1ST INTERNATIONAL SYMPOSIUM OF BIODIVERSITY STUDIES

SYMPOSIUM ABSTRACT E-BOOK

May 23-25, 2022

1st International Symposium of Biodiversity Studies

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May 23-25, 2022

Hosted by the

National Botanical Garden of Türkiye, Ankara, TÜRKİYE

Symposium Abstract Proceedings

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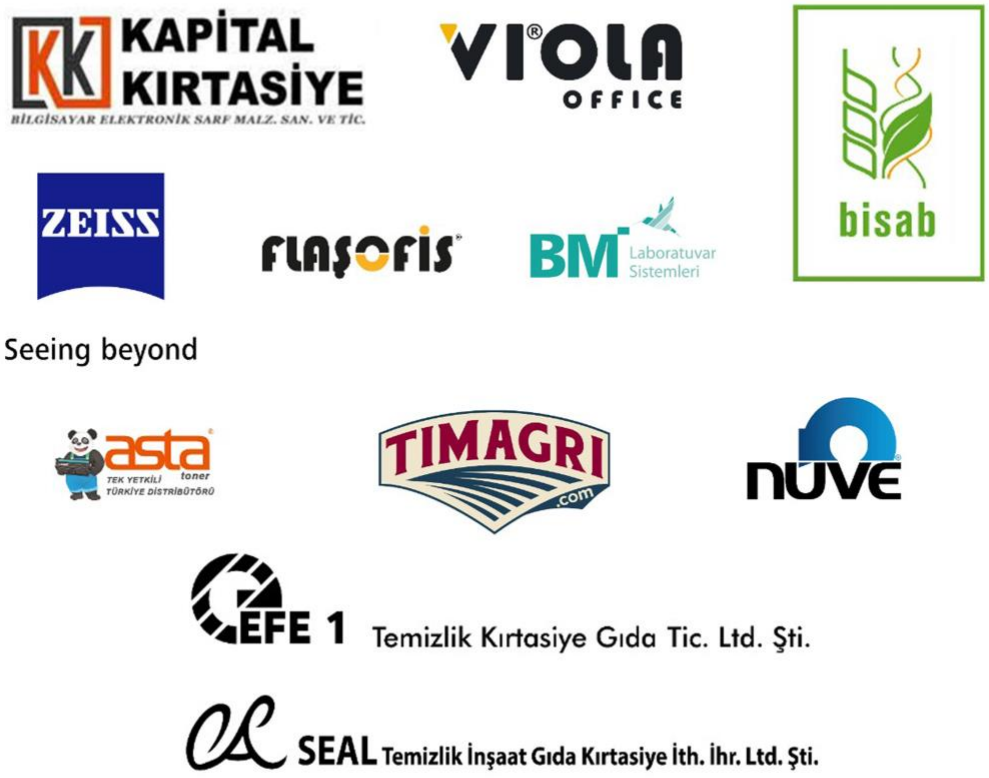

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PREFACE

Dear colleagues and researchers,

The main objective of the '1st International Symposium of Biodiversity Studies', in which a multidisciplinary approach is aimed in biological diversity researches, is to organize an event to celebrate 'May 22 - The International Day for Biological Diversity'. The Symposium has the same name and perspective with the 'Biodiversity Studies' Journal, which is an international, peer-reviewed, accessible, free and scientific journal, published by National Botanical Garden of Türkiye.

The Symposium was organized as an online symposium and the official language of it was English. However, translation from English to Turkish and from Turkish to English was made by the translators during the Sessions. More than 400 registrations from different countries were made to the symposium from universities, public institutions and organizations, the private sector and non-governmental organizations.

The Symposium covered all the research areas that are subject of Biology, Agriculture, Forestry, Landscape and Pharmacy as Botany, Zoology, Mycology, Hydrobiology, Entomology, Forestry, Microbiology, Conservation Biology, Ecology and Medicinal Plants. Abstracts submitted from 11 different countries and 105 of them were accepted. Presented 96 abstracts of them are included in this Abstract E-Book. Also 8 invited speakers, who are experts of their specific research areas from different countries, presented their researchs published in this E-Book. Moreover, full-texts of some abstracts were evaluated to be published in the 'Biodiversity Studies' Journal.

I am thankful to the members of the Scientific Committee for all their valuable contributions to the Symposium. I also would like to thank Organizing Committee members for their hard work and the Sponsors for their supports to organize this Symposium.

Finally, I would like to thank all the participants of the '1st International Symposium of Biodiversity Studies' for making the Symposium an efficient and sustainable platform for Biological Diversity.

I am looking forward to meet with all the researchers in the 2nd Biodiversity Studies Symposium.

Symposium Chair

Dilaver ARSLAN

INVITED SPEAKERS

Biodiversity as a major target in drug development and discovery – From nature to product

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Abstract

Biodiversity is important both in terms of ecology, climate, and sustainability of global species as well as drug crude materials. As the major part of biodiversity, plants constitute an immense target for discovering new drug candidates. Not only plants, but also other members of biodiversity such as animal, marine organisms are also target in drug research. Many scientific studies have so far pointed out the fact that nature has provided many leading molecules for the treatment of diseases threatening human health. For instance; acyclovir (Zovirax®, Aclovir®), a potent antiviral drug against Herpes simplex was developed from a marine sponge, while galanthamine (Reminyl®), a clinically available drug isolated from the bulbs of snowdrop plant (*Galanthus woronowii*), has been registered against Alzheimer's disease in many countries. In addition, exenatide, a peptide derivative, whose model molecule was isolated from the venom of a reptile called *Heloderma suspectum* (Gila monster), is already a licenced drug as Byetta® in pharmacies for the treatment of type-II diabetes. As another example of animal venom-derived drug, captopril (Capoten®), being angiotensin-converting enzyme (ACE) inhibitor against hypertension, was initially discovered in venom of *Bothrops jararaca*, a snake species. Moreover, microorganisms, also a part of biodiversity, have produced many antibiotics that have saved lives of millions of people so far. Relevantly, phytotherapy and aromatherapy benefit medicinal and aromatic plants and up to date, hundreds of herbal medicines have been developed to serve for human health. In this talk, significance of the species constituting biodiversity will be discussed through the prominent examples.

Keywords: Animals, drug, marine organisms, microorganisms, plants, venom

Climate change, biodiversity and agriculture: Risks and policy responses

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Abstract

Climate change is one of the biggest problems of today and the future. Due to climate change the expected increases in temperature, decreases in precipitation, changes in precipitation regime, shift of seasons, increases in extraordinary events such as drought, flood and storms have effects on the ecosystem. Both the impact of climate change and the efforts to reduce the climate change impacts, can cause ecosystem degradation and biodiversity loss. Biodiversity, the unique variety of life on our planet, underpins our cultural, economic and social well-being. However, human-induced changes to ecosystems and the extinction of species have been more rapid in the past 50 years than at any time in human history. Today, around one million species of an estimated 8 million animal and plant species are already threatened with extinction. It is estimated that climate change will increase these threats even more. On the other hand protecting biodiversity can help to climate change adaptation and mitigation. Agriculture, which produces food for people survival, is an activity that has pressure on biodiversity and causes biodiversity loss. Tackling these challenges and increasing the benefits of biodiversity will require local and global efforts. In order to cope with the difficulties and at the same time to produce enough food for growing population as protecting biodiversity, policies have transformed recently at the national and international level. In this paper, the impacts of climate change, the risks on biodiversity and the transformation of agricultural policies will be explained.

Keywords: Agriculture, biodiversity, climate change, agricultural policy, ecosystem, food

The conservation of animal genetic resources, breeds at risk: Criteria and classification to assess the degree of endangerment of livestock breeds

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Abstract

The genetic diversity of the World's livestock species is in a state of continuous decline so called genetic erosion and the animal genetic resources that remain are not used in the most efficient way. There are several factors such as the growing trend to a global reliance on a very limited number of modern breeds suited for the high input-outputneeds of industrial agriculture.

The effect of this trend is that many breeds have lost their function and disappear by means of cross breeding without notice which place breeds at risk of loss and threaten domestic animal diversity. In order to avoid this phenomenon of erosion of farm animal genetic resources several measures are takenby the countries owned as in the form of constructing *in situ* and *exsitu* conservation herds or often small populations.

However, due tothe risk of inbreeding and random drift may cause the loss of genetic diversity in the case of conservation programs with limited number of live animals in small breeding herds. The rate of inbreeding (ΔF) has a predictable form, and has a very important relationship with loss of variation. Effective population size (N_e), in other words, the numberof breeding individuals in an idealized population that would show thesame amount of random genetic drift or the same amount of inbreeding as the population under consideration which is the functionof number of males and females gives general measurable idea of the dynamics of genetic variability within a given population. This work was aimed to review the methods of assessing the degree of endangerment for extinction risk status (assigning populations to categories of endangerment) of livestock breeds in conservation programs.

The degree to which a breed is exposed to becoming extinct, i.e., its degree of endangerment, is an essential information to orient conservation policies. Assessing degree of endangerment properly is a difficult task, as numerous factors are involved.

Several methods are currently applied in several countries. The development of some objective criteria to promote the creation of a uniform system including demographic and genetic aspects of population decline should considered. Estimating the number of years needed to reach a critical population size, which is also a measure of time available to evaluate options and undertake action before extinction.

Keywords: Effective population size, loss of genetic variation, extinction of breeds, degree of endangerment of livestock breeds

Genetic adaptation and diversity in oaks: past, present and future

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Abstract

Oaks (genus *Quercus*) constitute one of the most species-rich genera including trees and shrubs. The first known fossil species which could be assigned to the genus lived during the early Eocene (about 56 million years ago). Since then, oaks have adapted to a wide amplitude of ecosystems across large parts of Eurasia, around the Mediterranean Sea, as well as in Central and North America. Adaptations to similar environmental conditions have resulted in phenotypic similarities even between unrelated species. Moreover, hybridization has been prevalent in all extant sections of the genus. This is reflected in a pattern of reticulate evolution which is evident throughout the oaks' tree of live. Eastern Eurasia, including the Anatolian hot-spot of oaks' species diversity, is one of the most intensively studied geographic regions with respect to oak genetics. Thus far, genetic studies have provided insights into genetic diversity and adaptation at different scales and have elucidated past and current dynamics of hybridization. Given their high adaptive capacity, oaks are expected to gain in importance in European forest ecosystems as climate change is progressing. Therefore, current genetic studies focus on genomic aspects of adaptation, on the association between genotype and phenotype, but also between genotype and environment. Such genetic and genomic research provides an important basis to develop strategies of assisted migration or assisted gene flow and thus reinforce climate change mitigation in European forest ecosystems.

Keywords: *Quercus*, evolution, hybridization, genetics, genomics, climate change mitigation

Using grass taxonomy to understand the history of Madagascar and build forest conservation and climate sustainable food systems

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Abstract

Taxonomy is considered by some to be an old-fashioned discipline, no longer relevant to the modern sciences and the modern world. This talk will present an example to the contrary, demonstrating the need for plant taxonomy to understand landscape history and build more productive and climate-resilient food systems. The author's ten years of work on the grasses (Poaceae) of Madagascar has identified an estimated 541 species, with an endemicity level of 40%. Molecular phylogenetic reconstruction of the Madagscar grass colonisation events has shown that most grasses date back to the Miocene, in line with the global grassland expansion. Taxonomic revisions have revealed radiations of grass species with the C4 photosynthetic type in the central highlands, suggesting pre-human open canopy landscapes. A standardised ecological plot sampling method has identified fire-adapted and grazing-adapted assemblages of native and endemic species, evidencing extinct open canopy grazers. Analogous to tropical African savanna, we conclude that fire has been a natural pre-human driver of Malagasy ecosystems, and not a wholly new anthropogenic phenomenon as commonly assumed. We are currently testing native and endemic grass species utility in improving rangeland livestock fodder flow, and using local community expertise to design regionally effective fire management regimes to protect unique gallery forest patches, homes to lemurs. This talk will demonstrate the close mutual dependency of numerous academic research disciplines and the practical implementation of food system and conservation interventions in the real world, rooted in organism knowledge.

Keywords: Classification, forage, grass, Madagascar, Poaceae, taxonomy

The importance of biodiversity in plant breeding

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Abstract

Agricultural crops in particular horticulture ones characterized by narrow genetic base because a few horticultural commercial cultivars belong to different species have been using in cross breeding studies as parents for centuries and also some horticultural species shows self-fertility, which makes them vulnerable to loss biodiversity. Thus, it is necessary to increase of gene pool for all horticultural species for future climate change scenario that affects food security. One of the solutions to increase biodiversity in horticulture plants is that use of horticulture plants wild relatives that have adaptive characteristics to diverse environmental conditions because they include rich gene or gene combinations that are adapted to climate change. Another solution is to use different breeding methods that positively affects biodiversity. Among them mutation may have an opportunity to increase gene pool. The induced mutation technique is becoming increasingly important to bring about heritable changes in several horticultural plants and offer new genetic variabilities to plant breeders.

Keywords: Crops, horticulture, biodiversity, plant breeding

Species Action Plans - a tool for species conservation in Turkey

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Abstract

Due to its global positioning and its specific topographic features, Turkey is home to three of the 35 global biodiversity hotspots. As such Turkey is one of the most important countries with variable ecological environmental conditions in the world with about 12.000 plant taxa and 3/1 endemism rate, 385 butterfly species, which is higher than any of the European countries, more than 160 mammal species, 130 reptile, 30 amphibian and 250 freshwater fish species (app. 26% being endemic), and 496 bird species recorded in the country so far.

Conservation of wild species is thus a high priority and high on the agenda of responsible authorities. Apart from over 200 protected areas that are identified in support of species conservation over the whole territory and the surrounding seas, the country has been focusing to conserve species by using the Species Action Plans (SAP) as the main tool for species protection. So far over 100 SAP have been initiated in Turkey. Within the project "Preparation, Implementation and Monitoring of Species Action Plans for endangered species in Turkey within the concept of a new Methodology" new tools for conservation have been introduced and the methodology of species conservation has been standardized.

The Species Action Plans have been remodelled and systemised, as well as put in a context of wider species conservation mechanisms that can ensure that the biodiversity of Turkey is protected in more efficient and long-lasting way.

Keywords: Turkey, species conservation, Species Action Plans, new methodology

Developing bioformulations to replace chemical inputs used in crop production and protection in agriculture

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Abstract

Agriculture is essential to human survival and societal development. Hunger is one of the greatest challenges facing humanity right now and is likely to become even greater in the future as food production requirements increase. Main goals are to increase yield, ensure food security, eliminate poverty and stimulate comprehensive agricultural development, protect the natural resources and environment for present and future generations. Technological advances in agriculture need to meet these challenges. Crop production and protection strategies combine different management practices to achieve maximum yield and quality in agricultural products. Extensive use of synthetic fertilizers and chemical pesticides in Agricultural production is causing a number of environmental and human health problems in the World. In order to avoid these adverse effects of synthetic inputs used in modern agriculture, alternative agricultural systems such as sustainable and/or organic have been developed. Organic farming relies on natural ingredients. Lower yield and quality problems in organic agriculture production system due to unbalanced nutrients and pest/pathogen attacks are generally solved by using microbial-based biotechnological methods and products derived from sources of biological wealth of non-synthetic. Recent studies showed that many microorganisms called plant growth promoting rhizobacteria (PGPR) in the nature have a profitable role and used as biostimulants, biofertilizers, and biopesticides in agriculture by promoting the circulation of plant nutrients, and reducing the need for chemical fertilizers and pesticides. Our scientific works at Yeditepe University demonstrated that the PGPRs tested on many agricultural crop species have very important roles in degrading organic waste, agricultural waste, re-plant nutrient cycling, nitrogen fixation, dissolving phosphate from organic and mineral sources, stimulating plant growth by phytohormone production and nutrient uptake in the soil, and biological control of plant pests/pathogens. Last two decays, a number of biofertilizers and biopesticides developed from the selected PGPR strains at Yeditepe University have been certified and launched into the local and international agricultural market for crop production and protection purposes.

Keywords: Biofertilizer, biopesticide, biocontrol, biostimulants, PGPR, biodiversity

ORAL PRESENTATIONS

BOTANY SESSION

Anther development and cytochemistry in *Hibiscus syriacus* L. (Rose of sharon)

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Abstract

The regular development of the anther wall layers has an important role in the healthy progression of pollen development in plants. There is a close connection between the tapetum, which is one of these layers, and pollen yield. Tapetum cells show high metabolic activity during pollen development. These cells have a role in the feeding of pollen, the formation of the exine wall, the release of microspores from the microspore tetrad, and the secretion of signal molecules that are involved in the recognition of pollen in the pistil. Abnormalities in tapetum development cause sterile pollen. Cytological studies show that cells in the tapetum have undergone programmed cell death. The aim of this study is to examine the anther development of *Hibiscus syriacus* L. plant belonging to the Malvaceae family. This study was carried out by analyzing the wall layers of *Hibiscus syriacus* L. plant at different stages of anther development by cytochemical methods. Flower buds of *H. syriacus* at different developmental stages were collected and divided into parts. Staining was done with hematoxylin, Coomassie brilliant blue, Sudan Black B, and periodic acid & Schiff's. The developmental characteristics of the anthers were examined. The characterization of cell death was characterized by DAPI staining. In addition, morphological examinations of *H. syriacus* pollen were also made. The results obtained are intended to contribute to the embryological studies of the Malvaceae family.

Keywords: Anther, *Hibiscus syriacus*, Malvaceae, pollen, tapetum

Evaluation of phenological and morphological properties of some Asian pear cultivars in the climatic conditions of south Moravia

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Abstract

The cultivation of Asian pear varieties in Czech climatic conditions, specifically South Moravian region, shows to be very promising. The introduction of pear species and varieties can increase and enrich the local biodiversity. It is a very important factor in dealing with current threats in context with climatic changes. Asian pears seem to be a good source of desirable characteristics. Especially the most valuable is their resistance to fireblight and pear decline. They also excel in frost and European pear scab resistance. Most of the pear species are good pollinators. For this experiment, pomological and phenological properties were analysed on 30 pear varieties. The fruits were maturing from 9th September (Zao Su Li) until the 20th October (Kieffer, Mut Chen). The largest fruits with the highest weight were recorded at 'Wu Jiu Xiang' (308 g on average) and 'Zao Su Li' (275 g on average). The lowest weight was recorded at 'Nanguo' (66 g on average) and 'Baoshy' (67 g on average). An important parameter is the thickness of fruit skin. For example, 'Wu Jiu Xiang', 'Zao Su Li' and 'Nanguo' have thin skin, which makes them ideal for consumption but also, they are prone to damage. In contrast, 'Baoshy' and 'Dong guo' have thick skin, which gives good damage protection but decreases the organoleptic properties. The thick skin tends to be very bitter and overwhelms the taste of the fruit. The highest values of sugar content were measured in 'Nanguo' (17,5 %) followed by 'Baoshy' (16,3 %). The sourest was 'Dong guo' (0,63 %) and 'Nanguo' (0,54 % of total titratable acids). Varieties of Asian pears and their fruits have very diverse characteristics and it is clear, that their cultivation is worthwhile in the conditions of South Moravia, i.e. in the conditions of the Middle Europe.

