IConPB2025

4th INTERNATIONAL CONGRESS ON PLANT BIOLOGY

03-06 September 2025
DENİZLİ - TÜRKİYE

CONGRESS BOOK

"From genes to forests - understanding life through botany"

IConPB 2025

4th International Congress on Plant Biology

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Congress Book

Publishing Editors

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CONTENTS

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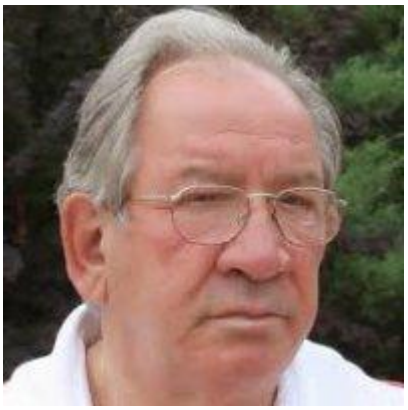
IN MEMORY OF
Prof. Dr. Yıldırım AKMAN
(1934-2025)



Professor Dr. Yıldırım Akman was born in 1934. He graduated from the Department of Natural Sciences at the Faculty of Science, Ankara University, in 1959 and began his academic career as an assistant in the Department of Botany the same year. As a UNESCO scholar, he continued his doctoral studies at the University of Montpellier in France, where he received his Ph.D. in 1962. After completing his military service between 1964 and 1966, he returned to Ankara University and, in 1968, went back to Montpellier with a French government scholarship to further specialize in plant ecology. He was promoted to Associate Professor in 1969 and to Full Professor in 1976.

Between 1977 and 1979, Prof. Dr. Akman served as the founding dean of the Faculty of Arts and Sciences at Selçuk University in Konya. He played a pioneering role in the development of plant ecology, vegetation science, biogeography, and bioclimatology in Turkey. Throughout his academic career, he conducted extensive research on steppe ecosystems of Central Anatolia, plant distribution patterns, plant–climate relationships, and ecological research methodologies. His studies made significant contributions to understanding the vegetation structure and floristic diversity of Türkiye. He also enriched the Herbarium Turcicum collection at Ankara University with numerous plant specimens.

Renowned for his scientific productivity, Prof. Dr. Akman authored several fundamental textbooks, including *Plant Ecology*, *Vegetation Ecology and Research Methods*, *Biogeography, Climate and Bioclimate*, *Steppe Vegetation of Central Anatolia*, and *Ecological Synthesis*. These works remain essential references in ecology and biogeography education in Türkiye. Fluent in French, he worked for many years as a faculty member at Ankara University's Faculty of Science and retired in 2001.

In recognition of his valuable contributions to Turkish flora, the endemic plant species *Sideritis akmanii* was named in his honor. Although various academic sources note that Prof. Dr. Yıldırım Akman has passed away, the exact date of his death has not been formally published. Married with two children, he is remembered as a distinguished scientist who left a lasting legacy in the field of botany in Türkiye.

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PREFACE

Dear Participants,

It was a great honor and pleasure to welcome all participants to the 4th International Congress on Plant Biology (IConPB2025), held in Denizli, a city renowned for its white travertines and listed as a UNESCO World Heritage Site. Scientific gatherings such as this congress serve not only as platforms for sharing knowledge but also as opportunities to establish professional networks, foster collaborations, and expand the frontiers of science. Botany, much like the story of life itself, spans from the roots beneath the soil to the canopy above. Plants are essential for human health, nutrition, ecological balance, and a sustainable future. Today, over 200 academics, researchers, and students from across Türkiye and around the world have come together to explore the field of botany. Through presentations, panels, and discussions, this congress aims to enrich our collective knowledge and contribute meaningfully to the scientific community.

Denizli is distinguished not only by its historical and cultural heritage but also by its unique natural beauty and biodiversity. I sincerely hope that participants will have the opportunity to appreciate the city's attractions alongside the scientific program. The 4th International Congress on Plant Biology continues a tradition that began in 2018 at Selçuk University in Konya. The second congress took place in 2019 at Ondokuz Mayıs University in Samsun, marking the centenary of Mustafa Kemal Atatürk's arrival in the city, while the third congress was organized in 2022 at Recep Tayyip Erdoğan University in Rize. This relay-style organization underscores our commitment to hosting future congresses in different regions of Türkiye.

This congress has been organized by Pamukkale University, in collaboration with the Flora Research Association, one of the most esteemed institutions in Turkish botany, and the Nezahat Gökyiğit Botanical Garden, a leading botanical institution in the country. I extend my sincere gratitude to Lect. S. Tuğrul Körüklü, President of the Flora Research Association, and Prof. Dr. Adil Güner, Director of the Nezahat Gökyiğit Botanical Garden, for their invaluable academic support and collaboration. I would also like to thank our Rector, Prof. Dr. Mahmud GÜNGÖR, for his unwavering support, and all members of the scientific committee, as well as the numerous institutions that contributed to the realization of this congress. Special appreciation is extended to all participants who have joined us despite demanding schedules, and to senior botanists from across the country who have traveled to be here, even after retirement.

I sincerely hope that this congress will be productive, inspiring, and enlightening for all attendees. As a scientist in the field of plant biology, I believe there remains much to learn from the silent yet profound language of plants. In conclusion, I wish the 4th International Congress on Plant Biology every success and extend my best wishes for a fruitful, healthy, and rewarding event.

Prof. Dr. Gürkan SEMİZ

Chair of the Congress

CLOSING DECLARATION

IV. International Congress on Plant Biology (IConPb2025)

Final Declaration

03–06 September 2025, Denizli – Türkiye

06/09/2025

Hosted by Pamukkale University and organized with the contributions of the Flora Research Society and the Nezahat Gökyiğit Botanical Garden, the "IV. International Plant Biology Congress (IConPb2025)" was successfully held in Denizli, renowned for the white travertines of Pamukkale, a UNESCO World Heritage Site, between **03–06 September 2025.**

The congress brought together **205** scientists from various regions of the world and many universities in Türkiye. A total of **87** oral presentations and **80** poster presentations were delivered. Research covering a wide spectrum of plant biology was shared under **17** thematic sessions:

Plant Taxonomy and Systematics (BS), *Plant Physiology and Biochemistry* (BF), *Plant Biodiversity* (BB), *Plant Ecology* (BE), *Plant Pathology* (BP), *Plant Morphology and Anatomy* (BMA), *Palynology* (P), *Plant Genetics* (BG), *Plant Chemistry* (BK), *Plant Sociology* (Vegetation) and *Syntaxonomy* (BSS), *Medicinal and Aromatic Plants* (TAB), *Ethnobotany* (E), *Invasive Plants* (IB), *Terrestrial and Aquatic Flora Studies* (F), *Plant Tissue Culture* (BDK), *Plant Production* (BU), and *Other Plant Biology* (DBB).

The congress also featured invited lectures by distinguished scientists. Presentations titled "**The Illustrated Flora of Turkey and Beyond**", "**Anatolian Biogeography: Understanding the Past, Predicting the Future**", "**The Endemic Anatolian Civilization: The Role of Anatolian Plants in Cultural Continuity and Interaction**", and "**Contributions to the Flora of Denizli from Past to Present**" attracted great interest.

The congress outputs highlighted the importance of conserving Türkiye's rich plant diversity, promoting endemic species, and ensuring the sustainability of biodiversity. It was emphasized that interdisciplinary approaches (such as molecular biology, ecology, ethnobotany) are gaining importance in plant biology research, and that global comparative studies are needed on the effects of climate change on plant ecology and biodiversity. The growing potential of medicinal and aromatic plants in the pharmaceutical and food industries was underlined, and opportunities for scientific exchange and networking were provided, especially for young researchers and students.

Mission: The main mission of the congress is to support research in plant biology, enhance the sharing of scientific knowledge, strengthen awareness of nature conservation, and connect young researchers with the national and international scientific community.

Vision: The vision of the congress is to make Türkiye and Denizli an international hub for plant biology research, to open scientific innovations to global discussion, and to highlight the importance of plant biology studies for a sustainable future.

Priority topics until the next congress include:

* Launching the activities of the "Türkiye Herbaria Network (TURKHEB)", established under Flora Research, nationwide and contributing to the dissemination of its intended initiatives,

* Monitoring and modeling the impacts of climate change on plant ecology, biodiversity, and agricultural production,

* Conducting detailed studies on the biogeographical, ecological, and economic aspects of invasive species spread,

* Prioritizing studies to identify plant vegetation in our country,

* Promoting the sustainable cultivation of medicinal and aromatic plants and enhancing their industrial potential,

* Preserving and documenting traditional knowledge through ethnobotanical research,

* Expanding the use of modern techniques such as biotechnology and tissue culture in plant biology studies,

* Organizing international student workshops and summer schools to support young researchers,

* Supporting nature conservation policies with scientific data and communicating them to the public,

* Recognizing that well-designed scientific research is reliable regardless of the language in which it is presented. Therefore, scientific presentations and publications in Turkish should be encouraged. Such encouragement would ensure that Turkish-language articles, publications, and presentations are evaluated based on their content rather than dismissed in academic promotion due to being in Turkish. Universities, the Higher Education Council (YÖK), and TÜBİTAK should take this into consideration. It must also be remembered that publishing research conducted with national resources in Turkish is a prerequisite for the direct benefit of the Turkish nation.

Conclusion:

The “IV. International Plant Biology Congress (IConPB2025)” has created a significant platform for sharing scientific data, fostering new collaborations, and discussing strategies for the future of plant biology. With the consensus of the participants, it has been acknowledged as a permanent scientific meeting point that should be held regularly at both national and international levels.

