective Activity of *Heracleum persicum***

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**Aim of the study:** Therapeutic effects of some medical plants and vegetables are well known since they generally are used as food and folk medicine for many diseases as well. *Heracleum Persicum* (*H. persicum*) is a flower-bearing herb that possesses interesting pharmacological importance due to its bioactive compounds. It is commonly used as spice, food additive, dietary supplement and traditional remedy. In this study, ethanol extract of *H. persicum* was tested for its antioxidant and DNA cleavage protective activity.

**Material and Methods:** The antioxidant activity of *H. persicum* was evaluated by 1,1-diphenyl-2-picryl-hydrazil (DPPH) radicals and deoxyribose assay. The amount of total phenolics in extract was determined with the Folin- Ciocalteu reagent, gallic acid was used as a standard. Total flavonoid content was determined by method based on the formation of a flavonoid-aluminium complex, quercetin was used as a standart. DNA damage protective activity of *H. persicum* was checked on pBluescript M13(+) plasmid. Plasmid DNA was isolated by Qiagene plasmid mini prep kit.

**Results:** *H. Persicum* showed concentration-dependent free radical scavenging capacity and protective effect on DNA cleavage. The efficacy of *H. Persicum* in free radical scavenging and protection of DNA and protein from hydroxyl radical induced damage suggest that it could be useful to counteract the effects of oxidative stress.

**Keywords:** *Heracleum Persicum*, antioxidant activity, DNA cleavage.

PP-120

### Combined Effects of Pesticides on DNA

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**Aim of the study:** Pesticides are chemicals used to eliminate or control a variety of target organisms that can damage crops and livestock and reduce farm productivity. They are a class of biocide. The purpose of this study is to determine the effect of different concentrations of selected pesticides alone and combined effects on pBluescript M13+ plasmid DNA (3.2 kb). Imidacloprid, systemic insecticide, and cymoxanil, a penetrant fungicide, are used in this study.

**Material and Methods:** DNA damaging activities of imidacloprid, cymoxanil and mixture of these pesticides were checked on pBluescript M13+ plasmid DNA (3.2 kb) by using agarose gel electrophoresis. The plasmid DNA pBluescript M13+ was prepared and isolated according to standard protocols using Qiagen plasmid mini preparation kit.

**Results:** It has been found that these pesticides single and mixture can effectively promote damage of plasmid DNA. The combination of pesticides has significantly increased DNA damage.

**Keywords:** Imidacloprid, cymoxanil, DNA cleavage, genotoxicity.

## New Distribution Records of *Petrosimonia* Bunge (Chenopodiaceae) in Turkey

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**Aim of the study:** *Petrosimonia* species spread throughout the world in saline areas. Genus contains 12 species in the World. In Turkey, this genus is represented 4 species (*Petrosimonia glauca* Bunge, *P. brachiata* (Pall.) Bunge, *P. nigdeensis* Aellen, *P. squarrosa* (Schrenk) Bunge) and *Petrosimonia nigdeensis* is endemic for Turkey. According to “Flora of Turkey and the East Aegean Islands”, *Petrosimonia* is spread on A9, B4, B9, B10, C4 ve C5 regions. This study aimed to determine the new distribution areas of *Petrosimonia* species in Turkey.

**Material and Methods:** “Flora of Turkey and the East Aegean Islands” records and various herbarium (ANK, GAZİ, HUB, AEF, VANF, EGE, ERC, ISTE, ISTEf, KNYA) specimens were examined and localities were recorded. Field studies were organized in line with these records and according to habitat preferences of the genus. The material of this study is *Petrosimonia* specimens, which were sampled in these regions. These specimens were made into herbarium material and are kept in Herbarium ANK at room temperature.

**Results:** As a result of the field studies; 24 new locations of *Petrosimonia brachiata*, known to spread in 4 localities, 16 new locations of *Petrosimonia nigdeensis*, known to spread in 4 localities, 4 new locations of *Petrosimonia glauca*, known to spread in 1 locality have been identified. Three localities were given for *Petrosimonia squarrosa* in “Flora of Turkey and the East Aegean Islands”. First locality is A9 Kars: Aras valley, Kağızman to Tuzluca, 1200 m. and the plant was sampled by Sorger. However, no examples were found in field studies conducted in the region. Second locality is B10 Kars: Iğdır to Aralık, 25 km from Iğdır, 830 m. and the sample is exemplified by A. Baytop. When the sample in ISTE (Istanbul University, Faculty of Pharmacy) is examined, it is understood that the plant belongs to *Petrosimonia glauca*. The last locality was given by Davis as B10 Kars: 27 km from Iğdır to Aralık, 880 m. Also this locality coincides with the second locality. *Petrosimonia squarrosa* was not found in the studies conducted at these locations. Only the *P. glauca* and *P. brachiata* species were located. In the field studies on the areas where individuals of *Petrosimonia* genus are likely to be found, 2 localities were encountered for *P. squarrosa*.

**Keywords:** *Petrosimonia*, Chenopodiaceae, Turkey, distribution

PP-122

## Mythological Meanings of Some Plants Found on Historical Monuments Some Ancient City in Turkey

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**Aim of the study:** The plants carry a symbolic meaning in mythology. When human nature is observed, it is greatly influenced by the movement and appearance of plants. For this reason, people have used their plants as a symbolic tool while transferring their experiences about their own experiences through future generations through myths. In this study, the mythological meanings of the plants found on the historical monuments in three different ancient cities including Aizanoi (Kütahya), Laodikeia (Denizli) and Stratonikeia (Muğla) were studied.

**Material and Methods:** Field studies were carried out on the ancient cities of Aizanoi (Kütahya), Laodikeia (Denizli) and Stratonikeia (Muğla) between 2010-2017. Some plant motifs have been identified on historic works such as reliefs, columns and sarcophagi, which are revealed as a result of excavations during the field studies. In this study was evaluated plant figures on a total 25 stone reliefs, columns and sarcophagi from three different ancient cities. Photographs were taken of all plant figures found in archaeological remains. The reasons for using these plants on historical artifacts are explained by checking the relevant resources.

**Results:** Eighteen different plant figures have been defined as the result of the study. It has been discovered that the described plant figures are present in these ancient cities in the present day flora. In the three ancient cities, the most commonly used plant figures include grape (*Vitis L.*), olive (*Olea L.*) and acanthus (*Acanthus L.*). Latin names, photographs and mythological meanings of these plants on historical artifacts are given.

**Keywords:** Ancient city, Mythological plant, Turkey.

PP-123

## Role of Urease and Carbonic Anhydrase in Thermal *Bacillus* sp. B33 for Calcium Carbonate Mineralization

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**Aim of the study:** Microbial calcium carbonate precipitation is a natural biological process in which microbes produce different carbonate polymorph as a result of their metabolic activities. Although, different groups of microorganisms involved in this process, calcium carbonate precipitation by urea hydrolysis is the simplest and most widely seen method in bacteria. Two enzymes are important in this process, namely urease and carbonic anhydrase. In this respect, identification and characterization of urease positive bacteria and their enzyme activity have been great interest in these days. In the light of these, the aim of this study is to identification of urease positive bacteria that can be used for calcium precipitation and to determine their urease and carbonic anhydrase activities.

**Material and Methods:** Thermophilic bacteria was isolated from Pamukkale hot stream, Denizli, Turkey. The colonies were transferred onto Urea agar base, urease selective medium, to check the production of urease. Isolates designated as B33 were selected for further studies based on their ability to produce urease qualitatively. 16S rRNA gene was amplified to identify the B33. The urease enzyme activities of bacteria were determined by phenol-hypochlorite method reading of colour at 630 nm. The carbonic anhydrase activity was determined by measuring the amount of *p*-nitrophenol produced at the end of reaction. Both enzyme activities were measured at two different medium, namely calcium precipitation medium (CPM) and LB-urea.

**Results:** According to nucleotide Blast results, the isolated bacteria was *Bacillus* sp.. Biochemical test showed that this bacteria was urease positive bacteria. Urease enzyme activity of B33 was calculated as  $1.350 \pm 0.015$   $\mu\text{mol}/\text{min}/\text{ml}$  in CPM medium and  $1.356 \pm 0.065$   $\mu\text{mol}/\text{min}/\text{mg}$  protein in LB-urea medium. In addition to urease enzyme activity, carbonic anhydrase activity of B33 was determined throughout in this study. This enzyme activity was found  $13.02$   $\text{nmol}/\text{min}/\text{ml}$  in CPM medium. On the other hand, carbonic anhydrase activity was calculated as  $18.47$   $\text{nmol}/\text{min}/\text{ml}$  in LB-urea medium. All these enzyme activity results showed that this urease positive bacteria may be used in various process such as biodeposition in soil and sand materials, biomineralization in cementitious materials and restoration of limestone buildings due to its high enzyme activities.

**Keywords:** Ureolytic bacteria, urease enzyme activity, carbonic anhydrase activity biomineralization, calcium carbonate mineralization

**Composition and *in vitro* cytotoxicity of essential oil from *Hypericum scabrum* L.**

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**Aim of the study:** *Hypericum* (Guttiferae) is a genus of flowering plants that have various medical activities. Therefore, they have been used widely for medicinal purposes all around world including Turkey. To our knowledge there are no published reports on cytotoxic activity of the essential oil from *Hypericum scabrum* L. for colon cancer cells. In this regard, the present study was aimed to investigate the cytotoxic effect this oil. Also, we focused on the chemical composition of essential oil of *H. scabrum*.

**Material and Methods:** *Hypericum scabrum* arial parts were collected from in Salda Lake, Burdur, Turkey. *Hypericum* areal parts were submitted for 4 h to water distillation using a Clevenger apparatus to obtain essential oil. GC-MS analysis was performed on an Agilent Technologies 7820 A model GC system equipped with 5975C inert MSD. The samples were analyzed on a HP5-MS colon. Helium was used as carrier gas. The identification of the compounds was based on comparing the mass spectral data with WILEY and NIST05 libraries and by referring to compounds known in the literature. For cytotoxic activity determination, essential oil was applied different concentration to the Caco-2 cells (2500 cells/well) for 24 hours. At the end of 24 hours, the survival rate of cell was measured crystal violet test at 630 nm by using ELISA reader.

**Results:** The GC/MS analysis revealed the presence of mainly monoterpenes in *H. scabrum* essential oil. In addition to these, the cytotoxicity result was showed that the LD50 value of oil was found to be 63.2 µg/ml. All those data suggest the hypothesis that *H. scabrum*'s essential oil is relatively cytotoxic to Caco-2 cells and has promising phytochemicals that may be used in cancer treatment.

**Acknowledgements:** This work is supported by the Scientific Research Projects Council of Pamukkale University (PAU-ADEP-2018KRM002-013).

**Keywords:** *H. scabrum*; essential oil; composition GC-MS; cytotoxic activity, cancer

PP-125

## Chemical composition and Cytotoxicity of *Nepeta nuda* subsp. *lydiae* P. H. Davis Essential Oil Towards Colon Carcinoma

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**Aim of the study:** *Nepeta nuda* subsp. *lydiae* is one of the endemic species of Turkey which are used as aromatic herbs and for some other purposes. It belongs to the genus *Nepeta*, a member of the Mint family (Lamiaceae). It has many diverse biological activities. However, it is unknown whether the oil of this medicinal plant is cytotoxic towards the colon cancers. In this regard, the aim of this study is to investigate the cytotoxic effect of essential oil of *N. nuda* subsp. *lydiae* in human colon cancer cell line, namely Caco-2. Moreover, chemical content of this essential oil was determined throughout this study for the first time.

**Material and Methods:** *N. nuda* subsp. *lydiae* were collected from Çameli, Denizli, Turkey. Essential oil was prepared by hot water distillation using a Clevenger apparatus for 3 hours. GC/MS analysis was performed on an Agilent Technologies 7890 A model GC system equipped with 5975 C MS. The samples were analyzed on a HP5-MS. Helium was used as the gas vector. The identification of the compounds was based on comparing the mass spectral data with WILEY and NIST05 libraries and by referring to compounds known in the literature. Human colon cancer cells (Caco-2) cells were cultured in DMEM medium containing 10% fetal bovine serum (FBS) supplemented with 1% penicillin/streptomycin solution. The cells were maintained as monolayers in a plastic culture flask at 37°C in a humidified atmosphere containing 5% CO<sub>2</sub>. The cell proliferation was assessed using a standard crystal violet dye. Fresh stock solutions of the *Nepeta* essential oil was prepared in DMSO (0.5 % final concentration). The cells were suspended to a final density of 12500 cells/ml. Two hundred microliters of the cell suspension were placed into the wells of a 96-well culture plate. Each concentration was tested in at least two independent plates. At the end of 24 hours, the survival rate of cell was determined by measuring the final color at 630 nm. Control group was treated with the medium containing 0.5% DMSO without plant oil.

**Results:** The GC/MS analysis revealed the presence of 4 $\alpha$ ,7 $\alpha$ ,7 $\beta$ -nepetalactone (27,2%) in *N. nuda* subsp. *lydiae* essential oil. In addition to these, the cytotoxicity result was showed that the LD50 value of oil was found to be 129.6  $\mu$ g/ml. All those data suggest the hypothesis that this essential oil has the ability to inhibit the cell growth of Caco-2 cancer cells at moderately low concentration. Therefore, it may have promising phytochemicals that may be used in cancer treatment. In order to determine the mechanisms of this cytotoxicity and to isolate the presence of new active substances, further studies should be carried out.

**Acknowledgements:** This work is supported by the Scientific Research Projects Council of Pamukkale University (PAU-ADEP- 2018KRM002-013).

**Keywords:** *Salvia frigida*; essential oil; chemical composition; GC-MS; cytotoxic activity, cancer

PP-126

***In vitro* propagation of bitter orange (*Citrus aurantium* L.)**

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**Aim of the study:** Bitter orange (*Citrus aurantium* L.) is a medicinal plant that are used to make drug from its peel, flower, leaf, fruit, and fruit juice. Its orange oil is made from the peel and it is used to treat anxiety, insomnia, and as an anticonvulsant. It is also used to treat gastrointestinal tract disorders and for its diuretic action against tachycardia and rheumatism. Plants cultured *in vitro* yield thousands of genetically identical plants (clones) from a single plant. This process is called micropropagation and is used to commercially propagate plants asexually. The rapid multiplication allows breeders and growers to introduce new cultivars much earlier than they could by using conventional propagation techniques, such as cuttings. This study was aimed to identify the best type of explant from *in vitro* grown seedling and growth regulator concentration and/or combination for shootregeneration from explants and rooting of regeneratedshoots.

**Material and Methods:** Fruit from field-grown bitter orange (*C.aurantium* L.) trees were used as the source of seeds. Seeds were extracted by manual extraction, for surface sterilization, the seeds were treated with 70% ethanol for 5min with, 10% H<sub>2</sub>O<sub>2</sub> for 5min, and 10% (w/v) commercial bleach and after rinses with sterile distilled water they were stored at 4°C. Surface-sterilized seeds germinated *in vitro* in Petri dishes (100×15mm) on semisolid (1.5gL<sup>-1</sup>phytagel and 3.5gL<sup>-1</sup> agar) MS medium supplemented with 0.3μM gibberellic acid and 20gL<sup>-1</sup>sucrose (germination medium). The seeds were kept at 27±2°C with a 16-h photoperiod, under white cool fluorescent light of 50μmol<sup>-1</sup>m<sup>-2</sup>s<sup>-1</sup>, at the Plant Molecular Genetics and Biotechnology laboratory, Mugla.

**Results:** The decontamination protocol was effective for *C. aurantium* L. seeds, with all seeds remaining free of contamination after this treatment and decontaminated seeds were then germinated easily. Germination was evaluated four weeks after the *C. aurantium* L. seedswere transferred to germination medium.Seeds that produced at least one morphologically normal seedling were considered germinated.Seedlings derived from germinated seeds had well-formed shoots and roots and were easily acclimated to greenhouse conditions.

**Acknowledgements:** This study was supported by the MuglaSitkiKocman University Scientific Research ProjectsCoordination Unit (Mugla, Turkey, MSKU-BAP 16/021).

**Keywords:** Citrus seeds, germination, micropropagation, MS medium.

PP-127

## Properties of Güzelpınar (Pamukkale-Denizli) red clay soils

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**Aim of the study:** This study focuses on the evaluation of the positive and negative properties of the red clay soil in Güzelpınar (Denizli-western Anatolia) located in northeastern of the Pamukkale town. Red clay soil (RCS) is defined as ultisols that is composed of mostly clay particles. They are also defined as mineral soils which contain no calcareous material.

**Material and Methods:** Through the aim of this study, physical, mineralogical (X-ray diffraction, XRD), chemical (X-ray fluorescence, XRF), thermal analysis (Differential Thermal Analyser-Thermogravimetry, DTA-TG) were performed.

**Results:** RCS is found in Quaternary aged Asartape formation, which is consist of irregular alternations of reddish, brownish-colored sandstone, siltstone and mudstone. Physically, the RCS contains at least clay (18.0%) with high content of sand (31.7%). Mineralogically, clay minerals (illite and less chlorite, kaolinite and chlorite-smectite) as well as quartz, and little hematite were detected. Chemically, the relatively low CaO content (1.2%) of the RCS is indicative of a non-carbonaceous clay. The high content of SiO<sub>2</sub> (52.0%) and Fe<sub>2</sub>O<sub>3</sub> (7.65%) is associated with abundance of quartz and presence of the hematite, respectively. In addition, the high Al<sub>2</sub>O<sub>3</sub> (19.2%) content indicates that the clay mineral content. Loss on ignition (LOI: 14.2%) are generally very high, which is related to the presence of clay minerals, hydroxides and organic matter. RCS has some positive aspects as a keeps moisture due its density and tends to be richer in nutrients than other soils. Because of the clay particles, consist the clay soil are negatively charged. They attract and pick up the positively charged particles, such as for example calcium, potassium, and magnesium. RCS has also some negative properties, allows low water drainage, slowly warming in the spring, compacts easily, and it has tendency to be alkaline. In order to improve the RCS, organic matter addition is needed.

**Keywords:** Red clay soil, Illite, Güzelpınar, Denizli.

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## Benthic Macroinvertebrate Fauna of Yuvarlakçay Stream

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**Aim of the study:** Invertebrates have received considerable attention in the study of running water ecosystems. This study was carried out to determine the benthic macroinvertebrate fauna of Yuvarlakçay Stream between 2014 and 2017. For this purpose, six sampling points were selected and the benthic macroinvertebrate were collected.

**Material and Methods:** Yuvarlakçay stream is an important stream that flows to Köyceğiz Lake. Köyceğiz Lake is a very important wetland in the view of ecological and touristic potential. This study has been done between 2014 and 2017 in 6 chosen stations on Yuvarlak Stream Macroinvertebrate communities along the stream were sampled monthly by using a bottom kick net (500 µm mesh). The samples were taken from an area of nearly 100 m<sup>2</sup> in order to include all possible microhabitats at each station. In some areas with the presence of large stones, the collected macroinvertebrates were first picked out and washed into the kick net in order to remove pupae and other attached individuals. In addition, macroinvertebrate samples were separated from the macrophytes and the sediment using sieves (250 µm). Collected organisms were immediately fixed in formaldehyde (4%) in the field and then transferred to 70% ethyl alcohol. The macroinvertebrates were sorted, identified to the lowest possible taxon (species, genus or families) and counted under a stereomicroscope.

**Results:** As a result, to determine the benthic macroinvertebrates fauna of Yuvarlakçay Stream 6020 individuals were investigated. From the investigation of collected individuals, totally 47 taxa, belonging to Turbellaria, Gastropoda, Bivalvia, Hirudinea, Crustacea and Insecta classis were found. In this study 1 taxon belongs to Turbellaria, 6 taxa belong to Gastropoda, 1 taxon belongs to Bivalvia, 1 taxon belongs to Hirudinea, 2 taxa belong to Crustacea were identified. % 76,59 of identified taxa (36 taxa) were belonging to Insecta.

**Keywords:** Benthic macroinvertebrates, Yuvarlakçay Stream, Turkey

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**Essential Oil Composition of *Nepeta viscida* Boiss. from Buharkent, Aydın, Turkey**

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**Aim of the study:** The genus *Nepeta* (Lamiaceae) comprises 280 species that are distributed over a large part of Central and Southern Europe, and West, Central, and Southern Asia. About half of the existing species are recorded in Iran. The genus *Nepeta* is represented in Turkey by 33 species and altogether 38 taxa, 17 of these being endemic in Turkey. *Nepeta* species are widely used in folk medicine because of their antispasmodic, diuretic, antiseptic, antitussive, antiasthmatic, and febrifuge activities. The aim of the study was to determine essential oil composition of *N. viscida* collected from Buharkent, Aydın (Turkey).

**Material and Methods:** *Nepeta viscida* were collected at its flowering stage from Buharkent, Aydın, Turkey. Stems, flower and leaves of *N. viscida* were dried at room temperature. Dried materials were crushed and placed into the glass with 1000 ml distilled water and hydrodistilled for 4 h by Clevenger apparatus to obtain essential oil. The essential oil was dried in anhydrous sodium sulphate and after filtration stored in a sealed dark vial at 4 C until analysis. Chemical analyses of the essential oil were performed on GS-MS using a 30-m long HP-5MS capillary column. The individual peaks were identified by comparison of their retention indices as well as by comparing their mass spectra with Wiley 7 MS library and NIST02 mass spectral database. A series of n-alkanes was also injected under same analytical conditions with that of essential oil for the calculation of Retention Indices (RI). The samples percentages were calculated from the GC peak areas with the normalization method. The relative amount of compounds was calculated as mean values from duplicate GC and GC-MS analyses.

**Results:** The essential oil of the *N. viscida* was determined with high content monoterpene and sesquiterpenes hydrocarbons. The major content in the volatile oil of *N. viscida*, Water-distilled essential oils from aerial parts, leaves, flowers and stems with branches of an endemic species, were analyzed by GC and GC/MS. Twenty-five compounds constituting of the total components detected were identified. The most abundant compounds are listed as;  $\alpha$ -terpineol (20.59%), trans- $\beta$ -caryophyllene (9.90%), spathulenol (9.37%).

**Keywords:** Chemical composition, essential oil, *Nepeta viscida*, Buharkent, Turkey

## Diversity of Ladybeetle (Coleoptera: Coccinellidae) Species in Hazelnut Orchards

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**Aim of the study:** Lady beetle species are well-known predator species of many insect species on various plants and very valuable natural enemies. They usually prefer to feed on aphid and scale insects as well as on some mite species. Lady beetles species are very often observed from April to October in hazelnut orchards and feed on aphids and scale insects of hazelnut. This study aims to identify the current lady beetle species in hazelnut orchards.

**Material and Methods:** This study was carried out in hazelnut orchards in Samsun, Ordu and Giresun provinces of Turkey. Ladybeetle species were collected by the beating sheet method during the growing season in hazelnut orchards, in different years. The species collected were identified and insect bio-diversity parameters (abundance, dominance, Simson's index (D), Simpson's diversity index) were calculated for the three provinces.

**Results:** The results identified 11 Coccinellidae species in the survey area including *Adalia bipunctata*, *A. decempunctata*, *A. fasciatopunctata*, *Calvia decemguttata*, *C. quinquedecimguttata*, *C. quatuordecimguttata*, *Coccinella septempunctata*, *Oenopia conglobata*, *Propylae quatuordecimpunctata*, *Subcoccinella vigintiquatuordecimpunctata* and *Vibidia duodecinguttata*. *Coccinella septempunctata* (L.), *Calvia quatuordecimguttata* and *Propylae quatuordecimpunctata* (L.) were the most common species in the survey area. Also, the presence of *Calvia decemguttata*, *C. quinquedecimguttata* and *C. quatuordecimguttata* was recorded for the first time for Coccinellidae hazelnut orchards of Turkey. When all survey locations were evaluated together, the highest numbers of coccinellids were captured in April and May, after which their population levels sharply declined, but the species were present in the hazelnut orchards until the end of October. According to the Simpson diversity index, Ordu orchards had the highest dominant habitat (0.363), and Samsun orchards had the lowest (0.213). Similarity indexes for Coccinellidae fauna were 0.70 for Samsun and Ordu; 0.64 for Samsun and Giresun; 0.87 for Ordu and Giresun.

**Keywords:** Hazelnut, lady beetles, Coccinellidae, fauna, diversity, *Corylus avellana*

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### Population Estimate of the European Pond Turtle from Göksu Delta, Southern Turkey

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**Aim of the study:** The European pond turtle, *Emys orbicularis*, is a freshwater turtle with a wide distribution area ranging from North Africa over most of Europe and the Middle East to the Aral Sea. The species is endangered almost throughout the range and protected in many European countries. The present study is aimed to provide data on population size, sex ratio, and body size of a costal *E. orbicularis* population.

**Material and Methods:** We examined some population parameters of *E. orbicularis* from Akgöl (Göksu Delta, Mersin, Turkey) in 2011, using capture-recapture methods. The captured turtles were individually marked by notching their marginal scutes and measured their weight (W) by a scale with 1 g accuracy; their straight carapace length, plastron length by a tortometer with 1 mm accuracy. Population parameters were calculated by program Mark.

**Results:** Whereas a total of 28 (3 juveniles, 9 males, and 16 females) *E. orbicularis* were captured, a total of 150 (42 juveniles, 33 males, and 75 females) *Mauremys rivulata* were also observed. The *M. rivulata* population is five times bigger than *E. orbicularis* in Akgöl. The *E. orbicularis* population consisted of 11% juveniles, 32% males, and 57% females. The adult sex ratio was significantly skewed in favor of females (0.57). The population size was estimated at 47 (34 - 66) individuals. The survival rate calculated as 0.60.

**Acknowledgements:** This study is financially supported by TUBITAK [Project number: 110T927] and EBILTEM [2012/BİL/013]. We are indebted to these organizations for financial support. The study protocol was approved with Decision No.2010/13 by the Laboratory Animals Ethical Committee at Ege University, Turkey.

**Keywords:** *Emys orbicularis*, population ecology, body size, sex ratio, Turkey

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### Activity Pattern of European Pond Turtle from Mediterranean Turkey

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**Aim of the study:** The European pond turtle, *Emys orbicularis*, is distributed almost throughout Turkey and it is especially quite abundant in Central Anatolia. The Anatolian populations of species are threatened by many factors particularly habitat fragmentation and destruction, however; our knowledge of its population trends and ecology is inadequate. Here we report results from a study on home range, movements, and habitat use of *E. orbicularis* in Lake Gölhisar (Burdur, Turkey).

**Material and Methods:** In March 2011, we captured 8 (4 males, 4 females) individuals and then measured, marked, fitted with radiotransmitters (Advanced Telemetry Systems, Inc). We monthly monitored individuals about 350 days from March 2011 to February 2012. Radiotransmitters were attached to the anterior upper carapace margin with aluminium machine screws, and plumber's epoxy was used for streamlining. Transmitter packages weighed less than 5% of the turtle body mass. The location data were calculated by Biotas 2.0a.

**Results:** According to the minimum convex polygon method, a total home ranges of 8 individuals was calculated as 32.80 hectares, with a range of 0.88 – 12.44 ha. The values are accordance with literature. In the movement analysis, it was determined that an individual's orientation was random ( $K=-0.37$ ,  $Z= 1.960$ ,  $P \leq 0.05$ ). The situation could be depending on the availability of productive space for individuals.

**Acknowledgements:** This study is financially supported by TUBITAK [Project number: 110T927] and EBILTEM [2012/BİL/013]. We are indebted to these organizations for financial support. The study protocol was approved with Decision No.2010/13 by the Laboratory Animals Ethical Committee at Ege University, Turkey.

**Keywords:** *Emys orbicularis*, home range, movements, radio telemetry, Turkey

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### Effect of FeEDDHA and Zeatin on Shoot Formation of *in vitro* Grown *Mentha* spp. Meristems

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**Aim of the study:** Plant tissue culture, or the aseptic culture of cells, tissues, organs, and their components under defined physical and chemical conditions *in vitro*, is an important tool in both basic and applied studies as well as in commercial application. Plant tissue culture medium should generally contain some or all of the following components: macronutrients, micronutrients, vitamins, amino acids or nitrogen supplements, source(s) of carbon, undefined organic supplements, growth regulators and solidifying agents. Iron is an essential plant micronutrient that is key for metabolic reactions in plant cells, especially for chlorophyll biosynthesis; therefore, its deficiency strongly limits plant growth and provokes the development of an interveinal chlorosis. FeEDDHA had a positive effect on micropropagation and reduced chlorosis of plants. The most common form of naturally occurring cytokinin in plants today is called zeatin which was isolated from corn (*Zea mays*). Cytokinins are plant-specific chemical messengers (hormones) that play a central role in the regulation of the plant cell cycle and numerous developmental processes. In the present work aimed to examine the effect of addition of iron as FeEDDHA and zeatin.

**Material and Methods:** All MS media were supplemented with 30 gL<sup>-1</sup> sucrose and gelled with 7 gL<sup>-1</sup> agar (control); 50 mgL<sup>-1</sup> FeEDDHA and 3 mgL<sup>-1</sup>. The pH was adjusted to 5.8 and autoclaved for 20 min at 121°C. The cultures were incubated at 25±2°C, under a 16-h photoperiod, with light provided by cool daylight fluorescent lamps (50 μmol<sup>-1</sup>m<sup>-2</sup>s<sup>-1</sup>). Three Petri dishes, each containing ten 0.1 mm meristems, were used for each *in vitro* proliferation treatment, and each experiment was repeated at least three times. Data of *in vitro* proliferation were recorded 4 weeks after culture initiation and consisted of the percentage of meristems that generated at least one elongated shoot, the mean number of shoots formed per regenerating explant, the mean length of elongated shoots, and the SFC (shoot-forming capacity) index, which was calculated as follows: SFC = (average no of shoots per regenerating explant) x (% of regenerating explant) / 100. Statistical analysis of the non-parametric data (frequencies) was carried out by means of the test for homogeneity of proportions, and significant treatment differences were selected by a non-parametric statistical test, the post hoc multiple comparisons test. Discrete data were subjected to ANOVA, followed by the least significant difference test at P≤0.05 to compare means.

**Results:** We examined the effect of FeEDDHA and zeatin on multiplication via axillary branching and adventitious shoot regeneration from meristems in *Mentha* spp. *in vitro* cultures. When applied during multiplication, FeEDDHA reduced chlorosis, increased content of chlorophyll and iron but had no effect on the number of side shoots.

**Acknowledgements:** This study was supported by the Mugla Sitki Kocman University Scientific Research Projects Coordination Unit (Mugla, Turkey, MSKU-BAP 17/135).

**Keywords:** Cytokinin, meristem culture, micropropagation, MS medium.

**Infection of the *Pseudophoxinus burduricus* (Teleostei: Cyprinidae) by the *Paradiplozoon bliccae* (Monogenea: Diplozoidae) – Some Ecological and Genetical Aspects**

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**Aim of the study:** Studies on the parasite infection of endemic fishes are required for the management and conservation of fish population in natural water bodies. *Pseudophoxinus burduricus* is a member of the fish family Cyprinidae, It is mainly found in Burdur Endorheic Basin. This study is aimed mainly to investigate the occurrence of *Paradiplozoon bliccae* parasites of *Pseudophoxinus burduricus* specifically in a Doganbaba Creek population. Prevalence, intensity and seasonality of infection, length classes and sex compositions of infected population have been monitored and compared with other studies.

**Material and Methods:** The study was carried out in the Doganbaba Creek (Burdur) (37° 35' 48.35"N, 29° 38' 24.89"E-37° 34' 48.56"N, 29° 39' 28.55"E) between January 2014 and February 2015. Samplings were carried out by electrofishing method. A total of 60 *Pseudophoxinus burduricus* specimens were examined for the presence of helminth communities. Prevalence and mean intensity were calculated for parasite species as defined by Bush *et al.* (1997). Identification of *P. bliccae* was based on both, morphological and molecular characterization. Genetically, samples of *P. bliccae* collected in Turkey from *Pseudophoxinus burduricus* were compared with those collected in the Czech Republic from *Blicca bjoerkna* and with database records.

**Results:** In total, 60 individuals of *Pseudophoxinus burduricus* were examined and 14 (23.3%) specimens were infected by *Paradiplozoon bliccae*. In total, 86 specimens of *Paradiplozoon bliccae* were collected from 14 fishes (mean intensity 3). Up to date, only few *Paradiplozoon* species (*P. homoion*, *P. megan*, *P. bingolensis*, *P. bliccae*) have been previously reported from Turkey. The observed minimal genetic variability of *P. bliccae* parasitizing *P. burduricus* (4 SNPs, 3 A/T ambiguities and one mixed base W) we assigned to intraspecies variability that may reflects the population and geographical origin of the samples and may indicate possible relation or adaptation to the host.

**Acknowledgements:** This study was sponsored by MAEU BAP, Turkey (Project No: 0217 YL 14). The morphological and molecular analyses were financially supported by Czech Science Foundation (Projects No: P506/12/1258 and P505/12/G112).

**Keywords:** Monogenea, *Paradiplozoon*, Endemic, *Pseudophoxinus*

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## Determination of Ecological Quality of Lakes Sapanca and Mogan according to Water Framework Directive using Benthic Macroinvertebrates

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**Aim of the study:** Lakes from aquatic ecosystems are living systems and their continuity is only possible with owning healthy biota. Therefore biological monitoring programmes including aquatic organisms are began to use for maintain continuity and planning of lake basins and protecting of present biotic community and water quality also in Turkey rather than water quality parameters. Macroinvertebrates that are one of the biological monitoring quality component are alive memories of water and giving exact information about aquatic system quality belong to long term. In accordance with these views, it was aimed that determination of water quality of Lakes Sapanca and Mogan using benthic macroinvertebrates according to Water Framework Directive.

**Material and Methods:** Benthic macroinvertebrates samples were collected from both of lakes four times in 2017 (May, July, September and November) and at the same time temperature, pH, dissolved oxygen, biological oxygen demand, ammonium nitrogen (NH<sub>4</sub>N), nitrate nitrogen (NO<sub>3</sub>N) which are listed in Regulation on Management of Surface Water Quality were measured. Also, total coliform and total fecal coliform which analysis important for human health in recreational use were analysed. Water qualities of both lakes were evaluated with benthic macroinvertebrate which is one of the Water Framework Directive methods by using biotic indices (Biological Monitoring Working Party (BMWP), Average Score Per Taxon (ASPT), Simpson Diversity Index, Margalef Diversity Index and frequency and dominance).

**Results:** Both of lakes were not rich in point of community diversity and 16 taxa were identified in Lake Sapanca and 13 taxa in Lake Mogan. Generally, dominant taxa of Lakes are alpha-meso and polysaprobic Oligochaeta and Chironomidae specimens. Zoobenthic community of Lake Sapanca were consisted of Oligochaeta (42% of dominance) and Chironomidae (23% of dominance) and BMWP values were determined between 1-27; 1-3.26 of ASPT values; 0.38-0.82 of Margalef index values. Also, Mogan Lake's zoobenthic community were consisted of Oligochaeta (46% of dominance) and Chironomidae (27% of dominance) and values of BMWP were determined between 1-40; 1-3.38 of ASPT; 0.40-0.45 of Margalef index values. Coliform bacteria even fecal-origin were determined at all samples. This indicates that waste originating human and animal feces and/or sewage originating slaughterhouse flow into Lakes Sapanca and Mogan.

**Acknowledgements:** This study was supported by ESOGU-BAP (Project number: 2017/1571).

**Keywords:** Sapanca, Mogan, BMWP, ASPT, Biological monitoring

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## **A General Overview of Biological Monitoring Studies in Turkey Based on macroinvertebrates according to Water Framework Directive**

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**Aim of the study:** There are over 20 directives in regulation about protection and management of water resources in European Union. The most important of these directives is “Water Framework Directive (WFD)” which is 23 September 2000 dated and 2000/60/EC numbered (2000). WFD is harmonized in Turkey and completion of river basin management plans in Turkey is planned for 25 basins. There are performed studies in our country within this scope and legislation about “Protection of Water Basins and Preparation of Basin Management Plans” went in effect by published in 17.10.2012 dated and 28444-numbered official gazette. It is aimed that completed river basin management plans for 25 basins until 2023. Approaches related to Biological Monitoring Programmes used in Turkey were examined in this study.

**Material and Methods:** Up to now, published biological monitoring researches and current indices according to WFD using benthic macroinvertebrates in Turkey were examined and compared with studies in European and improved some suggestions about subject.

**Results:** For determination of the ecological quality of surface waters in Europe, Biological Monitoring Working Party (BMWP) and Average Score Per Taxon (ASPT) which are practicability easy besides Saprobic index, Belgium Biotic Index, Trent Biotic Index (TBI), Hilsenhof Biotic Index and Intercalibration metrics (ICMI), Ecological Quality Ratio (EQR) which are frequently used in recent years and some various indices in AQEM and Star projects are used. Some countries were improved index according to richness of aquatic community. Part of biological monitoring studies based on benthic macroinvertebrates in Turkey (with identify family and (or) species level) were applied some indices used in European, mostly used BMWP and ASPT. Although there are some indices that were suggested by Turkish researchers in some river basins, the biggest problem is seen that an index that suitable for own aquatic community diversity of Turkey are still absent. Besides, current indices are not exact suitable for aquatic fauna structure of Turkey. Our country has both river basins having varied different geographical structure and endemism ratio of these basins is quite high. Therefore, firstly aquatic invertebrates fauna of our country are identified at species level and get to improved index (indices) that suitable this structure.

**Keywords:** Macroinvertebrates, Biological monitoring

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## Chemical Constituent of Small Nettle (*Urtica urens*) Seed Oil and Its Cytotoxic Activity

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**Aim of the study:** It is known that some natural products and isolated compounds from these are capable to inhibit cancer cell growth and metastasis by changing several cellular processes including apoptosis. In this regard, there is a growing application of these natural compounds as an alternative medicine treatment of human cancers. *Urtica urens* (Small Stinging Nettle) is the most commonly used plant in alternative and complementary treatment of cancer patients in our country. However, studies in literature showed that there are limited studies investigating the cytotoxic activity and constituents of this plant. Therefore, the present study was aimed to investigate the constituents and cytotoxic activity of small nettle seed oil in human colon cancer cell line (Caco-2).

**Material and Methods:** For this purpose, firstly, oil of dried stinging seeds was obtained by using maceration with hexane. GC/MS analysis was performed on a Agilent Technologies 7890 A model GC system equipped with 5975 C inert MSD with triple-axis detector. The samples were analyzed on a HP5-MS column (60 m x 320 m x 0.25 m). Nitrogen was used as the gas vector. The identification of the compounds was based on comparing the mass spectral data with NIST05a, NIST05b, NIST05c, NIST05d, NIST05e, NIST05f, NIST05g, NIST05h, NIST05i, NIST05j, NIST05k, NIST05l, NIST05m, NIST05n, NIST05o, NIST05p, NIST05q, NIST05r, NIST05s, NIST05t, NIST05u, NIST05v, NIST05w, NIST05x, NIST05y, NIST05z, NIST05aa, NIST05ab, NIST05ac, NIST05ad, NIST05ae, NIST05af, NIST05ag, NIST05ah, NIST05ai, NIST05aj, NIST05ak, NIST05al, NIST05am, NIST05an, NIST05ao, NIST05ap, NIST05aq, NIST05ar, NIST05as, NIST05at, NIST05au, NIST05av, NIST05aw, NIST05ax, NIST05ay, NIST05az, NIST05ba, NIST05bb, NIST05bc, NIST05bd, NIST05be, NIST05bf, NIST05bg, NIST05bh, NIST05bi, NIST05bj, NIST05bk, NIST05bl, NIST05bm, NIST05bn, NIST05bo, NIST05bp, NIST05bq, NIST05br, NIST05bs, NIST05bt, NIST05bu, NIST05bv, NIST05bw, NIST05bx, NIST05by, NIST05bz, NIST05ca, NIST05cb, NIST05cc, NIST05cd, NIST05ce, NIST05cf, NIST05cg, NIST05ch, NIST05ci, NIST05cj, NIST05ck, NIST05cl, NIST05cm, NIST05cn, NIST05co, NIST05cp, 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NIST05zs, NIST05zt, NIST05zu, NIST05zv, NIST05zw, NIST05zx, NIST05zy, NIST05zz.

**Results:** The GC/MS analysis revealed the presence of Hexadecanoic acid, 9,12-Octadecadienoic acid, Octadecanoic acid, Linoleic acid, 9,12-Octadecadienoic acid, Dipalmitin, Linolenic acid, Butyl 9,12-octadecadienoate, beta-Sitosterol were identified in *Urtica urens* seed oil, representing 98.06% of the total oil. In addition to these, the cytotoxicity result was showed that the LD50 value of oil was found 126.15 µg/ml. All those data suggest the hypothesis that the small nettle seeds have promising phytochemicals that may be used in cancer treatment.

**Acknowledgements:** This work is supported by TUBITAK 111T515.

**Keywords:** *Urtica urens*, seed oil, cytotoxic activity, constituents

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## Luteolin Dependent Inhibition of CYP1A1: Application of *in vitro* and *in Silico* Modeling Approaches

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**Aim of the study:** It is well established that plant-derived active compounds are so important for human health due to their diverse biological activities such as anti-carcinogenic effects. These cancer protective activities of these compounds have been attributed to the wide variety of mechanisms including free radical scavenging and modifying xenobiotics enzyme activities including Phase I and Phase II enzymes. Luteolin is one of the compounds that have a series of biological and pharmacological activities, including antioxidants, anti-inflammatory, antibacterial and anticancer activity. One of the possible mechanism by which luteolin may exert their anti-carcinogenic effects is through an interaction by certain CYP450s. In this respect, the aim of this study is to determine the luteolin dependent *in vitro* and *in silico* inhibition mechanisms of CYP1A1, that is known to be involved in the activation of procarcinogens.

**Material and Methods:** Bistronic expression system that coexpresses human CYP1A1 and NADPH CYP450 Reductase was used to investigate this effect. Co-expression plasmid was transformed into *E. coli* DH5alpha. A single colony was selected and grown in overnight culture at 30°C in LB medium. Membrane fractions were prepared and used for enzyme source for inhibition studies. Mechanisms and type of inhibition of CYP1A1 were determined by using luteolin with its different concentration measuring CYP1A1 dependent EROD assay. For *in silico* studies QuteMol, Chimera and AutoDock software were used to identify crucial amino acid residues for the selective inhibition of CYP1A1 by luteolin.

**Results:** Luteolin inhibited ethoxyresorufin O-deethylation (EROD) activity in human P450 1A1 in a dose-dependent manner with IC<sub>50</sub> of 99.05µM. In addition to this, luteolin showed a mixed-type inhibition for a human P450 1A1 enzyme. In silico studies, nine potential binding sites for luteolin were found from the human CYP1A1 heme moiety. Our docking results showed that the ring of luteolin located to the heme moiety of all CYP1A1 formed interaction with Ser444, Val447, Ile449, Phe450, Gly451, Gln411, Arg464, Glu460, Glu445, and Glu369. This results indicated that this phenolic was strong and selective inhibitors of CYP1A1 associated EROD activity and may be considered for use as a strong cancer chemopreventive agent in humans by the preventing malignant transformation and reducing the activations of carcinogens through inhibition of CYP1A1.

**Keywords:** CYP1A1, luteolin, molecular modeling, mechanism of inhibition

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## Essential Oil Composition Analysis and Cytotoxic Activity of *Salvia frigida* Boiss. from Turkey

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**Aim of the study:** *Salvia frigida* Boiss. is a one of the native *Salvia* species to Turkey. It is one of the medicinal plants most frequently used by Turkish people. Locally, dried leaves infusions are prepared a tea. But other parts of the plant are also used in traditional medicine. However, studies in literature showed that there are limited studies investigating the cytotoxic activity of this sage. Therefore, the present study was aimed to investigate the cytotoxic effect of essential oil in human colon cancer cell line. Moreover, chemical composition of *S. frigida*'s essential oil was determined by GC-MS.

**Material and Methods:** *Salvia frigida* were collected from Altınyayla, Burdur, Turkey. Dried sage areal parts were submitted for 4 h to water distillation using a Clevenger apparatus to obtain essential oil. GC-MS analysis was performed on an Agilent Technologies 7820 A model GC system equipped with 5975C inert MSD. The samples were analyzed on a HP5-MS colon. Helium was used as carrier gas. The identification of the compounds was based on comparing the mass spectral data with WILEY and NIST05 libraries and by referring to compounds known in the literature. Essential oil was dissolved in dimethyl sulfoxide (DMSO) at a final concentration of 0.5 % and was applied different concentration to the Caco-2 cells ( $2.5 \times 10^3$  cells/well) for 24 hours. At the end of 24 hours, the survival rate of cell was measured crystal violet test at 630 nm by using ELISA reader. Control group was treated with the medium containing 0.5% DMSO without plant oil.