Keywords: Asian pear, *Pyrus*, phenology, pomology, fruit quality

New plant species of Adıyaman (Turkey) and surroundings

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Abstract

There are more than 350.000 plant taxa around the world and new plant species are discovered continually. Turkey is one of the most plant diverse countries in the temperate zone. More than one third of plant species found in Turkey are endemic taxa. Turkey is a bridge between Asia and Europe, one of the largest countries in Europe, has the richest flora in Europe, has unique geographical features, gene center of many genera and species, edaphic factors, ecological conditions, topography, habitat diversity, and a variety of climates. Turkey is in the interface of three different biogeographically regions where consist from Mediterranean, European Siberian, and Irano-Turanian regions. These characteristic properties of the Turkey resulted in plant diversity. Eastern part of Turkey, has a very rich flora in terms of plant diversity and richness. Turkey is a bridge between Asia and Europe and has more than 13.000 defined plant taxa. Turkey, has rich biodiversity, especially plant diversity. Adıyaman (Turkey) city is in the southeast part of Turkey. Adıyaman is in the Anatolia-Turanian phytogeographic region and is located in the C7 square according to Davis's grid system.

As a result of our floristic studies in Adıyaman and surroundings in recent years; 3 new plant species (*Allium adiyamanense* Yıld. & Kılıç; *Pimpinella adiyamanensis* Kılıç & Yıld.; *Aethionema adiyamanense* Yıld. & Kılıç) were discovered by plant taxonomists Ö. Kılıç & Ş. Yıldırımlı. In this study, these new plants are introduced briefly with their pictures, localities, their scientific names and habitats.

The authors thank the financial support from the Adıyaman University Scientific Research Project Unit, Adıyaman/Turkey, Project no. ECZFMAP/2019-0004.

Keywords: Turkey, Adıyaman, plant diversity, flora, new plant species

Diversity of *Sedum* L. in the flora of Ankara and its contribution to the ecosystem in the Central Anatolia Region

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Abstract

For a sustainable world within the concept of biodiversity, it is important to protect and preserve plant biodiversity and genetic resources and to transfer them to future generations. Türkiye has a rich plant diversity with many factors such as geographical location, topographic structure, climatic variability, etc. Within this plant richness, *Sedum* L. biodiversity is also seen in areas where rocky slopes and under forest vegetation are visible. The genus *Sedum* L., a member of the Crassulaceae family, has 34 species and a total of 44 taxa in naturally distributed in the flora of Türkiye. *Sedum* L. species is a good plant for landscaping and green space arrangement due to the importance of water use and soil erosion when water resources are rapidly depleted in this period in the world and in our country. n this study, it was aimed to determine the Sedum L. species in Ankara province and its districts. In 2020 and 2021, surveys were conducted in Ankara center and its districts according to literature studies and observations were carried out in 10 different locations. In some locations (according to the literature), it has been observed that as of 2020, *Sedum* species no longer live in that location. 5 *Sedum* species were identified in the surveys and started to be cultivated for use in studies. As a result of this study, a new record that has not been detected in this region according to the literature and also two new locations were determined.

Keywords: *Sedum* L., biodiversity, Ankara, Türkiye

Defining the mitotic and meiotic biodiversity with ribosomal RNA genes in caper (*Capparis spinosa*)

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Abstract

The ribosomal DNAs (rDNAs) encode ribosomal RNAs, essential components of ribosomes. They are highly transcribed and found in hundreds to several thousand copies as tandem repeats in the genomes of eukaryotes. Capparis genus, a well-known member of Capparaceae, consists of approximately 250 species. Caper, *Capparis spinosa*, is an underutilized species naturally adapted to the Mediterranean region with chemical and medicinal properties. The wide biological and geographical biodiversity of caper draws the attention towards possible improvement of the plant for agricultural adaptation. Therefore, a detailed characterization of the caper genome and chromosomes is necessary to understand the existing biodiversity. In this study, we investigated the somatic and meiotic chromosomes of caper at different cell division phases to understand chromosome number and structure by fluorescence *in situ* hybridization (FISH). We cytogenetically mapped the 5S, and 45S rDNA sites as well as telomere sequences on the chromosomes. The FISH analysis revealed two strong 45S rDNA signals at the heterochromatic region of a single chromosome pair and two 5S rDNA signals on a different chromosome pair in mitosis, while a variable number of signals were observed in meiosis. In addition, we attempted to clone and sequence the intergenic spacer (IGS) region of the 45S rDNA to determine locus-specific polymorphisms. Overall, our results will provide a fundamental resource for future genome and evolutionary studies to better understand the existing biodiversity within caper. This research is partially supported by the Scientific Research Projects Coordination Unit of Niğde Ömer Halisdemir University, Project ID GTB2018/03-BAGEP.

Keywords: *Capparis spinosa*, FISH, meiosis, rDNA, telomere, IGS

Secondary structure form of *ITS2* region: A significant labeling tool at all taxonomic levels

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Abstract

The general purpose of the molecular systematic studies is to illuminate the structure of the target populations, to determine its phylogenetic boundaries, and to clarify intra-species and inter-species relationships. Particularly, the internal transcribed spacer 2 (*ITS2*) region of nuclear ribosomal DNA which is approximately 200-220 bp in length, is one of the important DNA barcodes. It is used for these purposes due to the availability of conserved regions with its highly repeated in number in plant genomes. Therefore, these features are made this region as a significant barcode for molecular systematic studies at all taxonomic levels. Addition to the primary sequences of *ITS2*, also secondary structure form of the region became a valuable feature in species divergence and was became to use like a morphological character. In the current study to indicate the secondary structure form of the *ITS2* region as a useful tool in systematics, different taxa from 22 genera were used. The DNA samples were collected in the field studies in 2021 and sequences were aligned using ClustalW and Kimura-2 parameter to calculate the genetic distances. Phylogenetic tree was also constructed with Maximum Likelihood method with the best suitable model at MEGA X software. Moreover, for the secondary structure predictions of species and *ΔG* (Gibbs) free energy calculations, the tools of both the *ITS2* database and mFOLD web server were used. Based on the results, it was indicated that *ITS2* secondary structure predictions were represented the genetic differences visibly with its helices and motifs like a morphological character. Consequently, even if primary structure of the *ITS2* region was a valuable marker in molecular systematic studies, also, all tested secondary structure forms of the region will be used as an ideal marker for taxonomic and phylogenetic reconstructions at all taxonomic levels.

Keywords: *ITS2*, DNA, marker, molecular systematics

Petiole anatomy of the subspecies of *Acer hyrcanum* in Turkey

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Abstract
In this study, petiole anatomy and the systematic importance of it were revealed in the supspecies namely *Acer hyrcanum* subsp. *hyrcanum*, *Acer hyrcanum* subsp. *tauricolum*, *Acer hyrcanum* subsp. *keckianum* and *Acer hyrcanum* subsp. *sphaerocarium* of *Acer hyrcanum* from the genus *Acer* of the family Sapindaceae that are distributed in Türkiye. When the general anatomical features are taken into account, the epidermis cells are covered with cuticle, and there are regularly arranged lamellar collenchyma cells under the epidermis. Although the number of the cell lines of collenchyma varies between taxa, it is not considered as diagnostic. In the petiole cross sections, there are parenchymatic cells containing calcium oxalate crystals under the collenchyma layer, and crystals were also observed in the parenchymatic cells in the pith region. In addition, petiole vascular bundles are surrounded by a sclerenchymatic ring. The number of vascular bundles also varies among subspecies of the species, although sections from the same region are used in all taxa. It appears as a ring in the content of the vascular bundles and flattened in the adaxial in the leaf showcases, in all taxa with these features. Secretory duct-like structures were also observed in the phloem of taxa. Considering the measurements of the petiole sections of the subspecies of *Acer hyrcanum*, the smallest taxon is subsp. *hyrcanum*. However, subsp. *keckianum* has the largest petiole. Besides, according to the measurements, the largest epidermis cells are in subsp. *tauricolum* and the smallest epidermis cells are in subsp. *sphaerocarium*. The cuticle thickness is directly proportional to the epidermis cell size.

Keywords: *Acer hyrcanum*, petiole, anatomy

Trichome micromorphology of some *Minuartia* L. species in Turkey

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Abstract
In this study, *Minuartia imbricata* (M.Bieb.) Woronow, *Minuartia aizoides* (Boiss.) Bornm., *Minuartia circassica* (Albow) Woronow of the genus *Minuartia* belonging to the family *Caryophyllaceae* have investigated trichome features micromorphologically. The trichomes of leaf margins, leaf surfaces, pedicels, and sepals characters of the three closely related species have been compared and illustrated by using SEM and light microscopy. *M. imbricata* and *M. aizoides* were observed to be leaf margins long pubescent, however; *M. circassica* is rare puberilous. Although *M. aizoides* and *M. circassica* have glandular hairs on pedicel, *M. imbricata* have not glandular hairs on pedicel. Also, hair lengths are different from each other.

Keywords: *Minuartia*, trichome, micromorphology, SEM, light microscopy

Lilium taxa in Trabzon

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Abstract
Lilium species, belonging to the Liliaceae family, are important species in terms of plant biodiversity. This study has been carried out to determine *Lilium* taxa in Trabzon. To reach this purpose, the field studies has been conducted collecting the samples of Lilium species between the years of 2015 and 2021. This study has been made using a full field screening method during suitable vegetation periods. All field and literature information about taxa was recorded. 3 different Lilium taxa (*Lilium ciliatum* P. H. Davis, *Lilium monadelphum* var. *armenum* (Miscz. ex Grossh.) P.H.Davis & D.M.Hend., *Lilium ponticum* K. Koch. were determined in this study and the taxa were classified according to IUCN threat categories. The IUCN threat category of *Lilium ciliatum*, which is endemic to Turkey, is Endangered (EN). *Lilium ponticum* and *Lilium monadelphum* var. *armenum* are rare to Turkey and their IUCN threat category is Vulnarablae (VU). In this study, *Lililium ciliatum* at 12 different points, *Lilium monadelphum* var. *armenum* at 16 different points and *Lilium ponticum* at 19 different points was detected and distribution maps of the taxa were created. Moreover, threat factors, economic potentieals, habitat characteristics, flowering time, altitudes of these taxa were determined. In order to protect biodiversity, these taxa should be taken into account in higway expansion studies, tourism and transhumance activities and all technical forestry activities.

Keywords: *Lilium*, endemic, rare, biodiversity

Diversity of nuclear DNA content of stone fruits and their interspecific hybrids

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Abstract
The information about genome size is implied in the studies of genetic diversity, the genome size evolution and can be used in breeding of new interesting cultivars. A total of 52 apricots cultivars, including 17 new perspective apricot hybrids planted in South Moravia region were analysed by flow cytometry. In addition, nuclear DNA content and ploidy level of 10 representative cultivars *P. salicina*, *P. domestica*, *P. cerasifera* and 22 interspecific hybrids of stone fruit was determined. Only the CV values lower than 5 % were considered in analysis. All analysed apricot cultivars were diploid with average value of relative genome size 0.617 ± 0.014 pg/2C. The ploidy and DNA content of plums differ in botanical species. The obtained results were comparised according the geographical origin of cultivars and the theory about genome size evolution was considered. The values of relative genome size of original botanical species related to *P. armeniaca* (*P. mume*, *P. sibirica*, *P. ansu*) reached the lowest value in average compared with other cultivars in this study (0.603 pg/2C in average). In addition, the nuclear DNA content values of some new apricot hybrids were comparised with values of their parents and the results showed that the apricot progeny ranged in values of their parents. Two pentaploids and one tetraploid were found in interspecific hybrids, which could be part of interest of future studies.

Keywords: Flow cytometry, genome size, ploidy level, *Prunus*

Psychoactive plants utilized in shamanic culture

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Abstract

Plants, or spirits of plants utilized in ceremonial contexts play a unique role as intermediaries between one realm to another in the Amazon indigenous shamanic customs that located in Peru Amazonia. Whilst animal beings, rocks, locations, and humans all serve a purpose in the material, social, cultural and spiritual realms, plants specifically assist individuals in Peru Amazonia shamanic ritual traditions via mediating people that desire, for a variety of reasons, including gaining sacred wisdom and power from, or relationships with, entities in other realms (Taylor et al. 2013). This paper demonstrates the plants used in the beginning and apprenticeship of traditional medicine by Amazonian indigenous communities in Amazon rainforest in Peru. The term ‘’Dietas’’ refers to the special conditions under which these plants are given and ‘’Plantas con madre’’, or ‘’mother of the plants,’’ is an indigenous phrase that simply represents an perspective of native people, as described plants are believed to lead initiates through the process of obtaining sacred wisdom, cognizing about plant application, and practicing traditional medicine interpretation.The dietas system and plant mothers, the researchers discovered, are critical elements of everyday traditional medical practice, cultural continuity, and indigenous ‘’weltanschauung’’ in Peru Amazonia. This paper contributes to healing practitioners' and shamanism's comprehension of the initiation process. Determining the plants used in shamanism and determining their purpose of use will create an idea for the production of new herbal medicines for nervous system disorders by utilizing mentioned plants in the future. As a result of this study, it was founded that 30 taxa belongs to 19 family has been recorded as psychoactive plants utilized in shamanic culture. Among these families, the families with the most species are Apocynaceae (2 taxa), Araceae (2 taxa), Bignoniaceae (2 taxa), Euphorbiaceae (3 taxa), Fabaceae (4 taxa), Phytolaccaceae (2 taxa), Rubiaceae (2 taxa), Solanaceae (2 taxa).

Keywords: Shamanism, medicinal plants, Amazon basin, ethnobotany, traditional medicine, sacred knowledge

Characterization of repetitive DNA sequences in the genome of golden thistle (*Scolymus hispanicus* L.)

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Abstract

Golden thistle (*Scolymus hispanicus* L.) is a member of the Asteraceae family with a genome size of 3,645 Mbp (2n=20). Golden thistle is among the underutilized crops waiting to be improved and placed globally in the market. Although a few phylogenetic and molecular studies exist, there has been scarce research on golden thistle to explore the useful genetic diversity. Repetitive DNA elements are common features of eukaryotic genomes and present in various chromosomal domains such as ribosomal regions, centromeres and telomeres. In this study, we aimed to elucidate the repetitive DNA element composition in the *S. hispanicus* genome using bioinformatics, molecular cloning and cytogenetics methods. A novel 180-bp repeat sequence (Sh180) was identified using the Repeat Explorer bioinformatics program. With a specific pair of PCR primers, the Sh180 repeat was amplified, cloned and sequenced to determine the sequence organization. In addition, the physical positions of the ribosomal genes (5S and 45S rDNA) were mapped on the somatic metaphase chromosomes. To advance the genetic knowledge, a meiotic atlas in *S. hispanicus* was established towards the first karyotype. Our data provide crucial information for the phylogenetic and breeding efforts of *S. hispanicus* in the future.

Keywords: *Scolymus hispanicus*, tandem repeat, orphan crop, biodiversity, karyotype

Some morphological traits of *Asphodelus aestivus* Brot. at different slopes

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Abstract

The slope differences in the rangeland areas are effective on the vegetation. At the same time, in these areas where grazing pressure is high, there are differences in morphological characteristics in species where animals avoid grazing. Summer asphodel (*Asphodelus aestivus* Brot.), which has become a dominant species in Mediterranean rangeland ecosystems, affects biodiversity. In this study, some morphological traits of summer asphodel were investigated on different slopes of rangelands under intense grazing pressure. Soil coverage rate, plant height, stem diameter, number of leaves per plant, number of root tubers per plant, root tuber length and root tuber diameter are among the properties examined. In the study, while many features were not affected by the increase in slope, the density of the summer asphodel was higher in the lands with low slopes. While the area covered with vegetation decreased with the increase in slope, the summer asphodel density was observed less frequently in these areas compared to the low slope areas. The density and morphological traits of the summer asphodel are important in terms of the degree of grazing and the sustainability of the rangelands. The change in botanical composition with the increase in slope in natural rangelands should be closely monitored, and the sustainability of the rangelands should be ensured by grazing management and control methods in order to avoid negative effects on plant biodiversity due to the increase in species such as summer asphodel.

Keywords: Morphology, rangeland, summer asphodel, slope

Southeastern Anatolia Region research on determination, conservation and identification of vine genetic resources

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Abstract
Our country, which is located in a suitable climatic zone for viticulture, is among the homelands of the vine. The viticulture activities in the region for centuries have led to the existence of many grape varieties and types. Over time, some regions have been shaped as traditional viticulture regions with their unique varieties and cultivation style.For this purpose, it is ensured to identify growing areas of the vine, which is grown in different regions and under threat, as well as to collect and preserve them. In addition to the existing grapevine genetic collection, new grapevine genotypes are identified and included in this collection.The existing diversity of grapevine genotypes in this region is under threat due to cancer, phylloxera, forestry practices, environmental conditions that have become more important recently, and global warming. Under the influence of these factors, the vineyard areas in this region, which was famous for its vineyards, molasses, fruit pulp and other products (sausage, bastik, köfter, etc.) in the past, have decreased gradually. Additionally, pests and diseases have affected the yield negatively. Vine Genetic Resources in the Southeastern Anatolia Region is the collection and preservation of material to be used by breeding and other research programs. Thanks to its ecological structure and traditional farming the GAP region has a very large and important potential. While a total of 40 grape varieties and types belonging to the provinces of the region were kept under protection by the Pistachio Research Institute until 2010, this number increased to 117 in 2021. In addition, 101 local grape varieties and types found in genetic resources were identified by molecular marker techniques in Ankara University Faculty of Agriculture, Department of Biotechnology. By identifying and protecting the genetic resources, it is possible to use them for breeding and other research studies.

Keywords: Collection, vineyard, genetic resources, grape varieties and types, vine

Identification of selected bee forage plants using pollen morphological features from Khyber Pakhtunkhwa, Pakistan

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Abstract

Palynological studies of melliferous species from different regions of Khyber Pakhtunkhwa are documented. A total of 8 taxa from 4 different families were collected, identified, and analyzed, namely *Brassica campestris*, *Brassica juncea*, *Brassica oleracea*, *Eruca sativa*, *Chorispora tenella*, *Cicer arietinum*, *Saccharum spontaneum* and *Asphodelus tenuifolius*. Shapes of examined pollen grains were oblate-spheroidal, prolate-spheroidal, subprolate and suboblate. Pollen size varies from small to large and apertures from monocolpate to tricolpate. English names, flowers color and flowering period for each plant were established. Exine sculpturing notes were psilate, reticulate but spines were absent. Qualitative and quantitative features of pollen including equatorial diameter, polar diameter, colpus length, colpus width, exine thickness and P/E ratio were studied using light microscopy.

Variations in exine sculpturing are very diagnostic character in plant systematic studies. Studies were conducted for the first time in the study area to analyze bee foraged species from various localities of the study area, Using software IBM SPSS Statistics 20 quantitative, qualitative, and statistical analysis of pollen were investigated. Results of the current study revealed that pollen morphology of selected melliferous species plays a vital role in plants identification, floral calendar preparation and productions of honey in Khyber Pakhtunkhwa.

Very thankful to the Higher Education Commission of Pakistan (HEC) for the financial support under the project no. HEC/R&D/NRPU/2017/8420. The authors also presented special thanks to Herbarium of Pakistan (ISL) Quaid-i-Azam University Islamabad.