IConPB2025 Organizing Committee

CONGRESS PROGRAMME

03 September 2025 **Address: Pamukkale University, Prof. Dr. Hüseyin YILMAZ Congress and Culture Center – MAIN HALL**	
08:30-10:00	**REGISTRATION**
10:00-11:00	**OPENING CEREMONY & ILLUSTRATED FLORA OF TÜRKİYE EXHIBITION**
11:00-11:15	**Coffee break**
11:15-12:30	**INVITED SPEAKER: Prof. Dr. Adil GÜNER – Nezahat Gökyiğit Botanical Garden** ***Illustrated Flora of Türkiye and Beyond***
12:30-13:30	**Lunch (Pamukkale University Central Cafeteria)**
	Chairs: Prof. Dr. Kuddisi ERTUĞRUL – Prof. Dr. Tuncay DİRMENCİ
13:30-13:50	**Fusün ERTUĞ -** Ethnobotany of Buldan as a Pilot Project for the Biocultural Heritage
13:50-14:10	**Ali KANDEMİR -** Advantages and Disadvantages of Getting Nectar From Flowers Using Different Methods
14:10-14:30	**Golshan ZARE** - From Field to Flora: Scientific Plant Illustration
14:30-14:50	**Jaroslav DURKOVIC -** Defense Strategies of Forest Tree Species Against Harmful Pathogens: Comparative Insights from Fast-Growing Hybrid Poplar and Slow-Growing Sessile Oak
14:50-15:10	**Coffee break**
	Chairs: Prof. Dr. Ali KANDEMİR – Prof. Dr. Serdar MAKBUL
15:10-15:30	**Serdar Gökhan ŞENOL -** Current Status of *Phoenix theophrasti* (Datça Hurma Palm) Populations in Türkiye and Systematic Notes on *Phoenix theophrasti* subsp. *golkoyana*
15:30-15:50	**Kemal YILDIZ -** Taxonomic Status of Taxa Belonging to the Genus *Silene* (Caryophyllaceae) in the Flora of Türkiye
15:50-16:10	**Ozan ŞENTÜRK -** Is the Genus *Ebenus* L. Truly Polyphyletic?
16:10-16:30	**Emre ÇİLDEN -** The Genus *Iberis* L. (Brassicaceae) In Türkiye
16:30-16:50	**Aycan TOSUNOĞLU -** Allergenic Mercurialis Pollen; A Risk for the Eastern Mediterranean Basin?
16:50-17:10	**Emrullah YILMAZ -** Polygenic Discrimination of Leaf Morphotypes in Alpine *Heldreichia bupleurifolia* (Brassicaceae) Across its Natural Range

04 September 2025 **Address: Pamukkale University, Prof. Dr. Hüseyin YILMAZ Congress and Culture Center**			
	MAIN HALL	**HALL - A**	**HALL - B**
	Chair: Prof. Dr. Mesut KIRMACI	**Chair: Prof. Dr. Kemal YILDIZ**	**Chair: Prof. Dr. Ahmet AKSOY**
09:00-09:20	**Murat ÜNAL** Identification of Brassicaceae (Mustard Family) Spreading in Van Yüzüncü Yıl University Campus with the Help of Artificial Intelligence	**Arzu ÖZGEN** Molecular Docking Study on the Interaction of Pesticide Derivatives with Bacterial Enzymes	**Kübra DEMİRTAŞ** Important Invasive Plant Species in The Eastern Black Sea Region and Their Possible Effects on Tea Agriculture
09:20-09:40	**Volkan EROĞLU** Stigma Receptivity and Enzymatic Profiles Across APG-IV Angiosperms: A Comparative Evolutionary Study	**Handan KURTULMUŞ SANCAK** Antioxidant and Antimicrobial Activity of Ethanol and Ethanol/Water Extracts of *Evernia prunastri* Lichen	**Onur ALTINBAŞAK** An Ethnobotanical Study in Kocaeli Province
09:40-10:00	**Tuğkan ÖZDÖL** A Taxonomic Revision and Phylogenetic Relations of *Campanula* (Campanulaceae) subgen. *roucela*	**İlker DEMİRBOLAT** Chemical Characterization and Anticataractogenic Potential of Rose-Scented *Geranium* (*Pelargonium graveolens* L'Herit. ex Aiton.) Essential Oil	**Onur ESEN** Cytotoxic Effects of *Fritillaria imperialis* L. and *Fritillaria pinardii* Boiss. Extracts on A549
10:00-10:20	**Taner ÖZCAN** Phylogeny and Taxonomic Implications of *Ajuga* L. (Lamiaceae)	**Gülçin IŞIK** Ecophysiological Responses of Some Lamiaceae Species (*Mentha* x *piperita*, *Ocimum basilicum*, *Salvia officinalis* and *Thymus vulgaris*) to UV Light and Their Potential Uses in Astrobotanical Applications	**Sude TANIK** PGPB-Mediated Enhancement of Nickel Tolerance and Phytoremediation in Safflower
10:20-10:40	**Hayal AKYILDIRIM BEĞEN** DNA Barcoding of Medicinal-Aromatic *Satureja hortensis and Satureja spicigera* Species Naturally Distributed in Artvin	**Muhammad Shafiq SHAHID** Green Synthesis of Zinc Oxide Nanoparticles Using Peppermint Extract: Characterization and Antimicrobial Properties	**Seher YOLCU** Effects of Plant Growth Regulators on the Clonal Micropropagation of *Aloe vera*
10:40-11:00	**Coffee break**		
11:00-12:00	**INVITED SPEAKER: Prof. Dr. Hakan GÜR – Kırşehir Ahi Evran University** ***Anatolian Biogeography: Understanding the Past, Forecasting the Future***		
12:00-13:30	**Lunch (Pamukkale University Central Cafeteria)**		
	MAIN HALL	**HALL - A**	**HALL - B**
Chairs:	**Chair: Prof. Dr. Metin ARMAĞAN**	**Chair: Prof. Dr. Mehmet ÇİÇEK**	**Chair: Prof. Dr. Güven GÖRK**
13:30-13:50	**Jelena ERDAL** Conservation Assessment of Endemic *Festuca* L. Species in Türkiye: Current Status and Ongoing Efforts	**Fatma GÖÇ** Ethnobotanical Study of 72 Villages in Tokat Province	**Ömer SOLAK-AMET** Palynological Evaluation of Guano Contents in Two Different Caves in Bursa Province

13:50-14:10	**Mutlu GÜLTEPE** Fruit Anatomy of Turkish *Tragopogon* Species (Asteraceae) and Its Taxonomic Significance	**Şerife ERKOL** Genetic Diversity and Population Structure of *Gundelia* L. (Asteraceae) Revealed by SCoT Markers	**Zeynep TÜRKER** Taxonomic Evaluation of *Paronychia dudleyi* and *P. adalia* Based on nrDNA ITS Data in Türkiye
14:10-14:30	**Aycan TOSUNOĞLU** Atmospheric Cypress Pollen in S-Turkey	**Muhammet ÖZCAN** Preliminary Assessment of Vegetation Diversity, Species Richness, and Habitat Heterogeneity in the Valleys of the Armutlu Peninsula (Türkiye)	**Tuğba ERGİN** Towards the Development of a Micropropagation Protocol for Endangered *Stachys bayburtensis*
14:30-14:50	**Bilal ŞAHİN** Assesment the Vegetation Syntaxonomy of Türkiye According to the Existing Datas and Updated Developments	**Suzan KUNDAKÇI** Taxonomic Revisions of Turkish *Polygonum* L. Sensu Lato (Polygonaceae): Insights from New Biosystematic Evidence	**Tuğçe KIRCALI** The Effects of Smoke-Water, Karrikinolide, and Indole-3-acetic acid on Pollen Germination and Tube Growth in *Nicotiana tabacum*
14:50-15:10	**Ali Ramazan ALAN** Development of an Androgenesis-Based Doubled Haploid (DH) Protocol for Main *Brassica* Vegetables	**Başar SEVİNDİK** Investigation of Propagation Possibilities of *Paulownia tomentosa* in Plantform and SETIS Bioreactor Systems	**Uğur ÇATAK** The Bryophyte Diversity of Lapseki (Çanakkale) Mountains
15:10-15:30	**Coffee break**		
15:30-16:30	**INVITED SPEAKER: Hasan TORLAK – Ministry of Culture and Tourism of the Republic of Türkiye** ***Endemic Anatolian Civilization: The Role of Anatolian Plants in Cultural Coninuity and***		
16:30-17:45	**Flora Research Association-Türkiye Herbarium Network Committee Meeting**		
17:45-21:00	**Social Event: Trip to Pamukkale and Hierapolis ancient city**		

05 September 2025 **Address: Pamukkale University, Prof. Dr. Hüseyin YILMAZ Congress and Culture Center**			
	MAIN HALL	**HALL - A**	**HALL - B**
Chairs:	**Chair: Prof. Dr. Serdar Gökhan ŞENOL**	**Chair: Prof. Dr. Ali Ramazan ALAN**	**Chair: Prof. Dr. Yeşim KARA**
09:00-09:20	**İlayda DUMLUPINAR** Biogeographical Regions of the Brassicaceae Family in Türkiye	**İrem BEKRET** Traditional Uses of Boraginaceae Species in Turkey: An Ethnobotanical Assessment	**Tuğçe VAROL** Tissue-Specific Distribution of Bioactive Compounds in *Hedysarum* Species: Focus on Phenolics; Flavonoids; and Antioxidant Potential
09:20-09:40	**Ela Nur ŞİMŞEK SEZER** Phenolic Content and Bioactive Potential of Some *Sideritis* species from the Karaman Region	**Aybüke Kızılırmaklı DEMİR** First Vouchered Record of *Hyalopodium colchicum* (Albov) L. J. Gillespie & Soreng (Poaceae) from Northeastern Anatolia	