**Results:** The GC/MS analysis revealed the presence of germacrene D, trans- $\beta$ -caryophyllene and cadinol in *Salvia frigida* essential oil, In addition to these, the cytotoxicity result was showed that the LD50 value of oil was found to be 73.2  $\mu\text{g/ml}$ . All those data suggest the hypothesis that *S. frigida*'s essential oil is relatively cytotoxic to Caco-2 cells and has promising phytochemicals that may be used in cancer treatment. In order to test this hypothesis and to detect the presence of new active substances, activity guided fractionation experiment should be done.

**Acknowledgements:** This work is supported by the Scientific Research Projects Council of Pamukkale University (PAU-ADEP-2018KRM002-013).

**Keywords:** *Salvia frigida*; essential oil; chemical composition; GC-MS; cytotoxic activity, cancer

PP-140

## Determination of Organophosphate and Carbamate: Acetylcholinesterase Immobilization Study

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**Aim of the study:** The overuse of organophosphate and carbamate insecticides is contributing adversely to the environmental health and to ecosystem. Their mechanism of action is by reversible inactivation of the enzyme acetylcholinesterase (AChE), which is essential for nerve function in humans, insects and many other animals. For this reason, AChE based biosensors are being developed for pesticides detection. Various nanomaterials have been used as immobilization matrices for AChE biosensors. In particular, polymeric nanospheres are of interest because of their covalent interactions in enzyme immobilization.

**Material and Methods:** Herein, a new polymer-based nanoparticle has been reported as novel support for the identification of insecticides. For this purpose, the polymer-based nanosphere including azomethine was prepared by reacting of tris(2-aminoethyl)amine, polymer-bound with N-(2-hydroxyethyl)ethylenediamine-N,N',N'-triacetic acid and aminoferrocene by condensation method. Then, the AChE enzyme was immobilized on the polymeric support by means of the adsorption method and the enzymatic properties were investigated. Finally, whether or not there was any interaction between the immobilized enzyme and some organophosphate (diethyl(dimethylthiophosphoryl)succinate, chlorpyrifos-methyl, O,S-dimethylN-acetylphosphoramidothioate) and carbamate (2,3-dihydro-2,2-dimethyl-7-benzofuranolN-methylcarbamate, 4-methylmercapto-3,5-xylolmethylcarbamate, S-methylN-[(methylcarbamoyl)oxy]thioacetimidate) pesticides used against harmful products such as nuts, corn, sugar beets, apples and tobacco, was examined according to changes in the absorbance.

**Results:** The polymer-based nanoparticle was characterized by spectroscopic methods. The apparent kinetic parameters of the immobilized enzyme and free enzyme were compared. The results show that immobilized AChE enzyme become more stable against heat and denaturing agents even different conditions. AChE immobilization had been successfully fabricated for the detection of Phosmet. UV spectra for organophosphate / carbamate insecticides and immobilized-AChE + organophosphate / carbamate insecticides were determined and examined the changes in the absorbance. According to the results, we can say that this support is a good candidate for immobilization of AChE to detection pesticides.

**Acknowledgements:** This work was supported by the Düzce University Research Fund (Project number: 2017.07.06.661).

**Keywords:** Polymer-based nanosphere, acetylcholinesterase, carbamates, organophosphates.

PP-141

## Antigenotoxic Effects and Antimicrobial Activities of Pt(IV)-tagged Polymer Against Pathogenic Microorganisms

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**Aim of the study:** Polymer attached Schiff bases and metal complexes can be used antimicrobial polymers which are candidates for polymeric drugs due to their high biological activity. Antimutagens, a biological term for the compound that eliminates mutation process, can be both synthetic and natural compound. In recent years, there has been an increase in mutation-related diseases, therefore there is a need for new anti-mutagenic agents. Therefore, the purpose of this study was to investigate of polymers including azomethine as antimutagenic and antimicrobial agents.

**Material and Methods:** The synthesis of Pt(IV)-tagged polymer including azomethine (Pt<sup>4+</sup>L<sub>Cl</sub>) and the enzymatic properties of glucose oxidase enzyme (GOx) were reported by us [5]. Herein, we have investigated of antibacterial and antifungal activities of this compound against some pathogenic microorganisms and have examined the antimutagenic properties. As a first step, Pt<sup>4+</sup>L<sub>Cl</sub> was prepared from (aminomethyl)polystyrene, terephthaldehyde and 2-amino-4-chlorophenol with PtCl<sub>4</sub> by template method. Then, Pt<sup>4+</sup>L<sub>Cl</sub> was screened *in vitro* for antimicrobial activity against pathogenic strains gram positive; *Listeria monocytogenes 4b*, *Salmonellatyphi H*, *Bacillus cereus sp.*, gram negative; *Staphylococcus epidermis*, *Micrococcus luteus*, *Escherichia coli*, *Staphylococcus aureus*, *Brucella abortus*, *Proteus vulgaris*, *Klebsiella pneumoniae* and antifungal activity against *Candida albicans*. It was also compared with five commercial antibiotics. Finally, the antimutagenic effects of Pt<sup>4+</sup>L<sub>Cl</sub> was investigated against sodium azide in human lymphocyte cells by micronuclei and sister chromatid exchange tests. Results: Pt<sup>4+</sup>L<sub>Cl</sub> was exhibited varying degree of inhibitory effects on the growth of different tested pathogenic strains. Pt<sup>4+</sup>L<sub>Cl</sub> examined for antimutagenic properties against NaN<sub>3</sub>. According to in the obtained results, it has been determined that Pt<sup>4+</sup>L<sub>Cl</sub> has antigenotoxic properties.

**Acknowledgements:** We thank the above mentioned universities for equipment supporting.

**Keywords:** Pt(IV)-tagged polymer, antimutagenic effect, antimicrobial activity.

PP-142

**Anatomical and palynological features of *Cousinia stenocephala* Boiss. (Section, Stenocephalae Bunge., Asteraceae)**

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**Aim of the study:** In this study goals to investigate the anatomical and palynological properties of *C. stenocephala* Boiss. species belonging section Stenocephalae, to determine and to evaluate the usefulness of these characters for systematic purposes.

**Material and Methods:** The plant specimens were collected from type locality in Turkey. The specimens have been deposited in Selcuk University Herbarium (KNYA). 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 stems and leaves. The specimens were embedded in paraffin wax and then sectioned between 5 and 10 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 binocular light microscope with a Leica DFC280 camera. For 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:** Taxonomical significance were observed from transverse sections of leaves such as size of vascular tissue, shape and number of vascular bundle. 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 stenocephala* has 6-10 layers cortex cells. In leaves transverse section, It has a single layer upper and lower epidermis cells, and also it has 2 layers palisade and 2 layers spongy parenchyma. Pollen shape of *C. stenocephala* is subprolate. Aperture types of *C. stenocephala* is tricolporate. As a result of SEM studies, pollen ornamentation was determined as verrucos-perforate.

**Acknowledgements:** We would like to thank the curators of herbaria AEF, ANK, E, G, GAZI, HUB, ISTE, ISTF, K and LE for permitting the examination of *Cousinia* specimens. We also thank to "TÜBİTAK: TBAG-111T364"

**Keywords:** Asteraceae, *Cousinia stenocephala*, Anatomy, Palynology

PP-143

## Morphometric Analysis of *Bactrocera oleae* (Diptera: Tephritidae) Populations in Turkey

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**Aim of the study:** The olive fly, *Bactrocera oleae* (Gmelin) (Diptera: Tephritidae), is a major insect pest of olive crops worldwide. The spread of this species is limited to areas where cultivated and wild olive trees are grown. Even though it is pervasive along the Mediterranean basin and Middle East, the existing distribution of the species includes Central and South Africa, California, and Central America. The olive fly causes considerable quantitative and qualitative damage in the production of table olives and oil. Insect wing morphology has been used in many studies to describe variations among species. The aim of this study was to identify the effectiveness of standard morphometry for discriminating olive fly populations.

**Material and Methods:** The olive fly samples were collected from 10 provinces of Turkey. The left wing of each worker (total 274 wings) was dissected. The wings of slide-mounted specimens were digitized using a Leica MZ16 stereomicroscope with an attached Leica DFC320 digital camera system. Standard morphometry was based on 8 angles. Canonical Discriminant Function Analyses (CDFA) were performed for the analysis of morphometric data. In this way, the groupings of the populations are visualized. SPSS 20 (IBM statistic) program was used for this analysis. Canonical variance analysis (CVA) and multivariate analysis of variance (MANOVA) were performed using the PAST 2 program.

**Results:** Our CDFA and CVA results showed that there is no geographical differentiation among studied populations. But Adana population seems to be a little separated from the others. First four eigen values of CVA explained 88.28 % of total variation. The distance values ranged between 5,34 and 0,14. CVA scatter plot and the dendrogram based on the Mahalanobis distance did not show any clear geographic groupings. The East-West differentiation observed in previous studies using different markers was not observed in this study based on morphometric method.

**Acknowledgements:** This study was financially supported by the Scientific and Technological Research Council of Turkey (TUBITAK-TBAG), project number 110T190, and Muğla Sıtkı Koçman University Scientific Research Funds (MUBAP- 2012/46).

**Keywords:** *Bactrocera oleae*, Olive fly, Morphometry, Turkey

PP-144

## **An Economic Work of Drawing the Flowers of *Tulipa humilis* Herb. (Liliaceae) on Ceramic**

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**Aim of the study:** To create ornamental economic material by drawing the flowers of *Tulipa humilis* Herb. which is from Liliaceae family and creating different kinds of figures and shapes on ceramics.

**Material and Methods:** The plant material of *Tulipa humilis* was collected from Sille Konya and dried according to the common herbarium techniques. In the natural setting, photographs from different angles were taken. Latin scientific names of the dried sample was identified with the help of the Flora of Turkey. Using tile mud material, the tulip patterns were painted with the backing technique. Then it was covered with transparent glaze and baked at 920 °C in the oven and so the ornamental material was prepared.

**Results:** The ornaments were created by drawing the flowers of *Tulipa humilis* on ceramic. Thus, an economic product was created by the ornaments of a plant. This work will contribute to both awareness of biodiversity of the region and ecotourism activities.

**Keywords:** Liliaceae, *Tulipa humilis*, ceramic, ornaments.

PP-145

## Using Cryotherapy Techniques to Obtain Apple Mosaic Virus-Free *Corylus avellana* L.

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**Aim of the study:** Plant viruses cause major losses to several agricultural and horticultural crops around the world. Unlike other plant pathogens, there are no direct methods available yet to control viruses and, consequently, the current measures rely on indirect tactics to manage the viral diseases. Hence, methods for detection and elimination of viruses, both in plants and vectors, play a critical role in virus disease management. Cryotherapy is a new method for pathogen eradication based on cryopreservation techniques. In this technique, plant pathogens such as viruses, phytoplasms and bacteria are eradicated from shoot tips by exposing them briefly to liquid nitrogen. Uneven distribution of viruses and obligate vasculature-limited microbes in shoot tips allows elimination of the infected cells by injuring them with the cryo-treatment and regeneration of healthy shoots from the surviving pathogen-free meristematic cells. The aim of this work was to develop an efficient procedure for ApMV- free hazelnut via cryotherapy techniques and confirmation of virus free plants via RT-PCR technique.

**Material and Methods:** 0.5-0.1mm hazelnut shoot tips were cold-hardened at 4°C for 1 week and pre-cultured for 24h on semisolid MS medium containing 0.625M sucrose. All shoot tips were then placed in 3-5µL PVS2 drops on sterile aluminum foil strips and kept on ice for 30-75 min. Following treatment with PVS2, the aluminium foil strips were directly immersed into LN. Rewarming was done after a minimum of 24h LN exposure by rapidly removing the aluminum foil strips from the cryovials and immediately immersing them into washing solution (plant growth regulator-free liquid MS medium containing 1 M sucrose) at 25 ± 2°C for 15 min prior to transferring the shoot tips onto MS regeneration medium. Total RNA of hazelnut cultivars was extracted according to lithium chloride-based protocol. The reverse transcriptase (RT) PCR reactions were performed following a single non-interrupted thermal cycling programme. Each reaction contained the RNA template (50 ng); primers (20 pmol µl<sup>-1</sup>), dNTP (0,4mM); MgCl<sub>2</sub> (1,5mM); 2,5 µl reaction buffer (1x). 1 unit of Taq DNA polymerase and 20 unit RT. The total volume of 25 µl was subjected to the following program: 30 min at 42 °C, 3 min 95 °C, then 40 cycles of 92 °C for 30 sec, 54 °C for 30 sec, and 72 for 1 min and finally 5 min at 72 °C. PCR products were electrophoresed in a 1.5 % agarose gel and stained with ethidium bromide.

**Results:** Apple Mosaic Viruses were tried to eliminate from in vitro hazelnut cultures using two different cryogenic protocols, i.e., vitrification and droplet-vitrification in the present study. Results showed that APMV could be efficiently eliminated by cryogenic treatments with 86% and 95% of frequencies of virus-free plantlets obtained for the former and latter, respectively.

**Acknowledgements:** This study was supported by the Mugla Sitki Kocman University Scientific Research Projects Coordination Unit (Mugla, Turkey, MSKU-BAP 17/057). The Republic of Turkey Ministry of Food, Agriculture, and Livestock is acknowledged for providing the plant material.

**Keywords:** *Apple Mosaic Viruse* (ApMV), Cryotherapy, Hazelnut, RT-PCR.

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**Chromosomes of Hybrid (*O. × sevcaniae*) and Ancestral Species (*O. vogelii* and *O. vulgare* subsp. *hirtum*) of the genus *Origanum* (Lamiaceae)**

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**Aim of the study:** Karyological study needs to be used in conjunction with other sources of data to achieve a better understanding of the cytological relationships of *Origanum* L. taxa, leading to their plant classification. In this regard, chromosomes were determined in hybrid and parental species of *Origanum* naturally growing in Turkey, and cytological attributes of selected taxa were evaluated for the first time.

**Material and Methods:** All samples were collected from wild populations from Turkey. Collected specimens were deposited in Balıkesir University. All cytological observations were carried out on root tips. Root-tip meristems were provided from seed by germinating them on wet filter paper in Petri dishes at room temperature. Firstly root tips pretreated for 16 h in  $\alpha$ -monobromonaphthalene at 4°C, fixed in 3:1 absolute alcohol/glacial acetic acid, then the root tips were hydrolyzed with 1 N HCl for 12 min at room temperature and stained with 2% aceto-orcein for 3 h at room temperature. Stained root tips were squashed in a drop of 45% acetic acid and permanent slides were made by mounting in Depex. For karyotype analysis the photographs enlarged 10 ×100 were taken using a microscope with a camera attachment. The chromosome counts were measured by Software Image Analyses (Bs200ProP) loaded on a personal computer.

**Results:** According to the karyological results, *Origanum × sevcaniae* (*Origanum vogelii × Origanum vulgare* subsp. *hirtum*) have a similar somatic chromosome number, which is  $n=15$  for the haplotype. Chromosome analyses support that *Origanum × sevcaniae* is a natural hybrid that is generated from crossed homoploidy of *O. vogelii* and *O. vulgare* subsp. *hirtum*, which means that the hybrid taxon is generated by homoploid hybridization (all taxa have  $2n = 30$  chromosomes).

**Acknowledgements:** We express our gratitude for financial support provided by TUBITAK (Project no. 113Z225).

**Keywords:** Chromosome, *Origanum × sevcaniae*, Turkey

PP-147

**Chromosomes of Hybrid (*O. × aytacii*) and Ancestral Species (*O. sipyleum* and *O. vulgare* subsp. *hirtum*) of the genus *Origanum* (Lamiaceae)**

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**Aim of the study:** The main objectives intended to be resolved with this study were following: 1) to identify chromosome counts; 2) to examine the cytological characters of the *O. × aytacii*, *O. sipyleum*, and *O. vulgare* subsp. *hirtum*; 3) to clarify the hybridization hypothesis of the *O. × aytacii* hybrid.

**Material and Methods:** All samples were collected from wild populations from Turkey. Collected specimens were deposited in Balıkesir University. All cytological observations were carried out on root tips. Root-tip meristems were provided from seed by germinating them on wet filter paper in Petri dishes at room temperature. Firstly root tips pretreated for 16 h in  $\alpha$ -monobromonaphthalene at 4°C, fixed in 3:1 absolute alcohol/glacial acetic acid, then the root tips were hydrolyzed with 1 N HCl for 12 min at room temperature and stained with 2% aceto-orcein for 3 h at room temperature. Stained root tips were squashed in a drop of 45% acetic acid and permanent slides were made by mounting in Depex. For karyotype analysis the photographs enlarged 10 ×100 were taken using a microscope with a camera attachment. The chromosome counts were measured by Software Image Analyses (Bs200ProP) loaded on a personal computer.

**Results:** According to the karyological results, *Origanum × aytacii* (*Origanum sipyleum × Origanum vulgare* subsp. *hirtum*) have similar somatic chromosome number, which is  $n=15$  for the haplotype. Chromosome analyses support that *Origanum × aytacii* is a natural hybrid that is generated from crossed homoploidy of *O. sipyleum* and *O. vulgare* subsp. *hirtum*, which means that the hybrid taxon is generated by homoploid hybridization (all taxa have  $2n = 30$  chromosomes).

**Acknowledgements:** We express our gratitude for financial support provided by TUBITAK (Project no. 113Z225).

**Keywords:** Chromosome, *Origanum × aytacii*, Turkey

**The Fruit and Seed Volatile Oil Content of *Alcea apterocarpa* (Fenzl) Boiss.**

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**Aim of the study:** *Alcea* L. genus, a member of Malvaceae family, is native to Mediterranean regions and Central Asia. Many of the plants of the genus have ethnobotanical and biological properties related to antiviral, anti-inflammatory, diuretic and antimicrobial activity. *Alcea apterocarpa* (Fenzl) Boiss is the endemic plant for flora of Turkey and the decoction of this plant is used in folk medicine against urinary system and pulmonary disorders also kidney stones. The purpose of this study to determine the volatile oil content of *A. apterocarpa* fruit and seed via solid phase micro-extraction/gas chromatography/mass spectrometry (SPME-GC-MS).

**Material and Methods:** The plant samples collected from Selçuk University campus area. Fruits and seeds were dried at room temperature without sun light. Dried and powdered samples were used directly. Two SPME fibers, 65 µm PDMS/DVB and 85 µm polyacrylate were preferred for analysis. SPME procedure were analysed on a Shimadzu QP2010 ULTRA FID GC-MS system. Analyses were performed triplicate.

**Results:** The volatile oil compositions were identified in *Alcea* samples by SPME-GC/MS analysis using two different fibers. Totally 119 compound were separated and identified from the studied samples. With 65 µm PDMS/DVB fiber, the major components of fruit specimen; cyclodecanol (73.22 %) and 1, 2-Nonadiene (5.73 %) and for seed specimen; o-Cymene (15.22 %) and L-Linalool (12.86 %) respectively. With 85 µm polyacrylate fiber, the major components of fruit specimen; Benzene, 2,4-diisocyanato-1-methyl (35.33 %) and 1-Decyne (18.39 %) and for seed specimen Benzene, 2, 4-diisocyanato-1-methyl (41.26 %) and Pyrrole-3-carbonitrile, 5-formyl-2, 4-dimethyl (18.55 %). In conclusion, the comparative volatile oil composition of *A. apterocarpa* fruits and seeds were revealed via SPME method for the first time with this study.

**Keywords:** SPME-GC-MS, Gülfatma, Turkey.

## Effects of the Stem and Leaf Extracts of *Urtica dioica* L. on Some Microorganisms

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**Aim of study:** Nettle is a plant that has been used since ancient times. Stinging nettle has many beneficial effects such as good resistance to muscle and joint pain and anemia, protection against prostate cancer, immunity enhancement, diuretic and edema reducer and cell renewal. Side effects such as pruritus and allergies can occur when the bare hand is touched by the leaf. For this reason, it is necessary to collect with gloves. In many countries, it is used cosmetically as stinging nettle shampoo, oil, soap, and cream. In this study, the antimicrobial effects of the stem and leaf extracts of *Urtica dioica* L. were examined against some microorganisms.

**Material and Methods:** Plant stem and leaf were reduced to powder with liquid nitrogen. Ten grams of this material was added separately in 100 mL of n-propanol, ethanol, methanol, boiled water and acetone. Then the mixtures were agitated for a period of 72 hours. They were filtered with Whatman no 389 filter paper. Under aseptic conditions the extracts were filtered through 0.45µ-pore size diameter filters and stored at 4°C. The agar well diffusion method is used for the antimicrobial activity of extracts.

**Results:** The leaf extracts of the n-propanol, ethanol, methanol and acetone of *Urtica dioica* L. was found to be most effective against tested microorganisms while the leaf extracts of the boiled water never showed against used microorganisms. The leaf extracts of the n-propanol, ethanol, methanol and acetone of *Urtica dioica* L. showed high effect (12-16 mm) against *Bacillus cereus* ATCC 11778, *Bacillus subtilis* ATCC 6633, *Micrococcus luteus* ATCC 9341 and *Pseudomonas aeruginosa* ATCC 35032 but they showed low effect (9-10 mm) against used yeasts. The stem extracts of the n-propanol, ethanol, boiled water and acetone of *Urtica dioica* L. showed moderate effect (11-12 mm) against *Bacillus cereus* ATCC 11778, *Candida utilis* ATCC 9950, *Candida tropicalis*, *Bacillus subtilis* ATCC 6633, *Mycobacterium smegmatis* ATCC 607, *Proteus vulgaris* ATCC 33420. Consequently, the leaf extracts of *Urtica dioica* L. was found to be more effective than stem extracts.

**Acknowledgments:** This study was carried out at the Microbiology Laboratory of Biology Department, Faculty of Science and Letters, Adnan Menderes University.

**Keywords:** *Urtica dioica* L., antimicrobial effect, agar disk diffusion method

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## Biodiversity of Bacteria Isolated from Oil-Contaminated Soil

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**Aim of the study:** The substances contained in petroleum and petroleum products are complex compounds containing heavy metals. The degenerate and decomposition of these compounds is very difficult. Physical and chemical changes occur in soil where oil contamination occurs. So the microbial flora of the soil changes completely. The classical taxonomy to determine microbial flora may not be sufficient and reliable. For this reason, molecular identification needs to be performed. The aim of this study was to determine the bacterial biodiversity of oil-contaminated soil using 16S rRNA analysis.

**Material and Methods:** The oil-contaminated soil samples were collected from the villages of Aydın. Bacterial growth was realized on Nutrient Agar at 37°C for 24-48 h. After incubation each different colony were isolated and stocked in skim milk. For molecular identification DNA isolation of the samples were made according to De Boer and Ward (1995). After isolations DNA concentration and purity was measured with nanodrop spectrometer (Thermo Scientific). 16S rRNA PCR reactions were carried out at initial denaturation 95°C 5 min, denaturation 94°C 40 sec, annealing 50°C 40 sec, extension 72°C 40 sec with 35 cycles and final extension at 72°C 10dk. Reagents concentrations were 10X Taq Buffer, 0.5M dNTP mix, 10 pM from each primer, 7.5 mM MgCl<sub>2</sub> and 1U Taq polymerase with the final volume of 25 µl. PCR products were sent to the sequencing (GATC BioTech, Germany) after electrophoresis at 1.4% agarose gel at 90 V 40 min.

**Results:** In this study, a total of 32 samples were isolated from oil-contaminated soil. According to the morphological characterization, 31 of these samples were found to be Gram-negative rod shaped bacteria, 1 of these samples was found to be Gram-positive coc shaped bacteria. PCR results of these samples were sent to the sequencing (GATC BioTech, Germany). Molecular identification was made by comparing sequence results with Genbank using BLASTn software. Consequently, *Ralstonia* sp., *Pseudomonas* sp., *Acinetobacter* sp. and *Staphylococcus* sp. were obtained.

**Acknowledgements:** This study was carried out at Adnan Menderes University Biology Department Microbiology Laboratory.

**Keywords:** Soil, Bacteria, Biodiversity, 16S rRNA

PP-151

## The Contribution of Molecular Analyzes to Macrofungal Systematics in Turkey

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**Aim of the study:** Macrofungal taxonomic studies in our country, to our knowledge, dates back to the date as early as 1852 and the studies have continually increased since then. Classical taxonomy methods utilized by a number of mycologists have played instrumental and significant roles in defining the macrofungal diversity of Turkey, which is a country having unique and a variety of rich habitats. The goal is to accelerate the finding of the new records and taxons in order to fully realize the biodiversity of mushrooms. Although the classical efforts towards approaching that realization are certainly noteworthy and appreciated, we point out the need that the pace and accuracy should be accelerated and improved to create relatively the most comprehensive checklist and catalogue of the macrofungi of Turkey within the boundaries of taxonomic hierarchy.

**Results:** Saprophytic, parasitic or mycorrhizal macrofungi in the ecosystem and its contributions to the material cycle have been known for centuries. Some mushrooms are poisonous, while others may have the economic or medical importance. So, accurate identification of the specimen is crucial not only from the perspective of biodiversity value. There are simply several obstacles and limitations in order to identify mushroom species correctly and quickly. First, it is not possible to be an expert in identifying all of the macrofungi species, considering the number is currently approaching around 2000 in Turkey and the assumption for Europe is over 15000. Although, the collaborations among the specialized mycologists overcome the difficulty to some degree, a more independent and convenient approach is needed. The misidentifications at times and confusion in the taxonomic publications and databases are clearly evident to all. Second, sometimes morphological identification is not possible, basically due partly to the lack of spores and other traits or the fact that the nature of some parameters such as odor and color vary from person to person or from one geographic region to another. We argue that there must be another robust way that should be integrated as an aid and additional verification to the taxonomic efforts in Turkey. We suggest that the gene sequence of at least one barcode gene such as ITS (internal transcribed species), 28SrRNA (large subunit ribosomal subunit region) and/or 18SrRNA (small subunit ribosomal subunit region) should be considered and included in the publications of new records and surveillance studies. This, perhaps, should be advised, required, or enforced by some journals in the field in Turkey. In the future, a list of all the mushroom species found in Turkey should be made available online to the scientific world and the public including the pictures, geographic details such as GPS coordinates, the taxonomic features, identification keys as well as gene sequences and phylogenetic trees. A consortium or a platform should be established by the interested parties including the mycologists, molecular biologists, bioinformatics experts, government (non-government) officials, local mushroom "hunters" and university representatives. For this reason, firstly in this study, we aim to find out the current status of molecular studies regarding mushroom identification in Turkey by reviewing the relevant publications since the year 2000, projects and providing examples from our own experience. In this context, the contribution of the molecular systematic methods and the problems encountered will be discussed in more than one way.

**Acknowledgements:** We would like to thank all mycologists who have contributed to classical or molecular systematic methods.

**Keywords:** Macrofungi, Molecular Analysis, Taxonomy, Turkey.

PP-152

**Determination of Toxic Element Levels in Commonly Consumed Medicinal Plants by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS)**

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**Aim of the study:** Trace elements have important roles in plant metabolism and biosyntheses as cofactors for the enzymes. Medicinal plants are widely used in treatment of human diseases and pain relief due to their low side effects. However, some medicinal plants may cause health risks because of including toxic elements. The contamination may be result of the environmental pollution. For example, high levels of arsenic can be caused of the usage of pesticides and fertilizers. Plants are one of the most important medium for passage of trace elements from soil to human body. Accordingly, the quality controls of these medicinal plants are important in terms of trace element content.

**Material and Methods:** In the current study, metal analysis were applied to leaves and fruits of plant tea samples purchased from Diyarbakir herbalists such as mint, sage, chamomile, linden. The plant samples were dried at 105°C in an oven, and transferred and left in desiccator before starting to analysis. The powdered samples (200 mg/sample) were digested with concentrated HNO<sub>3</sub> (6 mL/sample) and H<sub>2</sub>O<sub>2</sub> (2 mL/sample) by using a microwave system. Then, the cooled and digested samples were transferred from polytetrafluorethylene (PTFE) tubes to volumetric flasks and completed to 25 mL with ultrapure deionized water. The concentrations of lead and cadmium metals were investigated by inductively coupled plasma mass spectrometry (ICP-MS).

**Results:** In order to verify the accuracy of the method, CRM1573a Tomato Leaves Certified Reference Material was employed. The results from the analysis of CRM were all within the 95% reliability limit. In the raw herbal plant materials, the toxicity limits for lead and cadmium were reported by WHO as 10.0 and 0.3 ppm, respectively. According to the obtained results in the present study, the concentrations of Pb and Cd are within the limits determined by WHO.

**Keywords:** Medicinal plants, ICP-MS, Cadmium, Lead.

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### Determination of Metal Content of Clay Masks by ICP-MS

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**Aim of the study:** The use of minerals for medicinal purposes is almost as old as mankind itself. Clay minerals used in pharmaceutical formulations are: smectites, palygorskite, kaolinite and talc. These minerals can act as active principles or excipients. The properties for which they are used in pharmaceutical formulations are fundamentally: a high specific area and sorptive capacity, rheological properties, chemical inertness and low or null toxicity for the patient. It is aimed to determine the metal contents of the people used by the people.

**Material and Methods:** In this study, 11 clay masks from Diyarbakır province, both local and different brands, were provided commercially from the market. 1.0 g. clay samples were treated with nitric acid-hydrochloric acid mixture (1:3) in closed vessels in a microwave oven system. Trace element analyses were carried out by using inductively coupled plasma-mass spectrometry (ICP-MS) technique.

**Results:** In the analyzes made, it was found that the Fe element was in the level of 19,82-7,61 mg kg<sup>-1</sup> in all samples. In the analyzes made, it is a pleasure to note that toxic metals such as Pb and Cd remain under LOD in many instances.

**Keywords:** Clay Mask, Iron, Lead, Cadmium, Analysis, ICP-MS.

PP-154

## **Molecular Investigation of Bovine Leukemia Viruses from Cattle in Turkey**

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**Aim of the study:** Bovine leukemia virus (BLV) is a retrovirus which belongs to the genus Deltaretrovirus of the family Retroviridae. BLV is known as the etiological agent of Enzootic bovine leukosis (EBL) and often affects dairy cattle. The BLV envelope (env) glycoprotein is the primary target of neutralizing antibodies. To date, ten genotypes of BLV have been identified based on the genetic characterization of the envelope surface glycoprotein (gp51) which is encoded by env gene together with transmembrane protein (gp30). The aim of this study is to investigate BLV genotype(s) from cattle housed different herds in Turkey.

**Material and Methods:** In this study, 55 retrospective blood samples, which were determined as positive by using BLV antibody detection kit (ELISA) were used. These samples were received to our laboratory from 4 different organized farms, at 2012 and 2016. All samples subjected to nested PCR by using the primers targeting the env gene as suggested by OIE terrestrial manual. The products with the expected size were sequenced and phylogenetic analysis was conducted using the MEGA software (version 6.0).

**Results:** The results of the PCRs showed that among the 55 blood samples with BLV antibodies, 35 were gave expected size amplicons. Of them 10 were sequenced, yet. The sequencing data indicated that all these BLV strains clustered in the genotype 1 in the phylogenetic tree. Further studies on the genotype characterization will lead to understand which genotypes circulating in our country. Considering the importance of importation in our country, these studies will reveal what BLV genotypes were introduced from where or how.

**Keywords:** BLV, cattle, genotype

PP-155

## The Phytoplankton Community of Beymelek Lagoon (Antalya, Turkey)

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**Aim of the study:** The algae that occur the basis of the food chain and provide the primary production of the organic matter must be well known in order to meet the nutrient needs and in particular to ensure the sustainability of aquatic ecosystems that are considered as a source of nutrients. The aim of this study is to evaluate phytoplankton composition and their seasonal changes in Beymelek Lagoon, and in Kaynak Lake which feeds the lagoon.

**Material and Methods:** The study was conducted six stations of Beymelek Lagoon and at three stations of Lake Kaynak between February 2006 and January 2007. Phytoplankton samples were collected by a plankton net (diameter 17 cm and 60 µm mesh size) with horizontally and fixed with 4% formaldehyde solution. For diagnostic, John et al., 2003; Lebour, 1978; Pankow, 1976; Tomas, 1997 were used. Water Quality parameters (temperature, pH, salinity and dissolved oxygen) were measured in situ with YSI dissolved oxygen meter and YSI pH meter.

**Results:** A total of 46 taxa were identified 9 taxa belong to Cyanophyta, 6 to Dinophyta, 23 to Bacillariophyta, 8 to Chlorophyta. Bacillariophyta was dominant groups in every season. Number of taxa was found higher in spring than in other seasons. *Aphonacapsa littoralis*, *Merismopedia elegans*, *Microcystis spp.*, *Oscillatoria sp.*, *Cyclotella sp.*, *Navicula sp.*, *Pleurosigma sp.*, *Peridinium sp.*, *Synedra spp.*, *Surirella sp.*, *Licmophora abbreviata*, *Melosira spp.* and *Prorocentrum spp.* were observed in every season during the study period. Other taxa were observed only in one or two seasons. Beymelek Lagoon comprised a mixture of marine, freshwater and brackish water taxa. Kaynak Lake comprised freshwater and brackish water taxa. According to season, mean values of water temperature in Beymelek Lagoon and Kaynak Lake were between 14.42 and 29.02°C, and 15.3 and 21.26°C, respectively. pH values in Beymelek Lagoon and Kaynak Lake were between 7.76 and 7.99 and 7.36 and 7.52, respectively. Salinity varied from ‰12.64 to ‰13.97 in Beymelek Lagoon and from ‰8.17 to ‰8.68 in Kaynak Lake. Dissolved oxygen in Beymelek Lagoon and Kaynak Lake varied from 8.22 to 9.02 and from 6.89 to 8.57, respectively. Although the species of algae with harmful algae potency such as *Microcystis aeruginosa*, *Peridinium sp* and *Prorocentrum micans* were found in the field of study, no living deaths were observed due to the increase of algae during study period. These species with toxic characteristics should be monitored and whether these species produce toxins should also be investigated in future studies.

**Acknowledgements:** The study was supported by the Republic of Turkey Ministry of Food, Agriculture and Livestock, General Directorate of Agricultural Research and Policies (TAGEM) (Project No: TAGEM/HAYSUD/2002/09/02/05).

**Keywords:** Phytoplankton, seasonal variation, Beymelek Lagoon, Turkey

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## Determination of *Culicoides* Species Thought to Carry Some Arboviruses in the Eastern Mediterranean Region

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**Aim of the study:** *Culicoides* spp. are insect vectors of fairly importance in veterinary medicine, particularly for their role in the transmission of the African horse sickness virus, bluetongue virus (BTV), Simbu serogroup of Orthobunyaviruses (Akabane virus (AKAV), Schmallenberg virus (SBV), Aino), Bovine Ephemeral Fever (BEF), Epizootic Haemorrhagic Disease (EHD) etc. These infections of livestock are distinctly seasonal (late summer and fall) in the temperate region once are transmitted biologically by certain species of *Culicoides* midges that consequently show maximum activity in high temperature and humidity. The epidemiology of these viruses is closely related to the presence of competent *Culicoides* vectors for their transmission and susceptible ruminant hosts that allow sufficient virus replication to provide an infectious blood meal to the insect vector. All these infections are known to have caused abortus and/or outbreaks of congenital malformations in cattle, sheep and goats. Given the background, in this study, we planned to catch and identify *Culicoides* spp. believed to carry some arboviruses and to determine some arboviruses to carry these *Culicoides* by molecular techniques in the Eastern Mediterranean Region.

**Material and Methods:** This study was conducted during 2015 and 2017 in herds reported abortus and/or outbreaks of congenital malformations in Hatay, Kahramanmaraş and Osmaniye provinces in the Eastern Mediterranean region of Turkey. This region has ideal climatic conditions for the survival and proliferation of *Culicoides* spp. Onderstepoort type light traps were set up to collect *Culicoides*, were caught and identified using stereomicroscope. Later, *Culicoides* were homogenated and constituted pools of 100 flies. RT-PCR assays were used to detect viral RNAs of AKAV, SBV, BTV, Aino, BEF and EHD in *Culicoides* samples. The PCR products were sequenced by a commercial company (MedSanTek, Ankara) automatic sequence analyser (CEQ 8000; Beckman Coulter, Brea, CA, United States). Sequence editing and multiple alignments were performed with the publicly available Bioedit software package version 7.0.9.0. Phylogenetic analysis (Neighbour-Joining) with bootstrap analysis (1000 replicates, 111 random seeds) and Kimura 2-parameter correction was conducted by using the MEGA (Molecular Evolutionary Genetics Analysis) software package version 6.0.

**Results:** Eleven different *Culicoides* species were detected in the area and *C. schultzei* was found as the dominant species. Although BTV, SBV, EHD, Aino viral nucleic acids were not detected in the collected *Culicoides*, AKAV viral nucleic acid was detected in *C. schultzei*, *C. longipennis* and *C. circumscriptus* species. The sequence analysis of the species of *Culicoides* in AKAV positive pools showed that they belong to Genotype II and Genotype Ib groups of AKAV. *C. schultzei*, *C. longipennis* and *C. circumscriptus* were proposed as a possible vectors of AKAV infection in this region. In addition, BEF viral RNA was detected in *C. circumscriptus* and *C. imicola* species.

**Acknowledgements:** Investigation of the epidemiology of some arboviral infections (Akabane virus Mavidil virus and Schmallenberg virus) in ruminants in Hatay, Osmaniye and Kahramanmaraş in Eastern Mediterranean Region and determination of possible vectors, Scientific Research Projects Coordination Unit of Ankara University, No:15B0239007.

**Keywords:** arboviruses, *Culicoides*, Eastern Mediterranean region of Turkey, PCR.  
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### **Morphological Identification of Orange Citrus Germplasm from South-West of Turkey**

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**Aim of the study:** Citrus species are the most important fruit groups for Turkey in view of production and export quantities. Orange (*Citrus sinensis*) is the first species among *Citrus* with high level of production. Mediterranean basin of Turkey has quite favorable ecological conditions for production of quality edible citrus. It is important to evaluate well-adapted, productive and good fruit quality varieties for optimal growing. The objective of this study was to characterized orange citrus varieties from Antalya by morphological analysis.

**Materials and Methods:** Seventeen orange varieties, have not been previously characterized, were evaluated by morphological and agronomical traits of leaves, flowers, fruits and trees based on IPGRI. Evaluated trees belong to the genetic resource collection of Bati Akdeniz Agricultural Research Institute (BATEM), in Antalya (Turkey), at 36° 52' N and 30° 43' E latitude. The experimental plot altitude is about 37 m. Sweet orange orchard had a typical Mediterranean climate, and soil had alkaline reaction, calcareous, unsalted, and rich in phosphorus. Sixty-eight trees had been evaluated belonging to 17 different orange citrus varieties from the plantation. Randomly collected leaves, flowers and fruits from each replicate tree were characterized based on the Descriptors for Citrus of the International Plant Genetic Resources Institute (IPGR, 1999).

**Results:** Particular variability was observed among varieties by the analysis of 23 quantitative and 19 qualitative morphological characters of leaves, flowers and trees. Flowering period was observed during April. All the orange citrus trees had evergreen vegetative life cycle with erect growth habit. Classification for density of spines was as: 11 sparse, 4 of them intermediate and 2 absent. The leaves of all trail varieties had simple and petiole wing. Leaf lamina shape was observed as: 10 ovate, 6 elliptic and 1 obovate. All varieties had hermaphrodite flower type with white petals, yellow anthers, 19-23 stamens and 1 pistil. While 3 varieties had rich pollen, 14 of them were normal. All trail fruit were appropriate for fresh fruit consumption, and orange cultivars were classified into three groups: blood orange (10), sweet orange (6) and low acidity (1). Especially seedless fruit are desired quality characteristics for orange citrus. Five varieties were defined as commercial seedless in Antalya. These results might be considered as a valuable reference for forthcoming studies on morphological characteristics of oranges when they are evaluated as a commercial production or parentage material for breeding. In addition, it has been observed that the orange varieties, budded on *C. aurantium* L, are able to maintain their commercial significance even in advanced ages under appropriate cultural conditions.

**Acknowledgement:** Thanks to The Scientific Research Projects Coordination Unit of Süleyman Demirel University for their financial support (Project No: 4641-YL1-16).

**Keywords:** *Citrus*, morphological diversity, qualitative and quantitative characters.

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## Extraction of the Natural Antioxidants and Coloring Agents from Agricultural by Products by Novel Technologies

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**Aim of the study:** The majority of agricultural by products such as grape pomace, olive leaves, spaghetti squash has been utilized as animal feed and fertilizers. However, these products contain some nutritive components such as antioxidants, anthocyanins and carotenoids which can be valorized when added into the foods or used for the purpose of functional food production. This review covers the general aspects of several novel extraction methods relying on different process parameters such as temperature, pressure, time, solid-liquid ratio, and particle size. It also aims to compare the major benefits and drawbacks of these techniques in terms of energy and installation costs, extraction yield, conformance to industrial applications and environmental concern.

**Material and Methods:** In this review seven novel extraction methods are evaluated which include ultrasound assisted extraction, microwave assisted extraction, pulsed electric field extraction, enzyme assisted extraction, supercritical fluid extraction, accelerated solvent extraction and high hydrostatic pressure extraction. This paper reveals the most favorable features of each method with respect to the type of the target components present in agricultural by products. In addition, it represents some examples of extraction systems utilized recently on both laboratory and industrial scale. A summary of literature research in relation to the novel technologies besides their modified combinations has also been illustrated in order to clarify the efficiency of extraction.

**Results:** This paper concludes that pulsed electric field extraction and high hydrostatic pressure extraction might be concerned as the most effective novel techniques from the point of yield, quality characteristics and environmental views. However, installation costs might burden and discourage the entrepreneurs for their industrial applications. Accelerated solvent extraction and supercritical fluid extraction might be a favourable alternative for the extraction of phenolic acids. On the other hand, subcritical water extraction may be preferable for the extraction of anthocyanins and procyanidins instead of conventional solvent extraction. Regardless of the structure of the analyte, some extraction methods such as ultrasound assisted extraction and microwave assisted extraction can be widely used. Even the modified versions of the combination of those techniques might reveal satisfactory results for a wide range of agricultural by products inspite of some restrictions which include difficulty in uniform sampling and the complications associated with the solubility of the analyte in food matrix. Consequently, the feasibility of the extraction system in addition to the benefit-cost relationship should be taken into consideration while engineering know-how makes the necessary contributions.

**Keywords:** extraction, novel, bioactive, antioxidant, agricultural by products, valorisation

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## Multiple Paternity Studies: A Tool for Estimating Genetic Diversity, Operational Sex Ratio, and Population Size for an Animal Species

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**Aim of the study:** Polygamy is the practice of mating with multiple mates. The mating of a female with multiple males is called polyandry, while the mating of a male with multiple females is called polygyny. Considering polyandry, multiple paternity (MP) is a phenomenon in many animal species. MP occurs frequently in the wild and its prevalence varies widely not only from species to species but also from location to location within a species. Recent advances in genetic analyses enhance MP studies. In this study we aimed to view and reveal the reasons and advantages of MP studies.

**Material and Methods:** We searched the literature for studies on MP. We reviewed their results and discussed the possible effect of MP on genetic diversity within a population of a species in light of the results of reviewed articles. We also viewed the reasons and advantages of these MP studies.

**Results:** MP is frequent in both invertebrates and vertebrates. Frequency of MP shows inter- and intra-specific variability. It has been well documented that the high frequency of MP implies the possible high genetic diversity and effective population size for a population. If it is very difficult to observe individuals while mating, it is usually impossible to determine which mating individuals are actually successful. Hence, MP studies provide an important tool for determining which individuals are contributing to species persistence in the lack of directly observing reproductive success and have revealed aspects of mating system of an organism that otherwise would be impossible to detect. MP studies enable the researchers to estimate mating behaviour, operational sex ratio (ratio of males to females that are available to mate at any mating season) and population size for any population particularly in the lack of sampling males. It is very important to estimate population size, population structure, and reproductive behaviour accurately in order to improve current conservation projects and make effective management decisions on endangered species. All these usages, advantages, and results have made MP studies very useful and valuable for conservation of endangered species and biodiversity.

**Keywords:** multiple paternity, mating behaviour, population size, operational sex ratio, genetic diversity

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**Reproduction of the Female Black Goby, *Gobius niger*, from the Aegean Sea, Turkey**

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**Aim of the study:** This study provided information on the black goby in the Aegean Sea, specifically on females' reproduction.

**Material and Methods:** Black goby, *Gobius niger* L., 1758, specimens were sampled monthly between March 2003 and February 2004 in Izmir and Candarli Bays (Aegean Sea) involving 1830 (1266 males, 494 females and 70 undetermined) individuals. All the specimens were injected to abdomen region with 4% alcohol and frozen. The total length of all individuals was measured to the nearest millimeter below and weighed to the nearest 0.01 g total weight. Sex was recorded and the gonads were weighed to the nearest 0.001 g. To quantify the changes that occurred in the gonads during the annual sexual cycle and to determine the spawning season, the gonadosomatic index (GSI) was calculated. In order to determine first sexual maturation length and age, a logistic curve equation was used.