Keywords: Light microscopy, pollen, taxonomy, honeybees, Khyber Pakhtunkhwa

ORAL PRESENTATIONS

CONSERVATION BIOLOGY SESSION

Turkish blanket bogs as national biodiversity conservation areas

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Abstract
Turkey has few blanket bogs that are rare and special habitats. They are all located in the Eastern Black Sea Region except the one located in Çanakkale province. Conservation of these unique areas that are generally located in high altitudes is very important in terms of Turkey and the world. EU Habitats Directive listed blanket bogs as prioritised protection areas and the Eleventh Development Plan of Republic of Turkey emphasises the recognition, protection and sustainability of Turkish biodiversity.

Understanding the special value of these areas before their disappearance by the current and future generations depends on scientific studies. Many microscopic organisms in these special areas serve as oxygen source for life and as various products for the benefit of humankind.

Such organisms, having their habitat destroyed day by day, are of great importance in terms of both historical and scientific perspectives, which infers a role to find out which species use what kind of habitats and to keep their scientific record. Recording endemic species of a country and detecting species that live in specific habitat or locations are also critical to bring about the unique biological diversity of that country. Here, we present the blanket bogs of Turkey, emphasising their importance and need for conservation.

This work was supported by the TÜBİTAK (The Scientific and Technological Research Council of Turkey) with project number 120Z575.

Keywords: Blanket bogs, biodiversity, climate change, peatland

Pollination biology of *Minuartia nifensis* (Caryophyllaceae)

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Abstract

In this study, pollinators and reproductive strategy of *Minuartia nifensis* Mc Neill, an endemic with a narrow distribution area, were investigated. 5 different insect taxa were identified that visited the plant. The number of visits of the pollinators depending on the wind and temperature were determined, and the effectiveness of the pollinators in pollination was determined by observing the behavior of the pollinators on the flower. Among these pollinators, Chelostoma rapunculi, Halictus sp. and Eristalis tenax were observed to be effective pollinators. *M. nifensis* is a gynodioic species. When the number of female and hermaphrodite individuals in the population was compared, it was determined that they were approximately equal in number (1:1). However, female individuals produce 12,81% more flowers than hermaphrodites. Females and hermaphrodites produce approximately the same number of ovules, and the fertilization rates of these ovules are approximately equal. While female individuals are completely dependent on the pollen of hermaphrodite individuals in terms of fertilization, hermaphrodite individuals show autogamy at a rate of 39.42% and allogamy at a rate of 60.52%. This means that hermaphrodites will be affected due to self-fertility depression. The fact that female individuals in the population produce more flowers than hermaphrodites causes them to produce more seeds than hermaphrodites. Despite the equal number of individuals and equal number of ovules and fertilization rates, it is thought that the number of hermaphrodite individuals in the population will decrease and the female population will become more dominant over time due to these two reasons.

Keywords: Gynodioecy, *Minuartia*, pollination, reproduction

Impacts of climate on plant diversity in deserts of Sindh, Pakistan: Challenges and future prospects

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Abstract

Pakistan being endowed with variety of climates, ecological precincts and topographical regions is gifted with inimitable biodiversity encompassing wide range of species. Overall, more than 6000 flowering plants has been reported from Pakistan, of which about 400-600 are medicinally important. The deserts show great diversity in terms of both their landscapes and their geomorphological processes. The major deserts in Pakistan are Thar, Cholistan, Thal, Chagi and Kharan located in Sindh, Punjab and Baluchistan respectively. Total area of Pakistan under deserts is 11.0 million hectares making about 14 percent of the whole country and the most populated of the desert areas of the world. Deserts are particularly important for their endemic medicinal plant species.

Despite the hostile conditions prevailing in the deserts, there are plentiful native plants which are used by the people of this arid region. Some of these plants are an integral part of the desert ecosystem and are closely related to the economy of the area. Due to anthropogenic pressure, natural disasters, ongoing famines in deserts, overexploitation is frequently believed to seriously affect the deserts of Pakistan. There are more than 15 functional botanical gardens in Pakistan where conservation is carried out to protect threatened plant species but such gardens are not established to protect the threatened species of deserts in Pakistan. There is dire need to establish desert gardens in Pakistan especially in deserts where most threatened species may be conserved on priority.

Keywords: Climate, plant diversity, flora, conserve, Sindh, Pakistan

Long-term conservation of two garlic (*Allium sativum* L.) local varieties of Turkey via cryopreservation

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Abstract

Allium sativum L. is an important plant species of the Amaryllidaceae family and is used extensively for culinary and medicinal purposes. Besides its strong aroma and flavor, garlic has many medicinal attributes such as antimicrobial, anticancer, antioxidant, ability to reduce cardiovascular diseases, lowering high blood pressure, enhancing immune functions, and anti-diabetic activity. For these reasons garlic has a huge demand and it has been cultivated all around the World. In Türkiye garlic demand is also high and two local varieties of garlic named "Kastamonu Garlic" and "Balıkesir-Savaştepe Garlic" are very popular. However, these top two local varieties are cultivated vegetatively from their cloves and, they don't form true seeds which limit their conservation in seed genebanks. Other preservation methods are needed for their long term-conservation. Cryopreservation is currently one of the best method used for the long-term storage of vegetatively propagated plant genetic resources. The present study was aimed to investigate cryopreservation of two Turkish garlic germplasms. Balıkesir-Savaştepe Garlic variety treated with five different exposure times (30-45-60-75-90 min.) of plant vitrifivation solution (PVS2) at 0 °C. Three vitrification techniques (vitrification, droplet vitrification and encapulation-vitrification) were applied to meristems of Balıkesir-Savaştepe Garlic variety. Vitrification method with seven different exposure times (30-45-60-75-90-105-120 min.) of PVS2 at 0 °C were applied to meristems of Kastamonu-Taşköprü Garlic variety.

The best regeneration rates (32, 20 and 12.5%) of Balıkesir-Savaştepe Garlic variety obtained from vitrification, droplet- vitrification and encapulation-vitrification methods, respectively.

The highest regeneration rate of Kastamonu-Taşköprü variety reached 78,5% when meristems were treated with PVS2 for 120 min.

We confirmed that among three cryopreservation methods vitrification technique could be successfully applied for long term conservation of Türkiye's local garlic germlasms and their sustainability for current and future generations could be achieved.

Keywords: Garlic, *Allium sativum* L., conservation, cryopreservation, vitrification

Genetic diversity and population structure of *Salix alba* across river systems in Turkey and their importance in conservation management

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Abstract

Salix alba is a pioneer species of river ecosystems throughout Turkey. Its genetic diversity and population structure across these ecosystems is currently unknown. We investigated genetic diversity in Turkish *S. alba* to assess factors likely to shape the genetic structure of the species and to assist with conservation recommendations. Six hundred and forty-six individuals from 10 major river systems in Turkey were genotyped using 15 microsatellite markers. Between one and five sub-populations were sampled from each river system with 23 sub-populations sampled in total. Populations contained moderately high levels of genetic diversity. Five genetic groups were detected by Bayesian clustering, with samples from particular river systems mainly assigned to particular genetic groups. This revealed a geographic structure, also detected by principal coordinate analysis, showing that particular river system populations in different parts of Turkey were genetically similar to each other but different from those in other parts of the country. Genetic isolation caused by geographic distance (in part) and natural barriers among river systems appear to have shaped the genetic structure of populations. The results have important implications for the conservation of genetic resources within *S. alba* and restoration of degraded Turkish populations of the species.

Keywords: Conservation, genetic diversity, genetic isolation, population structure, river ecosystems

Reintroduction of a tabescent species for Turkey; a case study for Çelebi Lalesi (*Tulipa clusiana* DC.)

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Abstract

Records of *Tulipa clusiana* DC. (Çelebi Lalesi, Bornova Lalesi) in Turkey shows that it was only spread Izmir-Kurutepe according to Flora of Turkey and East Aegean Islands vol. 8 (1984). Then, surveys around Kurutepe region, known also Laletepe, have not showed any significant evidence for existence of *T. clusiana*. It is clear that habitat of the species was completely destroyed. Hence, there is necessity to develop a project to reintroduction, development and preservation of habitat for the species. Firstly, reintroduction of *Tulipa clusiana* to Turkey was aimed in this study. Secondly, improvement to population, extensification of the species and creating public awareness for the *Tulipa clusiana* in society were targeted in the study.

Surveys were performed in Izmir and Aydin between 2020 and 2021 but *Tulipa clusiana* was not observed anywhere. However, it was detected in some hobby/private gardens in purpose of gardening for ornamental plants. Then, bulbs and seeds were collected.

In vegetative propagation process, collected bulbs were exposed to fungicide and planted into soil which lead to in successful results. In production based on seed process, seeds were directly planted in pots containing forest soil, peat and perlite. In the other application, first seeds were stored at 4 °C during 8 weeks then followed by germination, they were transferred to seedling trays full of soil, peat and perlite mixture.

Micropropagation studies have been carried out by using vegetative and generative parts of *Tulipa clusiana* and successful results were achieved. After propagating sufficient amount of Çelebi Lalesi (*Tulipa clusiana* DC.), plants will be planted in proper location of Izmir.

Keywords: *Tulipa clusiana*, Çelebi Lalesi, reintroduction

Status of indigenous fish species in the Kapna River, a tributary of the Shari-Goyain River in Bangladesh

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Abstract

The Kapna River, a unique aquatic ecosystem, is one of the most important rivers in the Sylhet district of Bangladesh. Once, the river was rich in fish biodiversity, but the availability of fish has decreased dramatically due to several indefinite drivers. In the present study, fish catch data for a decade (March 2008 to February 2019) were collected from experienced fishers using participatory rural appraisal tools and a semi-structured questionnaire. A total of 72 indigenous fish species from 29 families and 13 orders were recorded, where 15.28%, 19.44%, 23.61%, 36.11%, and 5.56% of species were abundantly available, commonly available, moderately available, rarely available, and not available, respectively. According to the IUCN Red List of Bangladesh, 20 fish species (27.78%) of the Kapna River were classified as threatened (3 critically endangered, 10 endangered, and 7 vulnerable) and the population trends of the maximum fish species were in the unknown category (62.50%), followed by decreasing (34.72%), and only 2.78% were found to be increasing. The most common threats affecting the diversity of fish fauna in the studied river were over exploitation (86.67%), followed by indiscriminate fishing methods and practices (82.22%), fragmentation, loss and alteration of habitat (78.89%), climate change (70.00%), pollution (68.89%), siltation and sedimentation (61.11%) and invasive species (52.22%). To keep the fish diversity in the Kapna River in a sustainable form, conservation and restoration measures must be implemented.

Keywords: Fish biodiversity, drivers, freshwater, management, conservation

Chloroplast genome diversity among wild species of agriculturally important crops, lentil, and chickpea

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Abstract
Modern agricultural practices shape the landscape of plant diversity and dramatically affect the ecological balances. Wild type species carry intrinsic strengths gained due to harsh environmental conditions. Such properties encoded deep in their genomes can enrich our current view of agricultural species, thus, need to be deciphered. Lentil and chickpea are commonly used food crops with nutrition rich seeds. Both are members of the Papilionoideae subfamily within the Leguminosae family composed of multiple wild and cultivated species. In this study, we explored sequence variations of chloroplast (cp) genomes from 7 different lentil and chickpea species using next-generation sequencing. We included four chickpea species (*Cicer bijugum*, *C. echinospermum*, *C. pinnatifidum*, and *C. reticulatum*) and 3 lentil species *(Lens tomentosus*, *L. ervoides*, and *L. lamottei*) in this work. We constructed whole cp genomes using de novo assembly approach and performed comparative analysis to determine divergent hot spots. Through our protein sequence predictions, we identified variant regions that can be associated with adaptive evolution or selective pressure. We expanded our study with comparative phylogenetic analysis by including other Leguminosae species. Overall, this study exhibits the level of divergence between the cp genomes from wild and cultured species of two food crops, lentil and chickpea, and points to certain regions that can be utilized as distinction markers for various goals.

Keywords: Chloroplast genomes, marker genes, wild species

Evaluation of threatened diurnal raptor birds in Turkey

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Abstract
494 bird species which are documented number of 456 species have been recorded so far in Turkey, which is located at the intersection of three phytogeographical regions. 41 numbers of these species are in the category of diurnal raptor species. Three species (Greater Spotted Eagle, Imperial Eagle and Sooty Falcon) as vulnerable (VU) and four species (Egyptian Vulture, Steppe Eagle, Bateleur and Saker Falcon) as endangered (EN) are classified according to the criteria determined by the International Union for Conservation of Nature (IUCN). Bateleur which was observed only once in Turkey was recorded in Istanbul in 2015. The Greater Spotted Eagle is a winter migrant species and is observed in many wetlands during the winter months. Sooty Falcon is an incidental species in Turkey and is found in south eastern Turkey. It is estimated that 120-300 pairs of Imperial Eagles breed in Turkey, 7-15 pairs of Steppe Eagles, 1500-3000 pairs of Egyptian Vultures and 3-10 pairs of Saker Falcons in the Central Anatolian Steppes. Egyptian Vulture and Imperial Eagle species have been studied more in Turkey than other raptor species. However, although the studies are still ongoing, unfortunately it is not sufficient. The wide difference between the minimum and maximum values of the population estimates may is evidence that the studies are not sufficient. Destruction of nests and feeding areas, electrocution and poisoning are the primary threats to these species. These threats need to be eliminated in order to prevent the decline in the population of the species. Knowing, especially the nests and feeding areas of these species, is very important for preventing threats. Studies on these species should be increased and supported. Relevant institutions and decision-makers should make their plans by considering the ecology and habitats of these species.

Keywords: Threatened, raptor, bird, population, diurnal, Turkey

Cryopreservation of well-known Turkish medicinal & aromatic plant: *Origanum sipyleum* L.

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Abstract

The endemic plant *Origanum sipyleum* L. known as "Mor Mercan" is valuable medicinal & aromatic plant species of Türkiye, belonging to Lamiaceae Family. In Türkiye, usage of this species is very common especially for their herbal and flavoring effects. It is used as spice, flavoring agent and herbal tea. In tradional medicinal, it's known to have immune-boosting, antiseptic, worm lowering properties and blood circulation stimulation effects. Although it's consumed for various purposes, cultivation of this plant species is rare in Türkiye and generally most of market supply is gathered from wild. Therefore, conservation of *Origanum sipyleum* by cryopreservation methods is necessary for maintance their population. In the present study, optimization of droplet-vitrification method for *Origanum sipyleum* was aimed. In the experiments shoot tips of *Origanum sipyleum* excised from *in vitro* plants were used. Subsequently, loading solution (LS) were applied to shoot tips for 20 min. After LS, for optimizing the duration of vitrification treatments, five different exposure times (30-45-60-75-90 min) of plant vitrification solution (PVS2) at 0 °C were tested. Shoot tips were placed on aluminium strips with individual microdroplets of PVS2 then immersed rapidly in LN. Aluminium strips were then transferred into cryovials and stored in LN at least 24 h. Rapid rewarming was performed in water bath and direct immersion in unloading solution containing 1.2 M sucrose for 20 min. After thawing, shoot tips were cultured on two different recovery media (MS and MS + activated charcoal). The highest *Origanum sipyleum* regeneration rate (80%) was achieved with PVS2 application for 90 min in MS recovery media without activated charcoal. The results of this study showed that droplet-vitrification method could be applicable for long term conservation of *Origanum sipyleum*.

Keywords: *Origanum sipyleum* L., conservation, cryopreservation, droplet-vitrification

ORAL PRESENTATIONS

ECOLOGY SESSION

Rooting and development performances of shoots from Indian fig (*Opuntia engelmannii*) plant with biochar supplementation in different media

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Abstract
In the study, rooting percentages and development performances of shoots taken from the Indian fig plant, which has a high landscape value, were examined in different environments. In the study, except for the control group (1/1: peat/forest soil), 2% walnut biochar added mixture (1/1: peat/ forest soil), 5% walnut biochar added mixture (1/1: peat/ forest soil), % The mixture with added 2 hazelnut biochar (1/1: peat/forest soil), the mixture with 5% hazelnut biochar added (1/1: peat/forest soil) was used. In addition, the experiment was established in two stages, both in which the shoots are planted directly and the shoot tips are planted by dipping into a honey + cinnamon mixture. At the end of the experiment, the rooting rates, root weights, root lengths, newly formed shoot numbers and lengths of the plants were determined. The effects of the honey+cinnamon mixture used in the study and the different doses and types of biochar varieties on plant rooting and yield were investigated.

Keywords: *Opuntia engelmannii*, biochar, rooting, yield

A current ecological evaluation on the floristic characteristics and habitat structures for the wetland of Lake Uluabat

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Abstract

In this study, it is aimed to make an up-to-date ecological evaluation of the floristic characteristics and the existing habitat structures of the Wetland of Lake Uluabat (which is one of Ramsar Site in Turkey) and its immediate surroundings. Floristic data were collected by using line-transect method at 10 different points representing different habitats such as forests, maquies, agricultural lands, urban areas, olive yards, rivers, marshes and lakes in the study area, where the Wetland Buffer Zone boundaries were selected as the study area. Current habitat analyzes have been completed as a remote sensing method via using CORINE 2018, EUNIS and up-to-date Forest Stand maps, and as point-by-point local controls, direct data collection from the field during the different seasons of 2021. As a result of the field studies and scanning the literature resources, 6 main ecosystems, 19 sub-habitat types, 104 families, 309 genera and 437 plant taxons belonging to these genera were determined. 14 species of the 437 plant taxa are the endemic for the study area. According to the Turkish Red Data Book of Plants, 1 is CR, 2 VU, 1 is DD, 1 is NE and 9 are LC of 14 endemic species. In terms of international contracts; 1 plant taxa is included in the Bern Convention Annex-1 List, while 7 taxa (which belong to the families of Euphorbiaceae and Orchidaceae) are included in the CITES Agreement Annex-2 list. Within the scope of this study, information about the current flora, habitat and ecological structure of the Wetland of Lake Uluabat were collected and comparisons with the previous years were made. As a result, recommendations were made on conservation measures that can shed light on the future of the wetland. By monitoring the results of this study, it will contribute to the long-term conservation of Lake Uluabat.

Keywords: Flora, habitat, Lake Uluabat, plant ecology, wetland

Pollinator diversity of the grassland communities from Mount Ergan (Erzincan, Türkiye)

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Abstract
The global decline of insects is a contemporary environmental issue of the Anthropocene. Declines are well documented in pollinator insects at community and population levels. It is a threatening phenomenon since pollinators show mutual dependencies with flowering plants that represent the base of the food chain in terrestrial ecosystems. On the other hand, it is a data-limited field, especially in Anatolian geography. In the scope of a project aiming to reveal plant-pollinator interactions in an east Anatolian high altitude setting, we studied lepidopteran, dipteran, hymenopteran, and coleopteran taxa in grasslands of 1.500, 2.000, 2.500, 3.000 m altitudinal belts, located at the northern slopes of Mount Ergan (Erzincan) during the vegetation period in 2021. 380 morphospecies were identified based on 3.174 individual insects recorded by direct observations during foraging on flowers or collected by baited traps (Pan traps) from twelve grassland patches. Species richness remained unaffected by the altitudinal variability below 2.500, whereas the highest altitudinal belt (3.000m) was characterized by lower richness significantly. In contrast, species composition significantly differed between every altitudinal level. Pollinators showed a peak of activity at 2.000m with significantly higher measured abundance compared to the rest of the levels. Bees (Hymenoptera) were the primary group dominating our samples, whereas some of the study plots at the highest altitudes were dominated by flies (Diptera). The honey bee *Apis mellifera* was the most dominant species among Hymenoptera. These results are only a part of an ongoing project; upon completion, it will be the first assessment of the diversity of pollinator communities from Eastern Anatolia with such taxonomic coverage.