09:40-10:00	**Meryem BOZKURT** The Determination of Genetic Diversity in *Rhaponticoides gokceoglui, Rhaponticoides aytachii and Rhaponticoides wagenitziana Populations via Molecular Methods*	**Deniz CANLI** The Essential Role of Melissopalynology in Origin Verification of Geographically Indicated Honeys	**Kerem KILIÇ** Bioactive Compound Contents In Broccoli (*Brassica oleracea* L. var. *italica*)
10:00-10:20	**Mesut KIRMACI** The Bryophyte Diversity of Western Anatolia	**Gül AYYILDIZ** Conservation-Focused Evaluation of Genetic Diversity in the Rare Endemic *Aethionema turcica*	**Dila ÇANA** Flora of Beytepe Gendarmerie and Coast Guard Academy Campus (Ankara – Çankaya)
10:20-10:40	**Metin ARMAĞAN** The Variations of *Allium muratozelii* in different ecological conditions	**Hayal AKYILDIRIM BEĞEN** Molecular and Morphological Description of endemic *R. sessilifolium* from Türkiye	**Büşra BALDAN** Investigation of The Effect of Some Needle Traits on *Thaumetopoea wilkinsoni* Tams. Host Preference in *Pinus brutia* Ten.
10:40-11:00	**Coffee break**		
11:00-12:00	**INVITED SPEAKER: Rasim ÇETİNER – Denizli Regional Directorate of Forestry** *Contributions to the Flora of Denizli from Past to Present*		
12:00-13:30	**Lunch (Pamukkale University Central Cafeteria)**		
	MAIN HALL	**HALL - A**	**HALL - B**
	Chair: Assoc. Prof. Dr. Barış ÖZÜDOĞRU	**Chair: Prof. Dr. Özcan SEÇMEN**	**Chair: Prof. Dr. Gürkan SEMİZ**
13:30-13:50	**Narin SADIKOĞLU** Pharmacognostical Investigations on *Cuscuta hyalina* Roth	**Aslı Öztürk KİRAZ** Docking-Based Investigation of Syringic Acid Against Cancer-Related Proteins	**Batıkan GÜNAL** Comparative Pollen Morphology of the Genus *Erigeron* L. (Asteraceae) in Türkiye: Implications for Taxonomy and Phylogeny
13:50-14:10	**Nejdet BOZKURT** In Vitro Propagation and Conservation Strategies for the Endemic Orchid *Ophrys lycia* in Turkey	**Derya ALTAY** Phenolic and Antioxidant Properties of *Sambucus nigra* Tea Prepared Under Different Conditions	**Nilüfer TÜRKOĞLU** Determination of Total Flavonoid Total Phenolic Content and Antioxidant Activity of *Cephalaria gokturkii* Semiz & Uysal (Caprifoliaceae)
14:10-14:30	**Nilay ŞEN** Multilocus Phylogenetic Reconstruction of the Genus *Omphalodes* (Cynoglossoideae) with a Focus on Turkish taxa	**Ekrem Mücahit DOĞDU** Genetic Diversity of *Alnus* Populations in Türkiye Based on ITS gene Region Analyses	**Gökhan TANAYDIN** Adaptation Trials of Medicinal-Aromatic and Geophyte Species in the Botanical Garden of Balıkesir University
14:30-14:50	**Nurdan ATALAN ÇAYIREZMEZ** Digitisation of Biocultural Collections: Research and Access Potential of BIAA Digital Archives	**Refika Ceyda BERAM** Evaluation of the Pathogenicity of *Neofusicoccum* Species on *Liquidambar orientalis*	**Tahmineh DARVISHMOHAMMADI** Comparison of Antioxidant Activity of *Salvia tomentosa* L., *Salvia bracteata* L. and *Salvia cilicica* L.

14:50-15:10	**Belkıs MUCA YİĞİT** Floral Biodiversity and Endemism in a Border Region: Iğdır Province (Türkiye) Through the Lens of Bibliometrics	**Gözde ASLAN** The Impact of Forest Fires on Bryophytes in the Sandras Mountain Region: Preliminary Findings on Biodiversity Loss	
15:10-15:30	**Coffee break**		
	MAIN HALL	**HALL - A**	**HALL - B**
	Chair: Prof. Dr. Ersin KARABACAK	**Chair: Prof. Dr. Ali Ramazan ALAN**	**Chair: Prof. Dr. Zeki AYTAÇ**
15:30-15:50	**Fatma TAEB DİŞLİ** Notes on *Astragalus chamaephaca* (Fabaceae) Based on Seed	**Özlem İŞ** Investigation of Androgenic Plant Production Potential in Chickpea (*Cicer arietinum* L.) Breeding Materials	**Belkıs MUCA YİĞİT** Ethnobotanical Assessment of Economically Important Plants in the Flora of Adıyaman
15:50-16:10	**Burçin ÇINGAY** Climate Crisis at the Doorstep: Conservation of Native Flora on Sedef Island	**Ali Reza LACHIN** Androgenic Carrot (*Daucus carota* L.) Production	**Ogün DEMİR** Weed Flora of Legume Cultivation Areas in Türkiye
16:10-16:30	**Batıkan GÜNAL** Taxonomic Problems of the Genus *Erigeron* L. (Asteraceae) in Türkiye	**Fatma DÜZGÜN** Gynogenesis Responses of Turkish Onion (*Allium cepa*) and Seed Shallot (*A. cepa* var. *aggregatum*) genotypes	**Ramazan YALÇINKAYA** Digitized Herbarium Records as a Strategic Tool in Urban Biodiversity Assessment: A Case Study from Beykoz Grove
16:30-16:50	**Onur ÇETİNKAYA** The Effect of Different Extraction Methods on the Biological Activity of *Viburnum opulus* L. Fruits	**Gökhan ERGAN** Germination Responses to Smoke and Light in 94 Plant Taxa from a Fire Prone Site in Southwestern Anatolia (Türkiye)	
19:00-22:00	**GALA DINNER (Pamukkale University, Central Cafeteria, Orange Saloon)**		

06 September 2025 **Address: Pamukkale University, Prof. Dr. Hüseyin YILMAZ Congress and Culture Center**	
	MAIN HALL
Chairs:	**Chairs: Prof. Dr. Atabay DÜZENLİ – Prof. Dr. M. Tekin BABAÇ**
09:00-09:20	**Seher YOLCU** Genome-Wide Computational Analysis of Vacuolar Iron Transporters (VITs) in Sugar Beet (*Beta vulgaris* L.)
09:20-09:40	**Ali Ramazan ALAN** Utilization of Doubled Haploid Lines in PAU BIYOM Onion (*Allium cepa*) Improvement Program
09:40-10:00	**Mehtap DÖNMEZ ŞAHİN** Uşak University 1 Eylul Campus Landscape Flora
10:00-10:20	**Ilgın Deniz CAN** Integrative Species Delimitation in *Heldreichia bupleurifolia* Using Genomic and Morphological Data
10:20-12:00	**Closing Ceremony**

POSTER PRESENTATIONS

PP NO	AUTHORS	TITLE	TIME
PP101	Zeynepnur ALEMDAĞ, Murat Erdem GÜZEL, Kamil COŞKUNÇELEBİ, Serdar MAKBUL, Norbert KILIAN	Molecular Phylogenetic Position of *Crepis hakkarica* (Asteraceae: Cichorieae) Endemic to Turkey	03 September 2025 - 14:00 – 16:00
PP102	Zeynepnur ALEMDAĞ, Zeynep TÜRKER, Murat Erdem GÜZEL, Kamil COŞKUNÇELEBİ, Serdar MAKBUL	Biosystematic Characteristics of *Garhadiolus hamosus* (Asteraceae: Cichorieae)	03 September 2025 - 14:00 – 16:00
PP103	Rukiye ARTUN, Mehmet SAĞIROĞLU	Flora of Akıncı Village, Beşiktaş Creek (Sakarya) and Its Surroundings	03 September 2025 - 14:00 – 16:00
PP104	Özge ÇAKMAK, Burcu TARIKAHYA HACIOĞLU, Köksal ŞAHİN, Özgür ONUR KANMAZ, Gülser İnci GÖKMEN, Ali GÖKMEN	Educational Activities and Observations on Campus Flora at MoniBostan Ecological Children's Campus (Ankara, Türkiye)	03 September 2025 - 14:00 – 16:00
PP105	Esra ÇAKIRLAR ALTUNTAŞ, Emre ÇİLDEN	Some Endemic Plants from the Flora of the Kartaltepe Zone (Polatlı/Ankara) of the Sakarya Battlefield Historical National Park	03 September 2025 - 14:00 – 16:00
PP106	Muhammed Emin OZTURK, Esra MARTIN, Melda Nur HELLAC, Turan ARABACI, Tuncay DİRMENCİ	Karyological studies of Endemic *Ajuga xylorrhiza* Kit Tan and Ajuga vestita Boiss. (Lamiaceae)	03 September 2025 - 14:00 – 16:00
PP107	Asude ERSAL, Ersin KARABACAK	Floristic Richness and Biogeographical Significance of the Genus *Euphorbia* L. (Euphorbiaceae) in Çanakkale, Turkey	03 September 2025 - 14:00 – 16:00
PP108	Tuğba ERTUĞRUL, Ahter FİŞNE, Özal GÜNER, Ecem BAĞ, Hayri DUMAN	Preliminary Observations on Fruit, Seed and Pollen Morphology of *Thalictrum sultanabadense* (Ranunculaceae) from Türkiye	03 September 2025 - 14:00 – 16:00
PP109	Saadet İŞLEK, Ersin KARABACAK	Taxonomic Assessment of *Ranunculus* L. (Ranunculaceae) Species in Çanakkale, Turkey	03 September 2025 - 14:00 – 16:00
PP110	Mesut KIRMACI, Hatice ÖZENOĞLU, Gözde ASLAN, Mithat Evrim DEMİR, Uğur ÇATAK	Distribution and Habitat Characteristics of the Rare Bryophyte taxon "*Riccia cavernosa*"	03 September 2025 - 14:00 – 16:00
PP111	Serdar MAKBUL, Suzan KUNDAKÇI, Mutlu GÜLTEPE, Kamil ÇOŞKUNÇELEBİ	Ocrea morphology of Turkish *Persicaria* Mill. (Polygonaceae) Taxa	03 September 2025 - 14:00 – 16:00
PP112	Seda OKUR, Serdar MAKBUL, Kamil COŞKUNÇELEBİ	Contribution to Biosystematics Properties of *Epilobium obscurum* (Onagraceaea) from Türkiye	03 September 2025 - 14:00 – 16:00
PP113	Tuğkan ÖZDÖL, Hasan YILDIRIM	A Taxonomic Revision of *Campanula* (Campanulaceae) subgen. Brachycodonia Distributed in Türkiye	03 September 2025 - 14:00 – 16:00