**Results:** Total length ranged from 5.1 and 15.9 cm, while weight varied between 1.42 and 48.43g. Macroscopic examination of the gonads, and analysis of the monthly values of the gonadosomatic index, indicated that reproduction starts in March and lasts during October, with a maximum in April, June and September. Individuals become sexually mature around 8.02 cm TL (a size that can be reached in more than 1 year) for females. In this population, the sex ratio (male:female) was 2.6:1.

**Keywords:** Black goby, reproduction, Izmir Bay, Candarli Bay

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**First records of Nymphs of *Zercon emirdagicus* Urhan, Duran & Karaca, 2016 from Turkey**

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**Aim of the study:** In this study, soil mites belonging to genus *Zercon* collected from different litter, soil, lichen and moss habitats of Isparta province are investigated in order to contribute of Turkish zerconid fauna and to contribute the zerconid mite fauna of world. The first record of the nymphs of *Zercon emirdagicus* Blaszk, 1979, was defined according to the samples collected from Isparta province and its geographic distribution was given.

**Material and Methods:** Collected 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. They were placed in 60% lactic acid for clearing and mounted onto permanent microscope slides using a glycerin medium. The examination and drawing of mites were done using an Olympus CX41 microscope with DP25 camera.

**Results:** As a result of the analysis of the samples, 16 females, 9 males, 21 deutonymphs and 17 protonymphs specimens of *Z. emirdagicus* were identified. The shapes of the individuals which best reflect the distinguishing features of *Z. emirdagicus* were drawn and measured. Then, the samples were put in stock bottles containing 70 % alcohol and 1- 3 drops glycine and labelled. In this study, deutonymphs and protonymphs specimens of *Z. emirdagicus* were recorded from Turkey for the first time.

**Keywords:** Acari, *Zercon emirdagicus*, Nymphs, Systematic, Isparta, Turkey.

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## Contributions to Cynipidae Fauna of Kazdağı National Park (Turkey)

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**Aim of the study:** Although Cynipidae is one of the largest families of the Cynipoidea and include about 1400 species around the world, this family is represented by 148 species in Turkey. This study was carried out to investigate the Cynipidae fauna of Kazdağı National Park (Turkey). Main focus of the study is reveal the cynipids diversity of this protected area and contribute to Cynipidae fauna of Turkey.

**Material and Methods:** All gall specimens on host plants were collected from different localities in Kazdağı National Park (Balıkesir Province) between June 2017 and April 2018. During field studies, photos of all gall specimens were taken. Galls were kept in laboratory conditions and checked weekly for emerged wasps. Then, adult gall wasps were fixed in ethanol. All gall specimens and adults were deposited in Zoology Laboratory, Department of Biology (Pamukkale University, Turkey).

**Results:** After identification processes, totally 23 cynipid species belonging to 6 different genera were identified. As a preliminary evaluation, the following species were found: *Andricus coronatus*, *A. grossulariae*, *A. caliciformis*, *A. caputmedusae*, *A. coronatus*, *A. cydoniae*, *A. infectorius*, *A. kollari*, *A. lignicolus*, *A. lucidus*, *A. megalucidus*, *A. multiplicatus*, *A. quercustozae*, *A. sternlichti*, *Aphelonyx persica*, *Cynips agama*, *C. divisa*, *C. quercusfolii*, *Neuroterus numismalis*, *N. quercusbaccarum* and *Synophrus politus*. According to these results, majority of detected species (22 species) belong to Cynipini tribus, and remaining 1 species belong to Synergini tribus. Also, datas about host plants/host galls, informations about localities and distribution reports for each species were given.

**Acknowledgements:** We would like to express our appreciation to the Pamukkale University Scientific Research Projects Unit, which supported this study (PAUBAP-2018FEBE004).

**Keywords:** cynipid, gall wasp, Hymenoptera, Kazdağı National Park, Balıkesir, Turkey.

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### Soil-Inhabiting Arthropods of Denizli City Center (Turkey)

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**Aim of the study:** Arthropods constitute about 80 % of all known animal species in the world. This huge phylum involves approximately 1.250.000 species in following 4 subphyla: Chelicerata, Crustacea, Myriapoda and Hexapoda. In this study, soil-inhabiting arthropods belonging to various ordo were researched in city center of Denizli Province (Turkey). Main focus of this study is contribute to Arthropoda fauna of the related province.

**Material and Methods:** Soil samples for research were collected between March 2017 and February 2018 from different habitats of Denizli city center. After collection, the samples were transferred to systematic zoology laboratory. Then, the samples were identified using various literature sources. All identifications were made at the families level. During identifications, Olympus CX41 and Nikon SMZ745 microscopes were used for work through.

**Results:** After identifications, 54 Arthropoda families of 11 different ordo were found. The following ordo were recorded from the research areas: Pseudoscorpianida, Oribatida, Mesostigmata, Trombidiformes, Geophilomorpha, Scolopendromorpha, Julida, Isopoda, Coleoptera, Collembola and Diptera. In brief, it was observed that the richest group is soil mites (Acari) in terms of species diversity. This study contributed to soil-inhabiting arthropods fauna of Denizli city center.

**Acknowledgements:** This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Keywords:** Soil, Fauna, Biodiversity, Arthropoda, Denizli, Turkey.

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## High Efficiency Degradation of Diesel Oil and Alkanes by *Acinetobacter haemolyticus* Strain 2SA

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**Aim of the study:** The aim of this study was to investigate the diesel oil degradation ability of the strain 2SA in the presence of crude biosurfactant. The strain was isolated from petroleum-contaminated soil and phylogenetic analyses indicated that 2SA belongs to the genus *Acinetobacter*. Culture studies revealed higher degradation rate of diesel oil in the presence of biosurfactant (85%) than in its absence (70%) for an improvement of 17.65%. Moreover, pure n-alkane (C13, C14 and C16) and cycloalkane (pristane) were completely degraded into 10 days of incubation. These results showed that the strain 2SA can greatly degrade a wide alkane range.

**Material and Methods:** The strain 2SA was isolated from a petroleum-contaminated soil. The diesel oil degradation ability was evaluated in the presence 0.2% of crude biosurfactant and in its absence by cultivating the strain 2SA in 50 mL of Bushnell-Hass (BH) medium supplemented with 0.05 % of yeast extract and 1% of diesel-oil. The medium was kept in a shaker at 200 rpm and 30°C for 21 days. The degradation of a mixture of C13, C14, C16 and pristane (500 mg/L for each substrate) was also carried out in BH medium for 10 days. The degradation rates were determined using gravimetric analysis method. The residual alkane analysis was performed in Agilent 7820A Gas Chromatography systems equipped with a fame ionization detector and a HP-5 column. For molecular identification, the gDNA was isolated using the ZR Fungal/Bacterial DNA kit, and the 16S rRNA gene was amplified by PCR using 11F (GTTTGATCCTGGCTCAG) and 1492R (GGYTACCTTGTTACGACTT) primers. The sequenced PCR product (1480 bp) was blasted into the NCBI database. The phylogenetic tree was carried out using the Maximum Likelihood methods with MEGA 7 software.

**Results:** Phylogenetic analysis showed high 16S rRNA sequence similarity between 2SA strain and *Acinetobacter haemolyticus* strain TJS01. During the experiment process (21 days), it was observed that the residual diesel oil decreased considerably. The degradation rate in the presence and in the absence of biosurfactant were 85% and 70%, respectively. In this study, a better degradation rate was found in the presence of crude biosurfactant with an improvement of 17.65%. Furthermore, the saturated n-alkanes C13, C14, C16 and pristane were used as carbon and energy source by the strain 2SA. N-alkanes (C13, C14 and C16) were completely degraded after 10 days of incubation. Although, the pristane is not an easily degradable compound by aerobic microorganisms, *Acinetobacter haemolyticus* strain 2SA showed complete degradation ability of pristane. The gas chromatography analysis results showed that strain 2SA was able to use a wide range of alkanes in diesel oil.

**Acknowledgements:** The authors acknowledge the personnel of the EGEMİKAL Analiz laboratuvarı. The authors also acknowledge the Dr. Umut ŞAHAR for his encouraging support in organizing experimental work.

**Keywords:** diesel oil, biodegradation, *Acinetobacter*.

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## Determination of the Toxicity of the Biodegradation Product in the Continuous Stirred Tank Reactor (CSTR) with the Microtox

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**Aim of the study:** Lyophilized bacteria which have capable of biodegradation of the terephthalic acid (TA), 4 carboxybenzaldehyde (4- cba) and paratoluic acid (p-tol) has been used in this study. The biodegradation of TA, 4-cba and p-tol have been studied in CSTR. Also, it has been evaluated whether the final product was toxic by the Microtox M500.

**Material and Methods:** Reactor has been constructed 10.0-L the reactor volume. Hydraulic retention time (HRT) of reactor has been adjusted 48h. Artificial wastewater has been used for feeding the sludge. Lyophilized bacteria have been reactivated phosphate buffer solution (PBS), mixed gently and incubated at room temperature for 15 min and then 5 mL transferred to 100 mL Nutrient Broth and incubated in the orbital shaker at 150 rpm, at 30°C overnight and then nutrient broth was added to CSTR. TA (40 mg/L), 4-cba (30 mg/L) and p- tol (40 mg/L) added to CSTR. Biodegradation process was performed during 24 hours. Biodegradation efficiencies were analyzed and evaluated with HPLC. *Alivibrio fischeri* has been used to evaluate the toxicity by the Microtox. The positive control which is sodium azide has been used.

**Results:** Lyophilized microorganisms successfully degraded chemicals in 24 hours. The final product resulting from biodegradation was not toxic. Lyophilized bacteria which is used biological treatment can also be used environment-friendly. Microtox methods can be usefully applied for toxicity detection in wastewater treatment.

**Acknowledgements:** The authors wish to thank Republic of Turkey, Ministry of Science, Industry of Technology under the grant SANTEZ-00719- 2014 (112D044-TUBİTAK) and Ege University, Scientific Research Projects Fund, Project (BAP 2016 FEN 008) for the financial support of this study. The Scientific and Technological Research Council of Turkey (TÜBİTAK-BİDEB) supported this study.

**Keywords:** Microtox, Lyophilization, wastewater, HPLC

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## Essential Oil Composition of *Bellardia trixago* L. from Dazkırı (Afyon-Turkiye)

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**Aim of the study:** *Bellardia trixago* (L.) All. (syn. *Bartsia trixago* L.) belongs to the family Scrophulariaceae. It is native to the Mediterranean region, from Portugal to Turkey. *B. trixago* is a green, photosynthetic plant that must parasitize other plants for carbohydrates. It has very specific aroma like honey. To the best of our knowledge, there are no published reports on the phytochemical composition *B. trixago* from Turkey.

**Material and Methods:** *B. trixago* was collected from Dazkırı, Afyon, Turkey. Dried materials were crushed and placed into a glass flask with 1000 ml distilled water and hydrodistilled for 4 h by Clevenger apparatus to obtain essential oil. The essential oils were extracted by hydrodistillation for 4 hours using a Clevenger type apparatus. Essential oils of inflorescence and leaves were extracted separately. The essential oils were stored in dark glass bottles at 4°C until analysis. The essential oil compositions were performed with GC-MS. The individual peaks were identified by comparison of their retention indices as well as by comparing their mass spectra with Wiley 7 MS library and NIST02 mass spectral database.

**Results:** The main constituent of *B. trixago* was determined as cembrene (51.7%). In other studies, growth inhibition and repellency were also found in polar extracts of *B. trixago*. By examining pharmacological properties of essential oil and its components, it may be considered beneficial that use in medical, cosmetic, industrial areas. The essential oils and their compounds can be safely used in research to identify new antibacterial products against pathogenic bacteria.

**Acknowledgements:** This work is supported by the Scientific Research Projects Council of Pamukkale University (PAU-ADEP- 2018KRM002-013).

**Keywords:** *Bellardia trixago*, essential oil, Dazkırı, Afyon, Turkiye

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## Saprobic and Pathogenic Fungi Found on Bean Seed Samples from Isparta, Turkey

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**Aim of the study:** Seeds are starting materials for plant production. To obtain higher yields, using healthy seeds is important. Fungal load of a seed is among the factors related with seed quality. Seed borne fungal pathogens cause significant crop losses and spread in and around countries by exported seeds. In addition, fungi on seeds like *Aspergillus*, *Penicillium* and *Fusarium* species mean that these seeds may contain mycotoxins harmful for human and animal health. Beans are among the important crops cultivated in Turkey. The aim of this study was to determine the fungal load of bean seeds obtained from the growers in Isparta province.

**Material and Methods:** Seed samples of 2015-2016 vegetation period, obtained from the bean growers in different villages or locations in Isparta province were used in the study. Fungal load of randomly selected 200 seeds were investigated by blotter and agar methods for each sample. For the blotter test, 100 seeds were placed on three layers of sterile blotter papers humidified by sterile distilled water in petri dishes, 7 or 8 seeds per dish. Petri dishes were then incubated under 22±1°C, 12 h light-12 h dark conditions for 7 days. For the agar test, again 100 seeds for each sample were placed on Potato Dextrose Agar with 50 mg/l streptomycine sulphate, after 10 min. surface disinfection by 1% NaOCl and three times washed by sterile distilled water. Seven seeds were placed in each petri dish and incubated under similar conditions in blotter test. Seeds were then examined under stereomicroscope and fungi grown on the seeds were noted. Identifications of the fungi were confirmed under microscope by using preparations made by lachtofuchsin. Incidence and isolation rates of the fungi on the seeds were calculated.

**Results:** As a result of the investigation of fungi on a total of 62 bean seed samples, 40 species of fungi belonging to 26 genera were determined. Blotter method yielded 25 genera while 20 genera were determined by agar method. *Alternaria*, *Aspergillus*, *Cladosporium*, *Fusarium*, *Penicillium* and *Rhizopus* species were the most common fungi found on almost all of the samples, in both methods. Isolation frequencies of these fungi were also high on bean seeds. Incidence and isolation frequency of the fungi were generally higher in blotter method, except *Fusarium* and *Verticillium* species that were determined on the seed samples in higher frequencies by agar method. *Absidia*, *Arthrinium*, *Epicoccum*, *Nigrospora*, *Scopulariopsis* and *Stachybotrys* species were only determined by the blotter method, while *Seimatosporium* sp. was found only by agar method. Some of the fungi like *Alternaria*, *Fusarium*, *Rhizoctonia*, *Stemphylium* and *Verticillium* species were previously found on bean seeds and are known as pathogenic fungi and may cause diseases on bean plants. *Aspergillus* and *Penicillium* species are saprobic fungi growing on the seeds and producing mycotoxins, so their presence on the seeds is also important.

**Acknowledgements:** This study was supported by the Scientific Research Projects Coordination Unit of the Süleyman Demirel University, with the project number "4837-YL1-16".

**Keywords:** *Phaseolus vulgaris*, seed-borne fungi, blotter test, agar test

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**Wild growing *Tuber aestivum* Vittad in Mugla-TURKEY**

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**Aim of the study:** Truffles are hypogeous ectomycorrhizal fungi belonging to the genus *Tuber*. Turkey has rich diversity of truffle taxa due to its unique phytogeographical location, climate and soil variability, and vegetation diversity. *Tuber aestivum* (syn. *T. uncinatum*) in throughout Europe, İsveç, Poland, France, Italy, England, Germany, Switzerland, Spain, Holland, Portugal, Israel, USA and Turkey. They grow in symbiosis with several trees and bush, such as oaks, hazel, beech, linden, and produce hypogeous sporocarps. The aim of this study is to determine the location the *T. aestivum* growing naturally in Muğla.

**Material and Methods:** Growing naturally in Muğla *T. aestivum* are obtained from the field studies constitute the main materials of this study. Photographs of the collected specimens were taken and their ecological and morphological characteristics were recorded. Microscopic features were also examined and compared with existing literature information to obtain species list.

**Results:** This study aimed to determine the location naturally grown *T. aestivum* in Muğla. These localations are Fethiye (Gökben village, Çenger village, Üzümlü, Arsaköy village), Ula, Menteşe (Kötekli). Some of the interesting features of these species found in our country are discussed in term of the properties including ecological requirements, morphology and identification stages.

**Acknowledgements:** We would like to thank Mugla S. K. University

**Keywords:** *Tuber aestivum*, Biodiversity, Taxonomy, Muğla, Turkey.

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**Morphological and Molecular Evidence for *Inocybe subporospora* Kuyper: a New Record of Macrofungus Species for Turkey**

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**Aim of the study:** In recent years, some problems associated with the identification and taxonomy of fungi have been overcome by using molecular analyzes. In most cases, the results obtained from molecular analyzes provide the researchers with reliable and useful information for identification. Therefore, in this study, both molecular and phenotypic methods were applied to identify the macrofungi specimens collected from Kütahya province and a new record for Turkey was identified and reported to be *Inocybe subporospora*.

**Material and Methods:** The macrofungi specimen was collected from Kütahya province during routine field trips in 2011-2013. In the field, morphological and ecological features were recorded and photographed. After the field studies, the specimen was brought to the laboratory at Muğla Sıtkı Koçman University. The specimen was identified based on morphological data and analysis of ITS gene sequences. The species is described in detail including habitats, substrata, ecological distribution, and the spores and fruiting bodies are illustrated. Genbank accession number is obtained for the species described in this study. A phylogenetic tree for the new record and relating taxa is presented.

**Results:** In order to assist and validate the identifications done by the phenotypic analyzes, a phylogenetic tree illustrating the relationship of the new record and related taxa was constructed using neighbor joining algorithm and ITS gene sequences of the macrofungi species. As shown in the figure, the identification of the species is confirmed by the molecular analysis.

**Acknowledgements:** We would like to thank TÜBİTAK (The Scientific and Technical Research Council of Turkey) for supporting this project (TBAG-110R019) financially.

**Keywords:** Macrofungi, Biodiversity, Taxonomy, ITS gene, Turkey, *Inocybe subporospora*.

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## **Biodiversity, Bioconservation and Bio-utilization of Medicinal and Aromatic Plants (MAPs) in Turkey**

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**Aim of the study:** Turkey is one of the world's richest countries with regard to diversity of plant species with over 11.000 generic taxa, more than one third of species are endemic. Among the main reasons for this rich biodiversity and endemism of Turkey's flora are that it is the crossroads of three different biogeographically regions, and its topographic, geologic and geomorphologic diversities. Many plants that grow naturally in Turkey's flora are also very valuable medicinal and aromatic plants (MAPs). The primary aim of this review was to evaluate the biodiversity, bioconservation and bio-utilization of MAPs in Turkey.

**Material and Methods:** *Flora of Turkey and the East Aegean Islands* was published by P.H. Davis in 9 volumes between 1965 and 1985. Since then, papers about additional taxa on the flora of Turkey have been published such as *Illustrated Flora of Turkey*. The flora of Turkey has over 9.000 species and 11.000 flowering taxa. It is especially rich in MAPs where the rate of endemism is very high. A great majority of MAPs are wild-harvested from natural habitats. However, uncontrolled and non-sustainable harvesting of seeds, fruits, roots, rhizomes, corms, bulbs and tubers of these species has caused extinction. Turkey has aimed to participate actively and to take in control the trade and conservation of natural and biological resources by signing international agreements at different dates with many institutions. A few of those important ones are: Protection of Cultural and National Heritage (1983), Bern Convention (1984), Barcelona Convention (1988), Bucharest Convention (1994), Ramsar Convention (1994), CITES (1996), Rio Convention (1997), Convention on Combating Erosion (1998), European Landscape Convention (2000), Cartagena Protocol (2004) and Kyoto Protocol (2009). The country gives solid efforts for the implementation of these international agreements.

**Results:** The endemism rate of Turkey's flora is about 35%, and also each year some new species or taxa are recorded. The richest family in endemism is *Labiatae* with 57% rate including very valuable medicinal and aromatic plants (MAPs). For example, there are 97 *Salvia* spp., 46 *Sideritis* spp, 41 *Thymus* spp., 27 *Origanum* spp. and 16 *Satureja* spp. in this family. As known, MAPs are the main sources of secondary metabolites which are alkaloids, terpenoids and fenolics which are evaluated mainly in the pharmacy, cosmetics, perfumery, food additives, dying matters, and agrochemicals. Turkey's flora has 36 *Papaver* species from *Papaveraceae* and 25 *Rosa* species from *Rosaceae*, and so Turkey is the leader in the production of opium alkaloids from opium poppy (*Papaver somniferum* L.), and also in the production of rose oil from Damask rose (*Rosa damascena* Mill.) in the world. Although there are several protection areas in Turkey for in-situ and ex-situ, MAPs are of high priority for conservation action, as wild-crafting will certainly continue to play a significant role in their future. Because industrial-scale harvesting of some valuable MAPs involves the uprooting or collecting of whole plants before seed formation lead to extensive gene and soil erosion in Turkey. Providing and promoting the sustainable wild-collection and cultivation of these species is necessary for meeting the needs of present and future generations.

**Keywords:** Turkey, flora, biodiversity, medicinal and aromatic plants

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## Essential Oil Yield and Composition of Lamiaceae Species in the Flora of Lakes Region (Turkey)

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**Aim of the study:** With nearly 10,000 *species* of vascular *plants* and ferns, *Turkey* has the *richest* flora of *any country* in the temperate zone, with a level of endemism of almost 34%. As a parallel to the Turkish Flora, the Lakes Region also has an important plant diversity. Göller Region of Turkey is placed on the cross of Mediterranean and Iran-Turan georofic zone, and for this reason it is very rich in the number of plant species, particularly in *Lamiaceae* family. In this research, it was aimed to determine the essential oil yield and composition of Lamiaceae species in the flora of Lakes Region (Turkey).

**Material and Methods:** The herbal materials of Lamiaceae family growing in Lakes Region of Turkey have been collected by the authors. The main collection areas were the mountains such as Dedegül (Aksu-Sütçüler), Sultan (Yalvaç), Tota (Sütçüler), Barla (Eğirdir), Kızıldağ (Şarkikaraağaç), Yaka Deresi (Aksu), the plateaus such as Anamas (Aksu) and Sarıçiçek, the lake areas such as Gölcük, Eğirdir, Kovada and Beyşehir and the natural parks such as Pınargözü (Aksu, Yenişarbademli) and Yazılı Kanyon (Sütçüler) in the region. After cutting of the plants when in full bloom were dried under shade. A voucher specimen (H. Özçelik) was deposited in the Herbarium of Science and Literature Faculty of Suleyman Demirel University. Diagnosis was made by the authors (Davis, 1965-1988; Davis et al., 1988; Güner et al., 2000) from the works of Flora of Turkey and the East Aegean Islands. The volatile oil was extracted from the dried herbs by using a Clevenger-type hydrodistillation apparatus. The oil content (v/w) was determined on a dry weight basis of herb, and then the oil yield was expressed as percentage (%). The essential oils distilled were used for analysis to determine the volatile compounds by GC-FID/MS analysis.

**Results:** In the research, 24 genera and 53 taxa from *Lamiaceae* family were identified in the Lakes Region of Turkey. The family was represented by 1 taxa from each one of *Acinos*, *Ajuga*, *Ballota*, *Calamintha*, *Clinopodium*, *Cyclotrichium*, *Lavandula*, *Melissa*, *Mentha*, *Rosmarinus*, *Scutellaria* and *Thymbra*, 2 taxa from each one of *Marrubium*, *Micromeria* and *Satureja*, 3 taxa from each one of *Salvia*, *Stachys* and *Teucrium*, 4 taxa from each one of *Phlomis*, 5 taxa from each one of *Nepeta*, *Origanum* and *Thymus*, 6 taxa from *Sideritis*. Lamiaceae plants were classified on the basis of their essential oil contents as rich (>2.0%), moderately rich (0.5-2.0%) and poor (<0.5%). The oil-rich genera included *Lavandula*, *Origanum*, *Satureja* and *Thymbra*, the moderately rich genera included *Acinos*, *Calamintha*, *Cyclotrichium*, *Mentha*, *Nepeta*, *Rosmarinus*, *Salvia* and *Thymus*, the oil-poor genera included *Ajuga*, *Ballota*, *Clinopodium*, *Lamium*, *Marrubium*, *Melissa*, *Micromeria*, *Phlomis*, *Scutellaria*, *Sideritis*, *Stachys* and *Teucrium*. While the essential oils from *Origanum*, *Satureja* ve *Thymbra* genera were rich in carvacrol, the oils from *Thymus* genera were rich in thymol. However, some *Origanum* species were rich in linalool and some *Thymus* species were rich in carvacrol and geraniol. As a result, this family has been found to have many species with high medical and aromatic values.

**Acknowledgements:** This study is supported by TÜBİTAK (project number: TOGTAĞ-2599) (this presentation is a part of the project).

**Keywords:** Lamiaceae, essential oil, Göller Region, Turkey.

## Diazaborine Containing Copolymer with Anti-Quorum Sensing Properties

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**Aim of the study:** In this study, it was aimed to produce water soluble diazaborine containing antimicrobial effective copolymer. For this purpose, a new monomer containing benzo-diazaborine {3-((1-hydroxybenzo[d] [1,2,3] diazaborinin-2(1H)-yl) sulfonyl) propyl methacrylate (DAZBMA)} and P(DAZBMA-co-5QDMAEMA-co-HEMA) random copolymer was synthesized with monomers DAZBMA, hydroxyethyl methacrylate (HEMA) and 1-iodopentane quaternized form of 2-(dimethylamino)ethyl methacrylate (5QDMAEMA).

**Material and Methods:** Synthesis of the P(DAZBMA-co-5QDMAEMA-co-HEMA) was carried out by RAFT polymerization mechanism. Structural analysis of the copolymeric structure was carried out by <sup>1</sup>H NMR and FT-IR analyses. Antibacterial effect of the copolymer against *E. coli* ATCC 25922 and *S. aureus* ATCC 25923 was investigated, and anti-quorum sensing properties with *Chromobacterium violaceum* CV 026 strain were determined.

**Results:** P(DAZBMA-co-5QDMAEMA-co-HEMA) random copolymers has limited antibacterial effect against both bacterial species. However, the minimum inhibitor concentration against CV 026 was determined to be 500 µg/mL. At this concentration, CV 026 showed anti-QS effect with a 12 mm inhibition zone. It is understood that this effect is caused by DAZBMA in the structure of copolymer. It has been evaluated that the use of this copolymer on solid surfaces in hospital environments due to the antibacterial and anti-quorum sensing effect may be appropriate.

**Acknowledgements:** This work was supported by the Scientific and Technological Research Council of Turkey (TUBITAK), Grant No: 213M181.

**Keywords:** Diazaborine, anti-quorum sensing, water soluble polymer.

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### For Permanent Antibacterial Activity a New Bead Carrying Boronic Acid Functionality

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**Aim of the study:** In this study, it is aimed to produce a new bead which can show antibacterial effect permanently.

**Material and Methods:** For this purpose, spherical P(VBC-co-EGDMA) beads are first obtained by cross-linking poly(vinylbenzyl chloride) (PVBC) with ethylene glycol methacrylate (EGDMA) by the suspension polymerization method. P(VBC-co-EGDMA)-graft-P(ASPBA-b-DMAEMA) spherical polymer brushes (SPBs) were produced by grafting polymeric chains on their surfaces via surface initiated-atom transfer radical polymerization (SI-ATRP) mechanism using 4-(*N*-allylsulfamoyl) phenylboronic acid (ASPBA) and 2-(dimethylamino)ethyl methacrylate (DMAEMA). Structural analysis of the SPBs were carried out by FT-IR and TGA analyses. Antibacterial effect of the SPBs against *E. coli* ATCC 25922 and *S. aureus* ATCC 25923 was investigated with kinetic studies.

**Results:** Although P(VBC-co-EGDMA)-graft-PASPBA and P(VBC-co-EGDMA)-graft-PDMAEMA didn't present any antibacterial activity, P(VBC-co-EGDMA)-graft-P(ASPBA-b-DMAEMA) SPBs were able to show reproducible antibacterial activity. This difference and the reason for the effectiveness is due to the anti-biofilm feature that the ASPBA structure created on the particle surface. SPBs have the potential to be used in fluidized beds to prevent bacterial contamination in the surrounding water.

**Acknowledgements:** This work was supported by the Scientific and Technological Research Council of Turkey (TUBITAK), Grant No: 213M181.

**Keywords:** 4-(*N*-allylsulfamoyl) phenylboronic acid, antibacterial particle, anti-biofilm

PP-174

## **A study of *Aethionema dumanii* Vural & Adıgüzel (Brassicaceae) based on Anatomical Characteristics**

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**Aim of the study:** The present study aims to reveal the anatomical characteristics of *Aethionema dumanii* which is an endemic plant distributing in Salt Lake of Turkey.

**Material and Methods:** The plant materials were collected from Salt Lake in Konya province and some of them prepared according to standard herbarium technique and some of them put in 70% ethyl alcohol. The paraffin method was applied to vegetative organs, fruits and seeds of studied taxa for cross sections. If paraffin method doesn't work, we take cross sections with hand. Permanent slides were observed by Leica DM 1000 light microscope. Measurements were made with Cameram 21 programme and photos were taken with a Canon EOS 450D camera attached to the light microscope.

**Results:** Four main anatomical region were determined in the cross sections of stems. These layers can be counted from the peripheral to centre as epidermis, cortex, vascular bundles and pith region. The outermost surface of stems is limited a rectangular shaped epidermis cells. Cortex cells which are parenchymatous are followed the epidermis towards the centre with 10 or 11 rows. Single lined the vascular bundles are composed of xylem and phloem with no sclerenchyma above them. The pith region is fully filled by oval shaped parenchymatous pith cells. The cross sections of leaves of the studied species have two epidermis with mesophyll tissue. Mesophyll, is equifacial type, is composed of 4 or 5 rows palisade and reduced spongy parenchyma cells. This phenomenon occurs about the living areas of *Aethionema dumanii*. The stomata type has been detected as anizositic type and the leaves of species are amphistomatic. The triangular shaped cross sections of fruits are composed of one lined exocarp, 3 or 4 rows mesocarp and, single layered endocarp. The cross sections of seed have been determined with integuments, endosperm and embryo.

**Keywords:** *Aethionema*, Anatomy, Brassicaceae, Fruit, Paraffin method

## Effects of the Head and Leaf Extracts of *Cynara scolymus* L. on Some Microorganisms

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**Aim of study:** It is known that the ancient Greeks and Romans traditionally used artichoke as a urine enhancer and digestive facilitator. Artichoke leaf contains flavonoids including 0-4% chloropicrin, 2% phenolic acids, especially 3-caffeoylquinic acid, and 1,5-di-O-caffeoylquinic acid, scolymoside, and luteolin glycosides at 0.1-1.0%; phytosterols including taraksasterol; sugar; inulin; enzymes; and mainly sesquiterpenes, beta-selinin and cryophile. In this study, the antimicrobial effects of the head and leaf extracts of *Cynara scolymus* L. were examined against some microorganisms.

**Material and Methods:** Plant head and leaf were reduced to powder with liquid nitrogen. Ten grams of this material was added separately in 100 mL of methanol, acetone and n-hexane. Then the mixtures were agitated for a period of 72 hours. They were filtered with Whatman no 389 filter paper. Under aseptic conditions the extracts were filtered through 0.45µ-pore size diameter filters and stored at 4°C. The agar well diffusion method is used for the antibacterial and anticandidal effects of extracts.

**Results:** The leaf extracts of the acetone and methanol of *Cynara scolymus* L. was found to be most effective against tested microorganisms while the head extracts of the acetone of *Cynara scolymus* L. was found most effective against tested microorganisms. However, the head extracts of the methanol and n-hexane of *Cynara scolymus* L. showed only low effect against *Bacillus cereus* ATCC 11778 but no effect against other microorganisms. The head extracts of the acetone of *Cynara scolymus* L. indicated significant antimicrobial activity (12-17 mm) against *Pseudomonas aeruginosa* ATCC 35032 while it a low effect (9-10 mm) against *Escherichia coli* ATCC 35218, *Micrococcus luteus* ATCC 9341, *Serratia marcescens* ATCC 13880, *Proteus vulgaris* ATCC 33420 and *Enterococcus faecalis* ATCC 29212. Additionally, it no effect against used yeasts. The leaf extracts of the methanol of *Cynara scolymus* L. showed high effect (13-16 mm) against *Stapylococcus aureus* ATCC 25923 and *Bacillus cereus* ATCC 11778 while the leaf extracts of the acetone of *Cynara scolymus* L. showed substantial effect (12-15 mm) against *Micrococcus luteus* ATCC 9341, *Pseudomonas aeruginosa* ATCC 35032 and *Bacillus cereus* ATCC 11778. Besides, the leaf extracts of the acetone of *Cynara scolymus* L. showed only effect against *Candida albicans* ATCC 10231 and *Candida utilis* ATCC 9950.

**Acknowledgments:** This study was carried out at the Microbiology Laboratory of Biology Department, Faculty of Science and Letters, Adnan Menderes University.

**Keywords:** *Cynara scolymus* L., antimicrobial effect, agar disk diffusion method

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### **Biodiversity of Bacteria Isolated from Some Cosmetic Products**

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**Aim of the study:** Cosmetics are products applied to human body parts for beautifying, cleansing and protecting. These products are formulated by the incorporation of a number of chemical compounds. The ingredients of the cosmetic products are the nutrient sources of microorganisms. For this reason, various pathogens, mostly opportunistic pathogens, and saprophytes can easily be produced in cosmetic products. These contaminants irritate the body and cause infections. Therefore, preservatives are added to prevent contaminants in cosmetic products. The aim of this study is to identify bacteria that can develop in cosmetic products frequently used by women using 16S rDNA analysis.

**Material and Methods:** The bacteria samples were isolated from some cosmetic products. Bacterial growth was carried out on Tryptic Soy Agar at 37°C for 24-48 h. After incubation each different colony were isolated and stocked in skim milk. For molecular identification DNA isolation of the samples were made according to De Boer and Ward (1995). After isolations DNA concentration and purity was measured with Nanodrop Spectrometer (Thermo Scientific). 16S rDNA PCR was carried out at initial denaturation 95°C 5 min, denaturation 94°C 40 sec, annealing 50°C 40 sec, extension 72°C 40 sec with 35 cycles and final extension at 72°C 10dk. Reagents concentrations were 10X Taq Buffer, 0.5 M dNTP mix, 10 pM from each primer, 7.5 mM MgCl<sub>2</sub> and 1U Taq polymerase with the final volume of 25 µl. PCR products were sent to the sequencing (GATC BioTech, Germany) after electrophoresis at 1.4% agarose gel at 90 V 40 min.

**Results:** In this study, a total of 10 samples were isolated from some cosmetics products. According to the morphological characterization 8 of these samples were found to be Gram-positive coc shaped bacteria and 2 of these samples were found to be Gram positive rod-shaped bacteria. PCR results of these samples were sent to the sequencing (GATC BioTech, Germany). *Enterococcus faecium*, *Enterococcus thailandicus*, *Staphylococcus saprophyticus* and *Bacillus licheniformis* strains were identified.

**Acknowledgements:** This study was carried out at Adnan Menderes University Biology Department Microbiology Laboratory.

**Keywords:** Cosmetics, Bacteria, Biodiversity, 16S rRNA

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## Determining the Spatial Effects of Quarries Using A Drone: The Case Of The Süleymanpaşa-Tekirdağ Quarries

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**Aim of the Study:** The present study calculated the area and volume of the quarries located in Süleymanpaşa district of Tekirdağ province using GIS software and drone-captured aerial images. Thus, it investigated the adequacy as well as the accuracy of drone-captured aerial photographs compared to high-cost satellite imagery.

**Material and Methods:** The coordinates of the quarries in Süleymanpaşa district, the area and volume of which were calculated in this study, were obtained through correspondence with the Provincial Directorate of Environment and Urban Planning. Land observations were made for those quarries whose coordinates were determined; the quarries were examined in the field to determine the parameters of the study, including transportation, departure points for capturing images using the drone, and the flight height of the drone. It was thus considered appropriate to study 12 quarry samples.

**Results:** This study demonstrated that calculations can be made on quarry samples using GIS technologies. The effects of the quarries in Süleymanpaşa district of Tekirdağ were numerically expressed through the calculations and were mapped with relative ease using the spatial data. Additionally, time-, labor-, and human-related errors were minimized through these quick calculations, thereby proving that it is possible to achieve results much more quickly and reliably. While satellite images can be obtained at certain times, images can be captured by a drone whenever conditions are appropriate. This is especially important in agricultural research and in time-critical research.

**Acknowledgements:** This work has been made from master's thesis that was supported by Namık Kemal University Scientific Research Projects Unit (BAP) as project NKUBAP.03.YL.17.087.

**Keywords:** Drone, Tekirdağ, IHA, Remote sensing, Quarries

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## Clonal Propagation of Two Local Lemon Cultivars “Yediveren” and “Kabalimon” Using *in Vitro* Tissue Culture Techniques

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**Aim of the study:** *Citrus limon* (L.) Burm is an important aromatic plant and its fruits are major source of vitamin C. They contain beneficial chemicals such as limonene, citral, coumarins, bioflavonoids,  $\alpha$ -terpinene,  $\alpha$ -pinene, vitamins and mucilage. They also act as an antiseptic, antibacterial and antioxidant. Lemon trees are usually propagated through cutting, budding or layering. These traditional techniques are limited to the period when buds are available and also they are not free from contamination risk. On the other hand, *in vitro* propagation can overcome some constraints to plant development and cultivation, and can improve fruit quality and resistance. In this work we describe an *in vitro* propagation procedure for cloning of two different local cultivars of *Citrus limon* (L.) Burm using seeds from mature trees.

**Material and Methods:** A high quality fruit yielding plant of two different cultivar lemon trees were selected for obtaining seeds. Lemon seeds were treated with 70% ethanol for 5min with, 10% H<sub>2</sub>O<sub>2</sub> for 5min, and 10% (w/v) commercial bleach and after rinses with sterile distilled water for surface sterilization and they were stored at 4°C. Surface-sterilized seeds germinated *in vitro* in Petri dishes (100×15mm) on semisolid (1.5gL<sup>-1</sup> phytigel and 3.5gL<sup>-1</sup> agar) MS medium supplemented with 0.3µM gibberellic acid and 20gL<sup>-1</sup> sucrose (germination medium). The seeds were kept at 27±2°C with a 16-h photoperiod, under white cool fluorescent light of 50µmol<sup>-1</sup>m<sup>-2</sup>s<sup>-1</sup>, at the Plant Molecular Genetics and Biotechnology laboratory, Mugla.

**Results:** The germination capabilities of *C. limon* L. Burm cv. “Yediveren” and “Kabalimon” were investigated starting from fresh seeds. After surface sterilization, the seeds were transferred to the MS medium. After 45 days of incubation, young seedlings were obtained and used in the further stages of the *in vitro* regeneration.

**Acknowledgements:** This study was supported by the Mugla Sitki Kocman University Scientific Research Projects Coordination Unit (Mugla, Turkey, MSKU-BAP 16/021).

**Keywords:** *Citrus limon* (L.) Burm, gibberellic acid (GA<sub>3</sub>), micropropagation, plant tissue culture.

PP-179

## **A survey on the Interaction Frequency of Dolphins with Gillnets in the Unye Coast of the South-Eastern Black Sea**

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**Aim of the study:** The aim of this study was to determine the frequency of damaging and depredation by dolphins to the gillnets in the Unye coast of the south-eastern Black Sea.

**Material and Methods:** The study was conducted in the Unye coast of the south-eastern Black Sea, from May 2015 and February 2017. For this study, two gillnet groups were formed which have similar characteristics. One of the groups was with pingers (active group), the other one was without pinger (control group). The used pingers (dolphin repellents) were Fucure Oceans (70 kHz).

**Results:** During the fishing experiments, interaction between gillnets and dolphins were determined only for three of total 65 experiments. The holes caused by the dolphins are characterized by characteristic fragmentation in the sprouting form on the net and by fishermen observations. The results of the study showed that the damage on the gillnets with pinger was 36.3% less than that on the gillnets without pinger.

**Acknowledgements:** This study was supported by the Scientific Research Fund of Ordu University with the project number TF-1461.

**Keywords:** Dolphins, Gillnets, Acoustic Pinger, Whiting, *Merlangius merlangus*

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**Comparison of Length-Weight Relationships for Whiting (*Merlangius merlangus*) caught from three different fields of the South-Eastern Black Sea**

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**Aim of the study:** The aim of this study was to compare the length-weight relationships of the whiting caught from three different fields in the south-eastern coast of the Black Sea.

**Material and Methods:** The study was carried out in the Perşembe and Medreseonu shores of Ordu province and in the Piraziz shores of Giresun province in 2010. During a year, whiting was sampled from each sampling fields with different mesh-sized gillnets. Length and weight of each whiting sample were measured. Length-weight relationships were calculated using length and weight values for each sex and combined sexes. Then, the "b" values of calculated length-weight relationships were compared.

**Results:** Length-weight relationships of female, male and female+male were calculated as  $W = 0,0161 * L^{2,7115}$ ,  $W = 0,0077 * L^{2,9869}$ ,  $W = 0,0149 * L^{2,7429}$  for Medreseönü,  $W = 0,0084 * L^{2,9568}$ ,  $W = 0,0122 * L^{2,8093}$ ,  $W = 0,0094 * L^{2,9097}$  for Perşembe and  $W = 0,0112 * L^{2,8474}$ ,  $W = 0,0065 * L^{3,0448}$ ,  $W = 0,0107 * L^{2,86}$  for Piraziz, respectively. The "b" values of the length-weight relationships showed that whiting in the south-eastern coast of the Black Sea grow isometric in three fishing fields.

**Keywords:** Black Sea, Whiting, *Merlangius merlangus*, length-weight relationship.

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## Antioxidant Activity of Cathcehol Changing by Temperature

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**Aim of the study:** Catechol which is one of phenolic compounds known as pyrocatechol or 1,2-dihydroxybenzene. It is an organic compound with the molecular formula  $C_6H_4(OH)_2$  which is an ortho isomer of the three isomeric benzenediols. It is a flavan-3-ol, a type of natural phenol and antioxidant. This study, required to fully understand the antioxidant benefits of cathcehol.

**Material and Methods:** We have utilized B3LYP/6-31G(d,p) method to explore the structural features and molecular properties of cathcehol. The geometric and electronic properties of the cathcehol were investigated in gas phase at B3LYP/6-31G(d,p) basis set at different temperatures. In addition to that various molecular descriptors such as the BDE, AIP, PDE, PA, ETE theobromine have also been obtained and studied, which are relevant to show evidence of antioxidant activity.

**Results:** The antioxidant estimation of cathcehol has been determined. Our calculations represented that AIP and  $\Delta E_{iso}$  are electronic properties responsible for the excellent antioxidant activity of the Catechol, which is a secondary metabolite part of the chemical family of flavonoids.

**Acknowledgements:** The authors are grateful to PAUBAP (Project No. 2012BSP004), TUBITAK (Project No. 107T606) and TUBITAK ULAKBIM, High Performance and Grid Computing Center (TRUBA resources).

**Keywords:** Secondary metabolites, cathcehol, density functional theory (DFT), antioxidant activity.

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### **Molecular Detection and Isolation of an Enterovirus from a Goat**

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**Aim of the study:** Enteroviruses belong to Picornaviridae family and have wide range host spectrum from humans to dolphins. Small ruminant enteroviruses are classified in Enterovirus G group. There are a lot of reports on molecular detection from humans but few studies have been made on animal sources and fewer reports from small ruminant species. These viruses have generally subclinical or mild infection onset. However, there are cases which they cause severe disease of respiratory, genital or alimentary tract. In this study we aimed to investigate Enterovirus from a goat flock from Kirklareli that had gastrointestinal symptoms.

**Material and Methods:** For molecular detection RT-PCR was chosen and we used a primer pair specific to 5'UTR region and simultaneously worked on isolating the virus using cell culture. Madin-Darby Bovine Kidney (MDBK) cell line was used as it is permissive to this virus type. After virus was isolated and cultured for several passages, further molecular study was carried on for VP1 region of the virus, which is the main site that is used for classification of Enteroviruses.

**Results:** As the result of molecular analysis isolated virus was found to be closely related in E1 serotype of Enterovirus E genogroup. As there is limited information on Enterovirus in small ruminants more molecular based reports are needed to build a database to deeply understand and compare interactions among this virus family.

**Keywords:** Goat, Enteroviruses, RT-PCR, Virus isolation

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## Determination of Fatty Acids from Coconut Pulp and Water using GC/MS

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**Aim of the study:** Coconut palm (*Cocos nucifera* L.) is one of the most important sources of vegetable oil and found throughout the tropics and a very important fruit worldwide. The exact origin of coconuts is still unknown. Coconut milk cake and mature coconut water (CW) are the by-products from coconut processing. Therefore, it is of interest to exploit coconut milk cake and CW as a source of protein and antioxidant, respectively. Therefore, in this study, the contents of fatty acids obtained from coconut pulp and water were investigated and the two products were compared with each other.