Keywords: Biodiversity, ecology, pollination, entomology, fauna, community ecology

Climate change and biodiversity

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Abstract

The term climate is defined as "the average weather condition, characterized by long-term statistics, mean values, variances, and probabilities of extreme values which cover typically three decades for the meteorological elements in a given area". These magnitudes remain external variables such as temperature, precipitation, and wind. Though there is no agreed definition for the term "climate change or climate variability" it is the inherent characteristic of climate that manifests itself as changes of climate over time. The grade of climate inconsistency could labelled through the alterations among long-term statistics of meteorological rudiments intended for dissimilar periods. Though there is no internationally agreed definition of the term "climate change" it can refer to the 'variation in climate over time'. Change in the climate has resulted in hazardous life occurrences including hurricane, drought, tornados, blizzard, or monsoon. Climate change refers to the rapid changes in earth system dynamics that have been occurring at an increasing rate over the past two or more centuries. Elevated CO_2, altered rainfall patterns, and temperature ranges that are the three main variables of climate change, aggravate seawater rise; increase drought, heatwaves, wildfires, storms and floods. Extreme variabilities in the global temperatures and in concentration of CO_2 in atmosphere would have an impact on timing seasons of flora, and fauna. Moreover, changes in temperature, flooding, and sea level rise will change ecosystems. Likewise, changes in precipitation and temperatures are likely to increase the extinction rates of the species. Therefore, expansion of species ranges (migration); changes in species compositions and interactions (adaptation); changes in resource availability; spread of diseases to new ranges; changes in the characteristics of protected areas; and changes in the resilience of ecosystems are among impacts of climate change on biodiversity. This paper aims to display the possible relationships and interactions between climate change and biodiversity.

Keywords: Biodiversity, climate change, interactions, possible affects, relations

Ecological attributes of *Erodium sibthorpianum* Boiss. subsp. *sibthorpianum* and preliminary trials for conservation

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Abstract
Erodium sibthorpianum Boiss. subsp. *sibthorpianum* known as a narrow endemic of Uludağ. In this research, distribution area of the species within the "Uludağ" mountain system, phenological characteristics, ecological characteristics of the belonging to the habitat and preliminary trials for conservation, were carried out. The species exhibits a fragmented distribution within the Uludağ. Field studies have shown that the vegetation period of the species is quite short. It has been determined that shoot formation takes place in May-June, flowering and fruit formation takes place in June-July and fruit distribution takes place in July-August. Soils from which the species spreads have a slightly alkaline and generally calcareous structure. The amount of iron, manganese and zinc of these soils is sufficient, the amount of phosphorus is low, and the amount of potassium is very low. Climate type of the region where the distribution area located is "Frosty Winter, Rainy Mediterranean Bio Climate". In terms of precipitation regime, the "Eastern Mediterranean First Variable (K.I.S.Y)" takes place, while the summer drought period is between June and August. The germination rate was determined as 61% under laboratory conditions within the scope of protection trials. Also, as a result of both the planting in autumn in natural environment did not yield results and the observations made in nature, it was determined that the germination time of the species is spring in its natural environment.

Keywords: Conservation, *Erodium sibthorpianum*, ecology, phenology, Uludağ

Ecosystem services and biodiversity: Relations and interactions

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Abstract

Ecosystems are a dynamic mixture of inanimate environment that functionally interacts with plant, animal and microorganism communities. At the same time, ecosystems are natural systems in which living and inanimate beings and are influenced by each other, consisting of a large number of subunits and having a meaningful relationship and interaction between these units. Ecosystem and its services also are the benefits natural ecosystems provide to people. That broad definition covers a vast array-from the tangible fish sold in a market or served in a family home, to the invisible influence of a seagrass meadow removing some of the world's excess carbon dioxide, subtly shifting the chemical balance of both the water and the air. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth. Changes in these services affect biodiversity, urban and rural life and thereby human being in many ways. Humanity depends directly on ecosystem services such as food, oxygen and water supplied by both by ''near-natural'' ecosystems, such as rangelands, oceans, and forests, and by highly managed ecosystems such as cultivated or urban landscapes. The term biodiversity defines as the variety of life on Earth at all its levels, from genes to ecosystems, and can encompass the evolutionary, ecological, and cultural processes that sustain life. Biodiversity includes not only species we consider rare, threatened, or endangered but also every living thing-from humans to organisms we know little about, such as microbes, fungi, and invertebrates. There are some relationships and interactions between ecosystem services and biodiversity, most of which are invisible or abstract. This article aims to reveal the relationships and interactions between ecosystem services and biodiversity.

Keywords: Biodiversity, ecosystem, ecosystem services, interactions, relations

Pollinators and plant preferences

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Abstract
Pollination in plants has vital importance for continuity of species. This mostly happens with pollinators (bees, ants, butterflies, flies, beetles, some birds and mammals). Without pollination, fruit and seed production is not possible in the vast majority of plant species. 90% of flowering plants are pollinated by insects, birds and mammals. 82 plant species that provide 90% of the world's food production are pollinated by pollinators. The survival of many species in nature is critical for many important issues such as the sustainability of plant gene resources, the protection of ecosystem balance and biodiversity. For this reason, it is of great importance that the relationship between plants and pollinators are sustainable. In this study, brief information about pollinators will be given and some pollinators and plant preferences and their importance in the ecosystem will be mentioned.

The second author is a PhD student in the field of sustainable forestry and forest disasters within the scope of the "YÖK 100/2000 PhD Project".

Keywords: Biodiversity, plant, pollination

ORAL PRESENTATIONS

HYDROBIOLOGY SESSION

Population characteristics of grooved carpet shell

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Abstract
Veneridae family is recommended as a bioindicator due to its ecological and economic importance. Members of this family have long been one of the most popular and profitable bivalves of the lagoon and coastal regions of the Mediterranean and are collected here for food. In the spring and autumn seasons of 2018, the sediment of the sea in the Yumurtalık coastline, located in northeastern Mediterranean, was surveyed through visual census. The speciments were collected by snorkelling with the aim of collecting updated data on distribution and abundance on the bay. In addition, various population characteristics and tissue metal levels of the grooved carpet shell were compared in different times and regions to be interpreted. When the growth type, various biometric characteristics and tissue heavy metal accumulations are examined, it can be thought that the species provided optimum values in this region.

Keywords: Bioindicator, biometric, heavy metal, Mediterranean

A study on epilithic diatoms of Lake Van (Erciş/Adilcevaz) microbialites

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Abstract
In this study, the epilithic diatoms on the microbialites that come to the water surface with the decrease in the water level in Lake Van were investigated.Microbialites are organo-sedimentary sediments that result from the interaction of benthic microbial populations with chemical sediments. Microbialites formed by the interaction of diatom and cyanobacteria, also give very important clues about the emergence of life on earth. Microbialites are currently limited to some lake and marine environments. This is especially related to the saturation of calcium carbonate minerals in water. It is estimated that the Van Lake microbialites were formed as a result of the precipitated inorganic calcite and some algae species in the Late Precambrian.In the study, diatom species isolated from microbialites on the shores of Lake Van (Erciş and Adilcevaz) were investigated under light and scanning electron microscopy.In the flora; Species belonging to the genus *Achnanthes*, *Amphora*, *Cyclotella*, *Cymatopleura*, *Cymbella*, *Diatoma*, *Diploneis*, *Epithemia*, *Gomphonema*, *Navicula*, *Pinnularia*, *Surirella* and *Synedra* were seen intensely.

Keywords: Algae, diatoms, flora, microbialites, stromatolites, Van Lake

Potentially harmful algal blooms and mucilage events in marine waters of Çanakkale and Samsun Coasts, Turkey

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Abstract
This study was carried out in late spring and midsummer of 2021 and the phytoplankton samples were collected from the coastal eutrophic waters of Samsun and Çanakkale shores. A total of 6 samples were taken by a Hydrobios water Sampler (5 L) for quantitative analyses and were fixed via Lugol's iodine solution. Samples were then counted via Utermohl chambers under a BES inverted phase contrast microscope. A species list and cell abundance-biovolume data matrix were constructed after species diagnoses and counts. A mucilage event associated dinoflagellate, Gonyaulax hyalina Ostenfeld & Schmidt 1901, was observed highly abundant during a yellowish brown formations in the harbour of Samsun City on early May of 2021 and Çanakkale shores on June 2021, while Nannochloropsis oceanica Suda & Miyashita 2002 bloomed and formed white yellowish foamy formations in the shores of Fatsa town during midsummer. Potantially harmful species were also diagnosed in the eutrophic marine waters of Taflan town during the midsummer.

Keywords: Eutrophication, HABs, mucilage, phytoplankton

Bioremoval of some heavy metals by using *Phormidium* sp. under confined and free suspended culture conditions

Tuğba Şentürk

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Abstract

Microalgae are promising bioresources that have garnered attention over the last decade due to its versatile environmental applications like removal of heavy metals or dye from a wastewater treatment plant discharge. In the present study, the removal of Cu^{2+}, Cr^{3+} and Ni^{2+} by the cyanobacterial strain *Phormidium* was investigated under confined with membrane and free suspended culture conditions, in order to compare the heavy metal uptakes. In the experiments, performed at pH 5-8 and 40 °C, with three different initial heavy metal concentrations between 2.5-10mg/L heavy metal containing media. According to the results, the mean removal value of Cu, Cr and Ni on *Phormidium* biomass was determined 31.875 µg Cu/g.dw, 4.563 µg Cr/g.dw and 18.666 µg Ni/g.dw under confined culture conditions while 17.187 µg Cu/g.dw, 1.05 µg Cr/g.dw and 6.333 µg Ni/g.dw under free suspended culture conditions at all dye concentrations tested after 7 days incubation. Result of this study suggests that *Phormidium* have an ability on removal of heavy metals at laboratory culture conditions especially under confined with membrane.

Keywords: Bioremoval, heavy metal, *Phormidium*

Lakes Region (Turkey) endemic fish habitats and problems

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Abstract
Turkey shows a remarkable habitat diversity with significant differences in altitude, precipitation, temperature, topography and geology. It is a country rich in biodiversity in parallel with its habitat diversity. According to recent studies, 195 of 405 inland fish species in Turkey are endemic species. It is reported that 4 of these species are extinct, and 32 of them are in a position to become extinct. Considering the species diversity, the Lakes Region and Konya closed basin constitute the richest regions in terms of endemics.

In this study, which is based on the habitat observations (16 lakes, 10 springs and 2 rivers) and fish samplings in the Lakes Region of the last 20 years; past and present situations, problems and solution proposals of habitats and endemic fish taxa were tried to be evaluated, and suggestions were presented for IUCN conservation criteria.

As a result; based on our fieldwork and observations, it has been evaluated that most of the protection criteria determined by IUCN (2013-2014) have changed negatively, and that some taxa (habitat loss, pollution and predator effect, agricultural irrigation, etc.) may even become extinct. Among the species in the region, it has been evaluated that 8 endemic species may become extinct in the near future, mainly due to habitat loss due to severe drought, withdrawal of groundwater for agricultural irrigation, intensive quarrying, pollution due to agricultural and domestic wastes. In the medium term, it is thought that 5 endemic species will be endangered due to similar reasons.

Keywords: Anatolia, aquatic ecosystems, biodiversity, endemic, EX

Two new records for the fish fauna of Yeşilırmak Basin (Samsun-Turkey)

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Abstract

In this study, we report two new freshwater fish species, *Gambusia holbrooki* Girard, 1859 and *Petroleuciscus borysthenicus* (Kessler, 1859) from Simenlik-Akgöl Lagoon in Yeşilırmak Basin (Samsun). Turkey has a rich biodiversity in terms of freshwater fish. Because of climate change, periodic ichthyofauna monitoring and updating of fish fauna are critical. *Gambusia holbrooki*, Eastern mosquitofish, is an invasive fish species and has a widespread range because of biological struggle against mosquitoes in many water sources. However, simultaneously feeding with fish eggs presents a significant threat to biodiversity. And also, *Petroleuciscus borysthenicus*, Dnieper chub, is a small bodied-fish from the genus *Petroleuciscus* with a wide range. Dnieper chub and Eastern mosquitofish were assessed as Least Concern (LC) species according to the IUCN criteria. The systematic characteristics of fish species were explained. The minimum and maximum total lengths of *P. borysthenicus* and *G. holbrooki* are 4.5 cm-5.7 cm and 2.5 cm-5.3 cm, respectively. The results of this study reveal that the existence of new fish species has been recorded for the fish fauna of Simenlik-Akgöl Lagoon, and the distribution area of both these fish species have reached a different location in Yeşilırmak Basin.

Keywords: New record, Yeşilırmak Basin, *Gambusia holbrooki*, *Petroleuciscus borysthe*

Algal biodiversity of Turkish blanket bogs

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Abstract
Algae include both microscopic and macroscopic photosynthetic organisms that have contributed to humankind and life in many ways throughout history. Algae produce about half of the world's oxygen today and contribute directly or indirectly to our food chain. Products obtained from algae are used in many fields such as food, paint, textile, rubber, paper, construction, cosmetics, dentistry, medicine and pharmaceutical industries. All these features make algae the most important photosynthetic organisms in the world. Studies to determine the algal flora of aquatic ecosystems in our country and in the world is far from complete and it is still possible to identify new algae species not yet defined in specific areas. Blanket bogs are a type of peat bogs and are found in a few parts of the world. They are home to endemic and rare plants, birds, invertebrates and microscopic organisms. Turkey contains few blanket bogs and are all located in the Eastern Black Sea Region except the one located in Çanakkale province. The algal flora studies include quantitative determination of the seasonal distribution of algae, environmental conditions such as the physical and chemical pr operties of water and sediments that affect this distribution. The algal flora of these blanket bogs and how the physico-chemical properties of these aquatic areas affect the biological diversity will be discussed.

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Keywords: Algae, biodiversity, blanket bogs, flora, Turkey

ORAL PRESENTATIONS

LANDSCAPE & FORESTRY SESSION

Ecosystem services and biodiversity of urban landscapes

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Abstract
As urban areas develop, natural habitats are degraded and fragmented, and surfaces change to be impermeable. All these changes cause some environmental problems and affects the resilience and resistance of biodiversity. The loss of biodiversity is perceived as a global problem. Urban biodiversity, which is of great importance in the livability of cities, has been considered together with the concepts of conservation and sustainability. However, another phenomenon that benefits people within the framework of livability is ecosystem services. In this sense, it is necessary to protect and maintain biodiversity in the development of urban ecosystems. In this study, the importance of urban biodiversity, the effect of cities and urbanization on biodiversity and the effect of biodiversity on people will be explained and its relationship with ecosystem services will be discussed within the framework of urban green spaces.

Keywords: Urban, urban biodiversity, ecosystem services, green space

Investigation of bird species in Southern İzmir's burned areas

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Abstract
Forest fires cause ecological and economic damage in Turkey as well as all over the world. However, natural fires, particularly in the Mediterranean region, allow the environment to regenerate. In the south of İzmir, which is located in the Mediterranean zone, total 46 forest fires, 17 in 2019, 19 in 2020 and 10 in 2021, greater than 0.5 ha, have occurred in the last three years. 18 of these fires occurred in the Mediterranean maquis, 23 in calabrian pine (*Pinus brutia*) forest and 5 in stone pine (*Pinus pinea*) plantation. As the fires affected all living taxons, they also negatively affected the birds in the first step. Thanks to their ability to fly, birds are luckier in fires than other taxons. Nests and feeding areas of birds are destroyed due to fire, and they converge to alternative regions. It has been classified that 12 orders, 34 families and 107 bird species in the burned areas in the last three years in Southern İzmir. 67 bird species had bred in these areas until the fire period. Although insectivore and seed-feeding bird species transitioned to different locations to eat in the initial stage owing to the fire, we believe that bird species returned to their original habitats due to the new generation of plants that emerged after the forest fire and the return of insects. Forestry activities should be carried out by considering not only the economy but also the ecology. In order to sustain the ecology burned trees shouldn't be harvested from the area immediately in the post-fire period. Also harvesting activities should be carried out carefully for the new generation of plants. Studies on the ecology of post-fire areas should be done and monitored periodically.

Keywords: Post-fire, wildfire, bird fauna, ecology, İzmir, Türkiye

Examination of steps to be considered in the performance of landscape planning works

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Abstract
Landscape planning is the most important tool in terms of ensuring and developing the sustainable use of the environment. Landscape plans are created by reflecting the natural structure, socio-economic and socio-cultural data, current land uses, Environmental Plans and Zoning Plans to the space. In this context; The importance of landscape planning has been put forward and tried to be explained with a sample landscape plan study. In this context, it is aimed to examine the spatial plans of Çukurova University, Balcalı Campus and to develop solution proposals by determining the contradictions between the use of space. In the last stage, in the light of the contradictions that occurred, solution suggestions were made for the campus area.

Keywords: Landscape planning, nature conservation, plan decision

Determining the change of diversity at the landscape level: The case of Denizli

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Abstract

Especially in recent years, one of the main reasons for the decrease in biodiversity is land use. With the increase in the anthropogenic effect in land use, species diversity at the landscape level decreases. As a result, biodiversity is decreasing, and species are in danger of extinction.

Long-term conservation of biodiversity depends on the conservation of biodiversity elements at different natural levels, from the lowest scales (genetic and species) to ecosystems and landscapes. In this context, diversity analysis carried out at the landscape level, especially in the planning stages of the studies is gaining importance.

This study aims to reveal the change in diversity in Denizli province according to the years. With the analyzes to be made, the current situation of the diversity in the province at the landscape level and changes according to the years will be revealed. As a result, with the study, sensitive areas in terms of diversity will be determined and suggestions will be proposed to ensure their sustainability. As a consequence, it will be ensured that biological diversity is protected, further improved, and transferred to future generations.

Keywords: Diversity, landscape level, change, Denizli

Monitoring indicators for conservation and management of urban biodiversity

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Abstract
Urban landscapes have a very complex structure and are exposed to numerous dangers, including the loss of natural character, habitat division, and biodiversity loss as a result of human activity. Biological diversity (biodiversity) refers to the sum of a region's processes involving genes, species, ecosystems, and ecological events. Biodiversity is an essential part of living species for long-term survival. It describes the diversity, quantity, and distribution of the components of life, such as species, ecosystems, or genes. Determination, protection, and development of biodiversity in urban settings are expected to make significant contributions to ecosystem integrity and ecological processes. The City Biodiversity Index (CBI) is a tool that allows cities to monitor and evaluate their progress and performance in protecting and improving biodiversity and ecosystem services. The simplicity of use by cities, scientific credibility, and impartiality were the major considerations in the development of this index. CBI consists of 4 components (Habitat Types, Species (Plant & Animal) Factors, Ecosystem Abiotic Factors and Governance and Management) and 32 indicators. A quantitative scoring approach based on a 1–4 point scale is used to evaluate indicators. The purpose of this study is to identify and analyze indicators for evaluating and managing urban biodiversity performance in Turkey.