PP114	Bilal ŞAHİN	A New Distribution Area of *Rhaponticum serratuloides* and Some Interesting Observations	03 September 2025 - 14:00 – 16:00
PP115	Ayşe Nur ŞEN	IUCN Red List of Threatened Endemic Species Categories of Anamur (Mersin)	03 September 2025 - 14:00 – 16:00
PP116	Burcu TARIKAHYA HACIOĞLU, Ata Umut ÖZSOY, Özge ÇAKMAK, Cansu KILIÇ, Ezgi KÜÇÜKEL ,Veli Deniz ÜNLÜ, Faheem Shehzad BALOCH, Dilek İNCEKÖSE BAĞLAN, Şenay BOYRAZ TOPALOĞLU, Evren CABİ	Investigation of *Triticum* Species of Türkiye using DArTSeq Markers	03 September 2025 - 14:00 – 16:00
PP117	Cemre Nur TELKES, Ebru ATAŞLAR	Historical Changes in Halophytic Plant Diversity Around Lake Tuz Based on Herbarium Records	03 September 2025 - 14:00 – 16:00
PP118	Nil DEMIRCAN, Buse PINAR, Baris UZILDAY, Rengin OZGUR UZILDAY	Altering ROS Levels and Fluorescent Imaging in Different Arabidopsis thaliana Ecotypes and *Schrenkiella parvula* to Elucidate Redox Regulation of Halotropism	03 September 2025 - 14:00 – 16:00
PP119	Esra KOC, Belgizar KARAYIGIT, Hatice Nurhan BUYUKKARTAL	Effect of Spermidine on Catalase Activity Against Root Crown Rot Disease in Pepper	03 September 2025 - 14:00 – 16:00
PP120	Handan KURTULMUŞ SANCAK, Selami SELVİ, Turgut TAŞKIN	Traditional Use and Antioxidant Activity of *Marrubium vulgare*	03 September 2025 - 14:00 – 16:00
PP121	Oktay BIYIKLIOĞLU, Serhat KARABICAK, Derya KELEŞOĞLU, İbrahim ÖZKUTLU, Talip ÇETER	LC/MS Analysis of Some Propolis Produced in Bolu, Türkiye	04 September 2025 - 10:00 – 12:00
PP122	Oktay BIYIKLIOĞLU, Serhat KARABICAK, Derya KELEŞOĞLU, İbrahim ÖZKUTLU, Talip ÇETER	LC/MS Analysis of Some Propolis Produced in Bartın, Türkiye	04 September 2025 - 10:00 – 12:00
PP123	Buse PINAR, Rengin OZGUR UZILDAY, Baris UZILDAY	Investigation of the SUMOylation Mechanism in the Halophyte *Schrenkiella parvula*	04 September 2025 - 10:00 – 12:00
PP124	Gulcin SEVIM, Buse PINAR, Hatice EKIN, Mustafa Cemre SONMEZ, Rengin OZGUR UZILDAY, Barış UZILDAY, Ismail TURKAN	Comparative Investigation of ER Stress and Photorespiration Interaction in C3 and C4 Plants	04 September 2025 - 10:00 – 12:00
PP125	Mert Can VARDAR, Uğurcan BARAN, Sude TANIK, Burcu Emine TEFON ÖZTURK, Ahmet AKSOY	Effect of *Pseudomonas thivervalensis* on Nickel Toxicity and Tolerance in Canola	04 September 2025 - 10:00 – 12:00
PP126	Seyda YILMAZ, Olcay DEDECAN, Mustafa KÜSEK, Canan CAN	Physiological, Biochemical, and Molecular Responses of *Allium sativum* to Biotic and Abiotic Stress Factors	04 September 2025 - 10:00 – 12:00
PP127	Şenay BOYRAZ TOPALOĞLU, Burcu TARIKAHYA HACIOĞLU, Nihan YENİLMEZ ARPA	A Multi-Species Action Plan for Crop Wild Relatives in the Karacadağ Steppe, Türkiye: A Participatory In-Situ Conservation Approach	04 September 2025 - 10:00 – 12:00

PP128	Okan ÇON, Mehmet ÇİÇEK	The Future of Endemic and Localized Geophytes: A Geographical Distribution Analysis of Three Grape Hyacinth Species	04 September 2025 - 10:00 – 12:00
PP129	Betül ÇETİNKAYA, Belkis MUCA YİĞİT	A Bibliometric Analysis of Scientific Publications on Kocaeli Flora: A Focus on Endemic Plant Species	04 September 2025 - 10:00 – 12:00
PP131	Orhan ÜNAL, Meryem GÖKOĞLU	Antalya's New Species	04 September 2025 - 10:00 – 12:00
PP132	Gözde ASLAN, Mithat Evrim DEMİR, Hatice ÖZENOĞLU, Mesut KIRMACI	Learning to Read Nature Through Biological Indicators: An Applied Nature Education Project for High School Students	04 September 2025 - 10:00 – 12:00
PP133	Mithat Evrim DEMİR, Mesut KIRMACI, Gözde ASLAN	Enhancing Awareness of Endemic Species Using Nature Education: A Focus on Tülüşah (*Rhaponticoides mykalea* (Hub.-Mor.) M.V. Agab.&Greuter)	04 September 2025 - 10:00 – 12:00
PP134	Gulselin CAM, Dilara TEMIZ, Ugur CATAK, Mesut KIRMACI	Determination of the Spore Production Capacity of *Timmiella anomala* (Pottiaceae/Bryophyta)	04 September 2025 - 10:00 – 12:00
PP135	Esra KÖSE, Gülçin IŞIK	Determination of Astrobiological Adaptation of *Triticum aestivum* L. cv. Cobra (Poaceae) to Different Durations of UV Stress	04 September 2025 - 10:00 – 12:00
PP136	Tomáš TOMA, Tatiana BUBENÍKOVÁ, Martin ČERNÝ, Ivan MILENKOVIĆ, Jaroslav Ďurkovič	Defensive VOC and Proteome Responses of Hybrid Poplar to Phytophthora Infection	04 September 2025 - 10:00 – 12:00
PP137	Oktay BIYIKLIOĞLU, Serhat KARABICAK, Derya KELEŞOĞLU, İbrahim ÖZKUTLU, Talip ÇETER	Investigation of Leaf Anatomy of Some Grapevine Varieties Grown in Turkey	04 September 2025 - 10:00 – 12:00
PP138	Oktay BIYIKLIOĞLU, Serhat KARABICAK, Derya KELEŞOĞLU, İbrahim ÖZKUTLU, Talip ÇETER	Investigation of Stem Anatomy of Some Grapevine Varieties Grown in Turkey	04 September 2025 - 10:00 – 12:00
PP139	Mihriban AHISKALI	A General Review on the Flora of Bingöl	04 September 2025 - 10:00 – 12:00
PP140	H. Nurhan BÜYÜKKARTAL, Hatice ÇÖLGEÇEN, Ümit BUDAK, Esra KOÇ	Comparative anatomy of leaves and stems *in Senecio castagneanus* DC and *Senecio tauricolus* V.A.Matthews (Asteraceae)	04 September 2025 - 10:00 – 12:00
PP141	Ajlan YILMAZ, Başak ÖZDEMİR, Yeşim OKAY, H. Nurhan BÜYÜKKARTAL	Anatomical Comparison of Grafting Compatibility Performances of Rootstocks with Different Growth Vigor in Bozkurt Almond Variety	04 September 2025 - 10:00 – 12:00
PP142	Betül KABALCI, Burcu YILMAZ ÇITAK	Anatomical notes on *Vinca soneri* Koyuncu (Apocynaceae) in Türkiye	04 September 2025 - 14:00 – 16:00
PP143	Nazlı AYDEMIR, Yasemin KÖROĞLU, Betül KABALCI, Burcu YILMAZ ÇITAK	The anatomical characters of endemic *Psephellus hadimensis* (Asteraceae) in Türkiye	04 September 2025 - 14:00 – 16:00

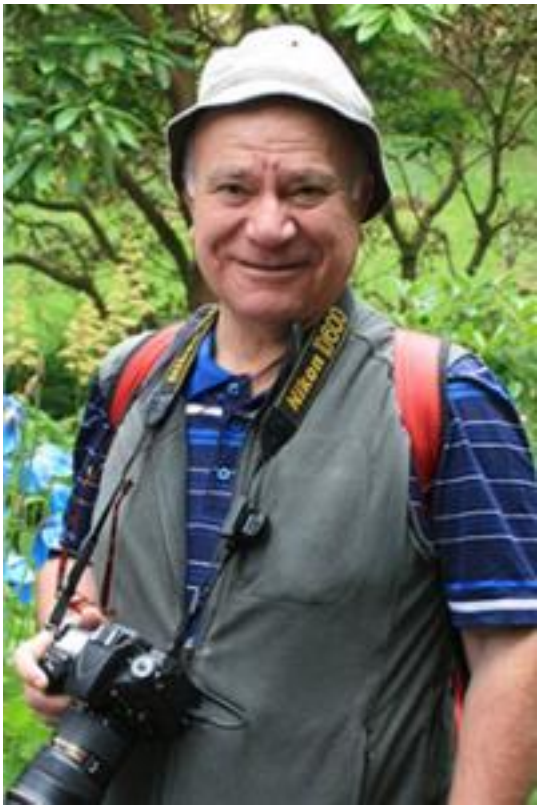
PP144	Kutlu SALİHOĞLU, Oktay BIYIKLIOĞLU, Serhat KARABICAK, Derya KELEŞOĞLU, İbrahim ÖZKUTLU, Talip ÇETER	Examination of the Seed Morphology of Some Grape Varieties Grown in Türkiye	04 September 2025 - 14:00 – 16:00
PP145	Dilara TEMIZ, Mustafa Semih ALTINDIS, Gulselin CAM, Ugur CATAK, Mesut KIRMACI	Morphological and Anatomical Adaptations of Xerophytic Bryophytes	04 September 2025 - 14:00 – 16:00
PP146	Burcu YILMAZ ÇITAK	Taxonomic Importance of Leaflet Anatomical Characters of the Genus *Hedysarum* L. (Fabaceae)	04 September 2025 - 14:00 – 16:00
PP147	Fatma ŞEN GÖKMEN, Golshan ZARE, Hayri DUMAN	Studies on Root, Stem and Leaf Anatomy of *Tuberaria* (Dunal) Spach Genus Distributed in Türkiye	04 September 2025 - 14:00 – 16:00
PP148	Şeyma ÇAKMAK, Mehmet Ufuk ÖZBEK	Comparative Pollen Morphology of *Tanacetum oxystegium* and *Tanacetum pinnatum*	04 September 2025 - 14:00 – 16:00
PP149	Kutlu SALİHOĞLU, Oktay BIYIKLIOĞLU, Serhat KARABICAK, Derya KELEŞOĞLU, İbrahim ÖZKUTLU, Şeymanur AKTAŞ, Talip ÇETER	Investigation of The Pollen Morphology of Some Grapevine Varieties Grown in Türkiye	04 September 2025 - 14:00 – 16:00
PP150	Omer SOLAK-AMET, Aycan TOSUNOĞLU	Determining the Sources of Dominat Pollen Found in Guano (Oylat Cave)	04 September 2025 - 14:00 – 16:00
PP151	Foroogh TAVAKOLI, Batıkan GÜNAL, Gürkan SEMİZ	Palynological and Micromorphological Characteristics of *Rhaponticoides ruthenica* (Lam.) M.V. Agab. & Greuter (Asteraceae)	04 September 2025 - 14:00 – 16:00
PP152	Foroogh TAVAKOLI, Batıkan GÜNAL, Gürkan SEMİZ	Palynological and Micromorphological Characteristics of *Rhaponticoides amasiensis* (Bornm.) M.V. Agab. & Greuter (Asteraceae)	04 September 2025 - 14:00 – 16:00
PP153	Leyla TAZE, Funda ÖZBEK	Pollen and Achene Morphology of the Endemic *Tanacetum oltense* (Asteraceae)	04 September 2025 - 14:00 – 16:00
PP154	Burcu YILMAZ ÇITAK, Emrah ŞİRİN	Comparison of Palynomorphological Characters of the Section Mesocentron From the Genus *Centaurea* (Asteraceae)	04 September 2025 - 14:00 – 16:00
PP155	Emrah ŞİRİN	Karyomorphological Features of *Centaurea* Section *Mesocentron* (Asteraceae) in Türkiye	04 September 2025 - 14:00 – 16:00
PP156	Naime KAPLAN, Dilek BÜYÜKBEŞE YAYLA, Fatih YAYLA	Effect of Woody Terrestrial Plant Sources on Activated Carbon Adsorption Capacity: Biotechnological Optimization Approach	04 September 2025 - 14:00 – 16:00