**Material and Methods:** Fatty acids were obtained from coconut pulp and water by hexane extraction method. The resulting oils were dried with anhydrous sodium sulfate and stored in a dark glass bottle at -18°C until analysed by Gas chromatography mass spectrometry (GC/MS). After oils were obtained, 30 mg of essential oil was weighed into a volumetric flask, then it was dissolved in 2 ml of hexane for injection to the GC/MS instrument. On the other hand, 100 mg of the fixed oil was weighed into a volumetric flask, then 10 mL of hexane was added. After vortexing for 5 min, 100 µL of 2N KOH dissolved in methanol was added. The lidded tube was vortexed for 1 min. After centrifugation at 4000 rpm for 10 min, the supernatant was removed for injection. GC/MS analyses were carried out using an Agilent 6890N Gas Chromatograph equipped with a Multi Mode Inlet (MMI) (280°C), a DB-1 capillary column (30 m x 0.25mm; film thickness 0.25µm) and coupled with an Agilent 5975C MS Detector (MSD), operating in the electron impact (EI) mode at 70 eV. Transfer line temperature was set at 250°C. The carrier gas was He (2.1 ml/min), and the oven temperature was held at 60°C for 5 min, then increased up to 220°C at a rate of 2°C/min and held at this temperature for 10 min. The injected volume was 2 µl and the split ratio 50:1.

**Results:** The identification of the compounds was based on the comparison of their retention times (RT) and mass spectra with those from the NIST 2008, Wiley 2008 libraries. Supelco™ 37 components of (fatty acid methyl ester) FAME mixture (Catalog no: 47885-U) was used for the comparison of the GC chromatograms. Relative percentages of compounds were calculated, and based on the peak areas from the MS data. According to GC/MS results Palmitic acid (31.157%), Myristic acid (22.615%), Stearic acid (17.466%) and Lauric acid (13.493%) major fatty acids were found in the coconut water. On the other hand, fatty acids detected in the pulp were Lauric acid (40.167%), Myristic acid (22.601%) and Palmitic acid (11.706%) fatty acids.

**Acknowledgements:** The coconut used in the study was obtained from local suppliers.

**Keywords:** Coconut, fatty acid, lauric acid, myristic acid, oleic acid, GC/MS

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## Determination of Fatty Acid Composition and Antioxidant Capacity of Chia (*Salvia hispanica* L.) Seed Oil using GC/MS

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**Aim of the study:** *Salvia hispanica* L., a biannually cultivated plant, is a member of the mint family (*Labiatae*), superdivision of *Spermatophyta*, and kingdom of *Plantae*. Prominently grown for its seeds. The seed contains essential fatty acids, ranging from 25% to 40% that cannot be artificially synthesized and required by the human body for good health. Because of this reason, it is important to know the individual amounts of each fatty acid in *S. hispanica* seed oil. The objective of this study was to determine the fatty acid composition of the seed oil of *S. hispanica* L. and to investigate its antioxidant capacity by different *in vitro* methods.

**Material and Methods:** *S. hispanica* L. seed oil was obtained by cold-press (Naturefuel 100, Germany) of seeds (3 kg) for 35 min. The seed oil was dried with anhydrous sodium sulfate, filtered and stored in a dark glass bottle at +4 °C until it analysed by Gas chromatography-Mass spectrometry (GC/MS). For the determination of fatty acids composition, 100 µL of the seed oil was weighed into a volumetric flask, and then 9.80 mL of hexane was added. After vortexing for 1 min, 100 µL of 2N KOH dissolved in methanol was added and vortexed for 1 min. After centrifugation at 4000 rpm for 10 min, the supernatant was removed for injection. A quadrupole mass spectrometer and a DB-1 capillary column (30m x 0.25mm; film thickness 0.25µm) were used for the GC/MS analyses of the methyl derivatives of fatty acids. 2 µL sample was injected automatically in the split mode. Split ratio was 50:1. Mass range was from *m/z* 50 to 650 amu. The antioxidant capacity of *S. hispanica* L. seed oil was determined by using DPPH (2,2-diphenyl-1-picrylhydrazyl) free radical scavenging activity, β-carotene-linoleic acid bleaching assay and ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid) cation radical decolourisation assay.

**Results:** Thirteen fatty acid methyl esters including linolenic acid methyl ester (C18:3n3), palmitic acid methyl ester (C16:0), oleic acid methyl ester (C18:1n9c) and linoleic acid methyl ester (C18:2n6t) were detected in the seed oil obtained by cold-press method. Linolenic acid (73.610%), palmitic acid (8.109%), oleic acid (6.548%) and linoleic acid (7.199%) were detected as major components in the seed oil of *S. hispanica* L. Palmitoleic acid methyl ester (0.033%), margaric acid methyl ester (0.099%) and behenic acid methyl ester (0.025%) were found to be minor components. On the other hand, antioxidant activities IC<sub>50</sub> (50% inhibition concentrations) were found to be 59.51±0.20 µg.mL<sup>-1</sup>, 104.05±0.14 µg.mL<sup>-1</sup> and 89.37±0.10 µg.mL<sup>-1</sup> for ABTS<sup>•+</sup> cation radical, DPPH free radical scavenging assays and β-carotene-linoleic acid bleaching assay, respectively. Butylated hydroxytoluene (BHT) IC<sub>50</sub> value, used as standard, was 10.02±0.10 µg.mL<sup>-1</sup>. The results show that chia (*S. hispanica* L.) seed oil has an important place in the human nutrition with significant antioxidant effects and rich fatty acid content.

**Acknowledgements:** Authors would like to thank to Lisinia Wildlife Rehabilitation Center for supplying the chia seed oils.

**Keywords:** *Salvia hispanica*, fatty acids, antioxidants, chia seed, GC/MS

PP-185

**Food composition of the Unisexual Lizard, *Darevskia unisexualis* (Darevsky, 1966), (Reptilia: Lacertidae) from Northeastern Anatolia, Turkey**

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**Aim of the study:** The study presents data on the food composition of the Unisexual Lizard, *Darevskia unisexualis* (Darevsky, 1966), from Hanak, Ardahan, northeastern Anatolia, Turkey.

**Material and Methods:** A total of 44 preserved adult females of *D. unisexualis* were examined from Hanak, Ardahan northeastern Anatolia, Turkey in 2016. Within an hour following capture, all specimens were anesthetized with ether, fixed with a 96% ethanol injection, and deposited in 96% ethanol. The specimens are deposited in the Zoology Lab. of the Department of Biology at the Faculty of Science, Dokuz Eylül University (ZDEU 48/2016). The snout-vent length (SVL) and total length (TL) were measured using a calliper to the nearest 0.01 mm and recorded. The digestive system was dissected, and prey items were identified under a stereomicroscope. The obtained food contents were preserved in 70% ethanol for later analysis. Food contents were identified to the possible lowest taxa. The prey volume was calculated using ellipsoid formula (Dunham, 1983):  $V = 4/3\pi (L/2) (W/2)^2$  [V: prey volume; L: length of prey; W: width of prey]. Food-niche breadth was calculated using Shannon's index (H, Shannon, 1948) performed with "EcoSimR vers. 1.0" package (Gotelli et al., 2015) in R vers. 3.4.3. The correlation between SVL and number of prey item were tested with non-parametric Spearman rho correlation.

**Results:** The mean head and body length (SVL) was  $62.86 \pm (1SD)7.88$  (range= 42.29.0 - 73.11) mm. The mean total length (TL) was determined as  $166.25 \pm 26.66$  (89.29 - 197.36) mm. In the stomach contents of 44 individuals, 172 prey items, with body lengths ranging from 1 to 24 mm, were determined with a median number of 3 (range= 1-9). There was no correlation number of prey items and size (SVL) (Spearman rho = 0.14, P = 0.926). Among the prey taxa, Hymenoptera (N%= 46.5%), Coleoptera (13.4%), Diptera (8.1%), Lepidoptera (7.6%), Orthoptera (7%) and Hemiptera (7%) are important prey groups in the food content and consist of 89.5% of total preys. Hymenoptera (F%= 70.5%), Lepidoptera (25%), Coleoptera (22.7%), Diptera (20.5%), Hemiptera (20.5%) and Orthoptera (16%) were frequently consumed by lizards. In conclusion, the food composition of the Unisexual Lizard is mostly composed of slow-moving arthropods especially formicids, coleopterans, dipterans, adult and larvae lepidopterans. However, more active and flying preys were less encountered in the food composition.

**Keywords:** *Darevskia unisexualis*, food composition, formicids, coleopterans, dipterans, Turkey

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**The Helminth Composition of the Mediterranean Chameleon, *Chamaeleo chamaeleon***  
(Linnaeus, 1758), specimens from several localities in Turkey

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**Aim of the study:** The present study examined the helminth composition of the Mediterranean Chamaleon, *Chamaeleo chamaeleon* (Linnaeus, 1758) from several localities in Turkey. The purpose of this study is to establish the initial helminth list for *C. chamaeleon* from Turkey, add to the helminth list of Turkish lizards. To our knowledge, there are no helminthological surveys of this species from Turkey.

**Material and Methods:** The lizard specimens were collected from several localities in Turkey [Akyatan, (Adana), Sutaşı (Samandağ, Hatay), Beşkonak, Manavgat, (Antalya), Sultanhisar (Aydın), Burç Village (Gaziantep), Köyceğiz (Muğla), Gümüldür, Buca (İzmir)] and they were deposited in Flora and Fauna Research and Application Centre, Dokuz Eylül University, Turkey. The hosts were dissected under a stereomicroscope. The abdominal cavity was opened, and the esophagus, stomach, and small and large intestines were removed, slit longitudinally, and examined under a dissecting microscope. The lungs, liver, and body cavity were also visually inspected for helminths. Each helminth was removed to a vial of 70% ethanol for a minimum of 48 hr and then cleared on a glass slide in undiluted glycerol. All helminths were identified under a light microscope.

**Results:** Thirty nine lizards (22♂♂, 17♀♀) were examined for helminth parasites. A total of four species of helminths were recovered comprising three species of digenea and one species of nematode. The digeneans recovered include; *Plagiorchis molini* Lent et Freitas, 1940, *P. loosi* and *Pseudosonsinotrema chamaeleonis* Dollfus, 1951. The nematode recovered was *Physaloptera* sp Hall and Wigdor (1918). Twelve percent of hosts were parasitized by at least 1 species of helminth. In a total 19 individuals of four parasites species were collected from 5 of the 39 lizards examined. Of all the lizards analyzed, thirty four were not parasitized. Of the infected lizards, 3 harbored one species of helminth, 2 harbored two species of helminths.

**Acknowledgements:** This work was supported by Dokuz Eylül University Scientific Research Coordination Unit. Project Number: 2017.KB.FEN.042

**Keywords:** Nematoda, Digenea, *Chamaeleo chamaeleon*, Mediterranean Chamaleon, Turkey

## Chemical Composition of Essential Oil from *Hypericum scabrum* L.

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**Aim of the study:** *Hypericum* (Hypericaceae) species, which grow naturally in Turkey, have been used for a long time in folk medicine. Modern studies have been focused on the activity of extracts of these plants against certain viruses and bacteria and on their possible applications as medicines for various diseases. The genus *Hypericum* is represented in the Flora of Turkey and the East Egean Islands by 80 species. *Hypericum scabrum* L. is a herbaceous and perennial plant which can be 40-60 cm length and grows on rocky hills. The flowering time of *H. scabrum* is range between May and August. The aim of this study is to determine essential oil composition of *H. scabrum* which is collected from Salda Lake, Burdur(Turkey).

**Material and Methods:** The samples were collected in May 2018, near the Salda Lake, Burdur. Stems, flowers and leaves of *H. scabrum* were dried at room temperature. Dried materials were crushed and placed into a glass flask with 1000 ml distilled water and hydrodistilled for 4 h by using Clevenger apparatus to obtain essential oil. The essential oil was dried in anhydrous sodium sulphate and after filtration stored in a sealed dark vial at 4°C until analysis. Chemical analyses of the essential oil were performed on gas chromatography-mass spectrometry (GC-MS) using a 30-m long HP-5MS capillary column. The individual peaks were identified by comparison of their retention indices as well as by comparing their mass spectra with Wiley 7 MS library (Wiley, New York, NY, USA) and NIST02 (Gaithersburg, MD, USA) mass spectral database. A series of n-alkanes was also injected under same analytical conditions with that of essential oil for the calculation of Retention Indices (RI). The percentages of the samples were calculated from the GC peak areas with the normalization method. The relative amount of compounds was calculated as mean values from duplicate GC and GC-MS analyses.

**Results:** The essential oil of the *Hypericum scabrum* species sourced in Burdur/Turkey was rich in monoterpene and sesquiterpenes hydrocarbons. The major constituents in the volatile oil of *H. scabrum* were  $\alpha$ -pinene (24.80%), sabinene (11.43%), 1,8 cineole (10.89%) and  $\gamma$ -terpinene (9.82%). Many studies on the essential oil content of *H. scabrum* indicate the enormous variability inherent in the volatile chemistry of this species. A comparison of our results with the previous reports on the chemical composition of *H. scabrum* suggests differences in the volatile composition of the plant material could be attributed to genetic (genus, species, subspecies and ecotype), climatic conditions, distinct environmental and chemotype. At the same time, seasonal sampling periods, geographic origins, plant populations, vegetative plant phases and extraction and quantification methods also can affect the chemical content of plant material.

**Acknowledgements:** This work is supported by the Scientific Research Projects Coordination Unit of Pamukkale University (2017FEBE061).

**Keywords:** Essential oil, monoterpene, sesquiterpene, *Hypericum scabrum* L., GC-MS

PP-188

**The Genetic Investigation of *Heremites* Gray, 1845 (Sauria: Scincidae) Genus in Turkey**

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**Aim of the study:** The aim of this study is to show the genetic and nucleotide diversity of the genus *Heremites* in Turkey, and to discuss the genetic relationship among the species.

**Material and Methods:** The genetic composition of Anatolian populations of the genus *Heremites* were studied by using two mitochondrial (COI and cytb) and two nuclear (c-MOS and MC1R) gene regions. All analyses were carried out with 128 specimens which are represent to three taxa of *Heremites*. After total genomic DNA extraction, a total of 2820 bp of gene was amplified for each specimen and the amplification products were sequenced in both directions with the primers used in the PCR reactions. The generated dataset was used both in network and in phylogenetic analyses.

**Results:** Highest haplotype diversity was shown in cytb region whereas lowest one was shown in c-MOS region for *H. auratus*. While highest nucleotide diversity was found in cytb region for *H. vittatus*, lowest value was seen in c-MOS region for *H. auratus*. The Bayesian Interference methods were supported three main clades: *H. auratus*, *H. vittatus* and *H. septemtaeniatus* with high support values. The Bayesian tree was also supported by network analysis.

**Acknowledgements:** This study was supported by TUBITAK via a research project with grant number 113Z752.

**Keywords:** *Heremites*, Scincidae, Sauria, haplotype diversity, nucleotide diversity, Turkey.

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## Endemic Amphibians of Turkey (Anatolia)

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**Aim of the study:** In this study, we aim to present endemic amphibian diversity of Turkey and to compare this diversity with some other countries in the world.

**Material and Methods:** Information on the endemic amphibian of Turkey was obtained by utilizing field trips and literature data.

**Results:** According to the latest assessments (on December 26, 2017), there are 7,782 amphibian species in the world. Of these species, 6,866 are frogs and toads, 709 are salamanders and newts, and 207 are caecilians. However, this number was only 5,624 fifteen years ago. Over the past fifteen years, 2,158 new amphibian species have been identified in different parts of the world. Only the number of species identified in 2017 is 148. Turkey is a very rich country in terms of amphibian species diversity. According to recent data, totally 34 (17 anuran and 17 urodelan) amphibian species are known to live in Turkey. However, this number in 2012 was totally 28 consisting of 14 anuran and 14 urodelan species. So, six species have been identified in Turkey last five years. More than half of the amphibian species in the world live endemically in a country. Five countries with the most endemic amphibian species are Brazil (534 species), Colombia (349 species), Mexico (246 species), Madagascar (241 species) and Peru (224 species). Moreover, the rate of endemism is 100% in some countries (Jamaica, Seychelles, Sao Tome and Principe, New Zealand, Fiji, and Palau). The number of endemic amphibian species in Turkey is 16 and the rate is around 47%. Of these, 13 are country endemic and 3 are regional endemic. Country endemic urodelan species are 10 and anurans are 3. This situation increases the importance of Turkey in terms of the endemic amphibians.

**Keywords:** Endemic, Amphibians, Turkey, Anatolia.

PP-190

**The mechanisms of escape as a component of the psychological characteristics of social and environmental behavior of society**

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**Aim of the study:** aim of the study is to research mechanisms of escape as a component of the psychological characteristics of social and environmental behavior of society.

**Material and methods:** the literature and sources in the different languages had been involved to the study. The desire of the society to overcome the increasingly obvious and even for society itself a feeling of apparent helplessness over all sorts of natural disasters and, as a result, the realization of one's own vulnerability in this "field" can lead, paradoxically, to the formation of a self-ideal ("phantom" giving to mankind the imaginary sensation of one's own power and power, and also "delivering" mankind from the "feelings of inferiority" that constantly oppresses it. The above-mentioned aspiration, in turn, also leads to the formation of quite specific mechanisms that to some extent carry out this process-the so-called "escape mechanisms" (E. Fromm). Finally, such a state also contributes to a significant increase of the general social-stressful background, which inevitably leads to increasing the intensity of neuro-somatic diseases. At the same time, the mechanism we have named seems to be the most acceptable for us to create a kind of symbiosis - the "merger" of goals, actions, etc. the society itself with the same (or similar) manifestations of the activity of its natural habitat (the "symbiosis mechanism").

**Result:** Erich Fromm singled out three typical mechanisms of escape from freedom, characteristic of modern society: Authoritarianism; Destruction (destructiveness); Automated conformism. E. Fromm believes that increasing the freedom of a person is accompanied by a feeling of isolation. Despite the material advantages of our free society, some people have a passionate desire to return to the early state of group solidarity. For this, several irrational mechanisms are used: sadomasochism, destructiveness and conformism of the machine.

**Keywords:** mechanisms of escape, social, psychological, ecological

PP-191

## Heavy metal levels in the wedge clam *Donax trunculus* (Linnaeus, 1758) in intertidal areas on Igneada coasts of the Black Sea

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**Aim of the study:** Molluscs have the capability of accumulating heavy metals and thus they are candidate organisms for bio-indicator studies. In the present study the wedge clam *Donax trunculus* (Linnaeus, 1758) was chosen as bio-monitor organism. The aims of this study are to evaluate the levels of Hg, Cd, Pb, Cu and Zn in *D. trunculus* in intertidal areas on Igneada coasts of the Black Sea.

**Material and Methods:** All the wedge clam samples were collected from the Igneada coasts of the Black Sea seasonally in 2014. Sampling covered areas of the direct or indirect influence of urban releases and touristic and fishing activities, those located near the border of Rezovo, Bulgaria which carries domestic and agriculture discharges to the Igneada coasts of the Black Sea and a locality not under the influence of industrial releases. After sampling, specimens were transferred to the laboratory for further analysis. Each individual was properly cleaned by rinsing with distilled water to remove any debris and other external adherent. Then they were put into the plastic bags and frozen at 21°C prior to metal analysis. Heavy metal concentrations of mineralized samples were measured with ICP-MS (Agilent 7700x). Standard Reference Material (SRM) 2976 (mussel tissue) from National Institute of Standards and Technology (NIST) was used to determine the reliability of the heavy metal analysis. Student t-test and the one way analysis of variance ANOVA were used to determine whether there was a statistically significant difference between whole tissues and seasons or not. The significance level was set at  $p = 0.05$ .

**Results:** There were statistically significant differences between seasons ( $p < 0.05$ ). The results of the current study showed that the concentrations of examined metals in whole tissues were found in the following order: Zn > Cu > Pb > Cd > Hg. Mean values of heavy metals ( $\mu\text{g g}^{-1} \pm \text{SD}$  wet wt.) in *D. trunculus* are presented in Figures 2-6. Heavy metal levels in *D. trunculus* were found as: Hg, 0.015–0.025; Cd, 0.026–0.042; Pb, 0.17–0.40; Cu, 0.68–1.13; Zn, 3.1–4.67  $\mu\text{g g}^{-1}$  wet wt. There were significant differences ( $p < 0.05$ ) in the metal levels in *D. trunculus* between seasons. It was found that Hg and Pb levels were larger in whole tissues of the wedge clam in winter and autumn than those in summer and spring. However Cd was lower in summer than those in other seasons. Cu levels were higher in spring and autumn than the other seasons, whereas Zn levels were higher in winter and autumn than the others. The amounts of Hg, Cd, Pb, Cu and Zn in the present study were much lower than the allowable limits by European Community Regulation (EU) and Turkish guidelines.

**Acknowledgements:** The researchers wish to acknowledge the Department of Hydrobiology, Fisheries Faculty, University of Sinop for providing laboratory facilities during the study. This study is dedicated to Prof. Dr. Murat Sezgin who lost his life together with his son in traffic accident on 28th of July 2017.

**Keywords:** *Donax trunculus*, heavy metals, Igneada, Black Sea

### Bioaccumulation of metals in fish from Sarıkum Lake

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**Aim of the study:** Sarıkum Lake is a natural aquatic ecosystem. In 1987, Sarıkum area has been officially registered as “Natural Reserve Area” by the abrogated Ministry of Forestry. In 1991, Sarıkum Lake and its environment were registered as “Nature Protection Area”. It is a 785 ha complex ecosystem of sea, sand, freshwater lake, wetland, peatland, marshland and forest. Biodiversity of Sarıkum Lake is high due to this complex ecosystem. In addition riparian vegetation develops well around the lake. The bottom structure is composed of clay. It is close to the sea and it connects with the sea with a natural water channel. This situation makes the lake a proper living area for birds and other aquatic organisms including fish. The aim of the present study is to determine heavy metal amounts in *Cyprinus carpio* Linnaeus, 1758 belonging to the Cyprinidae family, *Platichthys flesus* (Linnaeus, 1758) belonging to the Pleuronectidae family, *Liza aurata* (Risso, 1810) and *Mugil cephalus* Linnaeus, 1758 belonging to the Mugilidae family from Sarıkum Lake.

**Material and Methods:** The present study was carried out in 2011. Trammel net, cover net and seine were mostly used in catching the fish species. Five individuals were taken from each species and were dissected in order to obtain muscle tissues that were mixed homogeneously and immediately frozen and stored at -21 °C till metal analyse. For determination of heavy metal amounts in fish samples, about 1 g of fish tissues was digested with Suprapur® nitric acid in a microwave closed system (Milestone Systems, Start D 260) for analysis. Samples were diluted to a final volume of 25 ml with double deionized water after digestion. At the same time, a blank trial was carried out. After digestion, Hg, Cd, Pb, Cu and Zn concentrations of muscle samples were analysed by ICP-MS (Agilent 7700x) and TORT-3 lobster hepatopancreas reference material for trace metals was used to determine the reliability of the heavy metal analysis. Heavy metals in fish tissues were expressed as microgram of metal per gram of wet weight sample.

**Results:** The certified and the analytical values with the Relative Standard Deviation percentage were always less than 10%. The contents of Hg, Cd, Pb, Cu and Zn in edible tissues of examined samples from the Sarıkum Lake were below the permissible levels. However, the results show significant difference ( $p < 0.05$ ) between the muscle tissues of various species. The order of mean metal amounts deposited in muscles of species from Sarıkum Lake is  $Zn > Cu > Hg > Pb > Cd$ . The highest concentrations of Hg, Cd and Zn were found in flathead grey mullet, European flounder and common carp, respectively. The higher concentrations of Pb and Cu are present in golden grey mullet. The concentrations of Cd are in range of 0.019-0.027  $\mu\text{g g}^{-1}$  in common carp, 0.028–0.040  $\mu\text{g g}^{-1}$  in European flounder, 0.020-0.034  $\mu\text{g g}^{-1}$  in golden grey mullet and 0.16-0.27  $\mu\text{g g}^{-1}$  in flathead grey mullet tissues. Differences between the mean concentrations of studied heavy metals in the muscles of four fish species are closely connected with their feeding habits. Considering all these results, it is needed to monitor the presence of heavy metals as environmental contaminants in the future, thus ensuring a Good Ecological Status (GES) of Sarıkum Lake, as well as providing the healthy ecosystem.

**Acknowledgements:** This work was carried out at the Department of Hydrobiology, Fisheries Faculty, University of Sinop.

**Keywords:** *Cyprinus carpio*, *Platichthys flesus*, *Liza aurata*, *Mugil cephalus*, Sarıkum Lake

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## Fatty acid composition of muscle lipids of *Sparus aurata* L., 1758

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**Aim of the study:** The main objective of this study was to measure the muscle fatty acid composition and SFA, MUFA, PUFA ratio of *Sparus aurata*. Total fatty acid compositions of *Sparus aurata* were investigated by gas chromatographic.

**Material and Methods:** *Sparus aurata* used in this study were obtained from Konya Markets. Three individuals were sampled. At the beginning of each analysis, the samples were allowed to equilibrate to room temperature, ground and homogenized in chloroform/methanol mixture (2/1, v/v). Ten gram of muscle sample were extracted. FAMES were analyzed on a HP (Hewlett Packard) Agilent 6890N model gas chromatograph (GC), equipped with a flame ionization detector (FID) and fitted to a HP-88 capillary column (100 m, 0.25 mm i.d. and 0.2 µm). Injector and detector temperatures were 240 °C and 250 °C, respectively. The oven was programmed at 160 °C initial temperature and 2 min. initial time. Carrier gas was helium (1 ml/min) used.

**Results:** Palmitic acid (C16:0), stearic acid (C18:0), oleic acid (C18:1) and docosahexaenoic acid (C22:6), were identified as the major fatty acid constituents. The contents of C20:5 n-3 and C22:6 n-6 in total fatty acid in the *Sparus aurata* ranged from 4.91% to 12.07% respectively. Total fatty acid compositions of fish tissues can be affected by diet, size, age, reproductive cycle, salinity, temperature, season and geographical location. Palmitic acid (C16:0) was the first highest SFA (15.76%). Oleic acid (C 18:1) was identified as a primary MUFA in the *S. aurata*. This fatty acid in muscle tissue of *S. aurata* was found to be 21.23%. C 14:1 ω5 and C 15:1 ω5 were found to be low amounts in the MUFA fractions of the muscle investigated. Polyunsaturated fatty acid (PUFA 42.08%) was found to be higher than SFA and MUFA. *Sparus aurata* may be a valuable food for human consumption in terms of fatty acids.

**Keywords:** *Sparus aurata*, fatty acid composition.

PP-194

**Fatty acid profile of *Mullus barbatus* (Linnaeus, 1758)**

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**Aim of the study:** The main objective of this study was to measure the muscle fatty acid profile of *Mullus barbatus*. Total fatty acid compositions of *Mullus barbatus* were investigated by gas chromatographic.

**Material and Methods:** The samples were collected from Konya's market. Three individuals were sampled. Ten gram of muscle sample were extracted. FAMES were analyzed on a HP (Hewlett Packard) Agilent 6890N model gas chromatograph (GC), equipped with a flame ionization detector (FID) and fitted to a HP-88 capillary column (100 m, 0.25 mm i.d. and 0.2 µm). Injector and detector temperatures were 240 °C and 250 °C, respectively. The oven was programmed at 160 °C initial temperature and 2 min. initial time. Carrier gas was helium (1 ml/min) used.

**Results:** The highest fatty acids in the *Mullus barbatus* were C18:1 ω9 oleic acid. Palmitic acid (C16:0) was the first highest Saturated fatty acids (SFAs) (20.89%). Oleic acid (C 18:1) was identified as a primary Monounsaturated fatty acids (MUFAs) in the *Mullus barbatus*. This fatty acid in muscle tissue of *M. barbatus* was found to be 23.83%. The percentage of palmitic acid in the muscle is higher than the DHA (docosahexaenoic acid). MUFAs was found to be higher than SFA and PUFAs. Various environmental conditions and the different diets of wild and reared fish affect their chemical composition, including their fatty acid profile. *Mullus barbatus* is a food source that can be renewed according to these results.

**Keywords:** *Mullus barbatus*, fatty acid profile.

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**Microplastic is consumed and affects metabolic activity of the copepod *Centropages typicus* in the Marmara Sea**

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**Aim of the study:** Microplastic particles are now found throughout the world's oceans. Recent studies have shown that these particles can be ingested by zooplankton species and later egested within their fecal pellets, which leads to spread of microplastic along the food web. This study investigated ingestion, egestion and effects of microplastic beads on metabolic activities of filter feeders marine copepod *Centropages typicus*, inhabited the Marmara Sea.

**Material and Methods:** Our study design incorporated 24 h feeding assays using a mixture of 6, 12 and 26 µm polystyrene beads at a concentration of 6,000 particles mL<sup>-1</sup>, in a ratio of 5: 4: 1, respectively. Microplastic consumption rate was determined by the number of pellets and the number of beads in the pellets, produced by one individual during 24 h. At the end of the experiment, the respiration rate of active and anesthetized by magnesium chloride, females and males were measured as indicators of their total and basal metabolic activity. Fecal pellets parameters and content were examined under a microscope and copepods oxygen consumption rate (µg O<sub>2</sub> ind<sup>-1</sup> h<sup>-1</sup>) were measured by sealed chamber method using modified luminescent dissolved oxygen sensor Hach LDO.

**Results:** During the first day after the addition of the mixture of microplastic beads to the filtering water, in 53% of the pellets produced by females and males, were found beads, while 43% of the pellets were empty. According to the amount of pellets produced and the number of beads contained in them, the consumption rate of microplastic by *C. typicus* was 26±16 beads female<sup>-1</sup> day<sup>-1</sup>. 95.3±3 and 4.8±2.8% of them belonged to 6 µm and 12 µm beads, respectively, while beads of 26 µm were absent in the pellets. Thus, *C. typicus* showed the ability to selectively prefer small beads of 6 µm of which correspondent the size of the natural food (eg 3-5 µm algae). No pellets were found in the experiments with starved individuals without beads. In the respiration experiments, oxygen consumption in both active females and males of *C. typicus* was significantly ( $p < 0.001$ ) 1.6 and 2.5, respectively, higher than in individuals consuming microplastic, whereas the oxygen consumption of anesthetized individuals was not significantly different. This indicates the inhibition of motor activity in *C. typicus* in a medium with a microplastic.

**Acknowledgements:** The present study was partly supported by the Research Fund of the Istanbul University (25919) and TUBITAK grants (CAYDAG-114Y244 and CAYDAG-115Y627).

**Keywords:** *Centropages typicus*, Microplastic, Consumption, Metabolic rates, Marmara Sea.

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## The Plants Used Against to the Evil Eye in Van (Turkey)

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**Aim of the study:** The reasons such as evil eye, bad spirits, or bad energy have been thought to cause adverse events that people experience. In such spiritual situations, people felt the need for protection and resorted to various methods for these. Commonly used methods are religious and traditional ones. It has been tried to determine the following: which plants are used against evil and destructive energy and why these plants are selected, the reasons why same plants are being used for the same purpose in different communities.

**Material and Methods:** In order to determine the plants used against the evil eye and the reasons for their emergence, we talked to people in Van city center and Van central villages and filled in the forms we had created. We numbered the references according to the interview sequence. We have tabulated the data we receive from the forms so that they are clearer and more easily comparable. We collected the plant samples mentioned and we identified their scientific names and local names.

**Results:** The most commonly used plant for the protection against evil is *Peganum harmala* L. (Harmal) by Van People. The number of plants used in the Van centre is higher than in the villages. The reason why the diversity of the plants used against the Evil in Van centre is too much because the fact that the province has a lot of cultural richness due to the heavy migration. Harmal is used for the same purpose all over Turkey and even even in countries such as Afghanistan, Pakistan, and Iran. The fact that it is so widely used for the same purpose is a sign that it has been used since ancient times and that it has spread over time to communities. *Centaurea virgata* Lam. (Acı Süpürge), *Achillea arabica* Kotschy (Hanzabel) and *Achillea santolinoidea* Lag. subsp. *willhelmsii* (K.Koch) Greuter (Kardaş Kınası) other than Harmal have been used for the same purpose in Van. *Styrax liquidus*, made from *Liquidamber orientalis* Mill., (Buhur) and *Nigella sativa* L. (Çörekotu) seeds are also sold by the herbalists for use against evil eye.

**Acknowledgements:** This study was supported by TÜBİTAK Scientific Human Resource Support Department (BİDEB) under the 2209/A in 2014.

**Keywords:** Evil Eye, Plant, Van, Turkey.

PP-197

**A New Inquiline Record, *Synergus consobrinus* Giraud in Houard, 1911 from the Eastern Black Sea Region, Turkey**

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**Aim of the study:** The genus *Synergus* belonging to tribe Synergini (Cynipidae) which are known the inquilines (except genus *Synophrus*), includes 30 valid species in the Western Palaearctic. So far, 17 inquiline wasps belonging to *Synergus* have been recorded from Turkey. It is aimed to contribute to the Turkish cynipid fauna that is thought to be rich, with this study.

**Material and Methods:** The oak gall specimens on their host were collected from eastern black sea region between late 2017 and early 2018. After collection, the galls were kept in laboratory and checked weekly for emerged inquilines. The inquilines were fixed on cards and pinned. The inquilines were identified using available literature sources.

**Results:** Material examined; BAYBURT, Taht, 40°17'N, 40°26'E, 1982 m, 19.X.2017, galls of *A. caputmedusae* on *Quercus macranthera* subsp. *sysprensensis*, emerged 20.XII.2017, 1♀♀; Bayburt-Erzurum 10. km, 40°10'N, 40°20'E, 1682 m, 14.XI.2017, galls of *A. quercustozae* on *Q. macranthera* subsp. *sysprensensis*, emerged 12.XII.2017, 1♀♀; GÜMÜŞHANE, Kelkit, Çağlar, 40°05'N, 39°17'E, 1642 m, 17.X.2017, galls of *A. quercustozae* on *Q. macranthera* subsp. *sysprensensis*, emerged 12.XII.2017, 1♂♂, 5♀.

**Acknowledgements:** This study was supported as financial by The Scientific and Technological Research Council of Turkey (TÜBİTAK Project No: 117Z096).

**Keywords:** Inquiline, Cynipidae, Synergini, New Record, Turkey.

PP-198

## Investigation on Soil Invertebrates of Lagina Ancient City, Turkey

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**Aim of the study:** Lagina is an ancient Carian city located at Turgut village in Yatağan, Muğla. Lagina Hekate used to be a Carian cult site belonging to Stratonikeia ancient city. It has been discovered that the history of the site dates back to the Bronze Age, about 3,000 BC. Local people call the site as Leyne. It is aimed to determine the soil invertebrates of Lagina and its environs, with this study.

**Material and Methods:** Litter and soil samples were collected monthly from Lagina and its environs between September 2017 and March 2018. After collection, the samples were kept in laboratory. Then, the samples were prepared for identification. After that, the samples were examined with microscopes and identified. The available literature sources were used to identification of species.

**Results:** After identification processes, totally 52 invertebrate families of 14 different ordo belonging to Nematoda, Annelida and Arthropoda phyla were found. The following ordo were found in the study area; Rhabditidae, Haplotaxida, Pseudoscorpianida, Oribatida, Mesostigmata, Trombidiformes, Geophilomorpha, Scolopendromorpha, Julida, Isopoda, Hymenoptera, Coleoptera, Collembola and Diptera. Also, definitions of found families were reviewed, their photographs were taken and world distributions were discussed. The soil diversity has been revealed by determining invertebrates families which living in litter and soil in Lagina Ancient City.

**Acknowledgements:** We would like to thank MSc and PhD students in acarology laboratory, Pamukkale University for their helping.

**Keywords:** Invertebrate, soil, biodiversity, Lagina, Muğla, Turkey.

PP-199

## Fisheries and Ecology of Köyceğiz Lake

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**Aim of the study:** Köyceğiz Lake is located in Southwest of Turkey in Muğla. Köyceğiz lake and lagoon covers an area of 5400 ha and connected to the sea with a 10 km long canal. Köyceğiz Lake is the most important active lagoon system in Turkey. Köyceğiz Lake and lagoon covers nearly 15% of the all lagoons among Turkey. Because of this reason, this area was declared as “Special Protected Area” in 1998 by the Ministry of Environment. The aim of the study was to observe the present situation of fisheries and ecological position in the lake.

**Material and Methods:** Köyceğiz Lake was declared as a Special Protection Area in 1988. The area is composed of terrestrial structures of various qualities around Köyceğiz Subsidence Lake. Köyceğiz Lake is a brackish lake and fed by springs and several streams. Fisheries are done by DALKO (Dalyan Fisheries Products Cooperation) and the major commercial species are gray mullet (*Mugil cephalus* (L.)), eel (*Anguilla Anguilla* (L.)), sea bass (*Dicentrarchus labrax* (L.)) and blue crab (*Callinectes sapidus* (Rathbun)). The beach is very important for sea turtles (*Caretta caretta* (L.)). Also, *Trionyx triunguis* (Forsk.) inhabits Köyceğiz Lake and canals. Köyceğiz Lake attracts tourists in terms of natural beauty. There are more than six hundred boats on duty to carry tourists.

**Results:** As a result, fisheries in Köyceğiz Lake and surrounding is mostly dependent on the mullets. *Mugil cephalus*, *Liza saliens*, *Liza ramada*, *Liza aurata* and *Chelon labrosus* are the main fishes of fisheries in Köyceğiz Lake. The lagoon is under pollution pressure of agricultural runoff and untreated urban waste. High amounts of pesticides are applied for citrus fruits farming and greenhouse farming due to intensive cultivation. Usage of pesticides and fertilizer are an important problem of Köyceğiz lake as mentioned in scientific studies which were carried out in Köyceğiz Lake to determine heavy metal pollution.

**Keywords:** Köyceğiz lake, Fisheries, Mullet, Turkey

PP-200

**An morphological, anatomical and palynological study on *Paeonia kesrouanensis* (J.Thiébaud) J.Thiébaud (Paeoniaceae) in Turkey**

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**Aim of the study:** Paeoniaceae family is represented with only one genus. *Paeonia* L. contains 6 species and 8 taxa in Turkey. Only one subspecies is endemic. *Paeonia kesrouanensis* (J.Thiébaud) J.Thiébaud is identified as *P. turcica* in the flora of Turkey. *P. turcica* P.H.Davis & Cullen is endemic to Turkey. The work entitled the Plants Lists of Turkey prepared by Güner *et al.*, it was used as the synonym of *P. kesrouanensis* and this species now not endemic for the Flora of Turkey. In this study, morphological, anatomical and palynological properties of *P. kesrouanensis* have been determined.

**Material and Methods:** *P. kesrouanensis* samples were collected from Altınyayla (Burdur) in April 2018. Some of live materials such as root, stem, leaf, flower and fruit were taken into alcohol of 70% and were kept in refrigerator to be used for anatomic studies. The rest of samples were dried according to standard herbarium techniques and preserved in the Pamukkale University herbarium (PAMUH). The Flora of Turkey and the other related floras were utilised in the identification of the specimens. In anatomical investigations, both superficial cross-section of leaf and transverse sections of root, stem, leaf, flower and fruit were prepared. The anatomical descriptions was supported with Light Microscope (LM) photographs. The palynological part of this study was done using both Light Microscope (LM) and Scanning Electron Microscope (SEM).

**Results:** The Flora of Turkey was used in the identification and description of the species *P. kesrouanensis*. Some of the dried and fresh plant samples were used for morphological measurements, and then their detailed description, habitat, altitudinal range, Turkey and world distribution were prepared. Detailed the anatomical and palynological properties of *Paeonia kesrouanensis* have been determined in detail and supported by photographs.

**Keywords:** anatomy, morphology, Paeoniaceae, *Paeonia kesrouanensis*, palynology

PP-201

**Karyomorphological Analysis of *Muscari turcicum* and *Muscari vuralii* from Turkey**

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**Aim of the study:** In this study, two locally endemic species of Turkey, *Muscari turcicum* Uysal, Ertuğrul & Dural and *Muscari vuralii* Bağcı & Dogu were mainly examined by means of their karyomorphology.

**Material and Methods:** Plant materials consisted of bulbs belonging to the genus *Muscari* were collected from natural populations of Turkey. Root tips were pre-treated in 0.002 M 8-hydroxyquinoline at 4°C for 8 h. The material was fixed with Carnoy for 24 h at low temperatures (+4°C). Before staining, the material was hydrolyzed with 5 N HCl for 1h at room temperature, stained with 1% aceto-orcein and mounted in 45% acetic acid. At least 10 metaphases were examined per taxa; the best metaphase plates were photographed (100×) with a digital camera (Olympus DP-72), mounted on an Olympus BX53 microscope. Idiograms and karyotyping analyses were carried out using KAMERAM 2.9.4.0. We took into account seven different asymmetry indices to analyze the karyomorphologies of the endemic *Muscari* species using KAMERAM.

**Results:** Their chromosome numbers were counted as  $2n=18$ , therefore both of them are diploid species. The karyotypes of the analyzed taxa had a predominance of metacentric (m) chromosomes and their karyotypes formulas could be given as  $14m+4sm$ . The findings indicated that they are very similar in point of karyomorphologies as well as their morphologies.

**Acknowledgements:** We thank the TÜBİTAK (Project No: 111Z222) and Scientific Investigation Project Coordinator of Selçuk University (Project No: 18401016) for their financial support.

**Keywords:** Chromosome number, chromosome morphology, karyotype analysis, karyotype asymmetry, Turkey.

PP-202

## Analysis of Genetic Relationship among Local *Olea europaea* L. Cultivars Using ISSR Markers

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**Aim of the study:** *Olea europaea* L. has a high level of heterozygosity and genetic polymorphism is mutual among cultivars, so that they are predominantly allogamous. This variability, coupled with the complexity and difficulty in olive cultivar nomenclature, make necessary the evaluation and characterization of olive genetic resources that have been recognised as very important, since both olive productivity and oil quality are traits inherent to a variety. Determination of genetic relationships among cultivars eases efficient sampling, operating and using of germplasm resources. This study aims to determination of genetic diversity and relationship in different local cultivars of olive using inter simple sequence repeat (ISSR) marker systems using ten ISSR primers.

**Material and Methods:** The olive total genomic DNA was extracted by using CTAB method by grinding the young leaf tissue to a fine powder. DNA sample concentration was determined using a nanodrop spectrophotometer. DNA samples were diluted to 50ng/μl prior to ISSR PCR amplifications. ISSR-PCR DNA amplifications were performed using ten ISSR primers and PCR reactions were carried in a 25μl reaction volume, containing PCR Buffer (1x final concentration), 2.5mM MgCl<sub>2</sub>, 0.4mM of each dNTP, 0.4mM ISSR primer, 50ng genomic DNA and 2unit Taq DNA polymerase. Amplification conditions were as follows: initial denaturation at 95°C for 3 min, 35 cycles at 95°C for 15 sec, 55°C for 30 sec, a ramp to 72°C reaching in 3 min, followed by a 10min lag at this temperature, and an indefinite holding at 4°C, respectively. Amplicons were separated on 1.5% agarose gel at 80V. They were then stained with 3μl/ml ethidium bromide solution, visualized by illumination under UV light, and documented using a gel documentation and image analysis system. DNA fragments of ISSR PCR reactions were scored by their presence (1) or absence (0) and the ones at low intensities were scored only if they were reproducible in the PCR runs. Cluster analysis was performed to construct dendrograms, with the unweighted pair-group method by arithmetic averages (UPGMA) from the similarity data matrices using Jaccard's coefficient.

**Results:** Determination of genetic relationships among olive cultivars eases efficient sampling, operating and using of germplasm resources. In the present study, ISSR analysis displayed a high level of genetic variability among Turkish olive cultivars, indicating a potential resource for the use of this germplasm in clonal selection programs.

**Acknowledgements:** This study was supported by the Mugla Sitki Kocman University Scientific Research Projects Coordination Unit (Mugla, Turkey, MSKU-BAP 15/005).

**Keywords:** DNA fingerprinting, ISSR PCR, Molecular marker, UPGMA.

PP-203

### The Enzyme Inhibitory Activity of Some Oak Galls

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**Aim of the study:** Galls are abnormal plant tissues caused by a variety of organisms including insects, microorganisms, nematodes and acarids. Genus *Quercus*, belongs to the Fagaceae family, contains 500 species. Oak gall wasps (*Hymenoptera:Cynipidae: Cynipini*) is the second largest insect group with 1300 identified species preferring different oak species for gall formation. *Andricus* is a genus of gall wasps in the family *Cynipidae*. In this study, we aimed to determine the tyrosinase, urease, acetyl- and butyryl- cholinesterase enzyme inhibitory activity of *Quercus brantii* galls induced by *Andricus quercustozae* and *Andricus ceconii*.