Keywords: The Urban Biodiversity Index, landscape, ecologic system, biological diversity

Integrated botanical garden concept

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Abstract
Urban Biosphere Reserve Area, Urban Agricultural Gardens, Urban Farms, Urban Forests, Woodlands and Reforestation Areas, Water sensitive Urban Design Areas and Green Ways evaluated within the scope of Spatial Water Management. Natural, semi-natural and human-created values, which ensure the ecological renewal of the city with its naturalization, gain value as parts of nature in the city. In addition to the many functions that these areas provide, their main functions should be handled with a protection-based approach. The idea of botanical gardens that have been built so far is a part of the green network; however, it gives the impression of being reduced to a location that is the scene of more touristic and recreational uses of the city, realized in a region of the city with a limited size as known until now. Botanical Gardens are important living spaces with the other green network elements that make up the city and the diversity of living things. It is necessary to create a common biosphere reserve network to ensure its continuity in cities where natural values are decreasing and disappearing day by day. In this paper, based on the IUCN criteria of the city, the protection of sensitive, extinct species and communities as well as rare ecosystems and critical habitats, together with other elements of the green network, will be discussed in an integrated manner. Apart from this, it will be examined with a concept within the scope of a conservation-based program that also includes birds, invertebrates, domestic livestock, reptiles and, albeit rarely, wildlife. In different geographies of the world, under the concept of the botanical garden, applications that are compatible with thematic conservation programs created with an approach that prioritizes the natural values of that region, and which aims to protect as the basis, will be considered as reference examples.

Keywords: Garden, botanical gardens, biosphere reserve, integrated

Identification of plants with allergic pollen in urban open green areas of Kahramanmaraş

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Abstract

Urban open and green areas play an important role in increasing the quality of life of urban people with the environmental, social and economic contributions they provide. Plants, which are the basic components of these areas, cause some negative effects on human health in life processes, as well as many important benefits they offer to the urban ecosystem. One of these effects is that they cause allergic reactions from pollen. This study was carried out to determine the existing allergic plant taxa in the urban open green areas of Kahramanmaraş. Within the scope of the study, 91 plant taxa that can cause allergic reactions were identified in the urban open green areas of Kahramanmaraş. These plants were evaluated in terms of life form, flowering period, allergen rate and protective case. As a result of this evaluation, it was determined that 56 of 91 plants were exotic and 35 were natural. When the allergen rates of the detected plants were examined, from 91 plants; it was determined that 31 of them had low allergen rate, 21 of them had moderate allergen rate and 39 of them had high allergen rate. In addition, various suggestions have been developed regarding the use of these plants in planting design applications.

Keywords: Allergic plants, urban open green areas, Kahramanmaraş

First step activity for creating nature consciousness: A primary school application in Çanakkale

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Abstract

If the love of nature is acquired at a very young age, healthy societies will be able to reach. For this reason, starting from the primary school education period, children should be provided with multidisciplinary studies, in the company of experts, in touch with nature, and with practical and entertaining activities. Thus, awareness will be created by discovering nature itself, and the individual will have a sense of protection because he has grown up with a love of nature. Based on these facts, in this study, it was aimed to instill a love of nature and create awareness in primary school 3rd grade students. For this purpose, the study covers the introduction of trees, one of the most important elements of nature, and the design of a garden. The study was carried out at İsmail Kaymaklar College located in the center of Çanakkale in 2018-2019. In the study, 35 students from 3rd grade college students and 3 4th grade students from Çanakkale Onsekiz Mart University, Department of Landscape Architecture took part. First of all, university students were introduced to primary school students with visuals and materials and plants in the classroom environment, songs covering trees were sung, living examples of trees were shown in the green area near the school and their pictures were drawn. Afterwards, university students and children were allowed to plant plants together in the primary school garden. Finally, primary school students performed at the university and received certificates by making herbal design drawings in the studio. With this study, the students of the landscape architecture department were provided as role models for the children and the activities were carried out in the university environment. The profession of landscape architecture was introduced to young students and an activity was held in touch with nature.

Keywords: Children nature education, landscape architecture, planting design, trees recognize

Mapping of the deforestation dynamics of Turkey

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Abstract
Globally increasing population trigger the ever-changing environment. Natural causes such as drought, extreme weather events etc. and anthropogenic factors such as the increased need for energy, settlement areas, transportation etc. increase the pressure on our forest's day by day. Lack of effective protection and planning of forest areas are the main reasons that reduce the presence of forests all over the world. Also, the overuse of forest products and wildfires caused land degradation. Deforestation and forest degradation lead to biodiversity richness, water quality, and air quality losses. This study aims to analyze deforestation dynamics in Turkey concerning land use/cover change. Monitoring of land use/land cover and detection of the deforested areas are possible with high spatial resolution earth-observing satellites. Deforestation from 2000-2020 in global forests measured with Landsat series and total loss is 2.3 million km^2 for two decades. European Space Agency's World Cover 2021 project release on a global scale Land use/Land cover data that classified from Sentinel 1-2 data and a minimum overall accuracy of 75%. Two data sets were extracted from each other to determine from deforested areas in twenty years to land use/cover status in 2021. The results show that 63% of the deforested areas have turned into Tree land cover class in Turkey. The remaining 47% of the deforested area is changed to grassland (17%), scrubland (10%), barren or sparse vegetation (6%), cropland (2%), built-up (1%) and water (1%) land use/land cover class. The fact that a significant part of forest areas is being reclaimed in our country shows that the planning processes are carried out successfully. The data obtained by remote sensing techniques give fast and reliable results to improve and recover the quality loss of forest areas that develop due to various reasons.

*Turkey's Council of Higher Education CoHE 100/2000 priority fields scholarship program student

Keywords: Deforestation, Landsat, sentinel, landcover, landuse

The use potential of flowering bulbs (*Allium* L. Subg. *Melanocrommyum*) in the flora of Turkey as ornamental plants

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Abstract

Turkey is one of the most important gene centers in the world in terms of its biodiversity, critical geographic position, geomorphic structure, and its large diversity of habitats. The flora of Turkey has approximately 1100 geophyte taxa, of which 500 are endemic and economically important. The *Allium* L. genus contains around 1000 species worldwide and of these, there are 200 species in the flora of Turkey. Among the *Allium* species, the most fragrant is subg. *Melanocryommyum* and has around 40 *Allium* L. species. 20 of these are endemic to Turkey. Thus, the Flora of Turkey is one of the most significant gene centers for these species. Fragrant ornamental alliums from the subg. *Melanocryommyum* bloom the earliest in a cultivated environment. Their flowers are fragrant and multiform. Their flowers are in a wide range of colors. Thanks to these features of the subg. *Melanocryommyum*, they have high economic potential in the ornamental plant sector. Thus, focusing on the cultivation of these alliums is necessary. Improving breeding techniques, scent isolation, and the introduction of the plants into the relevant sectors are research topics for the fragrant ornamental alliums (subg. *Melanocrommyum*) in Turkey. Also, it is focused on the sustainable preservation of Turkey's alliums, improving a suitable propagation method for the fragrant ornamental alliums, and the developing new fragrant *Allium* varieties that will increase the competitive power in both domestic and foreign markets. This paper aims to determine the current situation that which *Allium* L. subg. *Melanocrommyum* has reached Turkey, and to examine the studies about them.

Keywords: Ornamental alliums, Turkey, endemic, geophyte, fragrant

Potential use of some plant species growing naturally in Manavgat (Antalya) in landscape architecture applications in the context of maintaining biodiversity

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Abstract

Turkey has rich biodiversity due to reasons such as geographical and climatic differences and being at the intersection of different phytogeographical regions. Natural vegetation in Turkey is under great pressure due to urbanization and biodiversity losses are experienced day by day. Although efforts have been made to raise awareness among all sectors of society in order for them to contribute to the process of biodiversity conservation, it has not been very successful in protecting nature and native plant species. Professional groups should fulfill their duties to protect native plant species. At this point, the task of landscape architects is to determine the usage areas and propagation methods of natural plants and to carry out cultivation studies. Despite the rich plant diversity in Turkey, the rate of use of native plant species in landscape architecture applications is quite low. The use of native plants increases the chances of success in applications due to their higher adaptability to different climatic and soil conditions, low cost, high disease, and pest resistance, and less water, fertilizer, and maintenance requirements. Thus, it contributes to creating sustainable landscapes. Within the scope of this study, some plant species that grow naturally in Manavgat (Antalya) were evaluated in terms of some morphological features such as general form, flower, leaf, and fruit, and their usability in landscape architecture applications was investigated. The botanical characteristics and ecological requirements of the species that have the potential to be used in open/green areas were determined and their usage purposes (aesthetic and functional) were evaluated and suggestions were made. Thus, it is aimed to bring some native plant species which grow naturally in Manavgat to landscape architecture applications and Turkey's economy. It is expected to make great contributions to Turkey's economy with the breeding studies aimed at cultivating new varieties in the future.

Keywords: Sustainability, native plants, adaptation, planting design

Estimation of present and future distribution areas of *Malva sylvestris* L. according to climate change scenarios

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Abstract
Global climate change has reached uncontrollable levels today and has affected all living realms. The responses of plants to climate change show much more variability, unlike other living things. *Malva sylvestris* L. is the most well-known species of the *Malvaceae* family, which has about 4000 species. In Turkey, it is consumed in compresses, tea, food and various other forms. In this study, an estimated modelling of the present and future distribution areas of *Malva sylvestris*, which grows naturally in Turkey, has been made. SSP2-4.5 and SSP5-8.5 climate change scenarios of MIROC-ES2L were used for the prediction of future distribution areas in the models and the outputs of ~2050 and ~2090 were obtained. According to the output results, it is seen that there will be an increase in the potential distribution areas of *M. sylvestris* in both scenarios. It is known that the species is currently seen wild in many parts of our country, on roadsides, mixed vegetation and agricultural lands. Considering all these data, it becomes clear that *M. sylvestris* may be among the invasive species in the future and may cause shrinkage in the habitats of other species, so breeding studies are necessary.

The first author is a PhD student in the field of sustainable forestry and forest disasters within the scope of the "YÖK 100/2000 PhD Project".

Keywords: *Malva sylvestris*, climate change, Turkey, MIROC-ES2L

An examination of local policies on the conservation of biodiversity: The case of Kayseri Metropolitan Municipality

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Abstract

After the subject of biodiversity conservation came to the fore in the organizations prepared by the United Nations in 1990s, it was observed that local governments have a great role in the implementation of the policies developed in this regard. Especially after Biodiversity Convention and Local Agenda 21, it has been promised that policy makers from international scale to local scale will take decisions to protect biodiversity and ecosystem services. Worldwide academic research and policies on the conservation of biodiversity have been associated with the issues that relationship biodiversity and urban wellbeing (provision of ecosystem services), major drivers of biodiversity loss and linking biodiversity loss to urban processes. In this study, policies on the biodiversity conservation conducted by local governments in Turkey were examined and Kayseri Metropolitan Municipality was chosen as the case study area. The aim of the study is to observe how the landscape policies regarding the protection of biodiversity determined by the central government are reflected in local government strategies. The main method of this study was based on the document scanning method, and the policy documents of the institutions empowered to produce policies on biodiversity and the strategic plans and annual reports of the Kayseri Metropolitan Municipality were used as materials. As a result of the examination, it was revealed that the purposes, objectives and actions related to landscape policies regarding the protection of biodiversity in the policy documents of the authorized ministries were not sufficiently detailed. Especially, strategies for the conservation of urban biodiversity are not included in policy documents. In addition, it has been observed that the policy moves determined by the national action plans were not reflected in the activities that included in the institutional reports of chosen municipality. Consequently, the necessity of developing and elaborating local government strategies and landscape policies that will ensure the biodiversity conservation has emerged. National and local biodiversity strategy plans should be prepared and coordinated with each other. Legal arrangements should be made regarding the protection of biodiversity, especially urban biodiversity should be included in the legislation.

Keywords: Biodiversity conservation, landscape management, landscape policies, local governments

Evaluations on the landscape of wetland ecosystems: The case of Lake Zinav

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Abstract

Wetlands are one of the most important ecosystems in the world. In addition to their ecological functions such as protecting biological diversity and ensuring the continuity of natural life, these areas also have commercial values such as evaluating wetland products, being a destination for recreation and tourism sector. One of the wetlands with these values is Zinav Lake, located in the Reşadiye district of Tokat province. Lake Zinav, which is the largest natural lake of the Kelkit river basin, consists of a wide variety of flora and fauna. Lake Zinav is a wetland with a high potential for touristic and recreational use due to its natural and cultural landscape values and high visual landscape quality. Today, the existing features of the lake are preserved, however if it is used intensively and unplanned in the future, it is in danger of losing its properties. For this reason, it was chosen as the case areas of study. The aim of the study is to determine the current landscape potential of Zinav Lake and its surroundings, and to create baseline information for a landscape planning proposal based on conservation culture. The method of this research consists of information gathering-analysis-synthesis-evaluations that are frequently used in landscape planning studies. Information about the area was collected in two stages, in the first one, literature information was scanned, and in the second, information was obtained from on-site investigations. All the information obtained was subjected to content analysis, interpreted and evaluated in line with the purpose and from an expert point of view. As a result of the study, it has been concluded that Zinav Lake and its surroundings are a landscape worth protecting with their natural and cultural landscape values and landscape quality. And it was concluded that the lake should be used by protecting it.

Keywords: Cultural landscape, Tokat, wetland, Zinav Lake

The potential of oleoresin production for Turkey forests'

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Abstract
Oleoresin is such a goods that produced by plant secondary mebolism's product featured defense against herbivores and pathogens in terms of plant physiological system at micro scale. On the other hand, it is assesed as non-wood or non-timber product having economical value used in diverse sector all over the world at macro level. Owing to chemical fractions of oleoresin composed of two main substances that "turpentine" which is volatile fraction containing mono-and sesquiterpenes and "rosin" is the nonvolatile diterpene, used as solvent or raw material from printing ink manufacture to agrochemical, food and pharmaceutical industries.

In forest ecosystems around the world, broadleaf and coniferous species are generally used in the production of oleoresins. Turkey's forests have a rich structure in terms of species diversity. General Directorate of Turkish Forestry reported that 22 main species of broad-leaved and coniferous species (Turkish red pine, Scotch pine, Black pine, Fir, Spruce, Juniper, cedar, Beech, Oak, Alder, Chesnut, Hornbeam, Lime, Turkish sweetgum. etc.) are exist having stand dynamics that naturally distributed in our country.

In this study, oleoresin production potentials from these species were investigated. As a result, the possible economic potential of oleoresin, which can be considered as one of the most important non-wood products of forest ecosystems, has been determined. Additionally, HPLC-MS, GC, reflux extraction methods have been examined in the analysis of oleoresin as chemical dimension.

Keywords: Non-wood product, oleoresin extraction, plant secondary metabolites

ORAL PRESENTATIONS

MEDICINAL PLANTS SESSION

Investigation of antioxidant, enzyme inhibition and antimicrobial effects of *Ononis viscosa*

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Abstract

The genus *Ononis* L.,which is a member of the Fabaceae family, has a wide distribution area in the world and is represented by 18 species in Turkey. *Ononis* species are known to have laxative, diuretic, analgesic, anti-inflammatory, antiviral, cytotoxic and antifungal activities. To our knowledge, a limited number of studies have been found on the biological activities of *Ononis viscosa*. Therefore, the aim of our study is to examine the antioxidant, antimicrobial, anticholinesterase and anti-urease activities of different extracts (petroleum ether, chloroform, methanol) obtained from aerial parts of the plant.

Agar well diffusion method was used in the determination of antimicrobial activity against 10 bacteria and 3 yeast strains. DPPH, CUPRAC and FRAP techniques were used to examine the antioxidant properties of plant' extracts. The extracts' anticholinesterase, and anti-urease activity were determined by using the Ellman and Indophenol techniques, respectively. In addition, the phenolic contents of the extracts were determined by FCR method. It was shown that all of the extracts had antimicrobial activity against *Enterococcus faecalis*, *Staphylococcus epidermidis* and both *Staphylococcus aureus* species. Additionally, the methanol extract of *Ononis viscosa* was found to be effective on *Candida albicans* strain. It was determined that the plant' petroleum ether extract showed stronger anticholinesterase and anti-urease activities when compared to other extracts. According to our findings the methanol extract of *O. viscosa* has stronger DPPH radical scavenging and ferric reducing/antioxidant capacity than the other extracts.

Keywords: *Ononis viscosa*, antioxidant activity, anticholinesterase activity, anti-urease activity, antimicrobial activity

Latest decade's activity model: *C. elegans*

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Abstract

Plants and herbal compounds are natural products that have a wide range of biological activities providing the treatment of various diseases since ancient times. Plant extracts are a complex mixture of substances with antioxidant, antiviral, anticancer, antiparasitic, antifungal, hypoglycemic, antihypertensive, and insecticide effects. Screening plant extracts is essential to find new or alternative natural therapy for common diseases that can be cost effective. *Caenorhabditis elegans* (*C. elegans*) is a microscopic, non-pathogenic free-living soil nematode (roundworm) that can be found in many different regions of the world. It is also one of the most widely used model organisms in the fields of biology and medicine, including genetics, cell science, neurobiology, toxicity, and aging studies. *C. elegans* is also easy to maintain under laboratory conditions and has a lifespan of approximately 15-20 days; so using it is more economical than the other biological techniques. The nematode can be grown in the lab on agar plates or in fluid media with *Escherichia coli* (*E. coli)* as the source of nutrition and it can be reproduced in three days under room temperature. Its short life cycle, reduced genome, stereotyped development, and being small-sized, and transparent are just a few of its many advantages. Using it as a neurodegenerative or metabolic disease model is another advantage of it, *C. elegans* has been used to screen anthelmintic, antimicrobial, antifungal, anti-infective, and anti-cancer drugs or plant extracts since the 1990s. In this study, we aim to explain the importance of choosing *C. elegans* model organism to screen plant extracts or products' biological activities.

Keywords: *C. elegans*, model organism, disease models, medical plant, biological activity screening

The biological activities of endemic *Ballota pseudodictamnus* subsp. *lycia*

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Abstract

The genus *Ballota* L. (Lamiaceae) includes species known as boz ot, bal otu, nemnem otu and have medicinal uses among the people. Additionally, it known to be used by the public in the treatment of cough, asthma, headache, nausea, hemorrhoids, wounds and burns. *Ballota* taxa have various phytochemical classes such as essential oils, iridoids, saponins, terpenoids, flavonoids, phenolic acids, tannins, and organic acids. *Ballota pseudodictamnus* subsp. *lycia* is one of the endemic species growing in southwestern Turkey. As a result of our research on the literature a limited number of studies have been found on the biological activities of this species. The aim of this study is to examine the antioxidant, antimicrobial, anticholinesterase and anti-urease activities of different extracts (petroleum ether, chloroform and methanol) obtained from the aerial part of *B. pseudodictamnus* subsp. *lycia.* DPPH, CUPRAC, and FRAP techniques were used to examine the antioxidant properties of plant' extracts. The extracts' anti-urease, anticholinesterase and antimicrobial activity were determined using the Indophenol, Ellman and agar well diffusion method techniques, respectively. While the petroleum ether extract obtained from plant, was found to be effective against *S. aureus, S.epidermidis* and *E. faecalis strains*; its chloroform extract was effective against *S.aureus* and *S.epidermidis* strains and its methanol extract was found to be effective against *Acinetobacter baumannii* strains. It was found that the plant' methanol extract showed the highest antioxidant activity when compared to the other extracts.