PP157	Ezgi ALVAR, Batıkan GÜNAL, Gürkan SEMİZ	Some Biological Activity Studies on Endemic *Salix purpurea* L. subsp. *leucodermis* Yalt. (Salicaceae)	04 September 2025 - 14:00 – 16:00
PP158	Büşra BALDAN, Batıkan GÜNAL, Gürkan SEMİZ	Determination of Total Flavonoid, Total Phenolic Content and Antioxidant Activity of *Anthemis rosea* Sm. subsp carnea (Boiss.) Grierson	04 September 2025 - 14:00 – 16:00
PP159	Nagehan SALTAN, İrem BAYRAM, Gamze GÖGER	Evaluation of Antioxidant and Antimicrobial Activities of *Viscum album* L. (Santalaceae)	04 September 2025 - 14:00 – 16:00
PP160	Olcay DEDECAN, Şeyda YILMAZ, Fatih YAYLA, Ebru BOZLAR, Canan CAN	An Interdisciplinary Approach to the Genus Helichrysum (Asteraceae) in the Flora of Türkiye: An Evaluation in the Light of Systematic, Physiological, Pathological, and Molecular Data	04 September 2025 - 14:00 – 16:00
PP161	Ayşe Peri EREN, Batıkan GÜNAL, Gürkan SEMİZ	Antioxidant Activity of *Hypericum auriculatum* (N. Robson & Hub.-Mor.) N. Robson and *Sideritis lanata* L.	04 September 2025 - 14:00 – 16:00
PP162	Azzet Esra GÜNDÜZ, Selen İLGÜN, Gökçe ŞEKER KARATOPRAK	In Vitro Evaluation of Antioxidant and Cytotoxic Activities of *Helichrysum plicatum* subsp. *pseudoplicatum*	04 September 2025 - 14:00 – 16:00
PP163	Elanur KOÇ, Nagehan SALTAN, Pervin SOYER	Evaluation of Antioxidant and Antimicrobial Activities of *Rosa canina* L. (Rosaceae) Fruits	05 September 2025 - 10:00 – 12:00
PP164	Duygu SEVİM-TATAR, Ertuğrul GÜNDAY	Evaluation of In Vitro Enzyme Inhibitory Activities and Antioxidant Capacities of Turkish Sea Buckthorn Twig and Leaf Extracts	05 September 2025 - 10:00 – 12:00
PP165	Fatih YAYLA, Ebru BOZLAR, Banu GÖKÇEK, Şeyda YILMAZ	Evaluation of the Fragrant Plant Potential of the Gaziantep Flora	05 September 2025 - 10:00 – 12:00
PP167	Tuğsem ERÇEL, Suzan KUNDAKÇI, Kamil ÇOŞKUNÇELEBİ, Serdar MAKBUL	Ethnobotanaical Features of Senoz Valley of Çayeli (Rize-Türkiye)	05 September 2025 - 10:00 – 12:00
PP168	Tulay TUTENOCAKLİ	An Ethnobotanical Research on Plants Used for Food Purposes in Ayvacik (Canakkale)	05 September 2025 - 10:00 – 12:00
PP169	Fatih YAYLA, Ebru BOZLAR, Şeyda YILMAZ, Banu GÖKÇEK	Ethnobotanical Appraisal of Gaziantep's Flora	05 September 2025 - 10:00 – 12:00
PP170	Tuğba ERGİN, Savaş AYVAZ, Özgür YILMAZ, Betül ERGİN	Effect of Sucrose on Microbial Contamination during in vitro Culture of Tea (Camellia sinensis)	05 September 2025 - 10:00 – 12:00
PP171	Gamze ERİKCİ , Hatice ÇÖLGEÇEN , Havva KARAHAN	Organogenesis in the Endemic Species of *Sabulina mesogitana* subsp. *flaccida*	05 September 2025 - 10:00 – 12:00

PP172	Zeliş Kübra GÜNGÖR, Belkis MUCA YİĞİT	Plant-Based Approaches to Pest Control in Organic Agriculture: An Ecological Perspective	05 September 2025 - 10:00 – 12:00
PP173	Uğur UKUŞLU, Kerem KILIÇ, Yeşim KARA	The Effects Of The Organic Fertilizer For Monet Broccoli (*Brassica oleracea* L. var. *italica*) Productivity	05 September 2025 - 10:00 – 12:00
PP174	İçim GÖKKAYA, Muhammed Ziya ŞAHİNÖZ, Hediye Kamuran İLERİ ÖZLER, Melis Hazal PERAŞAN, Mehmet Kağan ALTINBAŞ, Gülin RENDA, Hayriye Gülçin SALTAN İŞCAN	Comparison of quality parameters of safflower (*Carthami* flos) samples sold in the market with pharmacopoeia tests	05 September 2025 - 10:00 – 12:00
PP175	Hakan KAYA, Belkıs MUCA YİĞİT	Biopiracy of Heirloom Seeds: Ecological Risks and the Biological Necessity for Conservation Policies	05 September 2025 - 10:00 – 12:00
PP176	Kamil Mert YÜCEL, Hanife TARIM, İsa GÖKLER, Aylin Eşiz DEREBOYLUL	Liverwort Flora of The Balçova Therapy Forest (İzmir)	05 September 2025 - 10:00 – 12:00
PP177	Kamil Mert YÜCEL, Hanife TARIM, İsa GÖKLER, Serdar Gökhan ŞENOL	Fern Flora of Balçova Therapy Forest (Izmır)	05 September 2025 - 10:00 – 12:00
PP178	Melike KUYUCAKLIOĞLU, Oktay BIYIKLIOĞLU, Serhat KARABICAK, Talip ÇETER	Pollen Morphology of Some Rosaceae Species Distributed in Kastamonu, Türkiye	05 September 2025 - 10:00 – 12:00
PP179	Tarık Ziya EKMEN, Melek KARAASLAN, H. Gülçin SALTAN İŞCAN	Evaluation of DPPH Radical Scavenging Activity in Certain Lamiaceae Taxa	05 September 2025 - 10:00 – 12:00
PP180	Funda KESKİN, Kübra KOCABIYIK, Şevki ARSLAN	Anticancer Activity of Naringenin Derived from *Citrus* Fruits and Aromatic Herbs in Uterine and Endometrial Cancers	05 September 2025 - 10:00 – 12:00
PP181	Ömer ÇEÇEN, Yasir DOĞAN	Ethnobotanical Characteristics of Ayrancı (Karaman) District	05 September 2025 - 10:00 – 12:00
PP182	Nilüfer TÜRKOĞLU, Batıkan GÜNAL, Gürkan SEMİZ	Determination of Total Flavonoid, Total Phenolic Content and Antioxidant Activity of *Arceuthobium oxycedri* (D.C.) M. Bieb (Santalaceae)	05 September 2025 - 10:00 – 12:00

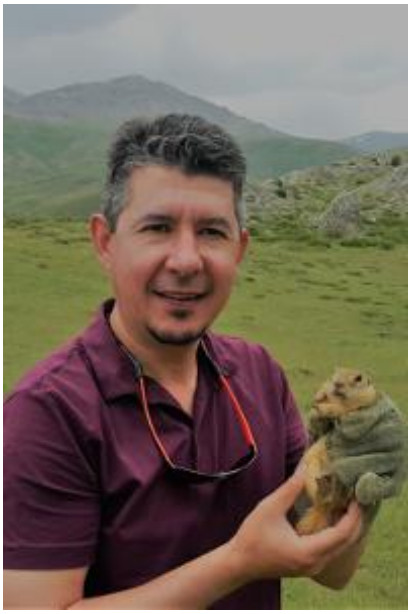
INVITED SPEAKERS

Illustrated Flora of Türkiye and Beyond



Prof. Dr. Adil GÜNER

Nezahat Gökyiğit Botanical Garden, İstanbul - TÜRKİYE



Anatolian Biogeography: How the Geological Evolution of Anatolia Has Shaped Its Biodiversity

Hakan GÜR
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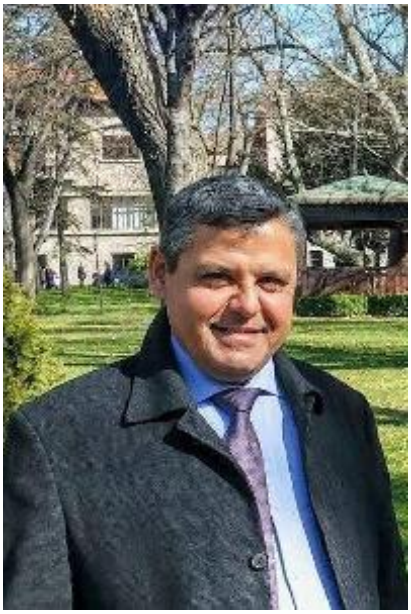
Abstract