**Material and Methods:** Two different gal samples were collected from Şirvan/Siirt. The dried and pulverized samples were macerated by methanol for 5 days. The enzyme Inhibitory activities of the samples were determined spectrophotometricly. *in vitro* Ellman method (for acetyl- and butyryl- cholinesterase inhibition activity), Mobley's method (for urease inhibition activity) and Hearing Method (for tyrosinase inhibition activity) used for this purpose.

**Results:** The gall of *A. quercustozae* was found to be more active than the gall of *A. ceconii*. The highest inhibition ratio on butyrylcholinesterase enzyme was 31%, on tyrosinase enzyme was 61% and on urease enzyme was 40% inhibition which was recorded by the gall of *A. quercustozae*. On the other hand, the gall of *A. ceconii* inhibited 8% butyrylcholinesterase enzyme, 55% of tyrosinase enzyme. Both of the extracts were not active on acetylcholinesterase enzyme inhibition.

**Acknowledgements:** The research was funded by grant: Batman University Scientific Research Projects Coordination Unit (.8.001Project number).

**Keywords:** Cholinesterase, tyrosinase, urease, gall, *Quercus brantii*, *Andricus*

PP-204

**Antioxidant Activity of *Adiantum capillus-veneris* L.**

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**Aim of the study:** Free radicals have been claimed to cause protein oxidation, lipid peroxidation and DNA damage that has come to conclusion with many diseases such as cancer and cardiovascular diseases. Some of the clinical effects of medicinal plants are closely related to their antioxidant activity. *Adiantum capillus-veneris* L. is a kind of medicinal and endangered fern belonging to Adiantaceae. In this study, we aimed to determine the antioxidant activity of *Adiantum capillus-veneris* with total phenols and flavonoid content.

**Material and Methods:** The aerial parts of the plant macerated by methanol and water. The total phenol and flavonoid content of the extracts were expressed as micrograms of gallic acid and quercetin equivalents, respectively. DPPH free radical scavenging activity, cupric reducing antioxidant capacity (CUPRAC) and ABTS radical cation decolorization methods were carried out to determine the antioxidant activity. BHT, BHA and ascorbic acid were used as positive controls.

**Results:** The phenolic content of the methanol extract ( $103.04 \pm 0.007$  µgGAEs/mg extract) was higher than the phenolic content of the water extract ( $61.84 \pm 0.01$  µgGAEs/mg extract). The flavonoid content of the methanol and water extracts are determined as  $73.31 \pm 0.06$  and  $10.12 \pm 0.04$  µgQEs/mg extract, respectively. In all test systems, the methanol extract exhibited higher activity than the water extract. The highest inhibition ratio of methanol and water extract in DPPH was 86% at 100 µg/ml and 70% at 2000 µg/ml concentration. On the other hand extracts exhibited nearly the same activity in ABTS method (methanol extract 95% inhibition and water extract 90% inhibition at 50 µg/ml concentration).

**Keywords:** *Adiantum capillus-veneris*, antioxidant activity, DPPH, ABTS, CUPRAC

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## Monitoring of Water Quality by using Macroinvertebrates in the Subriver Basin of Gördes-Gürdük of Gediz River

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**Aim of the study:** The main aims of this study were to determine the biological richness of the river basin with particular emphasis on the relationship between the structure of the macroinvertebrate community and the physical and chemical features of their environment and to assess the water quality using biological index of the subriver basin of Gördes-Gürdük of Gediz River.

**Material and Methods:** Macroinvertebrate communities along the stream were sampled Autumn 2016 and Spring in 2017 at each of the four stations. In this project will be applied WFD (Water Framework Directive) standards 10870 BS EN ISO 2012, Water quality - selection of manual sampling methods and devices for benthic invertebrates in fresh water BARBOUR et. al. accepted after 1999 and multiple multi-habitat technique AQEM I/STAR protocol contains a selection of selected sampling areas to improve habitat diversity. In addition, TSE 6469 EN 27828, EN 28265, EN ISO 9391, EN 8689-1, EN 8689-2 selection standards taking into account the common sampling procedures and equipment will be monitored. All the animals collected were immediately fixed in formaldehyde (4%) in the field and then transferred to 70% ethyl alcohol. The macroinvertebrates were sorted, identified to the lowest possible taxon and counted under a stereomicroscope. Multimetric Macroinvertebrate Index Flanders (MMIF), BMWP (Spanish Version), EPT-Takson (%) and Shannon-Wiener diversity index calculated.

**Results:** A total of 3433 individuals were collected covering 37 taxa in three stations. Water quality values were calculated according to National Water Index of sampling points using multimetric method (BMWP (Spanish Version), Shannon-Wiener Diversity Index and EPT-Takson (%)). Accordingly, st1 and st2 sampling points are in the High Quality Water Class and st3 is considered to be of Poor Quality Water Class. According to MMIF index results, st1 sampling point is in Good Quality Water Class; st2 sampling point in the Middle Quality Water Class and st3 considered to be in Poor Quality Water Class

**Acknowledgements:** This research was supported by Ministry of Forestry and Water Management and TUBİTAK\_MAM "Gediz Havzasında Nehir Ve Göl İstasyonlarında Biyolojik İzleme, Buna Bağlı Su Kalitesi Ve Ekolojik Durum Tayini 2016

**Keywords:** Gediz River basin, bioindicators, biological monitoring, benthic fauna

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## Assessment of Water Quality by using Macroinvertebrates in the Subriver Basin of Alaşehir of Gediz River

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**Aim of the study:** The main aims of this study were to determine the biological richness of the river basin with particular emphasis on the relationship between the structure of the macroinvertebrate community and the physical and chemical features of their environment and to assess the water quality using biological index of the subriver basin of Alaşehir of Gediz River.

**Material and Methods:** Macroinvertebrate communities along the stream were sampled Autumn 2016 and Spring in 2017 at each of the four stations. In this project will be applied WFD (Water Framework Directive) standards 10870 BS EN ISO 2012, Water quality - selection of manual sampling methods and devices for benthic invertebrates in fresh water BARBOUR et. al. accepted after 1999 and multiple multi-habitat technique AQEM I/STAR protocol contains a selection of selected sampling areas to improve habitat diversity (Cheshmedjiev et al, 2011). In addition, TSE 6469 EN 27828, EN 28265, EN ISO 9391, EN 8689-1, EN 8689-2 selection standards taking into account the common sampling procedures and equipment will be monitored. All the animals collected were immediately fixed in formaldehyde (4%) in the field and then transferred to 70% ethyl alcohol. The macroinvertebrates were sorted, identified to the lowest possible taxon and counted under a stereomicroscope. Multimetric Macroinvertebrate Index Flanders (MMIF), BMWP (Spanish Version), EPT-Takson (%) and Shannon-Wiener diversity index calculated.

**Results:** A total of 3403 individuals were collected covering 67 taxa in four stations. Water quality values were calculated according to National Water Index of sampling points using multimetric method (BMWP (Spanish Version), Shannon-Wiener Diversity Index and EPT-Takson (%)). Accordingly, st1 and st3 sampling points is in the Good Quality Water Class, st2 is considered to be of Moderate Quality Water Class and st4 is considered to be of Poor Quality Water Class. According to MMIF index results, st1 and st2 sampling points are in moderate Quality Water Class; st3 and st4 are considered to be in Poor Quality Water Class.

**Acknowledgements:** This research was supported by Ministry of Forestry and Water Management and TUBİTAK\_MAM "Gediz Havzasında Nehir ve Göl İstasyonlarında Biyolojik İzleme, Buna Bağlı Su Kalitesi Ve Ekolojik Durum Tayini 2016

**Keywords:** Gediz River basin, Bioindicators, Biological monitoring, bentik fauna

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**Rock Garden of Botanical Garden of Adnan Menderes University**

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**Aim of the study:** Rock garden concept has been used for many years by gardeners. Rock gardens are specially designed areas on basis of arranging rocks, sands and related plants which are usually drought resistance plants. The aim of this research is to prepare rock garden in ADÜ Botanical Garden.

**Material and Methods:** ADÜ Botanical Garden is located in ADÜ Central Campus area. Plants are planted according to their habitat needs in accordance with rock garden landscape.

**Results:** Botanical gardens are living collection of plants for scientific, educational, recreational and protection purposes. ADÜ Botanical Garden and Herbarium Research and Application Center was founded in 2010. Substructure and general landscaping was completed in 2013 and first planting works started. Rock garden section of ADÜ Botanical Garden is about 2 decares area located in northeast part of botanical garden. Rock garden landscape is designed in a special manner that shows miniature hills, false river with plants etc. ADÜ Botanical Garden rock garden have various species from different geographical areas around the world as well as native species.

**Acknowledgements:** This project was supported by Adnan Menderes University Scientific Research Projects Department with project ADU-MARL-15001.

**Keywords:** botanical garden, Aydın, rock garden, drought tolerant, ADÜ

PP-208

**Mediterranean Plants Garden of Botanical Garden of Adnan Menderes University**

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**Aim of the study:** It is well known that, there are 3 types of climate in Turkey; Mediterranean, continental and oceanic. The greatest part of country influences various types of Mediterranean climate. Mediterranean-type ecosystems (MTEs), with their characteristic and unique climatic regimes of mild wet winters and warm and dry summers. And also this type of climate occur in just five regions of the world: California; Central Chile; the Mediterranean Basin; the Cape Region of South Africa; and Southwestern and South Australia. These areas are home to remarkable and globally significant levels of plant diversity and endemism that has led all five regions to be designated as “biodiversity hotspots.” The aim of this research is to prepare special section for mediterranean plants in ADÜ Botanical Garden to introduce this plant group.

**Material and Methods:** ADÜ Botanical Garden is located in ADÜ Central Campus area. Plants are supplied from local distributors and/or tree nurseries. They are planted according to their habitat needs.

**Results:** Botanical gardens are living collection of plants for scientific, educational, recreational and protection purposes. ADÜ Botanical Garden and Herbarium Research and Application Center was founded in 2010. Substructure and landscaping was completed in 2013 and first planting works started. Mediterranean plants section of ADÜ Botanical Garden is about 1 decare area located in west part of botanical garden. ADÜ Botanical Garden mediterranean plants section have various species from different geographical areas around the world as well as native species.

**Acknowledgements:** This project was supported by Adnan Menderes University Scientific Research Projects Department with project ADU-MARL-15001.

**Keywords:** botanical garden, Aydın, mediterranean, climate, ADÜ

PP-209

**Morphological, Anatomical and Molecular Comparison of lichenicolous *Acarospora hospitans* H. Magn., *A. insolata* H. Magn. and *Acarospora stapfiana* (Müll.Arg.) Hue**

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**Aim of the study:** This study aimed to examine the morphological, anatomical and phylogenetic relationships of some parasitic species belong to genus *Acarospora* A.Massal., which widely spreaded in our country.

**Material and Methods:** Samples of parasitic lichens belonging to genus *Acarospora* were collected from different parts of Turkey. Total DNA was extracted from apothecia by using the DNeasy Plant Mini Kit (Qiagen) according to the manufacturer's instructions. PCR analysis was performed by using ITS (ITS1 and ITS4) and mtSSU (mrSSU1 and mrSSU3R). ITS and mtSSU sequence results of lichen samples were analysed by using Clustal W option in the BioEdit program. The phylogenetic analysis of lichen samples belonging to genus *Acarospora* were performed by using the Maximum Likelihood method of the Mega 7 (Molecular Evolutionary Genetics Analysis) software program.

**Results:** Some *Acarospora* species are known to be lichenicolous on different lichens. In this study, numbers of samples belonging to this genus collected from Turkey. *Acarospora hospitans* and *Acarospora insolata* are parasitic on genus *Aspicilia*, while *Acarospora stapfiana* species are spread on genus *Xanthoria*. After morphological examinations; molecular analyses of ITS nrDNA and mtSSU were carried on these samples. In this poster we are discussed the morphological and ecological characters of these species along with distributional data of the species in Turkey.

**Keywords:** Lichens, ITS nrDNA, mtSSU, biodiversity, *Acarospora*, Turkey.

**Efficacy of *Gliocladium roseum* against dry rot of potato caused by *Fusarium sambucinum***

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**Aim of the study:** *Fusarium* dry rot of potato is a major disease and caused by several *Fusarium* species with *Fusarium sambucinum* Fuckel being the most aggressive species in worldwide, including Turkey. Several fungal biocontrol agents have been used for achieving plant disease control, amongst them *Gliocladium* group has been found effective against tuber pathogens. *Gliocladium roseum*, a filamentous fungus which is widely distributed in soil and decaying vegetation. It is commonly considered a contaminant and has never been found to be a pathogen in animals or humans. It has ecologically relevant not only in the protection of plants against pathogens, producing a wide range of antibiotic substances and parasitizing other fungi, but also in the stimulation of plant growth. Moreover, these species of fungi can grow on cellulose and produce hydrocarbon and derivatives that look much like diesel. Aim of this study was to determine the efficiency of *G. roseum* against *Fusarium sambucinum* caused dry rot of potato.

**Material and Methods:** This study was carried out in two phases: *In vitro* and *In vivo* conditions. In first phase, the effect of *Gliocladium roseum* was studied against three isolates of *F. sambucinum* (Fs2, Fs3 and Fs4) *in vitro* conditions in PDA medium by dual culture technique and incubation at  $22 \pm 24^{\circ}\text{C}$ . In the second phase, Potato tubers, CV. Desire were wounded and inoculated with 500  $\mu\text{l}$  of *Gliocladium roseum* suspensions ( $10^7$  spores  $\text{mL}^{-1}$ ), 24 h prior inoculation by *F. sambucinum* and reduction rate of dry rot in tubers recorded 5-6 weeks incubation at  $20-24^{\circ}\text{C}$  in comparison with control treatments. Parameters of dry rot caused maximal width (w), depths (d) were noted, and tubers were calculated by applying the following formula (Lapwood et al. 1984). Penetration (mm):  $[(w/2 + (d-6)]/2$ .

**Results:** *In vitro* results showed that *G. roseum* was moderate mycoparasitism when compared to other antagonist microorganisms, *G. roseum* growth slowly on the colony of pathogen. But it had been found that *G. roseum* was very strong to penetrate and coiling on pathogen. *In vivo* results showed that tuber dry rot was reduced by *G. roseum* with different rates. Penetration measure for *F. sambucinum* Fs2, Fs3 and Fs4 was 9,58, 8,66 and 14,50 respectively. When compared to treated control (+), *F. sambucinum* (Fs2, Fs3 and Fs4) isolates were inhibited by *G.roseum* with the rate of 50,08 %, 56,82 % and 39,10 % respectively.

**Keywords:** Potato, Dry rot, *Fusarium sambucinum*, *Gliocladium roseum*, biological control

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**A New Record of Mesostigmatid Mites (Acari: Zerconidae) for the Iranian Fauna: *Zercon ozkani* Urhan & Ayyıldız, 1994**

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**Aim of the study:** In order to determine of zerconid mites (family Zerconidae) which spread in East Azerbaijan Province, and contribute to acarofauna of Iran, various litter, soil and moss samples collected from different habitats were investigated. Definition of *Zercon ozkani* was presented according to samples collected from Arasbaran Forest which is not known from the country before.

**Material and Methods:** Mites belonging to genus *Zercon* living in leaf litters were collected from Arasbaran Forest (East Azerbaijan Province, Iran). 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. Morphological terminology, idiosomal chaetotaxy and poidotaxy used in the description follows that of Maşán & Fend'a (2004).

**Results:** Original definition of *Zercon ozkani* was made in 1994 by Turkish Zerconidae specialist Raşit Urhan, according to female specimens collected from Uzundere County (Erzurum Province, Turkey). After that, female, male and deutonymph specimens of this species were recorded in the country by Urhan (1995) and Öztaş (2011) from Artvin and Giresun provinces respectively. As a result of collected samples from Arasbaran Forest, 2 females of *Zercon ozkani* were found for the first time in Iran. Definitions of female specimens were reviewed, photos of various body parts and measurements were taken, and world distributions were discussed.

**Acknowledgements:** This project was supported by the research division of the University of Maragheh, Iran, which is greatly appreciated.

**Keywords:** zerconid, new record, acarofauna, Arasbaran forest, East Azerbaijan Province, Iran.

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## Soil Mites (Acari) of Bozkurt and Çardak Counties (Denizli Province, Turkey)

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**Aim of the study:** Various mite groups (e.g. Mesostigmata, Prostigmata, Trombidiformes) are important components in forest ecosystems and so far, more than thousand mite species were recorded from Turkey. This study was carried out to investigate the diversity of soil mites in two different counties of Denizli Province. Main focus of this study is reveal the mite diversity of Denizli Province and contribute to acarofauna of Turkey.

**Material and Methods:** Litter, soil and moss samples collected from forestland areas of Bozkurt and Çardak counties between February 2017 and January 2018. In this context, samples were taken randomly in research areas at monthly intervals. Collected samples were brought in plastic bags, labelled and transferred to laboratory. Then, samples were put to extracting device of soil mites which include combined Berlese funnels. 3-5 days later, ethanol bottles were collected, poured into petries and mites were extracted under a stereo microscope (Nikon SMZ745T). 60% lactic acid was used for decolorizing and cleaning processes. After that, mite samples were examined with light microscope (Olympus BX50) and identified. Lastly, they were labeled and placed in storage bottles which contain 70% alcohol and 1-3 drops of glycerin.

**Results:** After identification processes, totally 48 mite species of 33 different families were identified. Mite species belonging to following 42 genera were found. *Alliphis*, *Allotrombidium*, *Amblyseius*, *Anystis*, *Belba*, *Bdella*, *Camerobia*, *Carobodes*, *Cepheus*, *Ceratozetes*, *Cheyletus*, *Cosmochthonius*, *Cunaxa*, *Eremaeus*, *Eupelops*, *Euphthiracarus*, *Galumna*, *Gamasellus*, *Gustavia*, *Hypoaspis*, *Labidostomma*, *Megemereus*, *Microtriatia*, *Nenteria*, *Nothrus*, *Odontodamaeus*, *Oppia*, *Oribatula*, *Parasitus*, *Pergamasus*, *Prozercon*, *Pseudoparasitus*, *Rhodacarellus*, *Rhyssotriata*, *Scheloribates*, *Tetranychus*, *Trichoribates*, *Trombidium*, *Uroobovella*, *Uropoda*, *Zercon* and *Zygoribatula*. Identification of detected mites has been tried at species level. However, some species were given at genus level. Examination of detected species was carried out in light microscope, their definitions were reviewed, photographs were taken and world distributions were given. The diversity of soil mites has been revealed by determining mite species which living in litter, soil and moss in forestland areas of Bozkurt and Çardak counties.

**Acknowledgements:** This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Keywords:** mite, diversity, Bozkurt, Çardak, Denizli, Turkey.

***Sphagnum papillosum* (Sphagnopsida); a new record to The Turkish Bryophyte Flora**

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**Aim of the study:** *Sphagnum* genus belongs to *Sphagnopsida*, which is one of 6 classis (Takakiopsida, Sphagnopsida, Andreaeopsida, Andreaebryopsida, Polytrichopsida, and Bryopsida) in mosses (Bryophyta). This classis is thought to be evaluated as divisio by some researchers because of some particular morphological properties, special living habitats (mostly acidic environments), lack of peristome teeth (responsible for dispersion of spores), different cellular arrangements (contains chlorophyllose and hyalin cells) and lack of costa (midrib). In spite of this approach, researches show that genus should remain monophyletically in Bryophyta divisio. The genus *Sphagnum* is represented with 23 taxa in our country. The aim of this study is to contribute to the understanding of the bryophyte flora of Turkey.

**Material and Methods:** *S. papillosum* was collected during revisional project on the Turkish *Sphagnum* supported by TÜBİTAK (the Scientific and Technological Research Council of Turkey) between 2013 and 2017. The new record was identified using flora books and relevant monographs and revisions. The new record is kept at the Herbarium of Adnan Menderes University (AYDN).

**Results:** Uniformly ochreous plants on bogs are distinctive. Green forms on bogs are virtually identical to green *S. magellanicum*. However, in these open habitats, both species typically assume their more characteristic and very different colouring. On bogs, any trace of red in the leaves or stem of a plant in Section *Sphagnum* signifies that the plant is *S. magellanicum*. Green or ochreous forms at the margins of bogs, or beside flushes, may be very similar to some forms of *S. palustre* and to *S. affine*. It can only be distinguished with papillose cell walls and seen certainly under a microscope. The genus *Sphagnum* which are placed under 7 sections represented by 23 taxa in our country. The new record therefore is an outstanding and interesting addition to the Turkish *Sphagnum* flora, raising the total number of recorded species to 24.

**Acknowledgements:** We cordially thanks to TÜBİTAK (The Scientific and Technical Research Council of Turkey) for financial support of project (TBAG 113Z631).

**Keywords:** *Sphagnum papillosum*, Sphagnopsida, Bryophyte, Turkey

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***Sphagnum cuspidatum* (Sphagnopsida); a new record to The Turkish Bryophyte Flora**

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**Aim of the study:** Bryophytes (mosses, liverworts and hornworts), being the second largest group among plants, have an important place in our country's biodiversity with approximately 1000 taxa (approximately 800 mosses, nearly 190 liverworts and 4 hornworts). Within this large group, the genus *Sphagnum*, also known as peat moss, has a special important role because of ecological and economical importance. Up to now, 23 taxa belong to genus *Sphagnum* were recorded from Turkey. The aim of this study is to contribute to the understanding of the bryophyte flora of Turkey.

**Material and Methods:** Material of this study was collected between 2013-2016 during the revisional project on Turkish *Sphagnum* supported by TÜBİTAK (TBAG, grant no. 113Z631). The new record was identified using flora books and relevant monographs and revisions. The new record is kept at the Herbarium of Adnan Menderes University (AYDN).

**Results:** *S. cuspidatum* was collected during revisional project on the Turkish *Sphagnum* supported by TÜBİTAK (the Scientific and Technological Research Council of Turkey) between 2013 and 2017. The shape of the stem leaf, a single juvenile branch between the capitulum rays, and the curved, drawn-out, pointed branch tip are the most reliable distinguishing features of *S. cuspidatum*. The new record increase the total known number of *Sphagnum* taxa in Turkey to 24. It is kept at the Herbarium of Adnan Menderes University (AYDN).

**Acknowledgements:** We cordially thanks to TÜBİTAK (The Scientific and Technical Research Council of Turkey) for financial support of project (TBAG 113Z631).

**Keywords:** Bryophyte, *Sphagnum*, *Sphagnum cuspidatum*, Turkey

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## Cytotoxic Effects of Methanolic Extracts from Different *Cladonia* Species on Human Lung Carcinoma (A549) Cell Line

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**Aim of the study:** Lichens have therapeutic effects on various diseases and are often used in alternative medicine. Lately, certain attention has been paid to lichens as a source of natural antioxidants. Lichens produce numerous secondary metabolites that attract big attention because of their antiviral, antimicrobial, antitumor, antiallergic, inhibitory activity of growth of plants and so on. 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 fimbriata* (L.) Fr. and *Cladonia rangiformis* Hoffm. on human lung carcinoma (A 549) 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 *C. rangiformis* extract was found to be most cytotoxic extract with 170.156 µg/mL IC<sub>50</sub> value on A 549 cell line. *C. fimbriata* extract showed 23.40% inhibition effect on the cell viability even at 1mg/mL concentration. Among the two *Cladonia* species studied, *C. rangiformis* was found promising on A549 cell line. The inhibitory effect of *C. rangiformis* extract on lung cancer cell line at different concentrations for 48 and 72 h will be examined in our subsequent studies.

**Acknowledgements:** This study was financially supported by 6602b-BMYO/17-121 coded Bozok University project.

**Keywords:** Cladoniaceae, *Cladonia fimbriata*, *Cladonia rangiformis*, cytotoxicity

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**Investigation of Fly (Insecta: Diptera) Fauna that is important for Forensic Entomology in Mustafakemalpaşa, Bursa**

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**Aim of the study:** Application method of the Forensic Entomology is the determination of the age of life cycle, from the moment that put eggs on the corpse when the flies (Diptera) species, which are the most important insect group in the identification of forensic events and found estimated PMI (Post-Mortem-Invertal) with this result. In this study, the aim is to determine the fly species which are important in terms of forensic entomology in the region.

**Material and Methods:** The species *Sus scrofa* which was used in this study, had been taken as dead from the Veterinary Faculty of Uludağ University. Adult Diptera and larval were collected from the surface of the dead *Sus scrofa* (stored in stainless steel cage) under different area conditions and also different seasons. The samples were kept in laboratory and checked after collection. The adults were fixed on cards and pinned. Adult Diptera and larval were started to identify using available literature sources.

**Results:** As a result of the field studies, two species (*Sarcophaga variegata*, *Sarcophaga Iehmanni*) from Sarcophadigae family, four species (*Calliphora subalbina* *Calliphora uralensis*, *Calliphora vomitoria*, *Lucilia caesar*) from Calliphoridae family and one species (*Musca domestica*) from Muscidae family are reported. Identifying from the collected and kept samples in the laboratory will be continue with using available literature sources.

**Acknowledgements:** This study was supported as financial by Pamukkale University, Coordinatorship of Scientific Research Projects (Project No: 2017FEBE022).

**Keywords:** *Sus scrofa*, Diptera, Forensic Entomology, Bursa, Turkey.

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## **Molecular Detection and Genetic Analysis of Peste des Petits Ruminants Virus Lineage IV in Small Ruminants in Turkey**

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**Aim of the study:** Peste-des-petits-ruminants (PPR) is one of the transboundary viral diseases of small ruminants and is caused by the PPR virus (PPRV), which is a Morbillivirus of the family *Paramyxoviridae*. The aim of the study was to investigate PPRV infection in PPR-suspected sheep and goat samples by RT-PCR assay based on the fusion (F) gene.

**Material and Methods:** A total of 16 tissue samples (lungs, spleen, liver, and lymph node) were collected from 2 sheep and 2 goats from four different flocks in several provinces (Antalya, Konya, and Niğde) located in the Central and Mediterranean regions of Turkey during the months of January and June 2017. Total RNA was extracted from samples by using a commercial RNA extraction kit. Samples were tested with real-time RT-PCR for the presence of PPRV genome. The samples detected positive in real-time RT-PCR were subjected to conventional RT-PCR for the amplification of the F gene. Genetic characterization of the PPRV field isolates was conducted by sequencing F gene segment.

**Results:** PPRV RNA was detected in all investigated tissue samples (n=16). Phylogenetic analyses based on the F gene sequence clustered field isolates in the present study belong to lineage 4 with other Asian and Middle East isolates. The analysis of the F gene sequences revealed that the amino acid homology between the field isolates in the present study was 100%, whereas the similarity with previously characterized Turkish isolates ranged from 98.9% to 100%. Results showed that PPR virus lineage IV has been in circulation in Turkey since the first detection of the disease.

**Keywords:** Peste-des-petits-ruminants, Sheep, Goat, Turkey, Lineage IV

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**Detection of border disease virus (BDV) genotype 7 and lineage IV peste des petits ruminants virus in aborted sheep foetus**

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**Aim of the study:** Border disease virus (BDV) is one of the important viral agent that can cause abortion in small ruminants. Peste-des-petits-ruminants (PPR) is another economically important and highly contagious disease of sheep and goats, and it can leads to abortions. The current study was conducted to investigate the potential roles of BDV and PPRV in abortion cases of sheep.

**Material and Methods:** A total of 9 aborted sheep foetuses were collected from a sheep flock with a history abortion problem in the Konya Province in Turkey in 2017. The rate of abortion in the flock was 39% (22/56). Tissue samples (brain, lungs, spleen, liver, kidney and lymph node) were collected from aborted sheep foetuses, and total nucleic acid was extracted from samples by using a commercial extraction kit. The conserved regions of the 5' untranslated region (5'UTR) and nucleocapsid (N) gene-based real-time RT-PCR methods were used to confirm the BDV and PPRV infection, respectively. The samples detected positive in real-time RT-PCR were subjected to conventional RT-PCR assays for the amplification of the 5'UTR of the pestivirus and fusion (F) gene of PPRV. Genetic characterization of the BDV and PPRV field isolates was conducted by sequencing 5'UTR and F gene segment, respectively.

**Results:** BDV RNA was detected in 5 of the 9 aborted sheep foetuses whereas PPRV RNA was detected 2 foetuses. BDV RNA was also detected in PPR positive samples. Phylogenetic analysis based on the 5'UTR region indicated that the isolates in the present study belong to BDV-7 genotype whereas genotyping based on F gene sequence analysis clustered field isolates in the present study into lineage IV of PPRV. Results showed that co-infection of the BDV and PPRV can occur and causes high abortion rate in small ruminants.

**Keywords:** Small ruminants, Abortion, Border disease virus, Peste-des-petits-ruminants virus, BDV-7 genotype, PPRV lineage IV

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## Identification of a Gene that may be Involved in Providing boron tolerance to an Extremophilic *Bacillus* Isolate

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**Aim of the study:** Increasing studies in recent years show that Boron is important from the biological perspective as well. In this study, we aim to identify gene resources that are implicated in the phenomenon of Boron tolerance in a *Bacillus* isolate. This isolate was initially isolated from a sample collected from Bursa Kestelek boron mine and can survive in the environments with extreme levels of boron concentration. Using this bacterium isolate as a model organism, we constructed its genomic library in *Escherichia coli* DH10b and selected clones that tolerated the higher level of boric acid concentration, where the wild type DH10b could not survive. We propose a gene candidate that may confer boron tolerance.

**Material and Methods:** In this study, an isolate that was initially isolated from boron-rich environment and is highly similar to *Bacillus firmus* based on 16SrRNA gene sequence was used as the model bacterium. This isolate can grow in TSB medium containing 300mM boric acid. Genomic DNA obtained from the isolate was partially cut and cloned into pACYCDuet1 plasmid. Upon transformation into *Escherichia coli* DH10b, a number of 3000 colonies were stocked as genomic library. All these colonies were subject to boron selection of 100, 110, 120 mM boric acid, where *E. coli* wild type strain normally does not survive. *E. coli* can't grow at concentrations above 80mM boric acid. The study used classical molecular biology and microbiology methods.

**Results:** After boron selection, one colony that is tolerant to 120mM boric acid was obtained. Using several methods, the tolerance level of the colony was confirmed. The recombinant plasmid was prepared, its insert was excised with *NcoI* and *EcoRI* enzymes and the insert size was found to be around 2000 bp. The sequencing of the insert region and BlastN ve BlastX analyzes revealed the activities of zinc transporter family protein (90%, coordinates nucleotide 35 to 490, 152 aminoacid) and pyruvate oxidase (93%, coordinates nucleotide 629 to 1786, 386 amino acid). Zinc transporter family protein belongs to superfamily COG0428. These superfamily proteins are divalent heavy metal cation transport proteins and known to be involved in inorganic ion transport and metabolism. It has also been reported that a zinc carrier in *Arabidopsis* is involved in response to salt stress. Boron can also form salts by combining with oxygen, sodium, calcium or magnesium. Pyruvate oxidase is an enzyme involved in the metabolism of pyruvate, where pyruvate is converted to acetyl phosphate.

**Acknowledgements:** This study is supported by The Scientific and Technological Research Council of Turkey (TÜBİTAK, project no 112T614 and 114Z987).

**Keywords:** Boron, *Bacillus*, Zinc transporter family, gene, tolerance, extremophile

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## Biodiversity of Insect Pest of Hazelnut in Georgia and Turkey

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**Aim of the study:** Turkey and Georgia are conveniently located in a climate zone where favorable conditions make growing hazelnuts easy, mostly in a narrow strip of land along the coast of the Black Sea. The countries are on the 1<sup>st</sup> and 4<sup>th</sup> place among hazelnut producers in the world. More than one hundred of insect and mite species have been found in hazelnut orchards up to today. Some species are serious pests for hazelnut production, with changes among countries. These pests affect the yield and kernel quality as well as the health of trees.

**Material and Methods:** Monitoring reveals the current pests and their levels and decisions to pest control were made depend on pest levels in orchards. The main monitoring methods in hazelnut orchards included pheromone traps, visual counts and beating sheet. The study was conducted during 2015 and 2017 in hazelnut orchards of Georgia (Samegrelo, Guria, Adjara) and Turkey (Trabzon, Giresun, Ordu, Rize, Artvin, Samsun) Black Sea Regions. Totally 900 randomly selected hazelnut orchards were surveyed from early June to end of September in above mentioned districts.

**Results:** Almost 13 insect species (*Anoplus roboris*, *Curculio nucum*, *Gypsonoma dealbana*, *Halyomorpha halys*, *Hyphantria cunea*, *Oberea linearis*, *Parthenolecanium spp.*, *Lepidosaphes ulmi*, *Lymantria dispar*, *Mykomyia coryli*, *Phytoptus avellanae*, *Palomena prasina*, *Xyleborus dispar*) have been determined from hazelnut, but some of them are pests of economic significance.

**Keywords:** Pests diversity, hazelnut, Turkey-Georgia.

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**Moist Meadow Vegetation of the Argözü Valley in Kibriscik, Bolu, TURKEY**

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**Aim of the study:** The aim of this study is to analyse the moist meadow vegetation of Argözü Valley in Kibriscik, Bolu (Turkey).

**Material and Methods:** The study area is located in Euxine province of Euro-Siberian Flora Region and on the southern slopes of Köroğlu Mountains. Study area is covered with andesite, tuff and agglomerate materials which are elements of the Köroğlu volcanic massif. The climate of the region changes from less rainy Mediterranean to rainy Mediterranean type. Annual precipitation varies from 700 mm to 1200 mm depending on altitudinal zones and mean annual temperature is 11°C. For vegetation analysis, a total of 12 sample plots were taken from moist meadow vegetation of the study area. Vegetation data were classified using TWINSpan (Hill, 1979) under JUICE software and indirect ordination analysis were applied to the data.

**Results:** As a result of classification and ordination, one moist meadow communities were defined. According to this definition, following scheme were proposed for shrub communities.

Order: MOLINIO-ARRHENATHERETEA Tüxen 1937

Alliance: MENTHO-JUNCION INFLEXI De Foucault 1984

Association 1: Mentho -Caricetum nigrae Ass. nov.

This society distributes between 1960-1985 m elevations in Köroğlu Tepesi in Argozu Valley. So its habitat is high mountain ecosystem. And high mountain habitats are very sensitive and fragile. In the study area high mountain ecosystem is under pressure by grazing, hiking and mountaineering activities. In this region, most of the endemic species distribute where exposed to this activities. Human activities must be reduced or performed in controlled manner, should minimize the damage in such sensitive ecosystems.

**Acknowledgements:** This study was supported by Scientific Research Project Coordination Unit of Duzce University, Project number: DÜBAP2012.02.02.117.

**Keywords:** Moist, Meadow, Communities, Kibriscik, Bolu, Turkey

PP-222

## The Effect of Quinine, Tannic Acid and Nicotine Mixtures on Feeding and Development of *Hyphantria cunea* L. Larvae

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**Aim of the Study:** *Hyphantria cunea* larvae are harmed by feeding in many deciduous trees and shrubs. Especially, it is more an important pest of nuts gardens. This species shows the distribution in USA, Canada, Europe (several countries), Eurasia (Russia and Turkey) and Asia (Azerbaijan, Georgia, Iran, China, Korea, Japan) and New Zealand. In Turkey, it was determined in the North Aegean, Marmara and Black Sea Region. Many plants produce secondary metabolites and these chemicals can act as repellents or toxins against herbivores. In this study, the effects of secondary metabolite mixtures on food consumption and development of *H. cunea* larvae were investigated.

**Material 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:** 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 (256,16± 2,9; 44,6 ±1,3; 10,9±0,9; 6,6±0,6), T1 (207,84 ± 1,2; 52,4 ±0,9; 5,1±0,3; 6,5±0,5), T2(184,95 ± 3,5; 27,1 ±1,3; 3,6±1,2; 8,0±0,4), N<sub>1</sub> (323,62 ±3,8; 44,6±2,4; 12,4±0,5; 11,2 ±0,5), N<sub>2</sub> (255,55 ± 2,3; 48,0±0,9; 13,5±0,5; 16,5 ±0,5), K1 (314,4 ± 1,9; 47,9±1; 11,5±0,7; 8,6±0,5), K2 (303,9 ± 95; 46,9±1,4; 10,5±0,5; 11,1±1), T1-N1 (279,8 ± 2,1; 48,4±0,6; 11,3±2,7; 9,5±0,5), T1-K1 (280,8 ±1,3; 48,5±0,7; 8,5±0,5; 7,4±0,4), T2-N2 (91,5 ±1,0; 23,9±0,7; 11,6±0,6; 12,5 ±0,4), T2-K2 (177,6 ±1,2; 32,4±0,7; 0,7±0,2; 4,3±0,2), T2-N2-K2 (86,0±1,2; 21,5±0,6; 5,5±0,4; 6,2±0,3), T1-N1-K1 (250,5±1,4; 46,5±0,6; 8,7±0,3; 7,5±0,4).

**Acknowledgements:** This work was supported by Research Fund of the Recep Tayyip Erdogan University. Project Number: 2011.102.03.5.

**KeyWords:** *Lymantria dispar*, Secondary metabolites, Feeding, Development

PP-223

**DNA Barcoding Confirmed the Occurrence of Blackchin guitarfish, *Glaucostegus cemiculus* (Geoffroy Saint-Hilaire, 1817) in Mersin Bay, Turkey**

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**Aim of the study:** Blackchin guitarfish, *Glaucostegus cemiculus* (Geoffroy Saint-Hilaire, 1817) is Atlanto-Mediterranean and distributed from Portugal to Angola. This species inhabits in shallow waters but frequently descends to 100 m. This study reports the use of a DNA barcoding methodology in confirming new record of *G. cemiculus* in the Mersin Bay, North-eastern Mediterranean. The DNA barcode result was verified by recognition based on morphological features of this species.

**Material and Methods:** On May 19th 2017, *Glaucostegus cemiculus* specimens (one female and two males) were caught by longline fishing in Mersin Bay, North-eastern Mediterranean at about 55 m of depth. Blackchin guitarfish samples were immediately transported in the ecophysiology laboratory, Fisheries Faculty, Firat University where they were identified, sexed and photographed. Morphometric characteristics of fish samples were measured to the nearest 1 mm and the weight of each fish was taken with a digital scale to the nearest 0.01 g. *G. cemiculus* specimens were preserved at the Museum of Fisheries Faculty, Firat University. DNA extractions were made using Qiagen DNeasy Blood & Tissue Kit according to manufacturer's protocol. Quality and quantity of extracted DNA was estimated using Colibri nano-spectrophotometer, and the template DNA was diluted to a final concentration of 50 ng/μL. 654-bp-long fragment from the 5' region of the mitochondrial cytochrome c oxidase subunit I (COI) gene, was amplified using universal fish barcoding primer pair FishF1-TCAACCAACCACAAAGACATTGGCAC and FishR1-TAGACTTCTGGGTGG CCAAAGAATCA (Ward et al. 2005).

**Results:** A total of three *Glaucostegus cemiculus* specimens were examined. Mean (Min-Max) values of total length (TL), standard length (SL) and weight (W) of fish were 123.46 (89.3-165) cm, 108.3 (78.0-142.0) cm and 7630 (1984-16768) g, respectively. The study provides also new maximum length (165.0 cm) for *G. cemiculus* from the North-eastern Mediterranean. Barcode sequence was trimmed to 642 base pairs using a reference sequence (KY176593). Species identification was found to be 99% according to BLAST result. In order to detect any possible stop codon, translated protein sequences were checked and no stop codon detected. Nucleotide composition analysis was made to infer GC% and resulted in 44.1%. The DNA barcoding methodology was demonstrated to be efficient for the identification of guitarfish species and can be considered an additional tool for confirmation of new records, but should be verified against morphometric data.

**Keywords:** First record, blackchin guitarfish, *Glaucostegus cemiculus*, Mersin Bay, Turkey

PP-224

**On the Occurrence of Mediterranean flyingfish, *Cheilopogon heterurus* (Rafinesque, 1810) in Mersin Bay, Turkey**

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**Aim of the study:** Black wing flyingfish, *Hirundichthys rondeletii* (Valenciennes, 1846) inhabits in small groups in the epipelagic area. This species is cosmopolitan and distributed in tropical waters. Up to now, occurrences of black wing flyingfish in the northeastern Mediterranean were recorded by Gücü and Bingel (1994) and Bilecenoglu et al. (2014), but biometric data of this species is scarce. The present is to report the existence of black wing flyingfish captured in Gulf of Iskenderun, North-eastern Mediterranean.

**Material and Methods:** On March 23th 2018, *Hirundichthys rondeletii* samples were caught by commercial purse seine fishing in the Gulf of Iskenderun, North-eastern Mediterranean at about 72 m of depth. Black wing flyingfish samples were immediately transported in the ecophysiology laboratory, Fisheries Faculty, Firat University where they were identified, sexed and photographed. Morphometric characteristics of fish samples were measured to the nearest 1 mm and the weight of each fish was taken with a digital scale to the nearest 0.01 g. *H. rondeletii* specimens were preserved at the Museum of Fisheries Faculty, Firat University.

**Results:** A total of five *Hirundichthys rondeletii* individuals were examined. Mean (Minimum-Maximum) values of total length (TL), fork length (FL), standart length (SL) and weight (W) of fish were 28.68 (26.5-31.1) cm, 23.64 (22.3-25.9) cm, 21.76 (20.5-23.5) cm and 133.29 (119.82-155.68) g, respectively. The study provides also new maximum lengths (31.1 cm) for *H. rondeletii* from the north-eastern Mediterranean.

**Keywords:** Black wing flyingfish, *Hirundichthys rondeletii*, Gulf of Iskenderun, Turkey

PP-225

**Determination of Urease and Carbonic Anhydrase Activities in Thermophilic *Bacillus licheniformis* B37**

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**Aim of the study:** This study aimed to determine urease and carbonic anhydrase enzyme activity in thermophilic and urease positive *Bacillus licheniformis* B37. Thus, the effect of urease and carbonic anhydrase enzyme activity on bacterial soil improvement will be learned.

**Material and Methods:** For this purpose, *Bacillus licheniformis* B37 were incubated in two different media (LB-urea and calcium precipitation medium (CPM)). Then, bacteria cell culture was sonicated by ultrasonicator. The urease enzyme activity was determined by phenol-hypochlorite method. The carbonic anhydrase activity was determined by measuring the amount of p-nitrophenol produced at the end of reaction.

**Results:** The urease enzyme activity of strain B37 in two different media is as follows; 0.751  $\mu\text{mole}/\text{min}/\text{mg}$  in LB-urea and 1.819  $\mu\text{mole}/\text{min}/\text{mg}$  in CPM. Carbonic anhydrase enzyme activity of B37 in LB-urea medium is 11.160  $\text{nmole}/\text{min}/\text{mg}$  and CPM is 18.69  $\text{nmole}/\text{min}/\text{mg}$ . These results showed that this bacteria may be used for soil improvement but, further studies will be required.

**Keywords:** Thermophilic bacteria, urease enzyme activity, carbonic anhydrase enzyme activity

PP-226

**The Effects of Two Different Media on Urease and Carbonic Anhydrase Activities of  
*Lysinibacillus sphaericus* B29**

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**Aim of the study:** Microbial carbonate precipitation (MCP) is a one of the important process. Enzymes, namely urease and carbonic anhydrase are involved in this natural MCP process. Therefore, this study aimed to determine urease and carbonic anhydrase enzyme activity in urease positive *Lysinibacillus sphaericus* B29.

**Material and Methods:** Ureolytic bacteria were incubated in calcium precipitation media (CPM) (3.0 g/L Nutrient Broth (Difco), 25 mM CaCl<sub>2</sub>, 25 mM NaHCO<sub>3</sub> and 333 mM urea) and Luria Bertani-Miller (LB) (10 g/L tryptone, 5 g/L yeast extract and 10 g/L NaCl) supplemented with urea (333 mM). Urease enzyme activity was determined by modified phenol-hypochlorite method. Carbonic anhydrase activity was determined with the modifying the method proposed by Armstrong et al. (1966).

**Results:** The urease and carbonic anhydrase enzymes activities of strain B29 in LB-urea media were as follows; 0.698±0.18 µmole/min/mg and 13.96 nmole/min/mg. The enzyme activities in CPM were as follows; urease activity 0.411±0.32 µmole/min/mg and carbonic anhydrase activity 16.72 nmole/min/mg. LB urea was the more efficient medium for MCP. These results showed that *Lysinibacillus sphaericus* B29 may be used many engineering processes including soil improvement.