Keywords: *Ballota pseudodictamnus* subsp. *lycia,* antioxidant activity, antimicrobial activity, enzyme inhibition

Attitudes and practices of pharmacists regarding the use of herbal products

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Abstract
World Health Organization (WHO) was reported that traditional and complementary medicine continues to be widely used in most countries and the majority of the world population use or benefit from herbal products as primary health care applications. The aim of our study is to evaluate the pharmacists' attitudes and practices towards herbal products' uses.

This study was a cross-sectional descriptive study was conducted in Istanbul (Turkey). Sociodemographic characteristics of the participants were recorded and a self-structured questionnaire was applied face to face.

A total of 50 pharmacists were included in the study. The mean age of the pharmacists was 34.6 years. 53% of pharmacists were female and 39% of them have been in service for less than 20 years. Ninety percent of the pharmacists stated that they sell herbal products and believe that the herbal products were not completely harmless. More than half of the pharmacists (68%) stated that they were not questioning the herbal product use while taking the anamnesis from patients. While 54% of the pharmacists were mentioning about the side effects of the herbal products, only 32% of the pharmacists stated that they questioned the patients about the use of herbal products use while taking the anamnesis.

In our study, it has been determined that most pharmacists sell herbal products. It was observed that most pharmacists were counseled about herbal products. Since pharmacists are easily accessible health consultants, they interact with patients through patient education and drug counseling and can contribute positively to the rational use of these products. Evaluation of the attitudes and practices of the community pharmacists will contribute to the rational use of these products.

Keywords: Attitudes, community pharmacist, herbal products, practices

Investigation of bioactive phytochemicals and *in vitro* antimicrobial effects of *Matricaria chamomilla* L. and *Tripleurospermum decipiens* Bornm. on some urinary system pathogens

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Abstract

Matricaria and *Tripleurospermum* species have been traditionally used to treat or ease the pain of several diseases as well as a tranquilizer. Although *Matricaria chamomilla* L. (MC)'s phytochemicals and biological acitivities have been well defined, there are very few studies on *Tripleurospermum decipiens* Bornm. (TD). In the present study, we demonstrated the antimicrobial effects and phytochemical contents of TD for the first time. Decocsion, tincture, ethanol and different solvent (96%) extracts of aerial parts of MC and TD were prepared and analyzed by LC-MS/MS. Apigenin, luteolin, apigetrin, cynaroside, quercetin and herniarin were found as the main compounds. The extracts of TD and MC were evaluated for their antimicrobial activities against *Escherichia coli* ATCC 8739, *Staphylococcus aureus* ATCC 29213 and *Candida albicans* ATCC 90028 by broth microdilution method and compared. Minimum inhibititory concentrations (MIC, µg/mL) were in the range of 3,906 to 250 µg/mL for all the strains. When compared to conventional antibiotics, MIC values of butanol and ethanol extracts of MC, hexan, ethyl acetate, butanol, water, ethanol and tincture extracts of TD were found to be superior to Vancomycin for *S. aureus*.

Keywords: *Matricaria*, *Tripleurospermum*, antimicrobial, phytochemical, herbal medicine

In vitro cytotoxic potential of medicinal plant *Alangium salvifolium* against cancer cell lines

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Abstract
The use of medicinal plants to treat illnesses is something that most societies on this planet have done for centuries. The aim of this study was to investigate the *in vitro* cytotoxic potential of *Alangium salvifolium* seeds against human skin melanoma (A375) and human skin carcinoma (A431) cells lines.

Phytochemicals were analysed in ethanol and ethyl acetate extracts of the *Alangium salvifolium* seeds using standard methods. *In vitro* cytotoxic assay were carried out against human skin melanoma (A375) and human skin carcinoma (A431) cells lines using MTT assay.

The Observations of MTT assays cell cytotoxicity study suggesting us that ethanol and ethyl acetate extract of plant showing significant cytotoxic potential properties against A431cell lines and showing moderate cytotoxic potential properties against A431 cell lines.

Overall ethanolic extract showing effective cytotoxicity against both A431 and A375 cell lines and may be considered as potent anti-skin cancer and anti-melanoma agent due to its low IC50 values than EA extract. The results clearly suggested that given ethanolic extract is anticancer in nature by significantly inhibiting the % cell viability and having considerable cell inhibitory potential properties against the A375 and A431 cell lines.

Keywords: *Alangium salvifolium*, cell lines, cytotoxicity

Ethnomedicinal plants for kidney disorder in Iraq and Turkey

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Abstract
Ethnomedicine is defined as the study or comparison of traditional medicine based on plants' bioactive compounds. Traditional herbal applications for kidney disorders are frequently used among people, as kidneys have a major role in the maintenance of homeostasis of the body, fluid, and electrolyte, and also, have a role to fulfill many metabolic functions. Both countries are homeland for many medicinal plants and it is crucial to understand local medicinal plant uses and their relationships with surrounding areas. To obtain valuable information, approximately 100 ethnobotanical and ethnomedicinal articles were scanned. As a result of this study, it was determined that 588 taxa were used in kidney diseases. Among these plants, 395 of them are used in Turkey and 193 of them are used in Iraq. In detail, 10 plants from a total of 193 plant taxa are used for renal disorders in only Iraq while, 12 plants from a total of 395 plant taxa are used for kidney diseases in only Turkey, and 5 plants were found to be effective against renal diseases and be present in both countries. Furthermore, 16 plant families have been recorded in which Apiaceae (5 taxa), Aspleniaceae (3 taxa), Fabaceae (3 taxa) and Malvaceae (3 taxa) were the most used ones. The purpose of this study is to identify the plant species that are used traditionally as herbal medicines for kidney disorders in both Iraq and Turkey, as well as to compare their traditional medicine based on the practical use of plants and highlight the same ones. The fact that the same plant species are used for the same disease in both countries will give us an idea about the development of herbal medicine with these plant species in the future.

Keywords: Ethnomedicine, ethobotany, herbal, kidney disorders, Iraq, Turkey

Ethnomedicinal resources exploration, conservation, and utilization: Deserts perspective from Pakistan

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Abstract
Though deserts are one of the centers of biodiversity with untapped taxonomic resource and traditional knowledge, currently the Pakistan biodiversity and indigenous knowledge are at risk and are reaming as underutilized and neglected treasures. In the present context, such unique diversity and associated indigenous knowledge are highly vulnerable to changing of physical environment, increasing population pressure, and rapid development of socioeconomic status. Presently the traditional community maintains their knowledge on close relationship with plants from generation to generation as personnel memories. In this context ethnomedicinal studies play a pivotal role in collecting, documenting, and conserving such knowledge before disappearing from old generations of indigenous communities.

At present the deserts in Pakistan does not have an appropriate and systematic mechanism to extract and preserve the traditional knowledge of indigenous community. We believe that government bodies, such as departments, universities, museums, herbaria and botanical gardens should have a leading role and keen interest to identify, collect, preserve, and disseminate indigenous knowledge for the benefit of the local and global community, because the traditional knowledge systems and the modern scientific knowledge together can make a powerful tool to achieve the country development and conservation goals.

We are grateful to Higher education commission of Pakistan for funding under project No NRPU-7837.

Keywords: Biodiversity, desert, ethnomedicine, folk knowledge, Pakistan

Attitudes and practices of patients regarding the use of herbal products

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Abstract
Herbal products are commonly used in public as a part of complementary and alternative medicine. The aim of our study is to evaluate the patients' attitudes and practices towards herbal products' uses.

This study was a cross-sectional descriptive study was conducted at two community pharmacists in Istanbul (Turkey). Sociodemographic characteristics of the participants were recorded and a self-structured questionnaire was applied.

A total of 200 patients were included in the study. The mean age of the patients was 34.6 years. Over sixty percent of the patients were using herbal products and approximately half of them believed that herbal products use was completely harmless ($p<0.05$). It was determined that the rate of using herbal products was statistically higher in patients with female gender, adults, low educational level, patients with chronic diseases, and non-smokers ($p<0.05$).

Patients with chronic illnesses commonly used herbal products and most of the patients believed that these products were harmless. In addition, a majority of patients advise the use of these products to their relatives and approximately half of the patients stated that they did not give information about using herbal products to the doctor or pharmacist. We think that pharmacists as the closest health consultants and other health professionals have an important role in the rational use of herbal products.

Keywords: Attitudes, herbal products, patient, practices

Polyploidy studies in medicinal and aromatic plants

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Abstract
Medicinal plants are in great demand due to their widespread consumption and constantly increasing worldwide. Medicinal and aromatic plants (MAPs) are valuable natural resources because they can synthesize a large variety of secondary metabolites widely used in many industries. Traditional breeding programs are often dependent on the environment; besides being susceptible to different biotic and abiotic stresses, the secondary metabolite content is too low for harvest. The secondary metabolism of plants delivers a wide range of chemical structures with application for a vast array of activities, thus offering opportunities for social and economic development. Polyploidization refers to duplication of a full set of chromosomes of a particular species to form a new species. Polyploids often exhibit some morphological features in different or larger forms than their diploid pedigree. The production of synthetic polyploids as a plant breeding strategy has allowed the development of new and improved varieties.

In this context, artificial breeding of polyploid individuals would be a remarkable approach to increase viability and achieve this goal. This article presents a current review of polyploidy, one of the key issues regarding the importance and role of both natural and artificial polyploidy in plant breeding programs.

Keywords: Chromosome doubling, flow cytometry, medicinal aromatic plant (MAP), plant breeding, polyploid plants, secondary metabolites

Bioactive diterpenes originated from Lamiaceae family plants

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Abstract

Natural resources, especially plants have been used by human beings for various purposes including the treatment of numerous disorders since ancient times to date. Secondary metabolites of the natural products such as terpenoids, alkaloids, and flavonoids are responsible for those therapeutic effects. While these compounds may show some pharmacological activities via synergy, they sometimes are more effective individually. For this reason, obtaining these bioactive compounds either naturally or synthetically is very precious.

Lamiaceae is a significant flowering plant family, which consists of many genera such as *Nepeta, Teucrium, Salvia, etc. Nepeta*, *Teucrium* and *Salvia* species have been used in the folk medicine for many years due to their biological properties. In this study, diterpenes originated from *Nepeta*, *Teucrium* and *Salvia* species and their biological effects are revealed and discussed. In addition, synthetic approach to diterpenoids are also given. In order to draw attention to the rich flora of Turkey, endemic plants are chosen.

Pimarane and abietane diterpenes of *Nepeta* sorgerae and *Nepeta obtusicrena*, and their anticholinesterase activities are presented. Neo-clerodane diterpenoids of *Teucrium alyssifolium* and their *in vitro* antidiabetic effects are examined. Another neo-clerodane diterpenoid, salvinorin A, the main compound of *Salvia divinorum* is a potent KOR agonist, which allows it to display some precious biological activity such as anti-drug abuse effect. Thus, synthetic studies related to salvinorin A-inspired structures are also given.

The present study aims to emphasize the importance of flora and biodiversity of Nature, especially existing in Turkey, where has almost equal number of plants to whole Europe Continent. In addition, biological properties of diterpenoids, which is valuable for the pharmaceutical industry, are revealed.

Keywords: Diterpenoid, synthesis, Lamiaceae, *Nepeta*, *Teucrium*, *Salvia*

Breeding and variety development studies on medicinal, aromatic and dye plants in the flora of Turkey

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Abstract

Plant biodiversity has great importance as it is the main resource for different industries all over the world. Considering the developing world and the increasing human population, it is inevitable that the demand for these raw materials will increase with industrialization. In particular, the tendency towards natural raw materials and products obtained from them is increasing rapidly. As people's consumption habits change, the variety and quality of the products increases accordingly.

Medicinal, aromatic and dye plants have a special importance in the herbal diversity of the Flora of Turkey. Some of the raw materials of herbal products used in the world today are exported from Turkey. Most of the exported plants are collected from nature. It is known that over time, plant communities have decreased due to the pressure caused by over-collection of different species, and some species have reached the limit of extinction. The most effective way to protect natural resources is to cultivate the needed species. With the production in the form of field or garden agriculture, both natural resources are protected and standard and high quality production is made.

Cultivation and breeding of medicinal, aromatic and dye plants in Turkey has gained great momentum in the last 30 years. In particular, registered varieties of oregano and sage, which are our important export products, have been developed and found in production areas. To date, 76 medicinal and aromatic plants of 24 different species have been registered and transformed into varieties. On the other hand, breeding studies are continuing in mountain sage, laurel, rosehip, St. John's wort, carob, myrtle, linden, oregano, mint, rosemary, oat, madder, gum tragacanth, salep, sumac, licorice and caper.

Keywords: Flora of Turkey, medicinal plants, breeding, variety

Immortality mushroom (*Ganoderma lucidum*) as functional food

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Abstract
It has been observed that the food demands of consumers have changed significantly in recent years; the expectation from food changes not only to relieve hunger, but also to prevent diseases and increase physical and mental levels. At this point, functional foods come to mind to meet expectations. For centuries, most of the edible or inedible mushroom groups have been used for medicinal purposes in East and South Asia. *Ganoderma lucidum* (Reishi); It is one of the fungi with the strongest effect area among these mushroom groups and is a non-toxic species. The species that has been used as a medicine in Chinese medicine for about 4000 years; it is usually grown on oak and plum tree stumps in a period of about 9 months. The species, which is reported to be a panacea, has high global consumption and is also traded as a food supplement. The mushroom of immortality has a share of approximately 2.5 billion dollars in world trade, including its extracts and isolated components in various formulations sold in different forms such as capsules, creams, hair tonics. This study was prepared to raise awareness about the medicinal use of mushrooms.

Keywords: *Ganoderma lucidum*, mushroom, reishi, functional food

Investigation on biological activities of *Melissa officinalis* subsp. *altissima*

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Abstract
The genus *Melissa* is used as antibacterial, sedative, digestive aid, carminative, diaphoretic and bile secretion enhancer. It is included in the composition of the preparations used during nervous digestive system disorders, psychosomatic heart disorders and migraine. The flowering branches and leaves of *Melissa officinalis* L. subsp. *altissima*. are used as carminative, sedative and its antipyretic effects. It is also used in vascular occlusion, stomach aches, heart ailments, kidney inflammation, cholesterol, blood pressure, and diabetes. According to our knowledge there are not enough studies on these species grown in Turkey. The aim of this study is to examine the antioxidant, cytotoxic, anticholinesterase, anti-urease and antimicrobial activities of plant' various extracts obtained by using the sequential maceration method. In the determination of antimicrobial activity well diffusion method on 6 gram negative, 4 gram positive and 3 yeast strains was used. DPPH, CUPRAC and FRAP techniques were used to examine the antioxidant properties of plant' extracts. The extracts' anticholinesterase, cytotoxic and anti-urease activity were determined using the Ellman, MTT and Indophenol techniques, respectively. In addition, the phenolic contents of the extracts were determined by FCR method. It was found that petroleum ether extract of the plant was effective against *Enterecoccus faecalis* and *Staphylococcus aureus* strains and ethyl acetate extract were effective against *Staphylococcus aureus* strains. The methanol extract of the plant exhibited the highest antioxidant activity when compared to other extracts. It was determined that the petroleum ether extract of *Melissa officinalis* L. subsp. *altissima* has stronger acetylcholinesterase and urease enzyme inhibition potential than its other extracts. Furthermore, in this study the ethyl acetate extract of the plant was found to have high cytotoxic activity.

Keywords: *M. officinalis* subsp. *altissima*, antioxidant activity, enzyme inhibition, cytotoxic activity

Faba bean (*Vicia faba* L.) on the way to becoming a medicinal plant

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Abstract
Faba bean (*Vicia faba* L.) is one of the important plants of the Mediterranean cuisine which dates back to prehistoric regions in Mesopotamia and Europe. Faba bean seeds are rich in protein, carbohydrates, minerals, fiber and B group vitamins. Faba bean is one of the rare plants that contain L-Dopa (L-3,4-dihydroxyphenylalanine) in their leaves, flowers and fruit parts that can be used in the treatment of Parkinson's disease which is common in older societies. In this review, the findings we have obtained from the our studies we have done with L-Dopa in broad beans so far are summarized. The first of our findings is that L-Dopa is present in good ratios in the leaves, flowers and fruits of the plant and the highest ratio of L-Dopa is in the flowers. After then, when honey was produced from faba bean flowers, it was determined that L-Dopa was transferred to honey and pollen. In another study we conducted, it was determined that L-Dopa was transferred to tea when tea was made from faba bean flowers. It was determined by another study that the amount of L-Dopa transferred to the tea water increased with the increase in the amount of flowers added to the tea. In another study, tea was obtained from the bean flower and its L-Dopa content was examined. It has been determined that the broad bean flower tea contains significant amounts of L-Dopa. Based on these data, we believe that broad bean can be used for Parkinson's disease through animal experiments and can be included in the category of medicinal plants.

Keywords: Faba bean, L-Dopa, medicinal plant, Parkinson's disease, *Vicia faba*

Turkish *Salvia* species and their pharmacological effects, ethnobotanical uses, chemical composition and endemism

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Abstract
Salvia genus -which is a member of the Lamiaceae family is represented by 1010 accepted species throughout the world.

Stems, aerial parts and essential oils of *Salvia* sp. have been used traditionally for several purposes such as appetite stimulation, digestive, hypotensive, for dysmenorrhea, as emmenagogue, for throat infections, for ulcers, to relieve stress, to improve the memory power, as sedative, for inflammation, for skin diseases, against bacterial infections and as anti-septic. There are some biological activities and pharmacological effects of *Salvia* sp., including anticancer, antimutagenic, anti-cholinesterase, improvement of mood and cognitive functions, reducing stress, antimicrobial, antioxidant, anti-inflammatory, antinociceptive, anti-septic, for diabetes, increase of serum HDL levels and choleretic according to the clinical and *in vitro* studies. *Salvia* sp. contains different types of seconder metabolites like glycosides, phenolic compounds, flavonoids, steroids and terpenoids. Thanks to this diversity in chemical composition, a wide range of bioactivities arise mentioned above.

A genus with such properties spreading worldwide is represented 100 species in Turkey –of which 53 of them have an endemic situation. In this study, we aimed to highlight the importance of the Turkish *Salvia* species and review their pharmacological effects, ethnobotanical uses, chemical composition and endemism situation.