Anatolia's exceptional biodiversity has been forged by a Cenozoic tectonic history that coupled rapid Neogene-Quaternary uplift with pronounced climatic transitions. Across ~2 km of vertical rise—with uplift rates of ca. 3 mm/yr at the southern margin of the Central Anatolian Plateau—the region's growing relief generated steep environmental gradients, strong orographic effects, and fine-grained edaphic mosaics (serpentine, gypsum, carbonate cliff systems). These processes multiplied habitats and microrefugia, accelerated isolation and diversification in young mountain belts (Pontides, Taurides, Eastern Anatolia), and helped structure biogeographic discontinuities such as the Anatolian Diagonal. Superimposed Pleistocene glacial–interglacial cycles repeatedly contracted and expanded ranges without erasing diversity, while the Early Pliocene shift toward C3-dominated steppe set the stage for the long-term prominence of open habitats. As an indicator and keystone of these systems, the Anatolian ground squirrel integrates climatic, elevational, and land-use signals—exhibiting marked lineage structure, eco-morphological and physiological differentiation, and sensitivity to habitat change. Today, land conversion is the proximate threat: only about half of climatically suitable areas remain as actual habitat, and high-forcing mid-century scenarios project severe losses of suitability, underscoring the urgency of safeguarding climate refugia and steppe heterogeneity. Despite covering ~0.5% of Earth's land, Anatolia sits at the nexus of three global biodiversity hotspots and remains a priority for species discovery. Strategic priorities emerging from this synthesis include protecting identified refugia and under-represented steppe ecosystems, expanding and connecting protected areas, and advancing integrative ecological niche modeling and phylogeography alongside long-term indicator monitoring to guide adaptive conservation.

Keywords: Alpine-Himalayan orogeny, Environmental gradients, Global climate change, Species discovery potential, Species richness pattern

Acknowledgments: Presented as an invited talk, this presentation synthesizes many of my past and ongoing studies and builds on extensive collaborations. These studies were supported by the Scientific and Technological Research Council of Türkiye (TÜBİTAK), Kırşehir Ahi Evran University, and Hacettepe University. I gratefully acknowledge all collaborators for their valuable contributions.



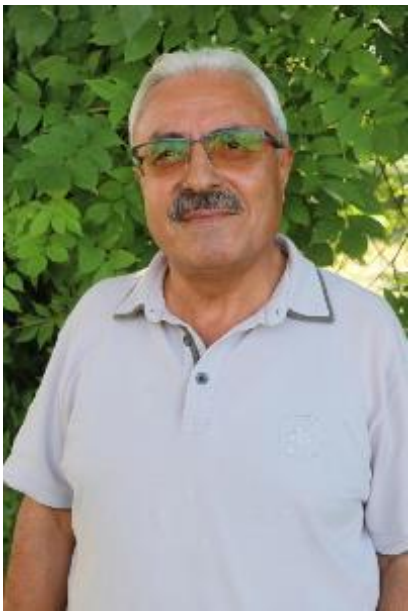
Endemic Anatolian Civilization; the Role of Anatolian Plants in Cultural Continuity and Cultural Interaction

Hasan TORLAK
Ministry of Culture and Tourism, Ankara - TÜRKİYE

Abstract

Plants are the most important natural elements that nourish cultural continuity. Hundreds of tribes have come to Anatolia over tens of thousands of years, and each tribe has added something of itself to Anatolia while also taking something from it. In Anatolia, plants have been carriers of cultural continuity due to their importance as food sources, fragrances, medicinal effects and other folk uses. Endemic plants, especially those specific to Anatolia, have become the source of unique cultural formations specific to these lands with their unique biological properties and usage values. In this context, the fact that the names of some of the trees and plants, which have been attributed with "protection from evil and repelling evil spirits" qualities in Anatolian cultures for thousands of years due to their insect-repelling and pleasant-smelling properties, have not changed for thousands of years, shows that the strong ethnobotanical practices and cultural perceptions of these natural elements, which emerged in prehistoric times, have survived to the present day without change. Plants with a masculine or feminine perception due to their physical appearance or usage values also attract attention. In addition to the juniper tree, which is identified with warrior men due to the durability of its wood and its ability to survive for nearly 500 years even after death, poplars, with their white and smooth trunks and soft silhouettes, are among the trees that have always had a high perception of femininity. The cypress tree's darker green colour, due to its structure, has made it the tree of death, the underworld, and the afterlife in all ages, and this cultural perception of the tree has not changed for thousands of years. Cultural continuity in Anatolia is very strong. One of the foundations of this is Anatolia's natural and vegetal continuity. The strong cultural continuity of plant origins could also be implemented in the form of ensuring cultural rupture and preventing continuity through the exclusion and destruction of plants during periods of paradigm shift in the belief structure. In my talk study, we will try to explain, on the basis of plant and tree taxa, the characteristics of trees and plants that affect culture and how the culture that emerged as a result of this interaction has survived to the present day without change throughout the ages and even millennia.

Keywords: Anatolian plants, endemic plants, cultural continuity, cultural interaction.



Contributions to the Flora of Denizli from Past to Present

Rasim ÇETİNER

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Abstract

Anatolia's geographical location and the many favorable features it offers for human life are related to the intersection of three phytogeographic regions within Anatolia, which in turn leads to a wide diversity of plant and animal populations. Throughout history, the geography of Anatolia has embraced both nations and belief systems, providing them with living spaces. The fact that some of the trade routes between the East and the West pass through this region has attracted the attention and curiosity of both Eastern and Western peoples and communities. Denizli holds a geographically and historically significant position in Türkiye. Two of the three phytogeographic regions present in Türkiye (the Irano-Turanian and the Mediterranean) include Denizli within their boundaries. Additionally, many elements of the third phytogeographic region, the Euro-Siberian region, are found in the northern or high-altitude areas of Denizli. The main purpose of this study is to present an updated list of plant species based on data from flora studies conducted in various parts of Denizli from the past to the present, along with the contributors, timelines, and locations. Furthermore, apart from general flora or vegetation studies conducted in Denizli, plant species recorded individually by local and foreign botanists in the Denizli region and introduced to the scientific community through academic publications are also documented in this study. Additionally, some important plant species that were not identified in flora studies and scientific publications conducted in Denizli, but that I discovered during fieldwork carried out as part of my profession, are also presented within the scope of this study.

Keywords: Denizli, Plant, Biodiversity, Flora, Vegetation

Acknowledgments: I would like to express my sincere gratitude to the Denizli Regional Directorate of Forestry for giving me the opportunity to carry out these studies and for their financial and moral support, as well as to the esteemed scientists who generously assisted in the identification of plant species and devoted their time to conducting fieldwork.

ABSTRACTS OF ORAL PRESENTATIONS

OP-001

Evaluation of the Pathogenicity of *Neofusicoccum* Species on *Liquidambar orientalis*

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Abstract

Liquidambar orientalis (Oriental sweetgum) is a woody tree species endemic to the Mediterranean region, naturally distributed only in southwestern Turkey and, to a limited extent, on the island of Rhodes in Greece. Due to habitat loss, anthropogenic pressures, and climate change, its population is under severe threat and is classified as “Endangered” by the IUCN. The genus *Neofusicoccum*, belonging to the family Botryosphaeriaceae, comprises important fungal pathogens characterized as latent and endophytic agents causing canker-like necrotic lesions and mortality in woody plants. Due to its broad host range and widespread geographic distribution, it has significant economic importance in agriculture, horticulture, and forestry sectors. Recent studies have shown that latent infections by *Neofusicoccum* species can become activated under environmental stress conditions, leading to tissue necrosis and host death. The biotic stress imposed by these pathogens on narrowly distributed and sensitive species poses a critical threat to ecosystem integrity and forest health. This study aims to evaluate the pathogenic potential of five different *Neofusicoccum* isolates obtained from *L. orientalis*. Two-year-old healthy *L. orientalis* seedlings, averaging 85 cm in height and 10 mm in stem diameter, were inoculated with each isolate in five replicates. Sterile potato dextrose agar (PDA) was used for the control group. At the end of the incubation period, the length and diameter of necrotic lesions on the stem surface were measured. The average lesion length was 1.63 cm, and the average lesion diameter was 0.69 cm. All isolates exhibited pathogenic characteristics, with statistically significant differences in pathogenicity observed among isolates. *Neofusicoccum parvum* demonstrated the highest pathogenic effect. The results indicate that *Neofusicoccum* species exhibit varying degrees of pathogenicity on *L. orientalis*. The biotic pressure exerted by these pathogens, especially on ecologically valuable and narrowly distributed woody species, is critically important for forest health management and conservation strategies. Furthermore, this study provides novel insights by reporting *Neofusicoccum* species as pathogens of *L. orientalis* for the first time, contributing to the understanding of regional pathogen diversity and the assessment of biotic threats.

Keywords: Forest, *Liquidambar orientalis*, *Neofusicoccum*, Pathogenicity

OP-002

The Effects of Smoke-Water, Karrikinolide, and Indole-3-acetic Acid on Pollen Germination and Tube Growth in *Nicotiana tabacum*

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Abstract

Pollen germination and tube growth are vital processes for the successful reproduction of land plants. However, little is known about how fire-related cues, such as smoke and its components, influence these processes. This study examined the effects of smoke-water (SW) and karrikinolide (KAR_1) on pollen germination and tube growth in *Nicotiana tabacum* L. To accomplish this, pollen grains obtained from flower buds at two different developmental stages were treated with SW (0.25%, 0.5%, 0.75%, and 1%), KAR_1 (0.1 µM), and indole-3-acetic acid (IAA, 5 ppm), a phytohormone that plays an important role in plant sexual reproduction. The pollen grains were then incubated in the dark at 30°C for 24 hours. Images of the germinated pollen grains were captured using a digital camera. Four microscope slides containing pollen grains were utilized for each treatment, with two images being captured for each slide. The results of the study indicated that KAR_1 promoted the germination or tube growth of pollen grains obtained from flower buds at varying developmental stages. The application of SW (1%) caused a complete inhibition of pollen germination at the early developmental stage. In addition, SW exerted a concentration-specific negative effect on tube growth at both stages. Finally, 5 ppm IAA treatment had an inhibitory effect on pollen germination and tube growth. In summary, the present study provides evidence that KAR_1 significantly enhances pollen germination and tube elongation, while SW, a complex chemical milieu, can adversely affect these processes. Further research is necessary to identify the specific inhibitory compounds in SW that impact pollen germination and tube growth.