**Keywords:** Thermophilic bacteria, urease enzyme activity, carbonic anhydrase enzyme activity

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### Evaluation of Cytotoxic Activity of *Crocus cancellatus* subsp. *mazziaricus*

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**Aim of the study:** Crocus plants are used in herbal folk medicine for the treatment of several illnesses. *Crocus cancellatus* species contain sugar and starch as well as corms of this species plants are eaten with raw or cooked. *Crocus cancellatus* subsp. *mazziaricus* belongs to the genus Crocus. This plant is a perennial and it is called 'Çiğdem' in Turkish. The present work was designed to evaluate cytotoxic activities of extracts isolated from corms and aerial parts (leaves and flowers) of *Crocus cancellatus* subsp. *mazziaricus* by water and methanol solvents.

**Material and Methods:** The corms and aerial parts (leaves and flowers) of *Crocus cancellatus* subsp. *mazziaricus* were air-dried, powdered and extracted with water and methanol solvents in our laboratory. The possible cytotoxic activity of *this plant* was evaluated using the brine shrimp lethality bioassay. The brine shrimps (*Artemia salina*) were hatched using *A. salina* eggs in a beher-glass (1 L), filled with artificial seawater (3.8 g sea salt was dissolved in 100 ml water) and left to incubate under artificial light for 24-48 h at 28 °C. In each experiment 0.5 mL of plant extract was mixed with 4.5 mL of brine solution and the sample was tested at 1000, 500, 100, 50 and 10 ppm. Following incubation, active nauplii were collected and used for assay. Ten nauplii were drawn and placed into test tubes containing different concentration of extracts and the control tubes. The extracts and control tubes were maintained under artificial light for 24 h at 28 °C. For each concentration of the all the extracts and controls, the number of dead shrimps were counted and recorded using an overhead projector. To determine the LC<sub>50</sub> values, the data was analyzed using the EPA Probit Analysis Program (version 1.5)

**Results:** The brine shrimp lethality test is highly beneficial for assessing the bioactivity of plant extracts. In the present study, the lethality of the methanol and water extracts of corms were 12.623 and 5.241 µg/mL and methanol and water extracts of aerial parts were 1.984 and 6.707 µg/mL respectively. The different part of *Crocus cancellatus* subsp. *mazziaricus* showed LC<sub>50</sub> values of less than 1000 µg/mL and these results indicate that these parts of this plant possessed strong cytotoxic activities. Therefore, the water and methanol extracts of corms and aerial parts from this plant warrant further phytochemical screening in order to determine their active cytotoxic components.

**Keywords:** *Artemia salina*, Cytotoxic activity, *Crocus cancellatus* subsp. *mazziaricus*

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## Cultivation of *Salvia hispanica* Chia Plant under Hydroponic System and Natural Minor Conditions

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**Aim of the study:** We started to work to find 'how the environmental conditions affect the development process of the *salvia hispanica* plant' in different environments.

**Material and Methods:** To grow *Salvia hispanica* plant in the greenhouse; *Salvia hispanica* seeds of Bolivian origin were planted in the MS medium supplemented with 0.4 mg l<sup>-1</sup> GA3 and 10 mg l<sup>-1</sup> AA in the Biom (Plant Genetics and Agricultural Biotechnology Application and Research Center) of Pamukkale University. In vitro germination was completed and transferred to flowerpot after 2 weeks without germination: soil, sand and perlite in 1: 1: 1 volume / volume / volume. the development process lasted about 10 months and seeds were obtained. Growing *Salvia hispanica* plant in natural soil; We planted a series of *Salvia hispanica* in our village in Denizli / Pamukkale. The seeds germinated after 1 week. The development process lasted about 10 months. The seeds were collected in December. Growth of *Salvia hispanica* bitikisin in the hydroponic system; *Salvia hispanica* seeds were germinated in petri dishes in Pamukkale University Plant Physiology Laboratory and transferred to the hydroponic system. 10 months after the transfer to the hydroponic system, flowers and seeds could not be obtained and ceased to work.

**Results:** The development of *Salvia hispanica* plant was observed in different environments. Plants in greenhouse conditions have reached lengths of 1,5-2 m, plants under natural conditions have reached lengths of 0,8-1,5 m and plants in hydroponic system have reached lengths 2-2,5 m. In greenhouse conditions, all of the plants survived, while 60% of plants lost their vitality in natural terrestrial conditions.

**Acknowledgements:** This work is Pamukkale University is Supported by the Scientific Research Centre (BAP). Project No: 2017FENBE47

**Keywords:** *Salvia hispanica* (*Chia*), Hydroponic system, Natural terrain conditions, Greenhouse, Tissue culture

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## Determination of Antioxidant and Phenolic Content of *Salvia Hispanica* (Chia) M1 Generation Seeds Grown in Greenhouse (PAU-BIYOM) Conditions

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**Aim of the study:** *Salvia hispanica* (Chia) plant seeds were germinated in tissue culture in the BIYOM, and grown into seedlings. It was transferred to the soil and the content analysis was taken on the harvested Chia seeds after the generation of M1.

**Material and Methods:** Chia (*S. hispanica*) seeds were obtained from commercial seed source (Chia Seed Bolivian) in Pamukkale in December 2018. University BIYOM (Plant Genetics and Agricultural Biotechnology Application and Research Center). The seeds were soaked in 70 % ethanol for 30 seconds and agitated in 15% bleach solution (ACE Procter & Gamble Co., USA) containing 5% active chloride for 5 minutes. It was then washed 5 times in distilled water. Disinfected seeds were transferred to MS basal medium supplemented with Murashige and Skoog, 1962, 3% sucrose, 7% agar, 0.4 mg gibberellic acid (GA3) and 1 mg ascorbic acid (AA). After 2 weeks, the plants were carefully removed from the culture dishes and the roots were washed for removal of the agar and transferred to small dishes. More than 60 kg was transferred to the pot. The M1 completed its developmental process in approximately 10 months. Seeds were collected from November to December. The seeds of the M1 generation were removed and extirpated.

**Results:** Biochemical analyzes of the m1 generation deriving from Chia seeds grown in tissue culture in sera conditions were performed. According to these results, antioxidant content and total phenolic substance content were found to be consistent with the literature. According to these results, antioxidant content and total phenolic substance content were found to be consistent with the literature. 25,110 Chlorogenic acid, 54,220 caffeic acid and 1,713 Quercetin were measured in micro grams / gram in in vitro chia seed.

**Acknowledgements:** This work is Pamukkale University is supported by the Scientific Research Centre (BAP). Project No: 2017FEBE47

**Keywords:** *Salvia hispanica*, Antioxidant substance, Phenolic substance, DPPH

PP-230

## Determination of Total Phenolic Alterations in Grape Leaves as Natural Antioxidant Source

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**Aim of the study:** Phenolic compounds are the main components of antioxidant system in plants. A wide range of biological activities of these phenolic compounds has recently been reported: inhibition oxidation of human low-density lipoproteins, antioxidant properties and radio-protective effects, prevention of cataract, anti-hyperglycemic effects, modulation of the expression of antioxidant enzyme systems, anti-inflammatory effects and therapy of cancer. In the last two decades, this issue has attracted the attention of many pharmaceutical firms due to its importance in drug discovery. Phenolics with potential antioxidant properties play a very important role in both food and pharmaceutical fields as nutraceutical and pharmaceutical agents. Grape is one of the fruit crops most widely grown in many areas of the world due to its economic importance and the beneficial effects on human health. Due to its rich phenolic compounds, such as antiradical and antioxidant properties, interest in grapes and grape products (especially food additives, pharmaceutical industry and natural cosmetic products) is increasing. Several preparations from different parts of grapevines, especially its fruits, are used in folk medicine. In many Mediterranean countries, grapevine's leaves have been used as food and medicine for the treatment of various diseases. Recently, the phenolic and other nonphenolic compounds in various grapevine parts such as berries, stems, petiole, leaves, and shoots have been of great research interest. In the present study, it was aimed to determine the alterations in phenolic content of different grapevine leaves.

**Material and Methods:** In this study, Bogazkere, Cabernet Sauvignon, Kalecik Karasi Okuzgozu, Alphonse Lavallée, Cardinal, Horoz Karasi, Italia, Michael Palieri, Red Globe, Sultani seedless and Narince grape leaves were used to determine total phenolic contents. Leaves were collected from the sixth to twelfth leaves on the shoot counted from the base. Total phenolic content was determined using Folin-Ciocalteu colorimetric. The reduction of the Folin-Ciocalteu reagent by phenolic compounds under alkali conditions, which resulted in the development of a blue colour, was measured at 765 nm using a spectrophotometer (UV-vis model 1601, Shimadzu, Kyoto, Japan). The amount of total phenolic was calculated with the use of a calibration curve made from gallic acid standard and expressed as mg gallic acid/g DW equivalents.

**Results:** In this study, it was determined that contents of total phenolic in leaves collected from 12 different grape cultivars were varied to cultivars and grape leaves had high phenolic compounds. It has been determined that grapevine leaves are rich source of phenolic compounds as other grapevine parts and berries. Therefore the grape leaves may be used as an easily accessible source of natural antioxidants and food supplement.

**Keywords:** Grape, total phenolic, leaves

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**Chemical Contents, Antiradical and Antioxidant Activities of flowers from *Kalanchoe blossfeldiana* with different flower colours**

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**Aim of the study:** The plants contain many valuable metabolites used in different fields such as medicines, food, perfumery and cosmetic. Determination of different compounds and synthesis mechanisms of them are the most popular topics of today. There are many species in the genus *Kalanchoe* known to have been used in the folk medicine since ancient times. There are some studies on the chemical contents and medicinal effects of some *Kalanchoe* species, especially *K. pinnata* and *K. crenata*. Whereas *K. blossfeldiana* species is one of the most common species easily grown all over the world, there is no detailed study on the chemical structure, antioxidant and antiradical activities. *K. blossfeldiana* is known only as ornamental plant. In this study, it is aimed to determine the chemical content, antiradical and antioxidant activities of flowers taken from *K. blossfeldiana* plants with 4 different flower colours.

**Material and Methods:** In this study, flowers taken from the *K. blossfeldiana* plants with different flower colours (yellow, pink, red and orange) were used as plant materials. Different coloured flowers were evaluated for total phenolic, total anthocyanin and  $\beta$ -carotene contents as well as the phenolics in HPLC. Additionally, antiradical and antioxidant activities of methanolic extracts of flowers were assessed by measuring DPPH radical-scavenging activity and reducing power, and compared with the synthetic antioxidant butylated hydroxytoluene (BHT).

**Results:** All criteria examined in the study, showed significant differences according to flower colours. The highest total phenolic and anthocyanin contents were found in red flowers while the maximum  $\beta$ -carotene contents were obtained from the orange flowers. It was determined that only gallic acid, *p*-hydroxybenzoic acid, quercetin and kaempferol of 12 phenolic compounds examined in HPLC were found in the flowers. The highest gallic acid, *p*-hydroxybenzoic acid and kaempferol were detected in the red flowers while the maximum quercetin content was found in the yellow flowers. Also the extracts, as natural antioxidants, were assayed. The flower extracts showed strong antiradical and antioxidant activity, by measuring their capacity to scavenge DPPH and reducing power. The highest antiradical and antioxidant activity were determined the extracts obtained from the red flowers.

**Acknowledgements:** This study was supported by the TÜBİTAK, with the project number 2209A.

**Keywords:** *Kalanchoe blossfeldiana*, flower colour, phenolic, anthocyanin,  $\beta$ -carotene antioxidant and antiradical activity.

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### The Antimicrobial Activities of Three *Thymus* Species

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**Aim of the study:** The genus *Thymus* L. is a member of Lamiaceae family and represented by 318 species in the world, 40 species in Turkey and 18 of them are endemic in Turkey (45%). Various types of spices behave as antimicrobial agents when applied against different pathogenic bacteria and fungi in vitro. Amongst the aromatic plants which belong to the family Lamiaceae, essential oils and extracts of the genus *Thymus* are remarkable for its high antimicrobial and antioxidant effects compared to the essential oils and extracts of other plants. So, we have aimed to determine the antimicrobial activity of *Thymus pubescens* var *crateicola*, *T. brachychilus* subsp. *bahcesarayensis* and *T. brachychilus* subsp. *brachialis*.

**Material and Methods:** The dried aerial parts of species were cut into small pieces and subjected to hydro-distillation with water for 4 h, using a Clevenger-type apparatus to produce essential oils which were dried over anhydrous sodium sulfate and stored in +4 (C until required. Antimicrobial activity of essential oils was determined against five different microorganisms, including Gram-positive bacteria (*Streptococcus pyogenes* ATCC19615 and *Staphylococcus aureus* ATCC25923), Gram-negative bacteria (*Pseudomonas aeruginosa* ATCC27853, *Escherichia coli* ATCC25922), and yeast. The antimicrobial activity was evaluated according to minimum inhibitory concentration (MIC) determined by broth dilution assay. Ampicillin and fluconazole were used as positive controls for bacteria and yeast, respectively.

**Results:** All the essential oil exhibited antimicrobial activity against the tested microorganisms. The MIC values of the essential oils range from 100-1000 µg/ml. The lowest MIC value recorded by *T. brachychilus* subsp. *bahcesarayensis* and *T. brachychilus* subsp. *brachialis* against *S. pyogenes*.

**Acknowledgements:** The research was funded by grant: DUBAP ECZ.15.003 from Dicle University Scientific Research Projects Coordination Unit.

**Keywords:** *Thymus*, essential oil, antimicrobial activity

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**The Aroma Composition of *Thymus brachyphilus* subsp. *brachyphilus* and *T. brachyphilus* subsp. *bahcesarayensis* by Using GC-MS/FID Head Space**

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**Aim of the study:** The genus *Thymus* L. is a member of Lamiaceae family and represented by 318 species in the world, 40 species in Turkey and 18 of them are endemic for Turkey (45%). In recent years, plant derivatives, especially essential oils, have gained significant interest in academic society and food industry. The screening of medicinal plants for efficacious compounds is becoming increasingly important with the growing approval of herbal medicine as an alternative form of health care. Essential oils are concentrated hydrophobic liquids containing volatile aroma compounds which are synthesized in several plant organs.

**Material and Methods:** In this study, the aroma contents of *T. brachyphilus* subsp. *brachyphilus* and *T. brachyphilus* subsp. *bahcesarayensis* were analyzed by GC-MS/FID. Identification of the compounds was based on the comparison of their retention times and mass spectra with those obtained from authentic samples and/or the NIST and Wiley spectra as well as the literature data.

**Results:**The essential oil content of *T. brachyphilus* subsp. *brachyphilus* and *T. brachyphilus* subsp. *bahcesarayensis* are determined in ratio of 98.77% and 97.06%, respectively. The major components of *T. brachyphilus* subsp. *brachyphilus* essential oil were found to be eucalyptol (12.35%), linalool (10.90%) and sabinene hydrate (8.46%). On the other hand, the major components of *T. brachyphilus* subsp. *bahcesarayensis* essential oil were alpha.-Pinene (17.06%), Eucalyptol (16.20%) ve D-Limonene (12.77%).

**Acknowledgements:** The research was funded by grant: DUBAP ECZ.15.003 from Dicle University Scientific Research Projects Coordination Unit.

**Keywords:** *Thymus brachyphilus* subsp. *brachyphilus* and *T. brachyphilus* subsp. *bahcesarayensis*, Aroma, GC-MS/FID

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## Conservation of Wild Olive (*Olea europaea* subsp. *europaea* var. *sylvestris*) Populations as a Genetic Resource of Turkey is Important

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**Aim of the study:** The olive (*Olea europaea* L.) is the most ancient, economically important plant, having historic and cultural significance in the Mediterranean basin. Olive is found in two forms, the cultivated form (*O. europaea* subsp. *europaea* var. *europaea*) and the wild form (*O. europaea* subsp. *europaea* var. *sylvestris*). Intensive agriculture of the olive in the long historical past resulted in genetic erosion in the species, the cultivated forms have suppressed the naturally found wild forms and therefore they are absent from many regions, at present time. Among the limited areas where wild olive populations remain, Turkey has a very special place. More than 2600 olive cultivars have been described using morphological analysis and genetic characterization of most of them at molecular level has not been completed, yet. Therefore, the studies related to the genetic variation of wild forms have remained at the second order of importance. However, the determination and conservation of genetic variation in natural populations of wild olives are very important because of the value of the genetic information in their gene pools. In this study, the results of genetic variation in wild olive populations in olive growing areas of Turkey determined by using RAPD, SRAP, SSR and ITS-1 markers will be discussed and some conclusions that we reached related to the conservations of these populations will be presented.

**Material and Methods:** 204 wild olive trees from 24 different sub-locations in eight provinces were sampled. These locations are representative of the entire distribution area covering the western to the southern parts of Turkey. The sampled provinces included Bursa and Balıkesir in the Marmara region, Izmir, Manisa, and Muğla in the Aegean region, and Mersin, Adana, and Gaziantep in the Mediterranean region. These three regions are the major olive-growing areas in Turkey. After genomic DNA extraction from the young leaves, RAPD, SRAP, SSR and ITS-1 analysis were carried out in the samples. Data analysis were performed by using population genetics software programs for each marker system.

**Results:** Complete results of all marker systems that were used let us to conclude that *in-situ* combined with *ex-situ* conservation is very important for Turkish wild olive genetic resources. Because distribution areas of wild olive populations becoming narrow very quickly and try to sustain their existence as fragmented populations due to intense human activities.

**Keywords:** *Olea europaea* subsp. *europaea* var. *sylvestris*, wild olive, genetic variation, conservation, genetic resource, Turkey.

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**The tyrosinase inhibitory activities of *Ballota nigra* ssp. *foetida* and *Marrubium vulgare***

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**Aim of the study:** Tyrosinase (EC 1.14.18.1) is the key enzyme in the first two steps of melanin biosynthesis, catalyzing the hydroxylation L-tyrosine to the 3,4-dihydroxyphenylalanine (DOPA) and the oxidation of DOPA to dopaquinone. The overproduction and accumulation of melanin cause several skin problems. In addition, neuromelanin formation in the mammalian brain may cause to neurodegeneration associated with Parkinson's disease. Tyrosinase inhibitors are used as depigmenting agents in hyperpigmentation problems and Parkinson's disease.

**Material and Methods:** In this study, the tyrosinase inhibition activity of *Ballota nigra* L. ssp. *foetida* (Vis.) Hayek and *Marrubium vulgare* L., naturally growing in Mugla region (Turkey), were determined. The plant samples were collected at their flowering stage. The air dried plant materials extracted with soxhlet apparatus using ethanol as a solvent. The tyrosinase inhibition activity was determined with spectrophotometric Dopachrome method in which L-dihydroxyphenylalanine (*L-DOPA*) is used as a substrate. Kojic acid was used as positive control.

**Results:** When compared with the kojic acid (85.88%), *B. nigra* ssp. *foetida* and *M. vulgare* demonstrated slight tyrosinase inhibitory activities with 13.01% and 9.5% rates, respectively. Although these inhibition values are thought to be low, the crude plant extracts can be used in the pharmaceutical and cosmetic cream preparations for the pigmentation problems.

**Acknowledgements:** This study was supported by the Scientific Research Project Unit of *Mugla Sıtkı Kocman University*, through the Grant number 15/060.

**Keywords:** *Lamiaceae*, tyrosinase inhibition, L-DOPA

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***In vitro* Hemostatic and Antiinflammatory Activities of *Fomes fomentarius* (L.) Fr.**

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**Aim of the study:** Edible and non-edible mushrooms have been used for the treatments of various diseases including inflammation and bleedings in traditional medicine since ancient times. *Fomes fomentarius* (L.) Fr., Polyporaceae, which is a perennial fungus, grows on deciduous tree species. It is a fungal plant pathogen that is distributed in Europe, Asia, Africa and North America. In the present study, the hemostatic and antiinflammatory activities of the ethanolic extract of *F. fomentarius*, a wild mushroom naturally grown in Turkey, were evaluated.

**Material and Methods:** The dried samples of the fungus extracted with soxhlet apparatus. The *in vitro* hemostatic activity of the ethanolic extract obtained with a soxhlet apparatus determined by activated partial thromboplastin time (APTT) and prothrombin time (PT) assays using commercial reagents. The antiinflammatory activity of the extract was determined by lipoxygenase inhibition assay.

**Results:** The ethanolic extract of *F. fomentarius* demonstrated potential hemostatic effect in the PT test that evaluates the extrinsic coagulation pathway. The extract showed moderate lipoxygenase inhibition activity (8%) when compared with the positive control nordihydroguaiaretic acid (40%). As a result, the *F. fomentarius* extract exhibited potent hemostatic and antiinflammatory activities and might be suggested as a potential source for bleeding and inflammation control.

**Acknowledgements:** This study was supported by the Scientific Research Project Unit of Mugla Sitki Kocman University, through the Grant number 15/205.

**Keywords:** Medicinal mushroom, lipoxygenase inhibition, hemostatic

## Antimutagenic, Antibacterial and Antifungal Activities of Schiff Base Attached Polymers

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**Aim of the study:** Polymers including Schiff base and metal complexes are used as anticancer drugs due to their biological activity. New antimutagens is remarkable due to good prospects of their practical use for the prevention of delayed negative effects of induced mutagens in human, the main of which are high prevalence to hereditary diseases and cancer. For this reason, the goal of this study was to evaluate the antimicrobial and antigenotoxic properties of Schiff base attached polymers.

**Material and Methods:** In this paper, Schiff base attached polymers (Sb<sub>1</sub> and Sb<sub>2</sub>) are obtained from condensation of polystyrene-A-NH<sub>2</sub> and 5-nitro-2-thiophenecarboxaldehyde / or 5-(2-nitrophenyl)furfural). Then, we have investigated the antigenotoxic properties of (Sb<sub>1</sub> and Sb<sub>2</sub>). Sodium azide (NaN<sub>3</sub>) was used as positive controls for human lymphocytes. Finally, the antimicrobial study of these compounds are reported. We examined the biological activity of (Sb<sub>1</sub> and Sb<sub>2</sub>) were studied by the well-diffusion method against some pathogenic strains (*Listeria monocytogenes 4b*, *Salmonellatyphi H*, *Bacillus cereus sp.*, *Staphylococcus epidermis*, *Micrococcus luteus*, *Escherichia coli*, *Staphylococcus aureus*, *Brucella abortus*, *Proteus vulgaris*, *Klebsiella pneumonia*) and yeast *Candida albicans*. Additionally, the antimicrobial activity of (Sb<sub>1</sub> and Sb<sub>2</sub>) were compared with five commercial antibiotics.

**Results:** The micronucleus method was used to detect the antigenotoxic properties of (Sb<sub>1</sub> and Sb<sub>2</sub>). The results showed that these Schiff base attached polymers have strong anti-genotoxic properties. According to the results of antibacterial and antifungal activities, it can be said that (Sb<sub>1</sub> and Sb<sub>2</sub>) have different activity levels.

**Acknowledgements:** We thank the above mentioned universities for equipment supporting.

**Keywords:** Schiff base attached polymers, antigenotoxic properties, antimicrobial activities.

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### **Intraspecific Variation of Parotoid Positions of *Bufo bufo* Populations in Turkey**

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**Aim of the study:** Bufonidae family members have warty skin, plump bodies, short legs, and parotoid glands on the side of their heads. These glands of toads consist of large aggregations of granular glands located between the otic region of the skull and the scapular region. The parotoid glands are composed of large aggregations of granular glands, each of which includes the typical component parts of this gland. There are many different head shape and parotoid position and shape of *Bufo* toads. In this study, we examined the variation in the parotoid position of *Bufo bufo* populations in Turkey.

**Material and Methods:** Parotoid positions of 152 *Bufo bufo* individuals (74 females+78 males) from twenty different localities of Turkey were examined according to the categories used in Arntzen et al. (2013). These categories were transformed to numeric variables and analysed by SPSS 21. Males and females were evaluated separately.

**Results:** We found 7 different parotoid positions in females and 6 positions in males, two of which are not mentioned for both sexes in Arntzen et al. (2013). The high frequency was seen in shape-a (28,4 %) and shape-d (33.8 %) in females. However, the high frequency was in shape-a (53.8 %). A-shape is characterized with a parotoid slightly divergent in comparison with the other one and d-shape with a parotoid quietly divergent in comparison with the other one.

**Acknowledgements:** This study was supported by TÜBİTAK under project number 114Z823.

**Keywords:** Common toad, Turkey, Caucasus, head shape, asymmetry

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### Investigation of Latitude and Altitude Effects on Density of *Bufo bufo*

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**Aim of the study:** The diversity of animal and plant species living on the earth is not evenly distributed latitudinal and longitudinally, and geographical gradients of living diversity have charmed biogeographers and ecologists for a long time. Additionally, altitudinal gradients can do the explanations for the species–area relationship and are linked to several environmental variables of interest to theoretical and applied research on biodiversity. In this study, we aim to investigate the effects of altitude and latitude on density of *Bufo bufo*.

**Material and Methods:** We collected both altitude and latitude data of *B. bufo* populations during the fieldworks in Turkey between 2015 and 2017. In this process, a total of 78 individuals were observed. We categorized the altitude as 0-500 m, 501-1000 m, >1000 m and the latitude as 36-37°, 38-40°, 41-42°. Then we analyzed the correlation between altitude and latitude of population density by Chi-square analysis using SPSS 21.

**Results:** According to the Chi-square test results at the 0.05 significance level, there is not an association between altitude and latitude on density of *Bufo bufo* ( $\chi^2= 9,38$ ,  $df=4$ ,  $p>0,05$ ). A relationship was generally expected related to the effects of altitude and latitude on density of amphibians, but this phenomenon does not appear on distribution of *Bufo bufo* in Turkey.

**Acknowledgements:** This study was supported by TÜBİTAK under project number 114Z823.

**Keywords:** Common toad, population density, Turkey, elevation

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## Molecular Detection of Pestiviruses in Aborted Sheep and Cattle Fetuses Tissues

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**Aim of the study:** The aim of this study was to molecular investigation the presence of Border Disease Virus (BDV) and Bovine Viral Diarrhea Virus (BVDV) in aborted sheep and cattle fetuses tissues using real time duplex RT-PCR methods.

**Material and Methods:** Internal organs (spleen, liver, lung, kidney and brain, total n=21 (10 sheep and 11 cattle) were collected from Afyonkarahisar, Konya, Karaman and used for RNA extraction. RNA extraction protocol was carried out by commercially available RNA extraction kit (QIAamp Viral RNA Mini Kit, Qiagen, Germany). The presence of BDV and BVDV specific nucleic acids on extracted RNA samples was investigated with real time duplex RT-PCR by using one step real time RT master mix (QuantiFast Multiplex RT-PCR, Qiagen, Germany). BDV nucleic acid positive sheep samples and BVDV nucleic acid positive cattle samples were homogenized and inoculated into Vero permanent cell line and blind passaged for three times. All were evaluated daily for cytopathic effect (CPE) with inverted microscope.

**Results:** Both one sheep and one cattle fetus samples were recorded CPE. In conclusion it can assessable that pestiviruses may important role on aborted cases both sheep and cattle.

**Keywords:** Pestivirus, RT-PCR, cell line

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## Evaluation of *in vitro* Antimicrobial, Antibiofilm and Antioxidant Activities of some Liliaceae Species

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**Aim of the study:** In this study; it is aimed to obtain antimicrobial, antibiofilm and antioxidant activities of *Allium ampeloprasum* L., *Asparagus acutifolius* L., *Muscari armeniacum* Leichtlinex Bakerin Gard, *Ornithogalum sigmoideum* Freyn&Sint. and *Gagea graeca* L. (Liliaceae) ethanol extracts.

**Material and methods:** The underground and aerial plant materials were separated and extracted with ethanol using the Soxhlet apparatus. Antimicrobial and antibiofilm activities of plant extracts have been investigated against *Escherichia coli* ATCC 25922, *Bacillus subtilis* ATCC 6633, *Staphylococcus aureus* ATCC 25923, *Pseudomonas aeruginosa* ATCC 27853 and *Candida albicans* ATCC 10239. Disc diffusion and microdilution methods were used to detect the antimicrobial activity of the extracts. The antibiofilm activity of the plant extracts was assessed by microplate biofilm method. Antioxidant activity were detected by DPPH (1,1-diphenyl-2-picrylhydrazyl) free radical scavenging activity and  $\beta$ -carotene-linoleic acid methods.

**Results:** According to the antimicrobial activity test results, extracts were found to be effective for Gram positive strains but not effective for the Gram negative strains. The highest antibiofilm activity were screened for *A. ampeloprasum* underground part extract with 15 mg/mL concentration. This concentration also reduced the *C. albicans* biofilm formation by 49.43 %. The highest antioxidant activity of DPPH assay activity was exhibited by *O. sigmoideum* underground part extract with IC<sub>50</sub> value (11.24 mg/ml). For  $\beta$ -carotene-linoleic acid method, the highest reduction rate was 97.40 % for *G. graeca* aerial part extract.

**Keywords:** Liliaceae, antimicrobial, anti-biofilm, antioxidant

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## The Mutagenicity and Antimutagenic Activity of Turkish Clementine Peel Essential Oil

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**Aim of the study:** In this study; the mutagenicity and antimutagenic activity of the essential oil of the peel of Clementine (*Citrus clementina* Hort. ex Tan.), a hybrid mandarin species growing in Mugla (Turkey), were investigated.

**Material and methods:** The essential oil of the fruit peel was obtained with Clevenger apparatus. The mutagenicity and antimutagenic activity of the essential oil was studied with AMES/ *Salmonella* microsomal test system using the histidine dependent strains *Salmonella typhimurium* TA 98.

**Results:** The essential oil was found to have an important antimutagenic activity. The essential oil, which was tested at three different concentrations (5, 1, and 0.2 mg/plate), did not exhibit mutagenic effect in the mutagenicity assay performed with *S. typhimurium* TA98. In the antimutagenicity assay that was performed with TA98 strain, the essential oil exhibited moderate antimutagenic effect at 5 mg/plate concentration (35.89%). These activities are important parameters that should be investigated for natural compounds that would be used in the medical field as well as in the food industry.

**Keywords:** Clementine, AMES, mutagenicity

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## Environmental Impact Assessment System in Turkey

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**Aim of the study:** This study aims to emphasize The EIA system in Turkey to supervise the efficiency of this procedure and point the success level.

**Material and Methods:** In Turkey, as a developing country, environmental impact assessment (EIA) is a critical key for environmental protection. EIA is not regulated in Turkey by means of law, but through a decree put into force on the basis of the relevant provision of the Environmental Law. The Environmental Impact Assessment (EIA) System, which embodies the “prevention principle” of the environmental law, is an important tool for environmental protection. This tool has a private importance for Turkey since it is a developing country, and it entered the Turkish law in 1983 with the Environmental Law. Besides, the EIA Regulation, which shows the application principles, became effective in 1993. Because Turkey is a candidate for European Union (EU), the EIA Regulation has been changed due to the EU compliance procedure, and its latest version became valid in 2014. According to the methods, firstly In the introduction part, general EIA concept, its importance, and some notations are mentioned. Following that, the legislation, which builds the EIA system, has been analyzed starting from the 1982 Turkish Constitution. Then, the legislation rules are explained due to the basic steps of the EIA procedure

**Results:** In the EIA process, the whole process is carried out by the State authority and the administration. The decision mechanism is the State and the administration as well. Here, administration stands for provincial organizations of the Ministry of Environment and Urbanization and Directorate General of Environmental Impact Assessment, Permit and Inspection that works under the Ministry.

**Keywords:** Environment, Impact, System, Turkey

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## **A New Method Regarding Ecological Risk Assessment For Mining Activities In Wildlife Areas**

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**Aim of the study:** This study describes a method to contribute to the decision-making process by determining the environmental effects of mining activities in wildlife areas.

**Material and Methods:** The proposed WAR method comprises a W-phase (Waste, Destruction, Pollution), in which potential impacts are determined; A (Attention) phase, in which appropriate precautions are determined; and R (Rehabilitation) phase. in which remediation activities are completed. Sub-criteria of each phase were determined as: data collection, integration and analysis, and criteria scoring. Administrative decisions regarding mining activities and appropriate precautions to reduce risk should be determined According to the scoring system. The WAR method is expected to enable an eco-systematic approach to the assessment of mining projects in wildlife areas, increasing transparency and thereby facilitating measurable, reasonable, and verifiable assessment..

**Results:** The proposed method provides a comprehensive assessment of planned mining activities in wildlife areas. Supervision of the whole process, from the project phase to site remediation, is reported by expert academics, and enables scientific contribution to administrative agencies.

**Keywords:** Ecological, Risk, Assesstment, Wildlife

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**Evaluation of Acute Toxic Effect of Neonicotinoid Insecticide Acetamiprit on *Gammarus kischineffensis***

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**Aim of the study:** The aim of the present study is to determine the acute toxicity response of *Gammarus kischineffensis* exposed to acetamiprid, an important class of organic xenobiotics, neonicotinoid insecticide.

**Material and Methods:** The acute toxicity test was performed under test conditions in which semi-static renewal was performed. The solutions to be used in the acute toxicity test of acetamiprite were prepared using a commercial pesticide containing the active ingredients acetamiprite. The nominal concentrations of the acetamiprid active substances tested are in the range of 10-4670 µg / L.

**Results:** In our study, the acute toxic effect of the neonicotinoid insecticide acetamiprid was examined and the 72-hour LC50 value for acetamiprite was 1687.2 (830-5279) µg/L and the 96-hour LC50 value was 517.2 (277-1152) µg/L.

**Acknowledgements:** I am grateful to Dr. Abbas Güngördü for their critical evaluation of the current study.

**Keywords:** *Gammarus kischineffensis*, Acute toxicity, Acetamiprid-based herbicides

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### **Endemic Plants and Their Threat Categories of Denizli Province (Turkey)**

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**Aim of the study:** It is an endemic plant in plants that spread only in certain areas on the earth and have low ecological tolerances. Turkey has a rich flora with around 11707 plant taxa. Another important feature of the Flora of Turkey also comprises a large number of endemic plant species. The number of endemic taxa in our country is 3649, which is about 31.16% of all plants in the flora. Turkey has a richer structure than both from neighboring countries and the European continent in terms of the number of endemic plant species. Endemic plants have been localized in certain regions. Denizli province has an important place in Turkey in terms of the number of endemic species. This study aimed to identify endemic plants distributed in Denizli province.

**Material and Methods:** The material of this study is composed of endemic taxa collected from Denizli province between 2016-2018 during a project named "Biodiversity and Monitoring studies of Terrestrial and Inland Water Ecosystems in Denizli Province". Collected samples were dried according to standard herbarium techniques and preserved in the Pamukkale University herbarium (PAMUH). The Flora of Turkey and the other related floras were utilised in the identification of the specimens. The conservation status of endemic taxa were also reported according to Red Data Book of Turkish Plants and revised according to IUCN Red List Categories.

**Results:** As a result of this study, 237 taxa belonging to 38 families and 121 genus were identified in Denizli province. In study area, Lamiaceae is the biggest family on the base of endemic taxa and *Astragalus* is the biggest genera. According to the threat categories assigned by IUCN in Red Data Book of Turkish Plants, 127 (%53.58) of these plants belong to the Least Concern (LC), 54 (%22.78) of them Vulnerable (VU), 24 (%10.12) of them Near Threatened (NT), 18 (%7.59) of them Endangered (EN), 12 (%5.06) of them Critically Endangered (CR) and 2 (%0.84) of them Data Deficient (DD) have been found.

**Acknowledgements:** The Project "Biodiversity and Monitoring studies of Terrestrial and Inland Water Ecosystems in Denizli Province" is funded by The Ministry of Forestry and Water Affairs, The General Directorate of Nature Conservation and National Parks. We are indebted to The Ministry of Forestry and Water Affairs, The General Directorate of Nature Conservation and National Parks for financial support and kindly interest.

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**Keywords:** Endemic plant, Threat categories, Denizli, Turkey

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### **A Taxonomic View on Plant Type Localities in Denizli Province (Turkey)**

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**Aim of the study:** Type locality where a type specimen was collected for the first time. These areas are important for taxonomic studies such as flora, revision and monograph. In this study, it was aimed to a taxonomic research on the plant type localities in Denizli.

**Material and Methods:** The material of this study is collected from Denizli province between 2016-2018 during a project named "Biodiversity and Monitoring studies of Terrestrial and Inland Water Ecosystems in Denizli Province". Collected samples were dried according to standard herbarium techniques and preserved in the Pamukkale University herbarium (PAMUH). The Flora of Turkey and the other related floras were utilised in the identification of the specimens.

**Results:** As a result of this study, 124 taxa with type locality Denizli were detected. 80 of these taxa are endemic. In study area, Fabaceae is the biggest family on the base of plant type localities in Denizli.

**Acknowledgements:** The Project "Biodiversity and Monitoring studies of Terrestrial and Inland Water Ecosystems in Denizli Province" is funded by The Ministry of Forestry and Water Affairs, The General Directorate of Nature Conservation and National Parks. We are indebted to The Ministry of Forestry and Water Affairs, The General Directorate of Nature Conservation and National Parks for financial support and kindly interest.

**Keywords:** Plant Type Locality, Endemic, Denizli, Turkey

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**An Investigation on Antioxidant Activity and Total Phenolic-Flavonoid Contents of  
*Andricus caputmedusae* (Hartig, 1843) Gall**

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**Aim of the study:** In recent days, the pharmacological and medicinal properties of cynipid galls have attracted considerable attention. Previous studies shown that, cynipid gall species have the astringent, anti-inflammatory, local anaesthetic, antipyretic, antiparkinsonian, antidiabetic, antiaging, antioxidant, antibacterial, antiviral, antifungal, larvicidal effects due to their high polyphenolic contents. In this study, the asexual galls of *Andricus caputmeduase* are used for determining their antioxidant capacity and total phenolic-flavonoid amounts.

**Material and Methods:** The oak gall specimens on *Quercus infectoria* were collected from Afyonkarahisar, Turkey in 2017. After collection, the galls were kept in laboratory. We prepared the gall extracts with water and ethanol. To determine antioxidant activity of this extracts we used DPPH radical scavenging assay. Also, Folin-Ciocalteu method and the aluminium chloride colorimetric method were respectively carried out to estimation of total phenolic and flavonoid contents. Total phenolic and flavonoid expressed respectively as mg gallic acid and quercetin equivalents per gram of extract.

**Results:** It was found that the galls of *A. caputmedusae* aqueous (IC<sub>50</sub>: 21.80 ±0.37) and ethanolic (IC<sub>50</sub>: 25.71±0.49) extracts possessed the highest antioxidant capacities in DPPH radical scavenging activity, and thus could be potential rich sources of natural antioxidants. These extracts presented the highest phenolic content (212.06 and 260.81 mgGAE/g). According to result of total flavonoid amount, 76.74 and 110.32 mgQE/g total flavonoid was determined respectively in water and ethanol extracts. A significant relationship between antioxidant capacity and total phenolic-flavonoid content was found, indicating that phenolic compounds are major contributors to the antioxidant properties of these gall. Further investigations their possible components should be identified and be focused on their potential health benefits and pharmacological effects.

**Acknowledgements:** We would like to thank MSc and PhD students in secondary metabolite laboratory for their helping.

**Keywords:** Secondary metabolites, oak gall, Cynipini, Cynipidae.

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**Morphological, Anatomical and Molecular Studies on *Psoroma cinnamomeum* Malme; an Antarctic Endemic Terricolous Lichenized Fungus Species from James Ross Island (Maritime Antarctica)**

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**Aim of the study:** *Psoroma cinnamomeum* is an Antarctic endemic lichenized fungus species mostly growing on moist soil or bryophytes. The distribution of this species ranges from southernmost South America to Antarctica Peninsula (c. 70°S). The second author collected specimens from James Ross Island of Antarctica and here we aimed to detail the knowledge about morphology, anatomy and molecular characters of the specimens collected.

**Material and Methods:** Samples of lichens belonging to *Psoroma cinnamomeum* were collected especially from high altitudes in James Ross Island, Antarctica. The external morphology has invariably been studied under dissecting binocular microscope. The anatomy of the thallus and apothecia were studied under compound microscope. The asci and ascospores were taken observed from the sections when sections were mounted in water and shapes, sizes were recorded. Chemistry of the specimens includes colour spot tests. DNA isolation was performed by using Qiagen DNeasy plant mini kit. PCR analysis was performed by using ITS (ITS1 and ITS4) primers. The phylogenetic analysis were performed by using the Maximum Likelihood method of the Mega 6 (Molecular Evolutionary Genetics Analysis) software program.

**Results:** The specimens belonging to this species grow on dry and moist soil and rarely on mosses in the high altitudes of James Ross Island. Thallus of this species is very visible regarding to its reddish brown squamulose thallus and also vivid red apothecia. It has 8-spored asci and colourless and globose ascospores. Ascospores of this species also have verrucose epispore. All the characteristics of the specimens fit well with the literature data and no lichen substances were observed by spot reactions and also TLC.

**Acknowledgements:** The first author thanks to Erciyes University for their financial support to his Antarctic Expedition.

**Keywords:** polar biodiversity, lichens, fungi.

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### Proteomics Approach of Crosstalk in Cell Signaling Investigation

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**Aim of the study:** Due to the worldwide adverse contamination of environment it is important to study molecular mechanisms of a plant's perception of separate stress factors and their combinations. The primary focus of this research is on understanding of signaling pathways and their crosstalk, thus elucidating specific and nonspecific components of plant adaptation responses to salt and radiation stresses. Crosstalk refers to the phenomenon when one or more components of different signal transduction pathways interact. We used morphometric indexes and proteomics approach to study how pretreatment with ionizing radiation affects pea seedlings reaction on osmotic stress. The aim of our study was to assess the proteome changes of pea seedlings during two days after stress treatments or their combination (ionizing radiation with salinity stress) to understand the phenomenon of crosstalk.

**Material and Methods:** Firstly, we studied morphometric changes in *Pisum sativum* L. seedlings divided in 4 groups: 1) control plants, 2) treated by water solution of sodium chloride in 0.22 M/l, 3) treated by  $\gamma$ -rays in dose 10 Gy, and 4) salt stress applied after  $\gamma$ -rays impact. Roots were used for physiological measurements and proteins extraction. We demonstrated different growth reactions of roots for all experimental groups. After some doses of radiation and salt seedlings had higher growth speed, in comparison with the group after irradiation only. This may indicate to resistant influence of salt treatment. Upon phenol-based extraction, pea proteins were profiled by 2-DE (IPG strips within pH 4-7, narrow-range 7 cm). Software-assisted analysis of Colloidal Coomassie-stained gels revealed quantitative and qualitative differences between protein spots belonging to all investigated groups. Majority of the differentially abundant spots were identified by LC-MS/MS mass-spectrometry and followed by sequence database search.

**Results:** Key proteins included: Pyruvate dehydrogenase E1 component subunit beta (mitochondrial), L-ascorbate peroxidase (cytosolic), Lipoxygenase etc. that are involved in the pathway of some compounds biosynthesis or are the parts of metabolism. The analyzing of proteomic data, using advanced bioinformatics tools helps to accumulate, integrate and interpret functional information. This molecular approach could allow objective insights into biological diversity processes to abiotic stress factors. Proteomic data might also allow us to substantially contribute to the understanding of physiological reactions, including crosstalk of signal systems, likely leading to future biotechnological applications.

**Acknowledgements:** This work was supported by grants IRSES GA-2013-612587 "Plant DNA tolerance". We thank our colleagues from Plant Science and Biodiversity Centre of Institute of Plant Genetics and Biotechnology (Slovak Academy of Sciences), especially to Katarina Klubicova and Viera Majercikova for advice and support.

**Keywords:** Pea, proteins, crosstalk, stress factors.

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**Anatomical and palynological study on *Cousinia ramosissima* DC. (Section, Stenocephalae Bunge., Asteraceae)**

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**Aim of the study:** In this study aims to investigate the anatomical and palynological properties of *Cousinia ramosissima* DC. species belonging section Stenocephalae, to determine the usefulness of these characters for systematic purposes.

**Material and Methods:** Specimens of *Cousinia ramosissima* were collected from different localities in Turkey. The specimens have been kept in Selcuk University Herbarium (KNYA).The herbarium samples were examined using Flora of Turkey under the stereo-binocular microscope. For anatomical studies, living material was kept in 70 % ethanol. The paraffin method was used for cross sections of stems and leaves. The specimens were embedded in paraffin wax and then sectioned between 5 and 10 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 binocular light microscope with a Leica DFC280 camera. For 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:** Taxonomical significance were observed from transverse sections of leaves such as size of vascular tissue, shape and number of vascular bundle. 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 ramosissima* has 7-11 layers cortex cells. In leaves transverse section, It has a single layer upper and lower epidermis cells, and also it has 2 layers palisade and 1-2 layers spongy parenchyma. Pollen shape of *Cousinia ramosissima* is subprolate. Aperture types of *Cousinia ramosissima* is tricolporate. As a consequence of SEM studies, pollen ornamentation was determined as verrucos-perforate.