Keywords: Turkish *Salvia* pharmacology, endemism, chemical composition

Investigation on biological activity of *Thymus longicaulis* subsp. *longicaulis* var. *subisophyllus* and analysis of its phytochemical content by HPLC-DAD

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Abstract

The genus *Thymus* known as 'thyme', belongs to the Lamiaceae family and has many species and subspecies taxa. *Thymus* species areutilized in medicine and pharmacology for their antioxidant, antiseptic, antibacterial, antifungal, antispasmodic, antitussive, expectorant, and analgesic effects.To our knowledge there is a limited number of studies on the biological activities and chemical content of *Thymus longicaulis* subsp. *longicaulis* var. *subisophyllus*. Therefore, the aim of our study is to examine the antioxidant, antimicrobial, anti-urease, cytotoxic andanticholinesterase activities of different extracts (petroleum ether, ethylacetate and methanol) obtained from the aerial parts of the plant. The phenolic components in the extract, which showed considerable biological activity, were subsequently analyzed using HPLC-DAD. DPPH, CUPRAC, and FRAP techniques were used to examine the antioxidant properties of plant' extracts. The extracts' anticholinesterase,cytotoxic, anti-urease and antimicrobial activities were determined using the Ellman, MTT, Indophenol and Agar well diffusion techniques, respectively. The phytochemical content of the potent extract was analyzed by HPLC-DAD. It was determined that the methanol extract obtained from the plant showed the strongest antioxidant activity when compared to the other extracts. Also it was assesed that petroleum ether extract had the highest enzyme inhibition potential compared to other extracts. Additionally, it was determined that all of the *Thymus longicaulis* subsp. *longicaulis* var. *subisophyllus* extracts had antimicrobial activity against *Enterococcus faecalis, Staphylococcus epidermidis* and both *Staphylococcus aureus* species. Besides while bothethyl acetate and methanol extractsexhibited antimicrobial effect against *Acinetobacter baumannii* and also the methanol extract had effect against *Proteus mirabilis*. Furthermore,in this study the ethyl acetate extract of *Thymus longicaulis* subsp. *longicaulis* var. *subisophyllus* was found to have high cytotoxic activity.

Keywords: *Thymus longicaulis* subsp. *longicaulis* var. *subisophyllus*, antioxidant activity, antimicrobial activity, enzyme inhibition activity, cytotoxicactivity

ORAL PRESENTATIONS

MICROBIOLOGY SESSION

Environmental factors on biofilm production of clinical human pathogens

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Abstract

Biofilm formation enhances the pathogenesis of microorganisms and leads to persistent infections because of the resistance to the antibiotics and human immune system. This study molecularly identified eight human clinical isolates by maximum likelihood and Bayesian analyzes and examined their biofilm-forming ability at different temperatures (24 and 37°C), pH values (pH 5.5, 7.5, and 8.5), and ferric chloride concentrations (0, 5, 10, 30, 50, and 100 µM) using crystal violet staining method. Biofilm production was higher at 24°C compared to 37°C in all strains. With the exception of the strains-*Klebsiella pneumoniae* SB1 and *Pseudomonas aeruginosa* SB1, biofilm production at lower temperature was significant ($P<0.05$). The pH and iron experiments were conducted at 37°C. In the pH experiments, *Escherichia coli* SB1/SB2, *Staphylococcus aureus* SB1 strains formed significantly more biofilms at pH 5.5 ($P<0.05$). These strains might increase their survival ability in the host by forming biofilms in the acidic environment of the stomach. Biofilm production by *K. pneumoniae* SB1 and *P. aeruginosa* SB1/SB2 strains was significantly higher at pH 8.5 ($P<0.05$). These pathogens might increase their pathogenicity by biofilm formation in alkaline environments of the human body. Elevated levels of iron inhibited biofilm formation in *E. coli* SB1/SB2, *K. aerogenes* SB1, *P. aeruginosa* SB1/SB2 strains and enhanced biofilm production in *K. pneumoniae* SB1, *E. faecalis* SB1, and *S. aureus* SB1. A strong positive correlation was found between biofilm formation, growth rate, and iron levels in *K. pneumoniae* SB1, *E. faecalis* SB1, and *S. aureus* SB1 ($P<0.05$). The excessive amount of iron especially in patients with hemochromatosis might drive these three strains to produce more biofilms in the human host.

Keywords: Temperature, pH, iron, biofilms, acidic

Microbial diversity in the environment: Molecular approaches for analysis

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Abstract

Microorganisms are abundant in the environment and they play crucial roles in nature. They are involved in the cycles of organic and inorganic matter on Earth. They can live in a broad range of environments such as soil, aquatic environments, volcanic areas, high alkaline or acidic areas, air, animal body, etc. Due to their importance in the continuation of the life, microbial populations are widely studied for many years. While first examinations were based on culture dependent techniques, as the molecular approaches are developed, culture independent techniques such as 16S rRNA, FISH, RFLP and DGGE analysis have started to be conducted. Today, next generation technologies based on DNA sequences give us comprehensive information not only about the diversity, but also the functional role of microbes within any given habitat. In this study, these molecular analysis techniques are discussed to present a brief state of the art.

Keywords: Microbial diversity, culture independent analysis, DNA sequencing

Hazelnut storehouse diseases and their control in some hazelnut storehouses in Fatsa District of Ordu Province

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Abstract

This study was carried out to determine the hazelnut storage diseases in some hazelnut storehouses in Fatsa district of Ordu province in 2018. PDA (Potato Dextrose Agar), WA (Water Agar) media were used for the isolation and development of disease agents. After 5-7 days of incubation at 24±1°C, the mycelium agar discs cut from the ends of the developing colonies were transferred back to the medium and subcultures were obtained. Among the shelled hazelnut samples taken, agents of *Fusarium* spp., *Botryospheria* spp., *Alternaria* spp. have been identified. The agent develops on the tree in nutshell in the garden before harvest and fungal development increases throughout the harvesting process. Factors such as storage in unsuitable conditions, high storage temperature, delaying the post-harvest drying process and placing the product in plastic bags accelerate fungal growth. For this reason, it is necessary to increase the amount of carbon dioxide (CO2) in the environment above a certain limit, to dry quickly and to reduce the water content in the fruit to stop fungal activities. In addition, harmful insect and fungus activities increase in a plant under stress and it becomes more susceptible to infections. Drought is one of the stress factors.

Various precautions should be taken before, during and at the end of harvest in order to prevent fungal growth. Especially suitable harvest time, drying and temperature are become more important for prevention of fungal development.

Keywords: Storage, hazelnut, post-harvest disease, fungi

Enhancement of amino acid catabolism by microbial action during solid-state fermentation using the composite waste product: amino acid degradation in relation to volatile compounds character

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Abstract
In accordance with particular amino acids adjustment for livestock, energy intake and expenditures are also required to consider to select an effective and productive flock. The use highly palatable feedstuffs chicken feathers and soybean as animal feed is an old practice because of its availability and protein content. In this study, optimized mixed substrates from solid state fermentation (SSF) with an inoculum of LU11 (hereafter, mixed11) were used to investigate the amino acids (AA) content. Individual CFP and okara were treated with LU11, and composite substrates without inoculum (hereafter, CFP11, okara11, and mixedC, respectively) from SSF were also investigated to compare as it is conventionally used. Total essential AA contents were found to be 28.74% in mixed11, 23.62% in mixedC, 7.61% in Okara11, and 17.48% in CFP11. Methionine is an important AA for feed which was found to increase in CFP11 0.62%, okara11 0.37%, and in control 0.69%, while mixed11 showed 1.09%. Sulfur-containing amino acid (SCAA), cysteine, in CFP11 and okara11 were 9.26% and 0.13%, respectively, which decreased to 6.14% in mixedC and SSF with LU11 (mixed11) it showed 7.04%. GC-MS analysis showed an effective action of LU11 to reduce malodorous compounds, which also indicates the elimination of toxic nitrogen from amino acids compounds. Hence, mixed11 showed convincing results than the other samples; PCA also showed the statistical accuracy of the model (PC scores for amino acids 95.03% and volatile compounds 80.97%). In summary, the mixed11, with its balanced amino acids and low volatile compounds, could be considered an excellent non-poultry livestock feed.

Keywords: Amino acids, catabolism, correlation, principle component analysis, volatile compounds

Determination of *in vitro* sensitivity of *Pseudocercospora griseola*, the causative agent of bean angular leaf spot disease to some fungicides

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Abstract

Angular leaf spot disease in beans is one of the diseases that cause significant damage to bean production in the world and in Turkey, especially in the Black Sea Region. The aim of this study is to determine the sensitivity of *Pseudocercospora griseola*, which is the causative agent of leaf spot disease in bean, to some fungicides with different mechanisms of action from different chemical groups such as nitro compound, benzimidazole, triazole, strobulurin and dithiocarbamate. For this purpose, tissue pieces of diseased plants collected from greenhouses were incubated in the dark at 24°C for 14 days in PDA, MEA and V-8 medium. As a result of the morphological and molecular diagnosis of growing cultures, it was found that all isolates were *Pseudocercospora griseola* f. *griseola*. Pathogenicity tests were conducted, virulence levels of the isolates were determined and one of the 15 isolates with the highest virulence was chosen randomly and the experiments were carried out with PG1 isolate. The susceptibilitiy of *P. griseola* PG1 isolate to 7 different fungicides have been demonstrated by conidial germination trials *in vitro*. As a result of studies, it was determined that Difenoconazole, azoxystrobin and mancozeb fungicides have the highest effect.

Keywords: Bean, phytotoxicity, germination, emergence, fungicides, Pseudocercospora, sensitivity

Fungal diversity of some important disease agents in vineyard

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Abstract
Grapevine (*Vitis vinifera*), which has a rich biodiversity, is an important plant that is grown economically in the northern and southern hemispheres of the world. It is widespread around the world and has an old history and culture, as it is economical in terms of grape yield, rich in terms of different usage forms and variety, and not very selective in terms of climate and soil requirements. Türkiye also has a rich vine gene diversity and an ancient viticulture culture, in addition to being one of the places with the most favourable climate zone in the world in terms of viticulture. Viticulture, which has an important place in Türkiye's agriculture, is faced with many problems in the process from production to marketing. Among these problems, fungal diseases, which increase in importance day by day in all countries where viticulture is carried out, and limit the production of grapes with their economically damage, have an important place. In fungal biodiversity of grapevine some important diseases, leaf and fruit fungal diseases (downy mildew, powdery mildew, gray mold, dead arm), grapevine trunk diseases (Petri disease, Black foot, Botryosphaeria cancer and etc. will be given initially in this review. Information will be given about the identification of agent, defination of diseases, their occurrence and distribution in the country and management of them.

Keywords: Grapevine, vitis, fungal diseases, trunk disease, leaf diseases

Bacterial biodiversity in bean production areas

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Abstract
This study was carried out in the provinces of Ankara, Konya, Eskişehir, Niğde and Burdur which covers approximately 70% of bean production nationwide. The survey carried out on a total area of 25,588 hectares, plant samples were collected from 110 different locations representing these provinces. 343 endophytes, 45 epiphytes and 48 rhizosphere bacteria were isolated from these samples. A total of 436 isolated bacterial isolates were grouped as beneficial (antagonist and plant growth promoting), harmful (pathogen) and neutral. 131 endophytic, 18 rhizospheric and 14 epiphytic bacterial isolate, which were beneficial, evaluated as plant growth promoting and antagonist. A total of 163 bacterial isolates were selected for identification as genus and species by using MALDI-TOF. 51 different bacterial species were isolated belonging to 13 different genera. Although the majority of these isolates are consisted by Bacillus, Arthrobacter and Pseudomonas genera, bacterial isolates from Azotobacter, Microbacterium, Achromobacter, Acinetobacter, Rhizobacter, Stenothropomonas and Enterobacter genera were also included in the collection. When the plant growth promoting properties of bacterial isolates were examined, it was determined that beneficial bacteria promoted plant growth by 10-33% compared to bean plants that were not treated with beneficial bacteria. When we look at the preventive properties against plant diseases, it was determined that beneficial bacteria prevented the emergence of Bean Halo Blight, which causes significant economic losses in bean production areas, 63% higher than control (diseased) plants and 75% higher than the plants applied with the comparison pesticide. With this study, it has been shown that many bacterial species belonging to different genera obtained from the roots, stems, leaves and fruits of bean plantations, play a very important role during plant development and in the development of response and resistance to disease factors. It has been revealed that the bean plant has very rich and important resources in terms of microbial biodiversity.

Keywords: Bacteria, bean, PGPR, antagonist

Microbial community composition of subsurface isolates

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Abstract
Although the subsurface is not as rich as microorganisms, genetic analysis of organisms adapted to this environment is important. Soil/crushed rock samples were collected with a drilling machine from 24 m below the soil. Core machining was done using a rotary drill rig with some recommended precautions to minimize external contamination. Samples in contact with the drill were discarded due to contamination. Samples were collected into sterile bags and tubes. To prevent loss of microbial diversity, collected samples were immediately frozen in situ using dry ice and then stored in storage at -80°C. Due to the expected decreasing bacterial population 24 m below the surface, genomic DNA was isolated by different isolation methods. A 16S rRNA gene library was constructed to evaluate the existing bacterial community present in the isolates. For this purpose, universal bacterial 16S rRNA gene-specific reverse primer 1492R1 (5-TGA CTG ACT GAG GYT ACC TTG TTA CGM YTT-3) and forward primer 530F (5-TGA CTG ACT GAG TGC CAG CMG CCG CGG-3) were employed. . The bacterial ribosomal gene sequences were analysed using the Basic Local Alignment Search Tool (BLAST) function at the National Centre for Biotechnology and Information (NCBI) website using the available DNA databases. It was found that the microbes present in this bacterial community were closely related to genus Bacillus spp. The nucleotide sequences generated for the 16S rRNA genes were deposited in GenBank under accession numbers JN937581, JN937582, JN937583, JN937584, JN937585, and JN937586.

Keywords: Microbial community, biotechnology, 16S rDNA

Identification, characterization, pathogenicity and prevalence of fungal disease agents and pests in *Medicago sativa* L. in Turkey

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Abstract

This study was carried out between 2015 and 2016 in order to determine the fungal disease agents in alfalfa in Zonguldak and Bartın provinces. Alfalfa samples were collected from the fields in the surveyed provinces. Fungi were isolated from diseased plants, pathogenicity tests of the obtained isolates were carried out, and the isolates were identified both morphologically and molecularly. In the result of the study, plant pathogenic fungal species, *Stemphylium vesicarium*, *Alternaria alternata*, *Alternaria petroselini*, *Fusarium oxysporum*, *Fusarium chlamydosporum*, *Fusarium solani*, *Fusarium equiseti*, *Macrophomina phaseolina*, *Epicoccum nigrum*, *Sclerotiorum rolfsii*, *Rhizoctonia solani* AG-4, *Rhizoctonia solani* AG-K, *Pseudopeziza medicaginis*, *Leptosphaerulina trifolii* ve *Neoascochyta paspali*, were obtained from alfalfa samples. *Acyrrthosiphon pisum* (Harris), *Aphis gossypii* Glover, *Therioaphis* (*Pterocallidium*) *trifolii* (Monell) (Hemiptera: Aphididae), *Subcoccinella vigintıquatuorpunctata* (L.) (Coleoptera: Coccinellidae), *Gonioctena fornicata* (Brüggem) (Coleoptera: Chrysomelidae), *Hypera variabilis* Hebst. (Coleoptera:Curculionidae) harmful species have been detected in the clover areas examined. *S. vigintiquatuorpunctata* and *G. fornicata* were found to be 100% common in all clover areas studied.

Keywords: *Medicago sativa*, survey, disease, fungi, pests

ORAL PRESENTATIONS

ZOOLOGY & ENTOMOLOGY SESSION

Investigation on Karakaya basin ornithofauna

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Abstract
This research, which is the first study on the Karakaya Basin on the ornitho-fauna, was carried out in a 12 month period in 2019. In the research carried out to reveal the bird species and their distribution in the area, transect and point count observation methods were used to determine bird species. Observations were carried out at 1-2 day intervals per week. Observed species have been described using birds of Turkey guidebooks. As a result of the observations, from 53 families belonging to 21 orders; 181 bird species have been identified. Distribution of bird species according to orders, Grebes (Podcipediformes), Pelicaniform (Pelecaniformes), Cormorants (Suliformes), Storks (Ciconiiformes), Flamingos (Phoenicopteriformes), Anseriform (Anseriformes), Accipiteriform (Accipiteriformes), Falconiform (Falconiformes), Galliform (Galliformes), Gruiform (Gruiformes), Charidriiform (Chadriiformes), Sandgrouse (Pteroclidiformes), Columbiform (Colombiformes), Cuculiform (Ferculiformes), Owls (Strigiformes), Nighjars (Caprimulgiformes), Apodiform (Apodiformes), Coraciiform (Coraciiformes), Bucerotiform (Bucerotiformes), Piciform (Piciformes), Passeriform (Passeriformes). The results of the research indicate that the Karakaya Basin is a leading ornithological region for Turkey. In addition, the species diversity and population densities may also increasing as a result of the effects of global climate change in the region.

This study was supported by the Scientific Research Projects Unit of İnönü University (*Project no: FYL-2020-1988*).

Keywords: Ornithofauna, birds, Karakaya basin

Amphibian fauna of Mersin province (South Anatolia, Turkey)

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Abstract

The main aim of this study is to reveal the amphibian fauna of Mersin Province. Field excursions (total 50 days of fieldwork) are conducted between March 2017 and June 2018. Field studies have been completed by performing at least one fieldwork in each of the 1/25.000 scaled 142 sheets, covering the whole of the province. As a result of this survey, total 9 amphibian species from 4 families (Salamandridae, Bufonidae, Hylidae and Ranidae) are determined. Two urodelan (salamanders and newts) species (*Salamandra infraimmaculata* subsp. *orientalis* and *Ommatotriton vittatus* subsp. *cilicensis*) and seven anuran (toads and frogs) species (*Bufo bufo, Bufotes viridis, Hyla orientalis, Hyla savignyi, Pelophylax bedriagae, Rana macrocnemis, Rana holtzi*) are found in Mersin Province. One of these species (*Rana holtzi*) is endemic to Bolkar Mountains of Turkey at species level but some of the authors consider this taxon as subspecies or synonym of *Rana macrocnemis*. Also, both abovementioned urodelans are endemic to Anatolia at subspecies level. *Rana holtzi* is listed as critically endangered (CR) while *Salamandra infraimmaculata* as near threatened (NT) by the IUCN. All taxa have been recorded from several new localities in Mersin Province. The taxonomic status and distribution of *Bufo bufo* in Southern Anatolia is still debated. Southern populations of *Bufo bufo* included to *Bufo verrucosissimus* recently, which is actually distributed in North-western Anatolia and Caucasia. The parapatry of the two Tree Frog species (*Hyla orientalis* and *Hyla savignyi*) is also confirmed in Anamur district. The provincial distribution, ecology and threat assessment of the amphibians of Mersin Province have been re-evaluated.