Keywords: Karrikinolide, *Nicotiana tabacum*, Pollen germination, Pollen Tube Growth, Smoke-Water

Acknowledgements: This study is a part of Tuğçe KIRCALI's M.Sc. thesis and was supported by Muğla Sıtkı Koçman University Scientific Research Projects Coordination Unit (Project no: 25/03).

OP-003

Utilization of Doubled Haploid Lines in PAU BIYOM Onion (*Allium cepa*) Improvement Program

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Abstract

In today's onion (*Allium cepa*) breeding programs, the major objective is production of new F1 hybrid varieties with high adaptation capacity, uniform maturity, high yield and quality. There are major constraints in the process of pure line development in onion via conventional breeding procedures. It is known that successful DH lines in some plant species can significantly shorten the time required for variety development in breeding studies. Here, we present the findings obtained from a detailed project designed to investigate the potential benefits of using doubled haploid (DH) onion lines as paternal parents in the production of hybrid onion lines. As part of the project, two F1 hybrid groups were created and evaluated. The first group was created by crossing cytoplasmic male sterile (CMSA) genotypes with DH genotypes, and the second group was created by crossing CMSA genotypes with open-pollinated (OP) genotypes, which are donors of DH genotypes. Studies revealed significant differences in yield traits among the CMSA, CMSB, Group 1 (CMSA X DHAC), and Group 2 (CMSA X OPAC) genotypes. It was determined that the DH and OP genotypes, which are donors, were similar. In general, the yields of Group 1 genotypes were higher. The highest head yield per plot, 16.23 kg, was obtained from the CMS3A X DHAC2 genotype, which produced large yellow heads. This was followed by the CMS3A X OPAC2 genotype with 15.75 kg. Among the female parents used, the highest yields were obtained from crosses conducted with CMS3A. The findings obtained in this project indicated that the CMS3A x DH F1 hybrids outperformed the CMS3A x OP F1 hybrids. It was determined that all onion genotypes used and produced within the project exhibited significant differences in head quality traits. The findings indicate that Turkish DH lines can be used in the development of new F1 hybrid onion lines. The development of DH lines from different onion genotypes and their integration into breeding efforts can accelerate the breeding process for new onion varieties.

Key words: Breeding, Cytoplasmic Male Sterility, Doubled haploid, Onion

Acknowledgment: This research (project no. 2018FEBE058) was supported by Pamukkale University, Scientific Research Projects Coordination Unit.

OP-004

Genetic Diversity and Population Structure of *Gundelia* L. (Asteraceae) Revealed by SCoT Markers

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Abstract

Plant genetic resources represent critical assets for national agricultural development and breeding initiatives. Understanding the extent of genetic variation within these resources is essential for their effective exploitation in breeding programs. This study focuses on evaluating the genetic diversity of 96 *Gundelia* L. genotypes collected from 26 provinces across a wide geographic range. Start codon targeted (SCoT) markers were employed as a molecular tool to assess polymorphism. Genetic relationships among the genotypes were explored through clustering, principal coordinate analysis (PCoA), and population structure analysis. This research represents one of the first comprehensive efforts to investigate the genetic diversity and structure of *Gundelia* germplasm using the Start codon targeted (SCoT) marker system. The study provides essential insights for the conservation, characterization, and potential breeding applications of this underutilized yet valuable plant resource.

Keywords: *Gundelia* L., genetic diversity, SCoT markers, population structure, molecular markers, biodiversity,

Acknowledgment: The Scientific Research Projects Coordination Unit of Necmettin Erbakan University supported the research with project number 23GAP26001.

OP-005

Current Status of *Phoenix theophrasti* (Datça Hurma Palm) Populations in Türkiye and Systematic Notes on *Phoenix theophrasti* subsp. *golkoyana*

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Abstract

Tertiary relict, *Phoenix theophrasti* (Datça date palm) is distributed along the Aegean-Mediterranean coast of Turkiye and Greek island of Crete. The Datça date palm is the closest wild relative of the *Phoenix dactylifera* (date palm) as genetically. The main focus of this study is to determine the current status of the Turkish Datça date palm populations. In addition, the systematic status of the *Phoenix theophrasti* subsp. *golkoyana*, described from Türkiye in 2019, is discussed. This study was supported by TÜBİTAK under project number 116Z288. According to the project data, *Phoenix theophrasti* is represented by five populations in Turkiye. From north to south, the population numbers are as follows: 80 individuals in Muğla and Bodrum Gölköy, 181 individuals in Datça Hurmalıbük and the Eksere Valley, 15 individuals in the ancient city of Patara, and 30 individuals in the Antalya Finike-Kumluca Gene Protection Forest. *P. theophrasti* (Datça date palm) populations, represented by 307 adults in Turkiye. During the project, in addition to the populations mentioned above, one individual was identified in İzmir Gümüldür Nature Park, which is presented as a new distribution area for the species in this study. Including this individual, the total number of individuals of the species in Turkiye is determined to be 307. In the populations of the species, although the characters such as fruit width/length, seed width/lenght, female flower petal, sepal width/length, pistil length, male flower petal sepal width/length, stamen length, leaf length, leaf width, number of leaf pairs, spiny area length, number of spines, inflorescence length, inflorescence stem length, number of rays, number of flowers per ray vary according to population size, measurements were made on samples taken from at least 15 individuals. Additionally, population-based pollen measurements and ornamentation identifications were attempted using SEM images. In light of all these data, it was concluded that there were no significant differences between populations based on the morphological character measurements mentioned above. Because the greatest variation in fruit characters was observed in the Bodrum Gölköy population and the highest number of pollen anomalies were also observed in this population, it was concluded that the *Phoenix theophrasti* subsp. golkoyana, published in 2019, cannot be considered a separate subspecies.

Keywords: Arecaceae, Date palm, *Phoenix*, Population

OP-006

DNA Barcoding of Medicinal-Aromatic *Satureja hortensis* and *Satureja spicigera* Species Naturally Distributed in Artvin

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Abstract

Satureja L. (Lamiaceae) is represented by approximately 50 species worldwide, and it is known that around 16 species of this genus are found in the flora of Turkey. *Satureja* species are among the economically valuable plants due to their medicinal properties and widespread use as spices. In Türkiye, *S. hortensis* and *S. spicigera* are among the most commonly wild-collected species. *S. hortensis* has significant potential for use in various industrial fields such as pharmaceuticals, cosmetics, and food due to its essential oil components, and is therefore considered one of the most valuable medicinal plants. *S. spicigera* stands out with both its medicinal and aromatic properties. In traditional folk medicine, it is widely used for relieving muscle pain, treating infectious diseases, and alleviating ailments such as diarrhea. In this study, the matK gene regions of two *Satureja* species were sequenced using the DNA barcoding method. The chloroplast genome matK gene sequences of the samples were identified and compared with those of related taxa. According to the results obtained, BLAST analysis based on a 775 bp fragment revealed that the matK gene region of the *S. hortensis* plant used in this study showed more than 99% similarity with the GenBank-stored sample numbered PV480541. The genetic distance (K2P) between the sample used in this study and the PV480541 sample, which was obtained from a different geographical region (Iran), was calculated as 0.4. This difference is due to three nucleotide substitutions. The genetic distance between the matK gene region obtained from *S. spicigera* and other taxa is also below 1%. According to the BI (Bayesian Inference) tree, the distance between *S. spicigera* and the PV480541 sample stored in GenBank is less than 0.3%. Thus, the authentication of these species in commercial products has been made possible.

Keywords: Artvin, herbal usage, *Satureja hortensis*, *Satureja spicigera*, Medicinal and Aromatic Plants, Türkiye.

Acknowledgment: This study was derived from the project numbered 2021-TAB-04, titled 'Creating DNA-Barcoded Labels in Medicinal and Aromatic Plants,' conducted under the Medicinal and Aromatic Plants Specialization Coordination at Artvin Çoruh University.

OP-007

Investigation of Propagation Possibilities of *Paulownia tomentosa* in Plantform and SETIS Bioreactor Systems

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Abstract

This study was conducted to determine the optimum immersion and aeration frequency using SETIS and Plantform bioreactors for large-scale, rapid and clonal propagation of commercially important *Paulownia tomentosa*. The use of bioreactors is important to overcome the problems that arise from traditional propagation methods and micropropagation studies using small vessels or tubes. In the study, 40 nodal segment explants were tested in SETIS and Plantform bioreactors, 3 different immersion and aeration frequencies (10-minute immersion every 3/4/6 hours, 5-minute aeration (Plantform)) and observations were taken at the end of 4 weeks, according to the randomized plots experimental design with 3 replications. MS nutrient medium containing 1mg/L BAP, pH 5.8 was used. All cultures were maintained at 25 ±2°C, 16/8h photoperiod. The observation parameters in the study are shoot regeneration, shoot number and length, leaf number and length, fresh mass. The best result was obtained from Plantform bioreactor with 10 minutes immersion and 5 minutes aeration applied every 3 hours and it was found that this bioreactor is more effective for large scale production of *Paulownia*.

Keywords: *Paulownia* sp, bioreactor, Plantform, SETIS, micropropagation

Acknowledgment: This study supported by TUBİTAK 1501 project encoded 3231301.

OP-008

Is the Genus *Ebenus* L. Truly Polyphyletic?