**Acknowledgements:** We want to thank the curators of herbaria AEF, ANK, E, G, GAZI, HUB, ISTE, ISTF, K and LE for permitting the examination of *Cousinia* specimens. We also thank to "TÜBİTAK: TBAG-111T364"

**Keywords:** Asteraceae, *Cousinia ramosissima*, Anatomy, Palynology

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**Research on Tyrosinase Inhibitory Effects of Endemic *Haplophyllum vulcanicum* (Rutaceae) Growing in Turkey**

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**Aim of the study:** The aim of the study is to determine the inhibitory effects on tyrosinase activity by the ethonal extracts of *Haplophyllum vulcanicum* Boiss. & Heldr. belonging to Rutaceae family.

**Material and Methods:** Plant material *Haplophyllum vulcanicum* was collected from their natural habitats in Karaman. The collected plants were dried according to common herbarium technics. The dried specimens were identified with the help of the Flora of Turkey and East Aegean Islands. Inhibition of tyrosinase, a key enzyme in skin aging, was achieved using ELISA microplate reader.

**Results:** Medium-level tyrosinase inhibition was detected in the concentrations studied in ethanolic extracts prepared from the *Haplophyllum vulcanicum* species stem and flowers.

**Acknowledgements:** We want thank to "Selçuk University, BAP: 17201126" for financial support.

**Keywords:** Rutaceae, *Haplophyllum vulcanicum*, Tyrosinase inhibition

## Determination of Organic Acid and Carotene Content of the *Paulownia tomentosa* tree

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**Aim of the study:** Organic acids are also effective in many physiological events (rapid growth, acceleration of root development, taste formation, ripening etc.) and also have great prominence in terms of human health. When the carotene substance is taken into the body with the help of plants, it breaks down in the small intestine and turns into retinol.

**Materials and Methods:** The leaves and flower parts of the *Paulownia tomentosa* tree grown in the Denizli province that we use in our research are also grown on the campus of Pamukkale University. Certain parts of the plant are collected at certain intervals (leaves, flower parts) in April-May 2017 period. The collected materials are dried at the plant physiology laboratory at  $24 \pm 2$  ° C. The leaves and flower parts of the plant were ground (Waring commercial blender, USA). Powdery leaves and flowers were mixed with methanol (MERCK, Germany) (1:10) and left in a water bath (Nucleon Water Bath) for 5-6 hours. The was evaporated using the rotary evaporator (IKA RV10). It was poured into Petri dishes and frozen at -20 °C. and dried on a lyophilizer (Labconco Freezone 6 USA.).

**Results:** In this study, the contents of carotene and organic acid were determined in leaves and flower extracts of *Paulownia tomentosa* naturally grown in Denizli. It was determined that the carotene ratio was 7716 µg/g-501.67 µg/g respectively. The amounts of organic acid in leaf and flower extracts were; the citric acid ratio is 42318.71 µg/g24172.34 µg/g, the oxalic acid ratio is 12611.50 µg/g16380.50 µg/g, the malic acid ratio is 2014.16 µg/g 35296.46 µg/g, the formic acid ratio is 49759,63 µg/g 30192,45 µg/g, the acetic acid ratio the 12375.33 µg/g4895.46 µg/g and the pyruvic acid ratio was 676.12 µg/g1246.6 µg/g. It was determined that the plant contained a high level of organic acid in the direction of the findings obtained from the study.

**Acknowledgements:** This work is Pamukkale University is Supported by the Scientific Research Centre (BAP). Project No: 2017FE46

**Keywords:** *Paulownia tomentosa*, Organic Acid, Carotene.

## Evaluation of the Phenolic Content of *Paulownia tomentosa* Plant

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**Aim of the study:** In this study, Denizli we determined the antioxidant properties of the methanol extract from leaf and flower parts of the *Paulownia tomentosa* tree grown in Denizli.

**Material and Methods:** The leaves and flower parts of the *Paulownia tomentosa* tree grown in the Denizli province, which we used in our research, are also growing at the campus of Pamukkale University. The vegetative parts of the plant are collected in certain periods (leaves, flower parts) in April-May 2016. The collected material was dried at  $24\pm 2^{\circ}\text{C}$  under Plant Physiology laboratory conditions. The leaves and flower parts of the plant were milled and powdered with the help of a blender (Waring commercial blender, USA). Powdered leaves and flowers were weighed on a precision scale (Grecisa XW210A) and mixed with methanol (MERCK, Germany) (1:10) and left in the water bath (Nucleon Water Bath) for 5-6 hours. The solvent was evaporated using the rotary evaporator (IKA RV10). Petri dishes were frozen at  $-20^{\circ}\text{C}$  and used for the lyophilizer (Labconco Freezone 6 USA.).

**Results:** The total phenolic content in methanolic extract of *Paulownia tomentosa* from leaf and flower was  $358,553\ \mu\text{g/g}$  and  $1150,302\ \mu\text{g/g}$  gallic acid equivalent of extract, respectively. The values for radical scavenging DPPH for leaf and flower The DPPH content of the *Paulownia plant* was  $1104,9079\ \mu\text{mol TE/g}$  in the leaf and  $223,2809\ \mu\text{mol TE/g}$  in the flower. These values prove that the free radical scavenger effect of each side of the plant is very high. Phenolic substance was found to be the most dense catechin ( $24035,902\ \mu\text{g/g}$ ) in this plant and it was found to be at least chlorogenic acid ( $34,863\ \mu\text{g/g}$ ) in the leaf. The phenolic substance was found to be the most dense catechin ( $1383,144\ \mu\text{g/g}$ ) in the plant's flora and the least chlorogenic acid ( $82,260\ \mu\text{g/g}$ ) in the flower.

**Acknowledgements:** This work is Pamukkale University is Supported by the Scientific Research Centre (BAP). Project No: 2017FE46

**Keywords:** *Paulownia tomentosa*, Total phenolic substance, Antioxidant content, Chemical composition, DPPH.

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## Phytoplankton Composition of the Black Sea Turkish Coasts in 2016

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**Aim of the study:** In the present study a cruise was organized during the period of February 2016. 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. A Sedwick-Rafter counting chamber was used for the micro-phytoplanktonic species. The samples brought to maximum concentrations specific to each sample, depending on the structure of each suspension, are carefully stirred in order to provide a homogenous distribution. From this suspension, a drop of 1 ml is placed on the counting chamber and left to settle down for a little while. Following this procedure, cell numbers ( $l^{-1}$ ) were counted under Nikon Eclipse E600 at various magnifications.

**Results:** Species belonging to 14 classes of algae (Bacillariophyceae, Coscinodiscophyceae, Mediophyceae, Fragilariophyceae, Dinophyceae, Prymnesiophyceae, Dictyochophyceae, Chlorophyceae, Cryptophyceae, Cyanophyceae, Ebriophyceae, Euglenophyceae, Conjugatophyceae and Noctilucofphyceae) have been recorded. A total of 107 taxa was determined in winter season sampling in 2016. From the total number of species, 45% was represented by dinoflagellates, 44% by diatoms and the remaining 11% by the other groups.

**Acknowledgements:** This work has been supported by Ministry of Environment and Urbanization/General Directorate of EIA, Permit and Inspection/ Department of Laboratory, Measurement and Monitoring in the context of "Integrated Marine Pollution Monitoring Project (2014-2016)" coordinated by TUBITAK-MRC ECPI.

**Keywords:** Black Sea, phytoplankton, abundance, biomass

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## Toxic/Potentially Toxic Phytoplankton Species Composition of the Turkish Coast of the Black Sea in 2016

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**Aim of the study:** In the present study a cruise was organized during the period of February 2016. The seasonal abundance, biomass and taxonomic composition of toxic/potentially toxic phytoplankton species 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. A Sedwick-Rafter counting chamber was used for the micro-phytoplanktonic species. The samples brought to maximum concentrations specific to each sample, depending on the structure of each suspension, are carefully stirred in order to provide a homogenous distribution. From this suspension, a drop of 1 ml is placed on the counting chamber and left to settle down for a little while. Following this procedure, cell numbers (lt<sup>-1</sup>) were counted under Nikon Eclipse E600 at various magnifications.

**Results:** Three diatoms and 18 dinoflagellates species were determined on February 2016 as toxic/potentially toxic. The abundance and biomass values of three harmful diatoms constitute 32% of the total abundance and 2% of the total biomass values of diatoms. The abundance values of harmful dinoflagellates dominated 61% of the total dinoflagellates abundances. The biomass values of 18 dinoflagellates species were dominated 52% of the total dinoflagellates biomass.

**Acknowledgements:** This work has been supported by Ministry of Environment and Urbanization/General Directorate of EIA, Permit and Inspection/ Department of Laboratory, Measurement and Monitoring in the context of "Integrated Marine Pollution Monitoring Project (2014-2016)" coordinated by TUBITAK- MRC ECPI.

**Keywords:** Black Sea, toxic/potentially toxic phytoplankton, abundance, biomass

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### **Fish and Invertebrate Diversity in a Semi-Protected Area (Pagasitikos Gulf, Greece)**

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**Aim of the study:** Pagasitikos Gulf (Central Aegean Sea) is an enclosed gulf, constituting a semi protected area as trawling and boat-seining are prohibited since 1966. Purse-seines (targeting sardine and anchovy), nets (targeting hake, surmulet, anglerfish and Norway lobster), longlines and traps (targeting Norway lobster) are the main fishing gears in the area. The ecological importance of Pagasitikos Gulf and the multi-gear exploitation of some species indicate the need for reconsidering the current management scheme and implementing ecosystem based fisheries management. The aim of the study was to assess and compare fisheries resources' biodiversity inside and outside the gulf, where additional fishing pressure exists.

**Material and Methods:** Samplings have been conducted onboard a trawler in July 2016, using an experimental bottom trawl and following the MEDITS sampling protocol. Five hauls were carried out; four of them inside and one outside the gulf where additional trawling pressure is exerted. All fish and invertebrates were listed and their abundance (number of individuals) and biomass (kg) were recorded. For the description of the communities in the area, both traditional diversity measures and complementary taxonomic diversity indices were calculated, based on abundance data, by means of the software PRIMER-E 6: (i) species richness; (ii) Shannon-Wiener diversity index, (iii) Pielou's species evenness index, (iv) taxonomic distinctness, and (v) variation in taxonomic distinctness.

**Results:** The number of species collected was more or less similar to all areas, without indicating a clear pattern, while the Shannon and Pielou's indices exhibited their lowest values in the high pressure area outside the gulf. Towards this direction, taxonomic distinctness was also higher in the areas inside the gulf, in comparison to the area outside the gulf, where additional trawling pressure occurs. Both taxonomic distinctness and variation in taxonomic distinctness were in all cases inside the limits of expectation and relatively close to the mean expected value. Based on the results, intense fishing (with the addition of trawling gear) seems to have a significant impact on biodiversity, whereas small-scale fisheries appear to affect it to a lesser extent. Respectively, areas with less intense fishing disturbance present a wider phylogenetic diversity in comparison to high pressure areas.

**Acknowledgements:** The present work was part of the EU DG MARE funded PROTOMEDEA project (Ref. MARE/2014/41; Grant Agreement SI2.721917).

**Keywords:** species richness, Shannon-Wiener index, Pielou's evenness, taxonomic distinctness

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### The Histopathological Effects of Atrazine on the Spleen of *Oreochromis niloticus*

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**Aim of the study:** It is aimed to determine possible alterations in spleen histology of *Oreochromis niloticus* individuals exposed to certain concentrations of atrazine standart with light microscope at 7th, 14th and 21st days.

**Material and Methods:** The analytical standard of diazinon was used for the study. 1/10 of LC<sub>50</sub> value of atrazine for *O. niloticus* was used as test concentration. The test design was static renewal. 15 individuals in each of three replicates were used per groups. Test duration was 21 days. Test groups were control, acetone control and exposure groups. At 7th, 14th and 21st days of the experiment 5 fish were taken randomly from each exposure and control groups. The fish were immediately sacrificed by decapitation. Spleen samples were removed and immediately fixed with 10% formalin solution for 24 hrs at +25 °C. After fixation, samples were washed under the tap water for 1 night for removing the fixative from the tissue. After wise, the samples were dehydrated with increasing grade of ethanol (30, 50, 70, 80, 90, 96 and 100%). Then, the samples were cleared with xylene and embedded in parafin. 5 µm sections were cut by microtome. After cutting, the sections were stained with Hematoxylin-Eosin and examined with a light microscope. The histopathological alterations were photographed.

**Results:** At the end of 7<sup>th</sup> day, cloudy swelling, picnosis and hypertrophy were observed in some regions of the spleen of the fish exposed to atrazine. The severity of histopathological alterations in the spleen tissue of *O. niloticus* individuals exposed to carbaryl for 14 days increased with the time. In this period, while cloudy swelling in the spleen cells of fish continued the frequency of this pathology increased, at the same time necrosis began to appear in the spleen tissue. Few melanomacrophage centers were also determined. At the end of 21 days, the most distinctive histopathologic change in the spleen was the number of necrotic areas. The picnotic nuclei spread throughout the tissue and the density of melanomacrophage centers increased.

**Acknowledgements:** This study was supported by The Scientific and Technical Research Council of Turkey (TUBITAK) under grant number 114-Z-730

**Keywords:** Histopathology, *Oreochromis niloticus*, spleen, melanomacrophage centers, atrazine.

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## The Histopathological Effects of Diazinon on the Spleen of *Oreochromis niloticus*

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**Aim of the study:** It is aimed to determine possible alterations in spleen histology of *Oreochromis niloticus* individuals exposed to certain concentrations of diazinon standart with light microscope at 7<sup>th</sup>, 14<sup>th</sup> and 21<sup>st</sup> days.

**Material and Methods:** The analytical standard of diazinon was used for the study. 1/10 of LC<sub>50</sub> value of diazinon for *O. niloticus* was used as test concentration. The test design was static renewal. 15 individuals in each of three replicates were used per groups. Test duration was 21 days. Test groups were control, acetone control and exposure groups. At 7<sup>th</sup>, 14<sup>th</sup> and 21<sup>st</sup> days of the experiment 5 fish were taken randomly from each exposure and control groups. The fish were immediately sacrificed by decapitation. Spleen samples were removed and immediately fixed with 10% formalin solution for 24 hrs at +25 °C. After fixation, samples were washed under the tap water for 1 night for removing the fixative from the tissue. After wise, the samples were dehydrated with increasing grade of ethanol (30, 50, 70, 80, 90, 96 and 100%). Then, the samples were cleared with xylene and embedded in parafin. 5 µm sections were cut by microtome. After cutting, the sections were stained with Hematoxylin-Eosin and examined with a light microscope. The histopathological alterations were photographed.

**Results:** At the end of 7<sup>th</sup> day, cloudy swelling, picnosis and hyperplasia were observed in some regions of the spleen of the fish exposed to diazinon. Few melanomacrophage centers were also determined. The severity of histopathological alterations in the spleen tissue of *O. niloticus* individuals exposed to carbaryl for 14 days increased with the time. On day 14, the number of picnotic nuclei in the spleen of *O. niloticus* individuals increased, at the same time necrosis began to appear in the spleen tissue and the frequency of cloudy swelling increased. At the end of 21 days, the most distinctive histopathologic change in the spleen was the number of necrotic areas. The picnotic nuclei spread throughout the tissue and the density of melanomacrophage centers increased.

**Acknowledgements:** This study was supported by The Scientific and Technical Research Council of Turkey (TUBITAK) under grant number 114-Z-730

**Keywords:** Histopathology, *Oreochromis niloticus*, spleen, melanomacrophage centers, diazinon.

PP-260

## **A New Strategy for Alveolitis Treatment: Zinc borate and Its Antimicrobial and Wound Healing Potential**

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**Aim of the study:** Alveolitis is a significant post-operative problem and occurs at around 2 to 3% of all extractions. Various causes, such as trauma, bacterial infection and biochemical agents, play a role in the etiology of alveolitis. In addition, failure of *the healing* process can result in *alveolitis*. *The purpose of this study* is to investigate the potential use of zinc borate in prevention of alveolitis.

**Material and Methods:** The antimicrobial activity was tested by agar diffusion and tube dilution methods against *Staphylococcus aureus* (ATCC25923), *Streptococcus mutans* (ATCC25175) and *Candida albicans* (ATCC10239) which were provided from American Type Culture Collection (ATCC). The wound healing potential was determined by its inhibition ability on collagenase, hyaluronidase and elastase enzyme activities and was evaluated via scratch wound-healing assay on 3T3 fibroblasts.

**Results:** According to the results of the antimicrobial activity test, the greatest inhibition zone is seen on *S. aureus* (11 mm). Similarly, *S. aureus* was relatively sensitive (MIC of 0.5 mg/ml), while *S. mutans* and *C. albicans* were more resistant to the zinc borate (MICs of 1.0 mg/ml). In addition, the zinc borate showed significant collagenase (81.5%) and elastase (43.4%) inhibition. Scratch assay showed that wound closure was faster than control for 0.01 µg/ml zinc borate/plate. In conclusion, zinc borate may stimulate wound healing by enhancing wound closure, inhibited ECM degradation enzymes and bacterial growth.

**Acknowledgements:** This study is a part of the PhD thesis of Semih Ayrikçil.

**Keywords:** zinc borate, alveolitis, antimicrobial, wound healing, enzyme inhibition

PP-261

### Characterization of RB11-1 Lipase for Detergent Formulations

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**Aim of the study:** *Lipases* catalyse the hydrolysis of long chain hydrophobic triglycerides to *more hydrophilic monoglycerides, diglycerides, free fatty acids* and *glycerol*. For this reason, over the years, lipases have been used as ingredients in laundry and dishwasher detergents to aid in the removal of oils and fats of vegetable and animal origin. In this study, we described the production and characterization of RB11-1 lipase for detergent formulations.

**Material and Methods:** Lipolytic activity of isolate RB11-1 was determined using tributyrin agar and Rhodamine-B Agar plates. Lipase activity was also measured with *p*-nitrophenyl palmitate (*p*-NPP) as a substrate. Then optimum pH, optimum temperature, pH and temperature stability, metal ions and surfactants stability were determined.

**Results:** The lipase from RB11-1 isolate exhibited maximal hydrolytic activity at 20 °C and pH 8.0. The lipase exhibited good stability at pH 6.0-11.0 and 20-40 °C. Lipase activity was increased by Mn<sup>2+</sup>, Mg<sup>2+</sup> and Co<sup>2+</sup> and inhibited by Zn<sup>2+</sup>, Cu<sup>2+</sup> and Cd<sup>2+</sup>. Moreover, the lipase displayed significantly stability against saponin, Triton X-100, Tween 20, Tween 40, Tween 60 and Tween 80. These properties make the RB11-1 lipase an ideal choice for detergent formulations.

**Keywords:** Lipase, production, characterization, detergent formulation

PP-262

### Phenolic Contents of *Viscum album* by HPLC

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**Aim of the study:** *Viscum album* is a semi-parasitic with haustorium that living in the branches of woody plants. *Viscum album* blooms in March - April and does not spill leaves in winter. This semi-parasitic plant carries many plant secondary metabolites. In this study, 15 phenolic compounds in *Viscum album* were analyzed by HPLC (High Performance Liquid Chromatography).

**Material and Methods:** Analysis of phenolic compounds in HPLC with standards was performed with Photodiode Array Detector (SPD-M20A) and LC20 AT pump. The analysis was carried out C-18 column (250 mm x 4.6 mm, 2.5 µm) with CTO-10ASVp column oven. The mobile phases were solvent A: 3.0% formic acid in distilled water and solvent B: methanol. 0.2 g sample was dissolved in mobile phase. Then sample was filtrated in 0.45 µm and was injected to the HPLC. The elution gradient applied at a flow rate of 0,8 ml min<sup>-1</sup> with 95% A for 3 min, 70%A in 47 min, 30%A in 23 min, 100%A in 7 min. Gallic acid, 3,4- hydroxybenzoic acid, 4-hydroxybenzoic acid, chlorogenic acid, vanillic acid, caffeic acid, p-coumaric acid, epicatechin, ferulic acid, naringin, rutin, ellagic acid, cinnamic acid, quercetin were used as standards.

**Results:** As a result of HPLC analysis, HPLC analysis showed that caffeic acid (39381,33 µg/g) was the major component. The other compounds are 2,5 dihydroxy benzoic acid (10595,60 µg/g), 4-hydroxybenzoic acid (2967,35 µg/g), cinnamic acid (1021,80 µg/g), ellagic acid (481,02 µg/g), vanillic acid (353,83 µg/g), epicatechin (250,81 µg/g), chlorogenic acid (220,43 µg/g), p-coumaric acid (94,71 µg/g), gallic acid (44,48 µg/g), 3,4- hydroxybenzoic acid (28,85 µg/g), quercetin(18,03 µg/g), ferulic acid (10,29 µg/g), respectively. Naringin and routine were not found in the analysis.

**Keywords:** *Viscum album*, HPLC

PP-263

### Biological Activity of *Paeonia kesrouanensis*

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**Aim of the study:** The genus *Paeonia* L. (Paeoniaceae) is only found in the northern hemisphere and only contains 35 species. *Paeonia* (peony) species are attractive ornamental plants and used as medicinal plants. The genus *Paeonia* is also one of the most important crude drugs in Chinese traditional medicine used against atopic eczema as well as for anticoagulant, anti-inflammatory, and sedative purposes. In this work, we investigated biological activity of aerial and underground parts of water, acetone and ethanol extracts of *Paeonia kesrouanensis*.

**Material and Methods:** *Paeonia kesrouanensis*'s samples collected in Altinyayla/Burdur, Turkey in 2018/May and were air-dried under the shade and ground using a laboratory mill and a kitchen blender. The plant samples were extracted with water, acetone and ethanol in a vibrating water bath. Extract was filtered, then the solvents were evaporated and the water in each extract was frozen in Freeze-Drying machine and then drawn out. DPPH, total phenolic and total flavonoid assays were performed with obtained extracts.

**Results:** In assay of DPPH, aerial part was found to be higher than underground part of *P. kesrouanensis* in concentration of 0,1 mg / ml in all solvents. The total phenolic and total flavonoid assays of *P. kesrouanensis* aerial part all solvents extracts were found more effective than underground part. We found that *P. kesrouanensis* extracts have high potentially antioxidant activity. This is the first study to report on antioxidant activity of the extract of *P. kesrouanensis*.

**Keywords:** *Paeonia kesrouanensis*, DPPH, Total Phenolic Assay, Total Flavonoid Assay

PP-264

**First records of Nymphs of *Zercon afyonensis* Urhan & Duran, 2017 from Turkey**

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**Aim of the study:** In this study, to determine zerconid mites fauna of Akdağ National Park, litters, rotted tree roots, moss pads and soil samples were collected from different localities in between March 2018 – May 2018.

**Materials and Methods:** Collected 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. They were placed in 60% lactic acid for clearing and mounted onto permanent microscope slides using a glycerin medium. The examination and drawing of mites were done using an Olympus CX41 microscope with DP25 camera.

**Results:** As a result of the analysis of the samples, 20 females, 5 males, 6 deutonymphs and 3 protonymphs specimens of *Z. afyonensis* were identified. The shapes of the individuals which best reflect the distinguishing features of *Z. afyonensis* were drawn and measured. Then, the samples were put in stock bottles containing 70 % alcohol and 1- 3 drops glycine and labelled. In this study, deutonymphs and protonymphs specimens of *Z. afyonensis* were recorded from Turkey for the first time.

**Acknowledgement:** This research was financially supported by the Pamukkale University Scientific Research Projects (PAUBAP), Project number: 2018HZDP009.

**Keywords:** Acari, Akdağ National Park, Systematic, *Z. afyonensis*.

PP-265

### Soil Mites (Acari) of Colossae Ancient City (Denizli Province/Turkey)

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**Aim of the study:** Numerous small arthropod animals in debris on the forest floor are available. Most of these are also mites. Mites form one of the animal groups rich in both species and number of individuals in the soil. Mites play an important role in the biological efficiency of soil, contributing to the organic matter separation, humus synthesis, biological preservation of elements, the stimulation of fungal and bacterial metabolism. Until now, more than one thousand mite species were recorded from Turkey. This study has been carried out to determine the soil mites which spread in Colossae Ancient City.

**Material and Methods:** Litter and soil samples collected from areas of Colossae Ancient City between November 2014 and October 2015. In this context, random samples were taken in research areas at monthly intervals. Collected samples were brought in plastic bags, labelled and transferred to laboratory. Then, litter and soil samples were put to extracting device of soil mites which include combined Berlese funnels. 3-5 days later, ethanol bottles were collected, poured into petries and oribatid mites were extracted under a stereo microscope. 60% lactic acid was used for decolorizing and cleaning some mite samples. After mite samples were examined with light microscope (Olympus CX41) and identified, they were placed and labeled in storage bottles which contain 70% alcohol and 1-3 drops of glycerin. The identification of the species was made according to Ayyildiz (1986, 1987, 1992), Karg (1993), Krantz 1978, Urhan (2001), Karaca & Urhan (2016).

**Results:** As a result of the examinations, 28 soil mites species which belonging to 18 different families of 3 orders were identified. Identification of detected soil mites has been tried at species level. However, some species were given at genus level which can not be identified at species level. Examination of detected species was carried out in light microscope, their definitions were reviewed, photographs were taken and world distributions were given with literature. The diversity of soil mites has been revealed by determining mite species which living in litter and soil in Colossae Ancient City.

**Keywords:** Acari, soil mites, Colossae Ancient City, Turkey.

PP-266

### Polymeric Nanomaterial for Dopamine Separation

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**Aim of the study:** Dopamine play the major role as neurotransmitters in central and peripheral nervous systems. Extremely high or low levels of dopamine can occur in nervous system deficiency, stress and addiction. Separation of dopamine is important from physiological fluids for detection of dopamine level. Traditional methods for dopamine separation are HPLC and flow injection analysis. They are time consuming and expensive methods. In this study, we aimed to develop a polymeric nanomaterial which is capable of binding dopamine with using boronate affinity chromatography in order to use separation of dopamine as an alternative for traditional methods.

**Material and Methods:** p(HEMA) nanopolymer was synthesized with non-surfactant emulsion polymerization method by using EGDMA, HEMA, PVA and KPS in 70°C for 8 h. and functionalized by APTES as a silanization agent and PBA for boronate affinity. p(HEMA-APTES-PBA) nanoparticles were characterized by Zetasizer, Elemental Analysis, FT-IR and SEM. Adsorption studies of PBA were carried out in terms pH, time and PBA concentration in 260 nm and adsorption studies of dopamine were carried out in terms of pH, time and dopamine concentration parameters in 295 nm with using UV-spectrofotometer.

**Results:** The zeta-size results of the p(HEMA-APTES-PBA) nanoparticle was found to be 316.2 nm and PDI: 0.013. FT-IR spectra showed that APTES was successfully added to the p(HEMA) nanoparticle structure. Optimum parameters for adsorption of PBA were found to be 2 h, 0,25 mg/mL and pH 6. Optimum parameters for adsorption of dopamine were found to be 30 min, 0,25 mg/mL and pH 8. But for the optimum dopamine concentration, due to the high surface area it is not possible to saturate the surface with dopamine. When dopamine concentration increases, the amount of dopamine bound is expected to increase.

**Keywords:** Dopamine, nanopolymer, seperation

PP-267

### ***Urtica urens* L. (Small Stinging Nettle) Induces Apoptosis in Caco-2 Human Colon Cancer Cells: Role of Caspase pathway**

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**Aim of the study:** Although, *Urtica urens* L. (Small Stinging Nettle) is one of the widely used plant in alternative and complementary treatment of cancer patients in our country, studies in literature showed that there are limited studies investigating the anticarcinogenic activity of this plant. In this regard, the present study was aimed to investigate the cytotoxic and apoptotic effect of small nettle seed hexane extract in human colon cancer cells.

**Material and Methods:** In this respect, firstly, hexane extract of dried stinging nettle seed were prepared and two different extract were obtained (Hexane solid and hexane oil). Hexane solid extract was selected for further studies. This extract were dissolved in dimethyl sulfoxide (DMSO) at a final concentration of 0.1% and was applied different concentration to the Caco-2 (human colon cancer cell line) cells ( $2.5 \times 10^3$  cells/well) for 48 hours. At the end of 48 hours, the survival rate of cell was measured at the end of a 30-minute incubation at 450-690 nm using ELISA reader by adding 10  $\mu$ l of WST reagent to the cells on 96-well plate. Control group was treated with the medium containing 0.1% DMSO without plant extract. Protein and mRNA levels of genes involved in apoptosis were determined by western blot and Real time PCR experiments.

**Results:** The cytotoxicity determination experiment result was showed that the LD50 values of extract was found to be 28.9  $\mu$ g/ml. This results showed clearly that hexane solid extract has higher cytotoxic and anticarcinogenic activity. Protein levels of bax, caspase 3 and 9 increased 20%, 65% and 25% as a result of seed hexane extract treatment, respectively. On the other hand, bcl-2 protein level was decreased 28%. Similar to protein levels, bax, caspase 3 and 9 mRNA levels increased 82%, 38% and 30% as a result of seed hexane extract treatment, respectively. On the other hand, bcl-2 mRNA level was decreased 42%. Induction of apoptosis by extract treatment was proved by Annexin V staining with Fluorescence microscopy as well. All these results put the hypothesis that the small nettle plant hexane extract contains promising phytochemicals that may be used in cancer treatment.

**Acknowledgements:** This work is supported by TUBITAK 111T515.

**Keywords:** *Urtica urens*, seed oil, cytotoxic activity, apoptosis, annexin V

PP-268

## The molecular and serological detection of Schmallenberg Virus (SBV) infection in cows and sheep in Eastern Mediterranean region, Turkey

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**Aim of the study:** Schmallenberg virus (SBV) recently discovered belongs to the Simbu serogroup within the genus Orthobunyavirus of the Peribunyaviridae family. Viruses of this serogroup are distributed worldwide- include SBV, Akabane virus (AKAV), Aino virus- which predominantly infects ruminants and may cause severe fetal malformation when pregnant animals are infected during a critical phase of gestation. Given this background, this study was carried out to determine the epidemiology of SBV infection in cows and sheep herds with abortion and/or congenital abnormalities problems in Eastern Mediterranean Region, Turkey.

**Material and Methods:** This study was conducted during the months of October 2015 and November 2017 in Hatay, Kahramanmaraş and Osmaniye provinces in the Eastern Mediterranean region of Turkey. The study focused on herds where abortion and/or congenital abnormalities cases were reported. The prevalence of SBV was investigated using serological and virological methods. With this purpose, totally 1156 serum samples (n=894 from cows and n=262 from sheep), virological control samples (n=799 from cows and n=288 from sheep) as blood with EDTA (n=976) and vaginal swab (n=88) from cows and sheep that had aborted and/or healthy appearance and tissue samples of aborted fetuses (n=23) were collected from three province. A commercial ELISA kit was used for the detection of SBV anti-nucleoprotein antibodies in sera samples. Real time RT-PCR assay was used to detect viral RNAs present in blood with EDTA, vaginal swabs and tissues. Genetic characterization of the local SBV field viruses was conducted by sequencing of SBV S segment.

**Results:** The rates of antibody for SBV were determined as 40,71% (364/894) in cows and 14,50% (38/262) in sheep. Overall seropositivity rate of SBV infection was found as 34,77% (402/1156). Virologically, SBV viral nucleic acid was detected as 1,12% (9/799) in cows and 5,55% (16/288) in sheep. According to the phylogenetic analysis, our SBV field strains were found 100% similar to the strains causing outbreaks in Europe. In conclusion, it has been determined that SBV was circulating in this region. Serological surveys on SBV infection conducted in ruminants in different parts of Turkey. However, no detailed data about the epidemiology of SBV in this region, Turkey have been available. Investigating whether SBV existed in different regions of Turkey should be very helpful for the early warning and control of SBV. There is no vaccination program in our country for SBV. However, given the fact that in recent years the disease poses a risk for our country, the use of vaccines may come into question.

**Acknowledgments:** Investigation of the epidemiology of some arboviral infections (Akabane virus Mavidil virus and Schmallenberg virus) in ruminants in Hatay, Osmaniye, and Kahramanmaraş in Eastern Mediterranean Region and determination of possible vectors, Scientific Research Projects Coordination Unit of Ankara University, No:15B0239007.

**Keywords:** Cows, epidemiology, Schmallenberg Virus, sheep, Turkey.

PP-269

## Mites diversity on weed plants in garlic growing areas of Kastamonu province

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**Aim of the study:** Garlic is now grown in almost every region of the world, it grows under temperate climates on sandy, loamy, and argilliferous soils. Some of the highest quality garlic in the world is grow in Taşköprü. Weeds sometimes play an important role in pest management systems, which serve as food sources for alternative hosts for natural enemies. Weeds, however, can be regarded as important components of agroecosystems. In this study, we determined mites species and their densities on weed plants from different localities of garlic areas in Kastamonu.

**Material and Methods:** The sampling were carried out from garlic cultivation areas in Taşköprü, Hanönü of Kastamonu in 2015-2016. The samplings were made from March to July by weekly sampling interval from garlic cultivation areas of two years. The samples were taken from *Cirsium arvense* (L.) (Dicotyledonae), *Sinapis arvensis* (L.) (Brassicaceae), *Convolvulus arvensis* (L.) (Convolvulaceae), *Medicago sativa* (L.) (Fabaceae), *Vicia sativum* (L.) Fabaceae), *Agropyrum repens* (L.) and *Lolium rigidum* (Gaud.) (Gramineae). The mites were extracted by Berlese funnel set up from weed samples.

**Results:** In total 91 sampling were made and 26 mite species were determined. 26 mite species were determined. Out of 5 (19, 23%) of these are phytophagous and 21 (80%) species belongs to predatory and neutral species. Eviphididae (Mesostigmata) members were the most populated species in this study (47.91%). Considering to the distribution of identified species according to districts, 67.85% of the species belong to Taşköprü, 26.89% of them belong to Hanönü and 5.26% of them belong to Centrum of Kastamonu.

**Acknowledgement:** This work was supported by TÜBİTAK-TOVAG (Project No: 1140416).

**Keywords:** Kastamonu, Acari, Weeds, Garlic, Density, Turkey

PP-270

**A Different Coloration on Eastern Four-Lined Ratsnake, *Elaphe sauromates* (PALLAS, 1814) Collected from Denizli Province (Turkey)**

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**Aim of the study:** In this study, we aimed to introduce a different and rare coloration of Eastern Four-Lined Ratsnake, *Elaphe sauromates* (Pallas 1814) from Denizli province. The Eastern Four-Lined Ratsnake, *Elaphe sauromates* is one of the largest and more massive snakes, growing up to 230 cm in length. Due to its dorsal coloration in Turkish this species is named “Yellow snake”. In this study, we observed a rare coloration of this species of first time in Turkey.

**Material and Methods:** *Elaphe sauromates* sample was observed within the scope of “Biodiversity and Monitoring studies of Terrestrial and Inland Water Ecosystems in Denizli Province”. Snake sample is caught by hand in Baklan district (860 m. elevation) in 18.06.2017 from Denizli province.

**Results:** In generally, *Elaphe sauromates* is easily recognizable by the yellow dorsal coloration pattern with four rows of dark brown, black, or reddish brown blotches. Our observed samples dorsal coloration is in pale pinkish-red toned coloration. Total length is measured 124 cm. This coloration pattern is rare in *Elaphe sauromates* species.

**Acknowledgements:** The Project “Biodiversity and Monitoring studies of Terrestrial and Inland Water Ecosystems in Denizli Province” is funded by The Ministry of Forestry and Water Affairs, The General Directorate of Nature Conservation and National Parks. We are indebted to The Ministry of Forestry and Water Affairs, The General Directorate of Nature Conservation and National Parks for financial support and kindly interest.

**Keywords:** Coloration, Denizli, Eastern Four-Lined Ratsnake, *Elaphe sauromates*, Turkey

PP-271

**A Preliminary Study on the Investigation of the Parasites of *Merlangius merlangus* (Whiting Fish) Collected from the Aegean Sea**

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**Aim of the study:** Whiting fish (*Merlangius merlangus*) is an important edible fish, whiting fish distributed in Black Sea, Aegean Sea, and Mediterranean Sea in Turkey. In this study, a helminthological study on whiting fish (*Merlangius merlangus*) was aimed.

**Material and Methods:** A total of 43 whiting fish (*Merlangius merlangus*) samples obtained from fishermen hunted in shore of Çeşme County in İzmir province, between October 2017 and March 2018. The frozen fish samples was brought to the Pamukkale University, Faculty of Arts and Sciences, Biology Department Parasitology Laboratory. The fishes were firstly dimensioned and examined parasitologically under the stereomicroscope, including body cavity, gills and internal organs.

**Results:** As a result of this research, a total of 20 *Hysterothylacium aduncum* (Rudolphi, 1802) parasite individuals belonging to nematoda groups was determined.

**Keywords:** *Hysterothylacium aduncum*, İzmir, *Merlangius merlangus*, Nematoda, Whiting fish, Turkey

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**Population Development and Distribution of *Frankliniella occidentalis* (Pergande) (Thysanoptera: Thripidae) in Selected Strawberry Greenhouses**

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**Aim of the study:** Strawberry has an important place in terms of Turkish economy. Strawberry is a fruit that requires great care in the production phase and also in marketing. Pests, diseases and weeds are the most important factors that has negative effects on the strawberry production. Rapid ripening of strawberry fruits, the control possibilities with pests in this product restricts. For this reason, it is necessary to continuously monitor the pests. Western blossom thrips, a polyphag species, is one of the most important pests of strawberries. Farmers often prefer chemical control methods against this pest. This threatens the health of the environment and human, as well as causing the pests to gain resistance. To be successful against pests, it is useful to know the state of the harmful situation within the ecosystem. For this reason, the distribution of harmful organisms in the greenhouse and the determination of the population change are the aim of this study.

**Material and Methods:** The study will be conducted in three different greenhouses with high tunneling characteristics of 2.5, 3.5 and 4.0 decares in the city of Kadriye in the province of Antalya, Turkey. The first two greenhouses had twenty-five and the third one had fifteen blue sticky traps. These traps were changed every week and brought to the laboratory. Thrips numbers in the traps brought to the laboratory were recorded by counting. The experiments were carried out during the period from seedling to harvest. In this way, the concentration of the trips in different areas of the greenhouses and population fluctuations were determined. Variance analysis programs were used to evaluate the data obtained in the trial. In addition, the Tukey multiple comparison test were used to determine the difference between the averages.

**Results:** As a result, graphics of *Frankliniella occidentalis* population fluctuation in three greenhouses were drawn. In addition, hot points related to numbers of *Frankliniella occidentalis* in greenhouses were designated. Pest population has changed throughout the time. It observed that pest population has different densities per place in greenhouses.

**Acknowledgements:** The authors thank the Research and Technology Department of Süleyman Demirel University in Isparta, Turkey for financial support for this project (Project number: 4999-YL1-17).

**Keywords:** Strawberry, western flower thrips, blue sticky trap, distribution

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**Anatomical and Palynological Features of *Cousinia cirsioides* Boiss. & Bal. (Section, *Cousinia* Cass., Asteraceae)**

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**Aim of the study:** The genus *Cousinia* Cass. comprises approximately 690 species throughout the world and nearly all of them occur in the central and southwestern Asia. It 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 species of these are endemic to 26 (Davis 1975). In this study goals to investigate the anatomical and palynological properties of *Cousinia cirsioides* Boiss. & Bal. species belonging section *Cousinia*, to determine and to evaluate the usefulness of these characters for systematic purposes.

**Material and Methods:** The plant specimens were collected from type locality in Turkey. The specimens have been deposited in Selcuk University Herbarium (KNYA). 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 stems and leaves. The specimens were embedded in paraffin wax and then sectioned between 5 and 10 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 binocular light microscope with a Leica DFC280 camera. For 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:** Taxonomical significance were observed from transverse sections of leaves such as size of vascular tissue, shape and number of vascular bundle. 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 cirsioides* has 3-5 layers cortex cells. In leaves transverse section, It has a single layer upper and lower epidermis cells, and also it has 2 layers palisade and 2 layers spongy parenchyma. The midrib form is triangular. There is one large vascular bundle in the center and is surrounded by a parenchymatic bundle sheath. Collenchyma of lower and upper epidermis 250 µm and 100 µm respectively. Pollen shape of *C. cirsioides* is subprolate. Aperture types of *C. cirsioides* is tricolporate. As a result of SEM studies, pollen ornamentation was determined as verrucos-perforate.

**Acknowledgements:** We would like to thank the curators of herbaria AEF, ANK, E, G, GAZI, HUB, ISTE, ISTF, K and LE for permitting the examination of *Cousinia* specimens. We also thank to "TÜBİTAK: TBAG-111T364"

**Keywords:** Asteraceae, *Cousinia cirsioides*, Anatomy, Palynology

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## Development of a Fast and Reliable Method for the Detection of Pesticide Residues in Bee-Bread Samples

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**Aim of the study:** Bee-bread, made by bees, the primary actors contributing the biodiversity, is processed pollen stored and packed in the honeycomb cells with the help of various enzymes and nectar or honey as it undergoes lactic acid fermentation. This product is exposed to pesticides due to various factors. Therefore, development of new fast, easy and cheap methods for the analysis of residues in food samples is very important. The cost-effectiveness of analytical study and especially multi-class methods are main issues for residue analysis laboratory. The aim of the study is to develop and validate the modified QuEChERS method for determination of ppb ( $\mu\text{g/L}$ ) level of 123 pesticide residues in bee-bread using GC-MS/MS.

**Material and Methods:** In this study, Agilent Technologies 7890A GC gas chromatography 7000B Triple Quadrupole mass spectrometer was used. Agilent Technologies 7693 autosampler, multi-mode inlet system and HP-5MS UI (15 m x 250  $\mu\text{m}$  x 0.25  $\mu\text{m}$ ) capillary column were used. Commonly, Primary Secondary Amine (PSA) is used for the clean-up in most analyses. In this study, residual levels of pesticides in bee-bread were determined by GC-MS/MS using modified QuEChERS method. 7.5 g of homogenized sample was transferred to 50 mL falcon tube and 15 mL of 1% acetic acid in acetonitrile, 1.5 g of anhydrous magnesium acetate, 6 g of anhydrous magnesium sulfate and 150  $\mu\text{L}$  of internal standard solution were added respectively. It is shaken 1.5 minutes, centrifuged at 4000 rpm for 5 min. The tube was left at -18°C for 3 hours. As soon as it came out of the cooler, 4 mL of the extract was removed from the tube to the next cleaning step. After addition of 400 mg of clearing agent and 1200 mg of anhydrous magnesium sulfate, tube was shaken and centrifuged. 1 mL of supernatant was transferred to vial and 50  $\mu\text{L}$  TPP was added. The tube was agitated in the mixer. The vial was analysed in GC-MS/MS.

**Results:** As a result of the study, it was found that the developed method gives high accuracy in detection of 123 pesticide residues in bee-bread sample. With the method validation studies, the LOD-LOQ parameter was used in bee-bread samples. The method presented quantification limits between 1.05 and 10.37 ppb. In the repeatability study of the analysis, the recovery of the method validation accuracy parameter was done at two different concentrations, 10 ppb and 50 ppb, with percent recovery and % CV values. The recovery results obtained in GC-MS/MS for contaminants for authenticity and precision sub parameters were 79.60 - 97.63% and CV 1.36 - 11.07%. A simple, easy, economical and efficient method was developed for the determination of 123 pesticides in bee-bread. The method demonstrates good sensitivity, precision, accuracy and allows for rapid analysis.

**Acknowledgements:** Authors would like to thank to "By Propolis Baki Cilga" for supplying the bee-bread.

**Keywords:** Bee-bread, pesticide, fluvalinate, QuEChERS, GC-MS/MS

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## Determination of Lemongrass (*Cymbopogon citratus*) Aroma Components by Headspace-GC/MS

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**Aim of the study:** Lemongrass (*Cymbopogon citratus*), belong to the family of *Poaceae* and being cultivated in tropical and subtropical regions of the world. It has been used by human for its characteristic flavour and potential health benefits due to its antioxidant, anti-inflammatory, anticancer, antimicrobial properties. Lemongrass possesses strong lemony odour. Lemongrass essential oil is used in aromatherapy to freshen the air, reduce stress and also used in food processes as food flavouring, perfume and cosmetic industry. The aim of this study was to determination of Lemongrass aroma components by Headspace-Gas chromatography mass spectrometry.