Keywords: Amphibian, fauna, biodiversity, distribution, Mersin

Endocrine chemicals as life threatening issue

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Abstract

Environmental chemicals have significant impact on biological systems. Endocrine disruptors are chemicals that may interfere with the body's endocrine system and produce adverse developmental, reproductive, neurological and immunological effects in both humans and wildlife. Endocrine disruptors enter the air or water as a byproduct of many manufacturing and chemical process and when plastics and other materials are burned. For over 70 years, scientists have reported that certain synthetic and natural compounds could mimic natural hormones in the endocrine systems of animals. These substances are now collectively known as endocrine-disrupting compounds (EDCs), and have been linked to a variety of adverse effects in both humans and wildlife. A wide range of substances, both natural and man-made, are thought to cause endocrine disruption, including pharmaceuticals, dioxin and dioxin-like compounds, triclosan, polychlorinated biphenyls, DDT and other pesticides, and components of plastics such as bisphenol A (BPA) and phthalates. EDCs are found in many everyday products – including plastic bottles, metal food cans, detergents, flame retardants, food additives, toys, cosmetics, and pesticides. Exposure to EDCs is more dangerous if it occurs during specific "critical periods" of life, such as intrauterine, perinatal, juvenile or puberty periods, when organisms are more sensitive to hormonal disruption, than in other periods. However, exposure to EDCs in adulthood also can alter physiology. Several This paper focus on the effect of endocrine disruptors in various groups of organisms including human beings.

Keywords: Accumulation, Bisphenol A, EDC, endocrine disruptors, phtalates, xenoestrogens

Preliminary contribution to the knowledge of wild bees in Tunisia (Hymenoptera: Apoidea)

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Abstract

Pollinators are important elements for the durability and the conservation of the terrestrial ecosystem. Insects belonging to Hymenoptera order specifically to Apoidea superfamily have a crucial role in the pollination and about 70% of cultivated plants worldwide directly depends on wild bees. In this study a preliminary contribution to the knowledge of wild bees in Tunisia is provided. It is based on the examination of specimens collected from different regions in Tunisia between 2017 and 2021 using entomological nets. Collected specimens were identified using identification keys found in literature. As result, a total of 572 specimens were collected from 39 delegations belonging to 15 provinces in Tunisia. 29 genera belonging to four families: Andrenidae (two subfamilies, four genera), Apidae (three subfamilies, six genera), Colletidae (two subfamilies, two genera), Halictidae (four subfamilies, eight genera) and Megachilidae (one subfamily, nine genera) were identified. The genus *Hylaeus* Fabricius, 1793 is the most collected genus with 155 specimens. Some diagnosis morphological characters used in genera identification were given and illustrated by digital photographs.

Keywords: Distribution, diversity, morphology, pollinators, Tunisia, wild bees

A contribute to the knowledge on mite diversity in Turkey: *Rhinothrombium nemoricola* (Acari: Tanaupodidae)

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Abstract
Mites are predators, parasites, herbivores and detritivores. The Parasitengona (Acari: Prostigmata) constitute one of the most diverse taxa among the Acari with respect to species richness as well as with respect to inhabited biotopes and realised life styles.Velvet mites (Trombidioidea) are found all over the world except in the antarctic region and their habitats range from hydric to xeric biotopes. Tanaupodidae Thor, 1935 are among the 16 families presently recognised within the Trombidioidea. The family Tanaupodidae includes about 8 genera and about 23 species worldwide. The fauna of Turkey represents with only 3 known tanaupodid species. All species included are rather rare, their biology remains almost unknown. *Rhinothrombium* is exclusively known from montane areas. Species of Tanaupodus inhabit lowlands and seem confined to hygric biotopes. *Rhinothrombium nemoricola* (Berlese, 1886) is the first report of the species from Turkey by this time. The mite specimens were collected in the mossy soil and litter layer in Erzincan and Tunceli provinces of Turkey. The following collecting methods were used: hand collecting and extraction in Berlese funnels. Examined material was preserved in 70% ethyl alcohol and cleared in 9% KOH. Measurements were taken in micrometers (µm) and drawings were made under an Olympus BX63 microscope with differential interference contrast (DIC). Short descriptions of *R. nemoricola* were made and their distributions in the world were given. In this study, we aimed to contribute to biodiversity of Turkish acari fauna.

This study was supported by the Scientific Research Foundation of Erzincan Binal Yıldırım University, research project number FYL-2022-837.

Keywords: Acari, biodiversity, distribution, first record, parasitengona.

Biological diversity on velvet mites (Acari) of Ergan Mountain (Erzincan)

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Abstract
The aim of this study is to contribute to Turkey's mite biodiversity. In this study, summarizing the current state of knowledge of the diversity and distribution of velvet mites in 5 environments in Ergan Mountain of Erzincan. Habitat information of these species and their distribution both in the world and in our country are given. The species were collected from different underwood litter, grassy soils by the Berlese funnels. Samples were taken at different times in the same previously determined areas, close to Ergan Mountain, Erzincan, Turkey. The studies were mostly concentrated in Ergan ski resort (Ardıçlı lake). Up to date, 15 species are definitively identified from a total of 213 taxa with 10 known genera, reinforcing the notion of a rich biodiverse area. The most abundant genera are *Trombidium* and *Atractothrombium*. The highest number of individuals was seen with the grassy soil collected from the plateaus, *Eutrombidium locustarum* (Walsh, 1866). The genus *Allothrombium* had found near agricultural land. The species with the largest home ranges were show that the taxonomic knowledge must be improved for the region. It has been observed that the diversity of species and the number of individuals belonging to the species decrease in the ski resort where tourism is increasing day by day.

Keywords: Acari, distribution, Ergan Dağı, parasitengona, trombidioidea

Herpetofauna of Elazığ province

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Abstract
This study aims to determine the amphibian and reptile species distributed in Elazığ province, eastern Anatolia, Turkey. For this purpose, 40 days herpetological trips were taken between 2017 and 2018. Observation studies were carried out in 219 different localities. A total of 6 amphibian and 28 reptile species were observed in this study, including two urodel, four anur, two chelonia, 11 lizard, and 15 snake species. *Bufotes viridis, Salamandra infraimmaculata, Blanus alexandri, Dolichophis jugularis, D. schmidti, Eirenis eiselti, E. thospitis, Eryx jaculus, Malpolon insignitus, Telescopus fallax* and *Rhynchocalamus satunini* were recorded for the first time Elazığ province with this study. Two of these species (*Neurergus strauchii, B. alexandri*) are endemic to our country.

Keywords: Herpetofauna, diversity, distribution, new record, Elazığ

Translational biodiversity: Harnessing the venoms of Anatolian vipers in search of new bioactive molecules

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Abstract

Translational biodiversity can be defined as converting the results of the basic biodiversity research into outputs for human benefit. One good example of translational biodiversity context is venom research. Animal venoms mainly consist of peptides and proteins and great sources of bioactive molecules with diverse pharmacological activities. Research on animal venoms resulted in the development of approved new drugs and diagnostic tests, and many other promising venom peptides or proteins are under investigation. Snake venoms, the most studied animal venoms among others, includes various enzymes, non-enzymatic proteins and peptides as main constituent. Anatolia is a biodiversity hotspot, sheltering many endemic flora and fauna species. It has also great potential for venomics with many undiscovered venoms from different species. In this presentation, research on the venoms of Anatolian vipers especially during the past ten years will be summarized and the latest (with some unpublished) results from our research group will be presented. As a result of the past and ongoing studies, venomic characterization of many Turkish vipers was achieved and data was collected regarding their basic biological and biochemical activities (eg. cytotoxicity, antimicrobial activity, enzyme activities). Moreover, their effect on blood coagulation cascade, platelet aggregation and angiogenesis are under investigation and the results of these studies revealed the antiplatelet, anticoagulant, antiangiogenic and fibrinogenolytic activities of these venoms.

Keywords: Bioactivity, biotechnology, characterization, protein, viper, venom

Larvae co-occurrence of bufonid and ranid frogs in the same breeding water bodies in Northeastern Turkey

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Abstract

Determination of the process constructing the spatial patterns of species co-occurrence is a vital point in ecology and biodiversity due to understanding the effect of environmental conditions and climate change. From this aspect, the sympatry of species has become a main interest in ecology. Most of amphibians show biphasic life cycle with aquatic eggs and larval period to terrestrial adults defined by metamorphosis. The genus *Bufo* is including terrestrial species and their breeding is generally characterized by lentic water bodies such as temporary or permanent ponds, slowly running shallow pools and small mountain creeks and streams with fish presence whereas most of the ranid frogs are typical pond breeders. In this study, we observed the larvae of bufonid and ranid species in the same small and temporary water bodies in the border of Rize and Artvin provinces during the survey between May-June 2021. Although it is known that the larvae of these groups differed in habitat use regarding aspects of the physical environment, the community structure including co-occurrence of different species can be associated with abiotic conditions, competition, and predation risk. Moreover, the distinct species may breed in the same temporary ponds due to the resilience of larval period under certain climatic conditions. The Caucasus hotspot which is including northeastern Turkey is one of the 34 hotspots on Earth with high level of biodiversity and the region serves as a unique settlement for most of the amphibians in view of climatic conditions and excessive humidity. Therefore, we assume that the presence of different larvae in these water bodies can be relevant to climate as well as habitat characteristics.

The study was supported by RTEU BAP with the grant number FBA-2019-1047.

Keywords: *Bufo verrucosissimus*, spawning, Caucasia, ecology

The relationship among heavy metal content, age and body size of the Marsh frog, *Pelophylax ridibundus* in samples from İstanbul Province, Turkey

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Abstract
Amphibians, which have the potential to live in both aquatic and terrestrial environments, are important as an indicator of pollution levels in these areas. In this context, we studied age structure and it's relationship with the concentrations of some trace elements (As, Cd, Co, Cr, Cu, Ni, Pb, Zn, Mn) in the edible tissues (muscles) of an amphibian species by sampling from a frog farm in Turkey. For this purpose, we obtained 23 individuals from a frog farm in Istanbul, Turkey. We determined age using the skeletochronological method, which is considered to be one of the most reliable methods for determining the age of amphibians. Considering the age distribution of the population in İstanbul, it was observed that the oldest individual was a 12-year-old female. Body size ranged from 45.96 mm to 103.25 mm (mean: 75.90 mm). Pearson's correlation analysis showed that body size was positively correlated with age ($r = 0.714$, $p < 0.05$), which is a situation common for most amphibians. However, we couldn't find a correlation between the metal levels of the specimens we examined and their age or body size (Pearson correlation, $p > 0.05$). According to the results, it was concluded that heavy metal accumulation is not directly related to age and body size for İstanbul samples of the marsh frog.

Keywords: Amphibians, bioaccumulation, life-history, skeletochronology, SVL, trace element

Mammalian Paleodiversity of Late Miocene Özlüce (Muğla) fauna

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Abstract
Özlüce Fossil vertebrate locality is located 1km north of Özlüce Village which is located about 35 km NW of Muğla. The excavations and field surveys were conducted in 1993 under the scientific consultation of Prof. Dr. Berna Alpagut, together with Muğla Museum Directorate. The excavations had started in 1994 with the financial support and authorization of Ministry of Culture and Tourism. Since 2000, paleontological studies under the title of "Turolian Park Project" have been continued under the supervision of Muğla Archaeology Museum and the faunal collections has been exhibited in "Dr. Lale Aytaman Department of Natural History" section of the museum. In September 2021, with the support of the Ministry of Culture and Tourism, the excavation was restarted. During the excavation, conservation and preliminary taxonomic studies of the catalogued fossils were also carried out. By this preliminary systematic study, diversity of fauna has found to be composed of: Rhinoceratidaeae (27.7%), Proboscidea (27%), Equidae (20.5%), Bovidae (13.5%), Graffidae (10%) and Carnivora 1 (1%). As the dietary adaptations in fossil ungulate families are variable, bovids have in general retained relatively specialized grazers which is reflected in their mostly high-crowned (hypsodont) dentitions. However, rhinoceroses and giraffids, which are also recorded in Özlüce as Chilotherium and Paleotragus respectively, have mostly retained browse dominated diets and brachydont dentitions. Proboscideans are represented by Choerolophodon in Özlüce was adapted to open environments and had foraged mostly on grasses and other monocotyledonous herbs. Studies of paleoecological reconstructions from this region indicate that during the early Late Miocene, woodland animals started to disappear and replaced by animals adapted to more open and dry habitats while Turolian habitat was even more open and drier. Palaeoenvironmental proxy data of Özluce fauna corroborate this hypothesis as the general of fauna indicates the dominance of open woodland conditions, observed in Early Turolian habitats.

Keywords: Faunal diversity, paleoecology, paleoenvironment, Özlüce, Late Miocene

Demonstration of the antioxidant effect of *Plantago major* leaf extract on the invertebrate model organism *Galleria mellonella*

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Abstract

Medicinal and aromatic plants have contributed to the identification and development of the active ingredient of many drugs for various treatments. In particular, medicinal plant-derived natural products and their supplements are currently one of the most frequently used sources for obtaining valuable therapeutic agents. *Plantago major* is used therapeutically and spreads widely in the world. It is known that this plant has anticancer, immunomodulatory, antibiotic, antifungal, antiviral, antioxidant, antimutagenic and diuretic properties. Antioxidant enzymes play a critical role in the removal of oxygen radicals that arise as a result of metabolism and immune activities. Invertebrate model organisms are increasingly preferred in immunoassays due to their low maintenance costs, their ability to be produced in large quantities in a short time, and their low physical needs. *Galleria mellonella* is an invertebrate model organism that has been more preferred in recent years in immune studies and especially in determining the effects of human pathogens. Comparing the data obtained from this organism with the data obtained from mammalian models, obtaining healthy data from the invertebrate model *G. mellonella* at least as much as mammalian models is one of the leading factors in its preference in experiments. In our study, the effect of *P. major* methanolic leaf extracts on *G. mellonella* catalase (CAT), superoxide dismutase (SOD) and malondialdehyde (MDA) levels was determined. Different doses (20 – 200 mg mL^{-1}) of *P. major* were injected to larvae with microsyringe. After 24h, the hemolymph was collected from larvae to determine enzyme activity with a microplate reader. According to our results, *P. major* extract caused a decrease SOD activities and MDA levels in *G. mellonella* larval hemolymph at all doses, but did not cause any effect on CAT activities.

This work was supported by the Scientific Research Coordination Unit, Çanakkale Onsekiz Mart University (Project number: FBA-2020-3251).

Keywords: *Plantago major*, *Galleria mellonella*, CAT, SOD, MDA

Amphibian and reptile species of Haspolat Wastewater Treatment Plant and surroundings in Northern Cyprus

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Abstract
Northern Cyprus herpetofauna; is represented by three amphibians, three turtles, 11 lizards, and six snake species. This study aims to determine the amphibian and reptile species of the Haspolat Wastewater Treatment Plant and its immediate surroundings, defined as an Important Bird Area. In addition to being an important bird area, detecting other fauna elements in the region is essential in considering the ecosystem holistically. The study will also reveal the species richness of the site, which will form a basis for future conservation activities. This study was carried out in the Haspolat Waste Water Treatment Plant region between 2010 and 2021. During the field studies, amphibian and reptile species found in the area were determined. The study was carried out in 4 different seasons: spring, summer, autumn, and winter. Line counting and visual encounter methods were used within the scope of the study. Species determined along the lines were noted, and the amphibian and reptile list of the area was recorded. Within the framework of the determined method, three amphibians (*Pelophylax cypriensis*, *Bufotes cypriensis*, *Hyla savignyi*) one semi-aquatic turtle (*Mauremys rivulata*), eight lizards (*Mediodactylus kotschyi fitzingeri*, *Hemidactylus turcicus*, *Laudakia cypriaca*, *Chamaeleon chameleo recticrista*, *Eumesces schneideri*, *Phoenicalacerta troodica*, *Ophisops elegans schlueteri*, *Chalcides ocellatus ocellatus*) and five snake species (*Xerotyphlops vermicularis*, *Dolichophis jugularis*, *Hemorrhois nummifer*, *Malpolon insignitus* and *Macrovipera lebetina lebetina*) were identified. Within the scope of the study, it was determined that the area is rich in amphibian and reptile diversity.

Keywords: Amphibians, birds, Haspolat, Northern Cyprus, reptiles, wetland

The autochthonous chicken breeds of Turkey: Ispenç and Sultan fowls

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Abstract

Local breeds have been displaced by highly effective commercial hybrid genotypes in Turkey and emerging nations because to rising protein requirements and fast population increase. This has caused significant genetic losses among livestock, especially in poultry species and breeds. The red jungle fowl, which is thought to be the evolutionary predecessor of chickens, was first domesticated in the Indochina region in the 6000s-8000s BC and subsequently brought to other continents by humans, according to the studies on ancient DNA. Anatolia is considered one of the world's most important biodiversity hotspots, with a key role in the migration of chickens from domesticated zones to other continents. Unfortunately, there is insufficient information regarding the biodiversity of poultry in Anatolia, despite its long history and vital geographic location. Only two chicken breeds have been recognized and designated as native breeds, Denizli and Gerze, which are named after the cities where they were reared. In actuality, this does not indicate that Turkey's poultry breeds have reached a genetic bottleneck. Although various indigenous chicken breeds have successfully adapted to different regions of Turkey, limited research have been conducted on their identification and morphological and genetic traits. The population status, morphological, and genetic characteristics of the Ispenç and Sultan autochthonous chicken breeds will be discussed in this paper. These breeds have very old origins and have been bred with interest by breeders in Turkey for many years but have not yet been registered as domestic chicken breeds.

Keywords: Poultry biodiversity, Ispenç, Sultan, autochthonous chickens

Acari of bats (Rhinolophidae) collected from Bursa Province, North-western of Turkey

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Abstract
In this study we examined a sample of 15 *Rhinolophus ferrumequinum* (7♀, 8♂) and 14 *Rhinophus hipposideros* (7♀, 7♂) for acari parasites from various locations in Turkey. We found two species of acari: *Eyndhovenia euryalis* and *Ixodes vespertilionis*. From them *Eyndhovenia euryalis* (1 ♀), *Eyndhovenia euryalis* (5♀, 2 Nymphs) and *Ixodes vespertilionis* (1 Nymph) were found in separately *Rhinolophus ferrumequinum* hosts. This bat species represents a new host record for *Ixodes vespertilionis* species of acari. Additionally animal species that in this study presents new locality records for Bursa province. The aims of this study are to determine the acari of some bats and contribution to biodiversity of Turkey fauna.

Keywords: Bats, acari, ectoparasite

In vitro cytotoxic effects of *Montivipera xanthina* crude venom and fractions on HUVEC cell line

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Abstract
Snake venom, secreted and stored in special venom glands, contains biologically active components such as enzymes, proteins, peptides, and low molecular weight compounds. Biological and organic materials are widely researched to find new generation agents for the treatment of various diseases such as autoimmune diseases, cancer, and cardiovascular disorders. Snake venom contents vary according to geographical regions, habitats, and climate. The study aims to investigate the cytotoxic effects of both crude venom and protein fractions of Ottoman Viper (*Montivipera xanthina*) collected from Turkey. Within the scope of this preliminary work, the effects of crude venom and fractions obtained by gel filtration chromatography on human umbilical cord endothelial cells (HUVEC) were examined by cell viability assay. According to the results of the chromatography, nine fractions were obtained from *M. xanthina* crude venom. HUVEC cells were treated with different concentrations of each fraction and crude venom in a range of 0.0625-12 µg/ml protein and incubated for 16, 48, and 72 hours. Percentage of cell viability and IC50 values were calculated for all time points. Percentages of cell viability decreased in a concentration and time-dependent manner for all fractions and crude venom. These results provide important preliminary data for our further studies including the potential usage of *M. xanthina* venom proteins in pharmaceutical and biomedical areas as an anti-angiogenic agent.

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Keywords: Snake venom, *Montivipera xanthina*, HUVEC cells, cytotoxicity

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