**Material and Methods:** Headspace-GC/MS is a specific gas chromatographic technique used to analyse volatile compounds. An example is placed in a heated closed sampling vessel using a known temperature profile and the gas sample in the headspace vial is used for analysis. In this study, quantitative and qualitative analysis of aroma components in lemongrass will be done. For this purpose, an Agilent 7890 Gas chromatography (GC) 7675A Headspace sampler combined with 5975C inert Mass spectrometer (MS) was used. The Headspace technique is an extremely safe, robust and specific Gas chromatograph Mass spectrometer technique to identify or measure the volatile organic compounds. The headspace vials were filled with 5 g of shredded plant and covered with help of a crimper. The vial was placed in the headspace sampler and was extracted at 90 °C for 30 minutes. At the end of 30 min., the volatile components collected at the top of the vial were transferred to the GC Split/Splitless inlet by the Headspace Sampler using helium gas for 1 minute via transfer line. Thus, the gases formed at the end of the extraction were qualitatively and quantitatively determined using Headspace-GC/MS.

**Results:** Lemongrass is rich in volatile components. 43 chemical compounds have been identified in the whole plant of lemongrass using headspace-GC/MS. The major aroma compounds identified in this study are myrcene (43.61%), *alpha*-citral (22.29%) and *beta*-citral (17.39%). Other volatile compounds found in lemongrass are linalool (1.34%), *trans*-geraniol (2.76%), *trans*-ocimene (1.96%) and *cis*-ocimene (1.25%). According to the results, the main reason of strong lemony odour of lemongrass is its high content of citral (39.68%). Citral has two geometric isomers *alpha* and *beta*-citral. Both isomers occur together. Characteristic and unique aroma of lemongrass that stimulates various sensations promotes its consumption in different ways such as herbal infusions, food additives or use in treatment and prevention of health disorders. The results show that lemongrass is one of the valuable parts of our diet with its rich volatile component content.

**Acknowledgements:** The lemongrass used in the study was obtained from local suppliers.

**Keywords:** *Cymbopogon citratus*, lemongrass, citral, Headspace-GC/MS

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## **A model of Early Transcriptional Response of the Plant Genome Integrity Maintenance Genes to Ionizing Radiation**

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**Aim of the study:** To build and evaluate parametric mathematical model of *AtKu70*, *AtRAD51*, *AtRad1* genes radiation-induced early transcriptional response, based on received experimental data.

**Material and Methods:** Using the RT-PCR gel-densitometry, we have studied the early modification of the level of transcriptional activity of the genome integrity maintenance genes *AtKu70*, *AtRAD51*, *AtRad1* in the leaves of 35-day model *Arabidopsis thaliana* (L.) Heynh. plants, ecotype Col-0 after total acute and fractionated irradiation with x-rays at sublethal doses of 3 Gy; 6 Gy; 9 Gy; 12 Gy; 15 Gy; 21 Gy, dose rate 1.48 cGy/s. Acute and fractionated irradiation with equal fractions (time interval between fractions 24 h) had been used 2 h prior to isolation of total RNA and RT-PCR.

**Results:** Nonlinear dependences of the mRNA concentration of all three genes on the irradiation dose with a maximum for *AtKu70* and *AtRAD51* at 3-6 Gy (12 Gy for *AtRad1*) and a minimum at 12 Gy (9 Gy for *AtRad1*) were obtained. Also in the range of 3-6 Gy a minimum of constitutive transcription was observed with 61%-67% decrease in concentration of the *AtEfla* mRNA, one of the most active housekeeping gene in eukaryotic living cells. Analysis of dose-transcription rate curves showed a greater DNA repair gene up-regulation efficacy of acute irradiation compared to the fractionated irradiation, a strong positive partial correlation between the *AtKu70* and *AtRAD51* mRNA levels after acute irradiation ( $r = 0.83^{**}$ ), the inverse dependence between concentration of *AtKu70* and *AtRad1* mRNA after the fractionated irradiation (partial correlation coefficient  $r = -0.94^{***}$ ). Generalization of available in the literature and our own data suggests that: 1) the presence of at least two cellular subpopulations in the plant tissues with different sensitivity to the action of ionizing radiation, as evidenced by dose-transcription rate dependencies with an intermediate minimum; damage to the critical portion of cells of a more radiosensitive population results in its inactivation and activation of cells of a more radioresistant population, possibly due to the removal of inhibition by the cells of a radiosensitive subpopulation; 2) the induction of the transcriptional response of the genome integrity maintenance genes and parallel inhibition of the constitutive transcription by a single initiating event – a double-stranded nuclear DNA break; 3) two or more double-stranded breaks in nuclear DNA suppress the early transcriptional response of the genes maintaining genome stability; 4) free single-stranded DNA in sites of radiation-induced damage stimulates the expression of the *AtRad1* gene and as a later result – upregulation of Rad1 (UVH1) endonuclease, that inhibit *AtKu70* transcription via ,probably, ATR signaling. Proceeding from the given provisions the parametric mathematical model, based on Poisson distribution, describing the received experimental dependencies, is offered.

**Keywords:** DNA repair, DNA damage response, genome integrity maintenance genes, *Ku70*, *RAD51*, *Rad1*.

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## **The Significance of Ecologically Important Biotopes in Struggling with Climate Change: The Case of Kusadasi**

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**Aim of the study:** The objectives of this study are to map ecologically important biotopes in Kusadasi city center, to present information about biotopes and functions in urban ecosystems, to explain ecologically important biotopes in cities struggling with climate change and their ability to become sink areas. It also emphasizes the importance and necessity of biotope mapping in terms of conservation of biodiversity in urban planning studies on the basis of case studies. The mapping of ecologically important biotopes in the fight against climate change and its impact on urban planning is crucial to the conservation, development and sustainable use of natural resources.

**Material and Methods:** The research carried out within the borders of Kusadasi district is based on a detailed examination of its natural structure. In the first phase of the study, the studies on the subject were examined and the natural, cultural and socio-economic characteristics of the city were investigated. Turkey-specific or settled, the most comprehensive studies to determine the types and habitats of plants with foreigners, edited by P.H. Davis recordings made "Flora of Turkey and the East Aegean Islands" work formed the basis material for this study. In the second phase of the research, all volumes of the book were thoroughly screened, and natural plant species found in Kusadasi were listed together with their habitat. From this list, characteristic plant species representing ecologically important biotopes have been classified. In the third phase of the study, the presence of ecologically significant biotopes in the city center and around Kusadasi was researched and mapped. At the last stage, ecologically important biotopes, which are an example in the city center of Kusadasi, have been evaluated for impacts and duties in combating climate change. Some recommendations have been developed on the basis of landscape planning to ensure the sustainability of the functions of ecologically important biotopes.

**Results:** Kusadasi's features include population structure, types of land use, natural characteristics. As a result of the evaluation of the list of characteristic plant species used in the classification of ecologically important biotope species in Kusadasi and the evaluation of other obtained data. These biotope types identified in the sample area (879,6 ha) in Kusadasi city center have mapped. Ecologically important biotopes of Kusadasi city center are classified as forests (19,8 ha), maquis (39,7 ha), garrigues (17,2 ha), rocks (12,4 ha), sand dunes (52,4 ha) and olive groves (32,6 ha). Among the other areas considered as urban areas, 24.8 ha of green areas, 3,9 ha of cemeteries and 674,6 ha of residential areas are covered. The impact of ecologically important biotopes on climate change has been assessed in terms of the sinking capacity of these areas. This will contribute to the expansion of the sink areas, the carbon binding performance of the sink areas will be increased, and the ecologically important biotopes will have a very limited chance of re-atmospherically transferring the carbon that they attach in industrial biomass such as forests, agriculture and meadows.

**Keywords:** Kusadasi, biotope mapping, climate change, landscape planning

## Importance of Native Plant Species in Bicycle Paths of Antalya

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**Aim of the study:** The aim of this study is to emphasize the possibility of enriching urban ecology and supporting biodiversity through bicycle paths, one of the applications developed against environmental problems in urban areas. For this purpose, in the case of Antalya city, which is in a region rich in biology, the natural structure features of the city, the existing bicycle routes and their relation to the environment have been examined. Planting studies and problems have been put forward on bicycle roads and natural plant species which can be used in these areas in terms of contribution to urban ecology have been determined.

**Material and Methods:** Urbanization and motor vehicles in the cities where concentrated in certain centers such as Antalya cause increase of environmental pollution. This situation necessitates the implementation of approaches to increase biodiversity in all urban areas. The research area is Antalya city center which includes Konyaalti, Muratpasa, Kepez, Dosemealti and Aksu districts. Konyaalti, Muratpasa and Kepez districts have completed urban development and Dosemealti and Aksu still maintain their rural characteristics. The study was conducted in three stages. In Antalya, where the relation of existing bicycle routes is not good, the factors which affect bicycle usage in general are emphasized first. In the second stage, natural features of the city center of Antalya (geology, geomorphology, soil, hydrology, climate, vegetation cover) and native plant species in habitats were found were determined. At the last stage, the city is divided into zones depending on its natural building characteristics and the planting purposes, methods and natural plant species to be applied on each bicycle route are determined. In addition, the use of natural species on bicycle routes has been evaluated and some suggestions have been developed in the context of contribution to ecology of the city.

**Results:** Bicycle is one of the best transport vehicles in the city in terms of economy, environmental pollution and low energy requirements. Antalya, the most growing cities in Turkey, new cycling routes are being built to improve the transportation. There are problems in the planting work done on the bicycle roads which are located in the road networks in almost every region of the city. The most important of these are the fact that the natural features of the city are not sufficiently taken into consideration. Climatic conditions that depend on global warming require sustainable use of our other natural resources, especially our water resources. For this reason, it is important to use the species suitable for the ecology of the area on the bicycle routes planned to be constructed in Antalya city. The basic philosophy of bicycle paths should be to make plant designs in order to "reduce carbon emissions to mitigate climate change" and to be multifaceted. In this way a unique vegetation texture will be created to the city of Antalya. As a result, biodiversity can be restructured through cycling routes based on the natural characteristics of the city.

**Acknowledgements:** This study was supported by the Administration Unit of Scientific Research Projects of Akdeniz University (Project No: FBA-2018-3316).

**Keywords:** Antalya, native plants, bicycle paths, planting.

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## Retrotransposon Based Marker Systems to Determine Genetic Stability for *In Vitro* Grown Plants: IRAP and REMAP

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**Aim of the study:** Retrotransposons are mobile genetic elements through the eukaryotic genomes, especially in plants, they are considered to act an important role in genome evolution. Their unstable genomic locations, flexible copy numbers, length, described and conserved sequences provide them with an advantage to be a more specific genetic marker for plant biodiversity and genome analysis. Inter-retrotransposon amplified polymorphism (IRAP) and retrotransposon-microsatellite amplified polymorphism (REMAP) marker systems, in contrast to other techniques, characterize large genetic dissimilarities and determine genetic stability and somatic clonal variation in the plant species. IRAP, where the fragments are amplified with (long terminal repeat) LTR primers while in the REMAP, where the fragments are amplified with a LTR and an Inter simple sequence repeats (ISSR) primers. Both retrotransposon-based marker systems based on the position of the given LTRs within the genome. There are few reports available on application of retrotransposon-based marker systems for molecular identification in plants. This study aimed to discuss and review the details of the IRAP and REMAP marker systems and its major applications.

**Material and Methods:** IRAP-PCR, DNA amplification is performed using LTR primers in a 25 µl reaction volume, containing PCR Buffer, 2.5 mM MgCl<sub>2</sub>, 0.4 mM of each dNTP, 0.4 mM LTR primer, 50 ng genomic DNA, and 2 unit Taq DNA polymerase. Amplification conditions are as follows: initial denaturation at 95°C for 3 min, 35 cycles at 95 °C for 15 sec, 55 °C for 30 sec, a ramp to 72 °C reaching in 3 min, followed by a 10 min lag at this temperature, and an indefinite holding at 4 °C, respectively. Amplicons were separated on 1.5% agarose gel at 80 V. They are then stained with 0.5 µg/ml ethidium bromide solution, visualized by illumination under UV light, and documented using a gel documentation and image analysis system. REMAP-PCR DNA amplification is performed using a combination of LTR and ISSR primers, each primer at the concentration of 0.2 mM for each reaction. Amplification conditions and separating are the same as for IRAP PCRs. DNA fragments of IRAP and REMAP PCRs are scored by their presence (1) or absence (0), and the ones at low intensities are scored only if they were reproducible in both the PCR runs. Cluster analysis are performed to construct dendrograms, with the unweighted pair-group method by arithmetic averages (UPGMA) from the similarity data matrices using Jaccard's coefficient.

**Results:** Molecular marker systems have great importance to overcome some problems, and is necessary to determine the polymorphism level of plant species and genetic stability problems in plant germplasm. Determination of genetic stability among *in vitro* plant cultivars ease efficient tissue culture systems, operating and using of germplasm resources.

**Acknowledgements:** This study was supported by the Mugla Sitki Kocman University Scientific Research Projects Coordination Unit (Mugla, Turkey, MSKU-BAP 15/005).

**Keywords:** ISSR, LTRs, molecular marker, PCR, somatic clonal variation.

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**The *Cryptosporidium parvum* Findings in the Waters Used for Agricultural Irrigation in Denizli Province Center, Turkey**

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**Aim of the study:** In this study, aimed to detect the *Cryptosporidium parvum* oocysts in the waters used for agricultural irrigation in Denizli province center.

**Material and Methods:** A total of 63 water samples were collected between October 2017 - May 2018 waters used for agricultural irrigation in Denizli province center. The Kinyoun Acid-Fast Staining Method was used for *Cryptosporidium parvum* oocysts detection.

**Results:** *Cryptosporidium parvum* is one of several species that cause cryptosporidiosis a parasitic illness of the intestinal canal. In this first work in Denizli city, the *Cryptosporidium parvum* oocysts were detected in the examined specimens.

**Acknowledgements:** This study is supported by Pamukkale University Scientific Research Projects Coordination Unit (PAUBAP) Project no: 2017FEBE067. The authors indebted to PAUBAP for its financial support.

**Keywords:** *Cryptosporidium parvum*, Denizli, irrigation waters, Kinyoun Acid-Fast Staining Method, Turkey

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## Biodiversity of Microscopic Fungi of Soil of The Exclusion Zone ChNPP Through 30 Years After Exident

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**Aim of the study.** To investigate the species composition of microscopic fungi from base places of the Exclusion Zone with different levels of radioactive contamination and to generalize the characterization of changes in the mycobiote of the ChNPP exclusion zone at the cenotic level, which was based on the analysis of the results of the study of the propagation of fungi in the radioactive soil at the frequency of their occurrence in comparison with similar monitoring results in the previous years.

**Material and Methods.** The object of the study were samples of soil selected from different layers of the four base places of the Exclusion Zone. The species composition of microscopic fungi was determined using the method of serial dilutions with subsequent sowing by the deep-down method on the nutrient medium. Cultivated at 25°C for 7 days. Definition of fungi was carried out using determinant's book. The species composition of microscopic fungi, isolated from the soil of four base places of the Exclusion Zone, was investigated.

**Results.** Fungi are represented by 42 species belonging to *Zygomycota* (6 species, 3 genera), *Ascomycota* (8 species, 6 genera), and *Anamorphic fungi*, which constituted the vast majority (28 species, 13 genera). Among the isolated and identified micromycetes, the representatives of the genus *Aspergillus* (9 species), *Mucor* (4 species), *Penicillium* (4 species) were dominant in the number of species. In a smaller variety, representatives of the genera *Acremonium* (3), *Cladosporium* and *Paecilomyces* (2) are singled out. Five species were detected in all sampling sites. Identified species of microscopic fungi can be potentially dangerous to human health in accordance with SP 1.3.2322-08; their active development and spread can lead to deterioration of the sanitary and epidemiological situation in the nearest settlements. Comparison of species lists of micromycetes allowed to establish reliable differences between the species composition of fungi of investigated stations in the Exclusion Zone. The determined index of Simpson's domination at 0.03 indicates an aligned domination structure. The Shannon index is 3.49, indicating a narrow range of species diversity. Comparing the obtained results with 2006, the similarity in generic and species diversity in all investigated objects is noted.

**Keywords:** microscopic fungi, biodiversity, exclusion zone of ChNPP

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## Monitoring Biodiversity of Microorganisms in Places of Great Dislocation of People - Educational Establishments, Shopping and Entertainment Centers

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**Aim of the study.** The study of the microbial contamination of air in places of high concentration of people is important and relevant in our time, because excessive amounts of fungi and bacteria can lead to serious illness. It is very important to monitor air in shopping and entertainment centers, as well as in schools and universities, because these rooms are places of frequent stay of children, youth and adults. Assessment of the air pollution contamination in the premises of the shopping and entertainment centers of the city of Kyiv, as well as the premises of the University of Ukraine, in order to assess the danger to human health.

**Material and Methods.** Analysis of heterogeneity of microorganisms in indoor air was conducted in two public building, a university and a shopping mall. Two sites in each building were chosen for air sampling with Typhoon P-40 air sampling pump. The conventional microbiological methods were used to analyse bacterial and fungi diversity of indoor-air. A series of culture media were used for selective enumeration of main bacterial and fungi groups.

**Results.** Results of evaluation of indoor-air bacterial and fungi diversity revealed that the major groups of microorganisms include *Staphylococcus*, *Escherichia coli*, *Salmonella*, *Aspergillus*, and *Candida*, the last one was abundant only in the shopping mall air. Analysis of microorganisms' amount in the university indoor-air during the day showed increasing of fungi content and decreasing of bacteria amount. On the contrary, the amount of bacteria was enlargement and fungi was decreasing at the end of the working day in the shopping mall. Totally, number of microorganisms in the shopping mall was higher than in the university that can be caused by the more intense people flows in the shopping mall.

**Keywords:** Microbial air contamination at the shopping mall.

PP-283

**Hair and Pollen Morphology of Endemic taxa *Potentilla davisii* R.R.Mill & H.Duman, *P. nerimanae* H.Duman and *P. ulrichii* Parolly & Nordt in Turkey**

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**Aim of the study:** *Potentilla* is one of the most difficult genus in Turkey. The Genus of *Potentilla* is represents 53 species and 55 taxa in Flora of Turkey (Volume 4 th). Considering the supplements (4 taxa in Volume 10 th and 4 taxa in Volume 11 th) a total issue of *Potentilla* is represents 63 taxa. According to Turkey Plant List which was written by Güner *et all* *Potentilla* is represents 60 species and 61 taxa. *Potentilla davisii*, *P. nerimanae* and *P. ulrichii* in Turkey are an endemic species belonging to the family Rosaceae. In this study, hair and pollen morphology of these species were analysed.

**Material and Methods:** The study material is hair and pollen of *Potentilla davisii*, *P. nerimanae* and *P. ulrichii* which were collected in 2017. *Potentilla davisii* from Acıpayam (Denizli), *P. nerimanae* from Elmalı (Antalya) and *P. ulrichii* from Manavgat (Antalya) have been collected. The pollen and hair morphology of these endemic species was determined using both Light Microscope (LM) and Scanning Electron Microscope (SEM). For light microscope (LM) investigations, pollen grains were mounted directly with basic-fuchsine-glycerin jelly. For scanning electron microscope (SEM) investigations, the pollen grains were transferred directly to double-sided tape affixed stubs and sputter-coated with gold plate.

**Results:** As a result of this study, both detailed pollen morphological characteristics such as shape, size, symmetry, association, apertural forms, exine ornamentation and detailed hair morphological characteristics such as glandular, straight, crispate or floccose tomentum hairs are given for each endemic species. Differences between the related species were supported according to the results obtained.

**Acknowledgements:** We thank to Prof.Dr. Ramazan Süleyman GÖKTÜRK and Assoc.Prof. Dr. İsmail Gökhan DENİZ for their helps during to our study. This study was funded by Pamukkale University Research Foundation (Project Number 2016FEBE014).

**Keywords:** Endemic, Hair Morphology, Pollen Morphology, *Potentilla*, Turkey

PP-284

**Native and Non Native *Rhagium inquisitor* (Coleoptera: Cerambycidae) Haplotypes of Kocaeli based on COI**

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**Aim of the study:** *Rhagium inquisitor* (Linnaeus, 1758) (Coleoptera: Cerambycidae) commonly named as ribbed pine borer is a polyphagous cerambycid insect, distributed in United States of America, Canada, Europe, Russia, Caucasus, Transcaucasia, Turkey and Algeria. Kocaeli province has been located between Europe and Asia and has high-volume international trade of industrial wood, timber and wooden packaging materials from many countries. This situation facilitate invasion of potential pests. *R. inquisitor* is a potential invasive species that may enter our country via ports from US and European countries mostly. Determination of native and non-native haplotypes, and migration routes of *R. inquisitor* in Kocaeli were aimed.

**Material and Methods:** Samples collected from Kocaeli forests, timber yards and ports in 2016-2017 and morphological details of each individual were clearly photographed. Total DNA were extracted and cytochrome C oxidase-I (COI) gene regions had been amplified by polymerase chain reaction (PCR) and then visualized under UV light after gel electrophoresis. PCR products were sequenced at Macrogen Holland Laboratory (ABI 3730XL Sanger Sequencing Analyser). Chromatograms of the obtained nucleotide sequences had been checked in BioEdit v7.2.6.1 program and sequences were matched up with "BLAST" tool in BOLD taxonomy browser. COI sequences of *R. inquisitor* which uploaded from other countries to BOLD and were downloaded and used in analysis. In MEGA 7 program, the all sequences aligned by ClustalW tool and exported. For determination haplotype diversity and nucleotide diversity, the sequences had been analysed in the DnaSP program. The haplotype network was drawn by the PopArt program using the Median Joining method to determine the relationships of the haplotypes. Distance analysis and Neighbor-Joining tree conducted in MEGA 7.

**Results:** Total number of haplotypes were 25 in 5 haplogroups. The closest haplotypes were Canada and Alaska haplogroups clustered in a main branch in NJ tree. Only one of the haplotype was founded both Alaska and British Columbia (Canada). All European haplotypes clustered in the same main branch with Turkey, except Russian haplotype. One of the haplotype from Kocaeli Gebze timber yard was in the same haplogroup with Germany, France, Austria, Finland and Italy. This result may be a sign of entrance of the *R. inquisitor* from Europe to Asia via ports.

**Keywords:** *Rhagium inquisitor*, Kocaeli, COI, haplotypes.

PP-285

## A Geometric Morphometric Analysis of Cephalic Plates of *Pseudopus apodus* (Pallas, 1775) from the Northern Side of Turkey

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**Aim of the study:** In this study, we examine the cephalic plates differences between four *Pseudopus apodus* (Pallas, 1775) population (Thracian, Western-Anatolian, Central-Blacksea, Eastern-Anatolia) by using Geometric Morphometrical analysis. It is known that head plates could be used to investigate taxonomy, evolution, and morphogenesis of lizards. According to our results, “Thracian” and “Western-Anatolia” regions grouped together whereas “Central-Blacksea” and “Eastern-Anatolia” regions grouped separately. Frontal plate is wider in “Central-Blacksea” population than other three populations whereas interparietal plates smaller. Also, occipital and interparietal plates are bigger in “Eastern-Anatolia” population than other three populations.

**Material and Methods:** 42 specimens, stored in the collection of the Zoology Research Laboratory- Çanakkale Onsekiz Mart University, belonging four populations [Thracian (T), Western-Anatolian (WA), Central-Blacksea (CB), Eastern-Anatolia (EA)] were collected during the field works between 2009- 2012. The head plates were photographed in the dorsal projection with a camera (Nikon d80). tpsDig2 (Thin Plate Spline Digitizer) (Rohlf, 2008) were used to digitise 22 landmarks from the pictures. To avoid asymmetric effects, the symmetric landmarks were averaged, according to Klingenberg (2011). MorphoJ software (Klingenberg 2008) were used to compare the shape and the size of the head plates. Canonical Variate Analyses were used to show differences between head plates of the populations.

**Results:** Head plate variation of *P. apodus* was analyzed in both size and shape. Four head plates (Azygoprefrontale, Prefrontalia, Frontale, Interparietale, Occipitale) were evaluated in all four populations. When WA and CB compared; occipitale and interparietale are wider in WA, whereas interparietal is wider in CB. Also, azygoprefrontale is a bit wider in the posterior side in WA. When T and CB compared; azygoprefrontale is wider in CB. Furthermore, frontale is wider in CB, whereas interparietal in narrower. WA and T populations analyzed as similar shaped except azygoprefrontale which is narrower in WA. On the other hand, when EA population is compared to others, both interparietal and occipital are bigger. Also, prefrontals are narrower, and the anterior part of the azygoprefrontale is wider. However CB and EA compared and, all of the head plates show differences. As a result, both CB and EA populations shows significant differences. Also, this populations show differences on morphological measurements such as ventralia etc. according to Tok et al., (2013).

**Acknowledgements:** The specimens we used in this study were collected for a project [Project No: 108T559] supported by TÜBİTAK (The Scientific and Technological Research Council of Turkey). We are indebted to TÜBİTAK for the financial support it has provided.

**Keywords:** *Pseudopus apodus*, geometric morphometrics, Turkey.

PP-286

**Morphological and Biological Characteristics of Dice Snake *Natrix tessellata* from Sarikum Nature Conservation Area (Sinop, Turkey)**

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**Aim of the study:** The aim of this study is to gain information about some morphological (pholidosis, morphometric measurements and proportions, color and pattern properties) characteristics of *Natrix tessellata* from Sinop where the northernmost part of Turkey.

**Material and Methods:** Lake Sarikum and its surroundings was declared as the "Nature Conservation Area" in 1987 because of the coexistence of various habitat types like sea, coast, sand dune, lake and forest within very short distances. In this study 26 (18 female, 5 male, 3 juvenile) *Natrix tessellata* specimens which was collected in 2011 from the Sarikum Nature Conservation Area were examined. 10 pholidosis (preocular, postocular, temporalia, sublabialia, supralabialia, gularia, dorsalia, ventralia, anal plate, subcaudalia) count were made and 8 morphometric measurements (rostrum height/width, frontale length/width, head length/width, body length, tail length) were taken. Results were statistically analysed with SPSS 15 and M. S. Office Excel program.

**Results:** In terms of body length, mean snout-vent length is  $447 \pm 31.5$  (340-530) mm in males,  $519.6 \pm 29.76$  (330-735) mm in females. Although morphometric measurements are not statically significant between the sexes, one of the pholidosis count (ventralia) was significant (Kruskal-Wallis,  $X^2=9.63$ ,  $p=0.002$ ). The number of ventralia in males is between 152-162 and 159-176 in females; the number of subcaudalia is between 53-59 in males and 45-72 in females. It was observed that all specimens had the same type of color and pattern characteristics. The head is spotless and the color of the dorsal surface of the head and the body is greyish, dark brown and olive oil. In some specimens, black spots on the background continue to the end of tail. Consequently, it was determined that, population of *N. tessellata* living in the Sarikum Nature Conservation Area is in accordance with the characteristics of *N. t. tessellata* subspecies.

**Acknowledgements:** This study was produced from first author's master thesis

**Keywords:** *Natrix tessellata*, morphology, Turkey

PP-287

**Stable Isotope Analyses to Elucidate Trophic Ecology of Non-Native Fish, *Gambusia affinis* in the Beymelek Lagoon (Antalya, Turkey)**

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**Aim of the study:** *Gambusia affinis* was brought to Turkey by the French for controlling malaria and was introduced into various wetlands of Anatolia by the Turkish Malaria Control Agency. In this study, we examined spatial variation in trophic ecology of *G. affinis* among habitats with different characteristics in Beymelek Lagoon and Lake Kaynak.

**Material and Methods:** Using stable isotope ratios of carbon and nitrogen, we analyzed primary production sources supporting this species and compared the niche widths occupying a spatially heterogeneous habitats, one from Lake Kaynak (brackish water) and two from Beymelek Lagoon (site 1 and 2). In order to compare isotopic niches of this species among three different habitats, we used the recently developed SIBER metric (Stable Isotope Bayesian Ellipses using R; Jackson et al. 2011).

**Results:** Isotopic ratios of both basal resources and fish varied significantly in relation to habitat.  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  values of both basal sources and fish from lake were lower than those from lagoon. Assimilation of material derived from detritus and POM was greater at site 1 in the lagoon and the lake, while all basal sources were equally contributed to biomass of fish at site 2. There were a differences in niche width and niche position of *G. affinis* especially between lake and lagoon. The conspecifics of this fish from lagoon exhibited the widest niche, while the conspecifics from lake occupied comparatively narrow niches.

**Acknowledgements:** This study was supported by Republic of Turkey Ministry of Agricultural and Rural Affairs General Directorate of Agricultural Research (TAGEM) (Project No: HAYSUD/2013/A11/P-02/6).

**Keywords:** *Gambusia affinis*, stable isotope, isotopic niche, mixing model, basal sources

PP-288

**Morphological, Anatomical and Molecular Studies on *Rinodina olivaceobrunnea*  
C.W.Dodge & G.E.Baker; a Common Lichenized Fungus Species growing on Soil or Mosses  
in James Ross Island (Maritime Antarctica)**

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**Aim of the study:** *Rinodina olivaceobrunnea* is a bipolar lichenized fungus species growing on mosses or soil in North America and maritime Antarctica. The second author collected many specimens from James Ross Island of Antarctica and here we aimed to detail the knowledge about morphology, anatomy and molecular characters of the specimens collected.

**Material and Methods:** Many samples of lichens belonging to *Rinodina olivaceobrunnea* were collected from different parts of James Ross Island, Antarctica. The external morphology has invariably been studied under dissecting binocular microscope. The anatomy of the thallus and apothecia were studied under compound microscope. The asci and ascospores were taken observed from the sections when sections were mounted in water and shapes, sizes were recorded. Chemistry of the specimens includes colour spot tests. DNA isolation was performed by using Qiagen DNeasy plant mini kit. PCR analysis was performed by using ITS (ITS1 and ITS4) primers. The phylogenetic analysis were performed by using the Maximum Likelihood method of the Mega 6 (Molecular Evolutionary Genetics Analysis) software program.

**Results:** The specimens belonging to this species mainly grow on calcicolous mosses and soil where the water streams are present in James Ross Island. It is one of the most common terricolous lichens of James Ross Island where vegetation cover is fragmented to a large number of vegetation oases formed on deglaciated area (170 km<sup>2</sup>, Ulu peninsula, northern part of the island) and dominated by mosses and lichens since vascular plants (*Deschampsia antarctica*, *Colobanthus quitensis*) are not reported from the island. Thallus consists of brownish granules mostly and the colour of the granules are more dark when they are under direct UV lights. All the characteristics of the specimens fit well with the literature data and no lichen substances were observed by spot reactions and also TLC.

**Acknowledgements:** The first author thanks to Erciyes University for their financial support to his Antarctic Expedition.

**Keywords:** polar biodiversity, lichens, fungi.

PP-289

**The Effect of Electrical Field on the Decreasing of Water Loss (*Solanum tuberosum* Subsp. *tuberosum*)**

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**Aim of the study:** In this study, the relationship between electrical field and water-loss of potato lumps was investigated.

**Material and Methods:** Potato *Solanum tuberosum ssp tuberosum* tubers were used as the research material in this study. The potato tubers were obtained from Diyarbakır Agricultural Research Institute. Electricity field energy was obtained easily with the use of condenser structure. Electric field energy was implemented about 3 months after harvest. According to this method, an electric field can be obtained in the insulating environment (air) between two conductive plates. Electric field can be found with the formula below according to the voltage implemented.

**Results:** Considering the weight change values in the end of 51 days of the potato groups implemented electric field, it was seen that water loss could increase and decrease in different values and durations of electric field implementation. If it is based on the 16% of water loss of the potato group unimplemented electric field by the end of 51 days, it can be seen that it caused a water loss up to 21,5 % in P34 group. The curve obtained with the combination of weight averages of P12, P22, P32 and P43 groups, which have the least water losses, is seen. What's seen in this curve is the occurrence of water loss less than 9% comparing to the first day. With this result, it is seen that it contains 7% more water comparing to the potato tubers unimplemented electric field.

**Keywords:** Electrical field, water-loss of potato, Stress, *Solanum tuberosum subsp. tuberosum*

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## Distribution of *Diplolepis* spp. (Cynipidae, Diplolepidini) on *Rosa* spp. in the Eastern Black Sea Region, Turkey

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**Aim of the study:** The tribe Diplolepidini (Cynipidae) which are associated only with the single shrub genus *Rosa*, has only 58 species belonging to 2 genera although roughly 1400 species belonging to Cynipidae are known in the worldwide. In the Western Palaearctic, the genus *Diplolepis* includes the six species, and these species are also known from Turkey. In this study, the aim is to determine distribution of *Diplolepis* spp. in the Eastern Black Sea Region.

**Material and Methods:** The rose gall specimens on *Rosa* spp. were collected from study area between late 2017 and early 2018. The galls were kept in laboratory and checked weekly for emerged adults after collection. The adults were fixed on cards and pinned. The adults were identified using available literature sources.

**Results:** As a result of the field studies, five species of gall inducing are reported from Eastern Black Sea Region - *D. eglanteriae* (Bayburt, Gümüşhane), *D. fructuum* (Artvin, Bayburt, Gümüşhane, Giresun, Ordu), *D. mayri* (Artvin, Bayburt, Giresun, Ordu), *D. rosae* (Bayburt, Gümüşhane, Giresun, Ordu, Rize, Trabzon), and *D. spinosissima* (Bayburt, Gümüşhane). These species are widely distributed across the entire Eastern Black Sea Region. *D. nervosa*, known only from Istanbul, has not yet been observed in the study area. Data about new localities and host plant of the species will be recorded as the fieldwork continues.

**Acknowledgements:** This study was supported as financial by The Scientific and Technological Research Council of Turkey (TÜBİTAK Project No: 117Z096).

**Keywords:** Distribution, Cynipidae, Diplolepidini, Rosa, Turkey.

PP-291

## First Records of Male and Deutonymph of *Prozercon boyacii* from Turkey

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**Aim of the study:** The genus *Prozercon* belonging to family Zerconidae which are known the soil mites, includes about 40 species in Turkey. Some detailed studies were carried out to contribute to Zerconidae fauna of Turkey in Artvin and Giresun provinces in Eastern Black Sea Region. Male and deutonymph specimens of *Prozercon boyacii* were recorded for the first time from Turkey, with this study.

**Material and Methods:** *Prozercon* mites were collected from *Fagus* sp., *Rhododendron* sp. and *Quercus* sp. habitats in Ordu. The samples were transferred to acarology laboratory and placed in combined Berlese funnels. 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 identification of *Prozercon boyacii* specimens. All specimens examined were stored in 70 % ethanol.

**Results:** Material examined; ORDU, Kabadüz, Pelitli-Döngeri 10. km, 40°44'N, 37°59'E, 1602 m, 14.III.2018, 12♀♀, 3♂♂, 1DN. The female adults of *Prozercon boyacii* Urhan & Ayyıldız, 1996, was previously described from Artvin province. So far, male and nymph stages of this species weren't yet recorded. Also, zerconid mites were recorded as first time from Ordu, with this study. It is thought that *Prozercon boyacii* distributed through the entire Eastern Black Sea Region.

**Acknowledgements:** We would like to thank MSc and PhD students in acarology laboratory, Pamukkale University for their helping.

**Keywords:** Zerconidae, *Prozercon*, male, deutonymph, Ordu, Turkey.

PP-292

**Protective and Pathogenic Potential of the Gram-Negative Endophytic Bacterial Flora from Leaf Explants of the *Nicotiana tabacum* L. under Stressful Environmental Conditions**

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**Aim of the study:** To evaluate the protective and pathogenic potential of the gram-negative endophytic bacterial flora from leaf explants of the *Nicotiana tabacum* L. under stressful environmental conditions.

**Material and Methods:** *in vitro* culture of *Nicotiana tabacum* L. cv. *Bright Yellow* leaves and seedlings; isolation and cultivation of bacteria; transmission electron microscopy (TEM); BioMerieux VITEK 2 System for bacteria identification; X-ray irradiation; experimental scheme, modeling extremal environmental conditions.

**Results:** A number of gram-negative bacteria strains had been isolated from the aseptic *in vitro* culture of *Nicotiana tabacum* L. cv. *Bright Yellow* leaves and seedlings. Leaf explants, containing bacterial cells in tissues, had been selected at the kanamycin containing MS medium. At the absence of kanamycin in the medium regeneration of explants did not differ from control. Control seeds and explants are susceptible to the antibiotic at concentration 50 mg/L and seeds and explants of one of the non-transformed tobacco lines no. We assumed kanamycin resistance due to endophytic microorganisms that produce beta-lactamase. Intracellular localization of bacterial cells in *N. tabacum* leaf mesenchyme had been confirmed by transmission electron microscopy. In order to isolate these unusually small intracellular bacteria leaf explants, previously additionally superficially sterilized by 7% NaOCl, were fine chopped in PBS buffer, then mixed on a vortex and centrifuged, and supernatant was filtered through a Whatman syringe filter 25 mm GD/X Sterile, 0.2 µm pore size. When bacteria from supernatant were cultured on solid MS medium in aerobic conditions reversion to the vegetative forms had been observed. Bacterial cultures obtained from the filtrate were identified as *Aeromonas salmonicida* by BioMerieux VITEK 2 System, Version 07.01 (Institute of Microbiological Research, Kiev, Ukraine) supplemented with oxidase test. Isolated strain of *Acinetobacter salmonicida* show growth-promoting and protective antifungal effect. Also inoculation of tobacco leaf explants by bacterial suspension could protect plants from the radiation induced damage. X-ray irradiation at dose interval 10-30 Gy greatly increase frequency of pathogenic transformation of isolated bacterial strain of *Aeromonas salmonicida*. Heat stress (cultivation at 41°C) and nutrient deprivation (liquid minimal medium with 1.2% sodium acetate) lead to the loss of virulence. Proceeding from the fact that the induction of phytopathogenic transformation of the opportunistic pathogen *Aeromonas salmonicida* occurs only under the action of genotoxic X-ray radiation, we assumed that pathogenicity might be induced by the genome rearrangements due to the DNA damage related activation of IS elements. It can be concluded that radioactively contaminated areas could be a potential source of virulent bacterial strains.

**Keywords:** plant endophytes, opportunistic pathogens, stress induced pathogenicity, *Aeromonas salmonicida*, ionizing radiation.

PP-293

**An Human-Caused Habitat Destruction and Degredation Sample: The Endangered species  
Tavas Frog (*Rana tavasensis*) from Çakıroluk in Denizli, Turkey**

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**Aim of the study:** The habitat of Tavas frog (*Rana tavasensis*) is very limited area, only one fountain source (named Çakıroluk) is supplying to water of this frog's habitat. In this study, the human-caused habitat destruction and degredation of an endangered endemic species, Tavas Frog (*Rana tavasensis*) which inhabiting Çakıroluk locality in Denizli province were reported.

**Material and Methods:** The first field work visit was made in 2008 in *Rana tavasensis* (Tavas frog) habitat from 1670 meter. In the following years, field studies were organized periodically in the area. The habitat destruction and degradation of this area detected and recorded with photographs.

**Results:** Between 2017 and 2018 years the human-caused habitat destruction and degredation was observed highly increased. Because of the uncontrolled human activities on the area, e.g. picnickers originated pollution, the decrease of water flux (the usage of a quantity of this fountain water for forest fire-pool as a water supply), and the most destructive activiy is off-road and motocross activities in this habitat area (The area is still a route of off-road and motocross activities). The breeding and living area of Tavas frog was observed, very damaged by the humans.

**Acknowledgements:** The Project "Biodiversity and Monitoring studies of Terrestrial and Inland Water Ecosystems in Denizli Province" is funded by The Ministry of Forestry and Water Affairs, The General Directorate of Nature Conservation and National Parks. We are indebted to The Ministry of Forestry and Water Affairs, The General Directorate of Nature Conservation and National Parks for financial support and kindly interest.

**Keywords:** Çakıroluk, Denizli, Habitat Destruction, *Rana tavasensis*, Tavas Frog, Turkey

PP-293

**A Different Coloration on Eastern Four-Lined Ratsnake, *Elaphe sauromates* (PALLAS, 1814) Collected from Denizli Province (Turkey)**

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**Aim of the study:** In this study, we aimed to introduce a different and rare coloration of Eastern Four-Lined Ratsnake, *Elaphe sauromates* (Pallas 1814) from Denizli province. The Eastern Four-Lined Ratsnake, *Elaphe sauromates* is one of the largest and more massive snakes, growing up to 230 cm in length. Due to its dorsal coloration in Turkish this species is named “Yellow snake”. In this study, we observed a rare coloration of this species of first time in Turkey.

**Material and Methods:** *Elaphe sauromates* sample was observed within the scope of “Biodiversity and Monitoring studies of Terrestrial and Inland Water Ecosystems in Denizli Province”. Snake sample is caught by hand in Baklan district (860 m. elevation) in 18.06.2017 from Denizli province.

**Results:** In generally, *Elaphe sauromates* is easily recognizable by the yellow dorsal coloration pattern with four rows of dark brown, black, or reddish brown blotches. Our observed samples dorsal coloration is in pale pinkish-red toned coloration. Total length is measured 124 cm. This coloration pattern is rare in *Elaphe sauromates* species.

**Acknowledgements:** The Project “Biodiversity and Monitoring studies of Terrestrial and Inland Water Ecosystems in Denizli Province” is funded by The Ministry of Forestry and Water Affairs, The General Directorate of Nature Conservation and National Parks. We are indebted to The Ministry of Forestry and Water Affairs, The General Directorate of Nature Conservation and National Parks for financial support and kindly interest.

**Keywords:** Coloration, Denizli, Eastern Four-Lined Ratsnake, *Elaphe sauromates*, Turkey

PP-294

## Potyvirus Infecting Economically Important Crops in Ukraine

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**Aim of the study:** The aim of the study was detection of the potyviruses infecting economically important crops in Ukraine.

**Material and Methods:** For this purposes we have used indicator plants and some analyzing methods eg. DAS-ELISA, RT-PCR, sequencing, phylogenetic analysis.

**Results:** Our research has shown that potyviruses are wide spread on economically important agricultural crops in Ukraine: WSMV – on the winter wheat plants, PVY – on the potato and tomato, and SMV – on soybean. The frequency of SMV in Poltava and Sumy regions (ELISA) was 48%. This is the first report about SMV affecting of soybeans grown in left-bank forest of Ukraine. Due to the previously reported data of soybean infection in Ukraine with Alfalfa mosaic virus and Bean yellow mosaic virus studied samples were tested on the presence of these pathogens. ELISA results showed no antigens of BYMV and AMV in all tested samples. It was revealed that the length of investigated SMV virions differs from previously isolated SMV strains in Ukraine. It was found a small percentage of seed transmission of Ukrainian. SMV isolates. This is due to properties of the studied isolates and localization of viral antigens in seminal peel and further hit in the cotyledons, but later the virus not transport is in trifoliolate leaves. Our research is revealed that spotted seeds do not always mean a viral etiology, and can be a sign of varietal characteristic or aftereffect of fungal or bacterial infections. Phylogenetic analysis of the nucleotide sequence of the capsid protein gene part of SMV isolate from Poltava region (Pol-17) and 36 isolates and strains of this virus from GenBank showed a 100% level of phylogenetic relatedness between the Ukrainian representative isolate and Chinese, Iranian isolates, American isolate 452, and Polish isolate M, which testifies to their common origin. In 2005-2016 new symptoms, which were not described before on tomatoes, are revealed on 36 cultivars of tomato plants (*Lycopersicon esculentum* Mill.) in four regions of Ukraine. The frequency of these symptoms was ranged from 18 to 25% of all surveyed tomatoes in these regions. Presence of PVY and PVM in tomato plants was detected with ELISA and RT-PCR. This is the first report about the infection of tomato plants with such viruses in Ukraine. The percentage of tomato plants affecting with PVY ranged from 16.7 to 22.2% depending on growing region. Some biological, physical and chemical properties of the pathogens are studying. Differences between tomato isolates of PVY and the known isolates were found in in the range of indicator plants and their reaction to infection. The results of our experimental studies have shown that in addition to the fact that in some cases, PVY+PVM spoil the appearance of tomato fruit, they significantly affect product quality of tomato fruit in decrease the content of lycopene and  $\beta$ -carotene in 1.3-3.5. It should be noted that PVY-to causes the greatest decrease as the concentration of lycopene and carotene and compared with PVM monoinfection and their mixed infection, indicating that its high harmfulness for tomatoes. Long-term studies show that today Wheat streak mosaic virus, WSMV and Barley yellow dwarf virus, BYDV are the most widespread viruses in cereal crops in Ukraine. These viruses alternately replace each other in certain regions. As a result of a comprehensive study of the properties of Poltava isolate of WSMV by classical, molecular and physical methods set we revealed that this isolate belong to tritimoviruses, related to the North American isolates. It is concluded that WSMV infection in resistant and susceptible plants leads to opposite changes in some parameters of the photosynthesis, respiration, and membranes vision and protein composition.

**Acknowledgements:** The authors are grateful to colleagues from Center for collective use, Danylo Zabolotny Institute of Microbiology and Virology of National Academy of Science of Ukraine for help with TEM investigations.

**Keywords:** *Potyviridae*, PVY, SMV, WSMV, soybean, tomato, wheat.

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