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Abstract

Ebenus L. (Leguminosae, Papilionoideae, Tribe Hedysareae) is a genus of 21 perennial shrub and subshrub species, many of which exhibit pronounced endemism at both national and regional scales. Its distribution ranges from only Oman in the Arabian Peninsula, across the Irano-Turanian region, with a primary center of species diversity in Türkiye and the Eastern Mediterranean, extending westward through North Africa. This study represents the most comprehensive phylogenetic analysis to date, encompassing all known species of the genus worldwide. Optimised DNA extraction was performed in the molecular laboratories of the Royal Botanic Garden Edinburgh. Genomic DNA was submitted to the Plant and Fungal Trees of Life (PAFTOL) project for the construction of genomic libraries, target enrichment using the Angiosperms353 probe set, and high-throughput sequencing. The data were analyzed using both maximum likelihood and coalescent-based methods to reconstruct a detailed phylogenetic framework for the group. Phylogenetic analyses unexpectedly reveal *Ebenus* as polyphyletic, although a well-supported core clade comprising 19 species is recognized. Notably, *Ebenus lagopus* Boiss., distributed in Iran, shows closer affinity to the genera *Chesneya* Lindl. ex Endl. and *Tibetia* (Ali) H.P.Tsui, while *Ebenus zekiyeae* Aytaç & Yıldırım in Türkiye, clusters within the genus *Onobrychis* Mill. This presentation aims to re-evaluate the taxonomy of the genus *Ebenus* in light of phylogenetic findings and to explore whether it constitutes a polyphyletic assemblage. For this purpose, interrelationships among distinct floristic regions have been considered, and morphological traits assessed in the context of phylogenetic evidence.

Keywords: Angiosperms353, *Ebenus* L., Leguminosae, Next Generation Sequencing, Phylogeny

Acknowledgment: This project was supported by the 2219 - International Postdoctoral Research Fellowship Program for Turkish Citizens, and the corresponding author express his sincere gratitude to TÜBİTAK for their invaluable support. We also thank Royal Botanic Garden Edinburgh Expedition Fund (2024, 2025) for funding the field excursions.

OP-009

Adaptation Trials of Medicinal-Aromatic in the Botanical Garden of Balıkesir University

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Abstract

The Botanical Garden is located within the Balıkesir University Campus, between the city center of Balıkesir and Bigadiç district, covering an area of 189,925 m². According to the grid system used by Davis in the Flora of Turkey, the area is situated in square B1 and belongs to the Mediterranean floristic region. Within the scope of this study, a Medicinal and Aromatic Plants Garden and a Geophyte Garden were established in the Botanical Garden. Medicinal plant selection focused on members of the Lamiaceae family, while the geophyte section included selected bulbous, rhizomatous, and cormous species. Among them, Crocus sativus (saffron) was cultivated and yielded promising results. Additionally, Nuphar lutea was introduced into the pond area, where it showed successful establishment and growth. These implementations contribute to the enhancement of biodiversity and support the educational, conservation, and landscaping functions of the botanical garden.

Keywords: Botanical Garden, *Crocus sativus*, Geophytes, Medicinal and Aromatic Plants, *Nuphar lutea*

OP-010

Advantages and Disadvantages of Getting Nectar From Flowers Using Different Methods

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Abstract

Nectar is a sweet, watery, renewable secretion that mediates the interactions of plants with pollinators, herbivores, nectar and pollen thieves, and is one of the primary factors that attract pollinators to flowers. When the literature is reviewed, it is seen that different methods such as microcapillary tubes, filter paper, washing, rinsing, micropipettes and microsyringes, centrifuge and aspirator are used for nectar production. In the present study; *Scrophularia xanthoglossa* var. *decipiens* (Boiss. & Kotschy) Boiss., *Scrophularia erzincanica* (R.R.Mill), *Astragalus pendulus* (DC.), *Scrophularia libanotica* subsp. *libanotica* var. *cappadocica* (R.R.Mill), *Psephellus pyrrhoblepharus* (Boiss.) Wagenitz, *Dianthus crinitus* (SM.), *Erysimum pulchellum* (Willd.) J.Gay and *Scrophularia catariifolia* Boiss. & Heldr. *Euphorbia denticulata* Lam. by centrifugation method. and *Euphorbia* sp. *Scrophularia rimarum* Bornm., *Silene montbretiana* Boiss., *Vaccaria pyramidata=Gypsophila vaccaria* (L.) SM., *Astragalus aucheri* Boiss., *Silene vulgaris* (Moench) Garcke, *Scrophularia libanotica* subsp. *armena* R.R.Mill, *Scrophularia fatmae* Kandemir & Ilhan, *Scrophularia libanotica* subsp. *libanotica* var. *sivasica* R.R.Mill and *Scrophularia canina* L. species, nectar was obtained by both centrifuge and micropipette methods. In the study, the advantages and disadvantages of different nectar collection methods were observed as follows: The centrifuge method; while it is advantageous in terms of being applicable to small flowers with protected nectar and obtaining nectar in a short time, it is disadvantageous for flowers that are too large to fit into Eppendorf and Falcon tubes and for flowers of plants that secrete milky liquid when plucked. The washing method; while it is advantageous for large flowers with exposed nectar, it is disadvantageous for small flowers with protected nectar. The micropipette method; while it is advantageous for obtaining nectar without disrupting the nectar chemistry, it is disadvantageous due to its difficulty in application to small flowers, time-consuming, flowers with hairs inside the flower and those that absorb pure water.

Keywords: Nectar Obtaining, Different Methods, Advantages and Disadvantages

OP-011

From Field to Flora: Scientific Plant Illustration

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Abstract

Scientific plant illustration is a distinctive discipline that integrates the principles of art and science to meticulously render the morphological characteristics of plants in the most detailed and comprehensible manner. In circumstances where photography is inadequate, such as the depiction of multiple structures in a single view or the emphasis on minute details, botanical illustration emerges as an indispensable tool, particularly for taxonomic identification. In Turkey, scientific illustrations are commonly used in flora books, academic theses, and botanical publications. However, the number of trained illustrators remains limited. The illustration process begins with the collection and live observation of plants in the field, followed by working with dried specimens, studying microscopic structures, preparing sketches, outlining and detailing, and finally completing the work with ink or digital techniques. This meticulous process necessitates patience, an in-depth understanding of plant morphology, and highly developed technical drawing skills. Among its strengths are the ability to represent structural details with clarity and accuracy, illustrate different developmental stages in a single composition, and produce visuals that meet scientific standards. However, it is also time-consuming, demands interdisciplinary expertise, and suffers from limited training opportunities. The instruments most frequently employed in such studies include technical pens, water-based inks, digital tablets, and stereomicroscopes. To promote the development of this field in Turkey, university-supported courses, botanical illustration workshops, and collaborations with natural history museums are essential. Scientific illustration plays a pivotal role in facilitating effective botanical communication by serving as a crucial conduit between scientific data and visual understanding.

Keywords: Botany, Flora, Morphology, Plant Illustration.

OP-012

Antioxidant and Antimicrobial Activity of Ethanol and Ethanol/Water Extracts of *Evernia prunastri* Lichen

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Abstract

Evernia prunastri (L.) Ach. is a shrubby lichen with a pleasant, woody odor that grows especially on the bark of oak trees. This species, which has been used as a wound healing and antiseptic in traditional medicine, has been frequently used in perfumery and cosmetics industries for years and is also notable for its antimicrobial and antioxidant properties. In this study, antioxidant activities of two different extracts of *Evernia prunastri* were comparatively investigated. Extracts of lichen samples collected from Kocaeli-Kartepe Mountains forest areas were obtained by maceration method in ethanol and ethanol-water (7:3) solvents. Antioxidant power and capacity of lichen extracts were determined by DPPH, CUPRAC and FRAP methods, while total phenolic compound content was determined by FCR. The study results showed that ethanol-water (7:3) extract obtained from lichen contained higher total phenolic substance and antioxidant capacity than ethanol extract. Antimicrobial activities were determined against 7 Gram-negative and 5 Gram-positive bacteria, 3 yeasts and 1 mold strains, which are major human pathogens, by trough diffusion and broth microdilution methods. It has been concluded that this lichen species, which shows strong antioxidant activity, can be evaluated as a raw material especially in the pharmaceutical industry after toxicity studies.

Keywords: Antioxidant, Drug, *Evernia*, Lichen extract.

Acknowledgment: This study was produced from doctoral data and was supported by Marmara University Scientific Research Projects Unit (BAPKO) under the number FDK-2024-11402.

OP-013

Effects of Plant Growth Regulators on the Clonal Micropropagation of *Aloe vera*

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Abstract

Aloe vera is an economically important ornamental and medicinal plant widely used in the production of food, medications and cosmetics. Its industrial value continues to rise due to its bioactive compounds and therapeutic properties. However, conventional propagation methods are limited by low germination rate, ineffective seed regeneration and slow vegetative growth, making large-scale production difficult. As compared to the conventional methods, plant tissue culture methods allow rapid and large-scale propagation under sterile conditions. Plant growth regulators (PGRs) are essential ingredients for morphogenesis and growth under *in vitro* conditions. Auxins and cytokinins, either alone or in combination, are commonly used PGRs in plant tissue culture. Among these PGRs, the BAP is a synthetic cytokinin, promoting shoot proliferation and cell division, while the IBA induces root initiation and elongation. As a natural auxin, the IAA regulates cell elongation, vascular tissue differentiation, and root growth. The current study aims to investigate the impacts of various PGRs on the propogation and growth performance of *A. vera*. For this purpose, the sterilized shoot tip explants were cultured on Murashige and Skoog (MS) medium supplemented with distinct PGRs, such as benzylaminopurine (BAP), indole-3-butyric acid (IBA), and indole-3-acetic acid (IAA), etc. The plantlets were incubated in a controlled environment for approximately 45 days under a 16/8 (light/dark) photoperiod. We recorded different traits such as number of shoots per explant, root number, root length, and shoot length. The highest number of shoots was found on the medium supplemented with BAP, while maximum root formation was observed on the IBA-containing medium. These results suggest that *in vitro* culture using optimized PGR concentrations and incubation time may be an effective method for the clonal propagation of *A. vera* in order to meet increasing commercial demands.

Keywords: *Aloea vera*, Clonal Propagation, *In vitro* culture, Plant Growth Regulator

OP-014

Towards the Development of a Micropropagation Protocol for Endangered *Stachys bayburtensis*

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Abstract

Stachys bayburtensis R.Bhattacharjee & Hub.-Mor. is a critically endangered and locally endemic plant species restricted to high-altitude rocky habitats (2000–2700 m) in northeastern Türkiye. Due to its narrow distribution and ongoing threats such as habitat degradation and overgrazing, urgent conservation strategies are required. This study aims to develop an efficient in vitro propagation protocol and assess the genetic fidelity of regenerated plants to support ex situ conservation efforts. Seeds collected from natural populations were surface sterilized and cultured on hormone-free Murashige and Skoog (MS) medium. The first signs of germination were observed on the 7th day. Nodal segments obtained from germinated seedlings were cultured under controlled in vitro conditions. Regular subculturing was conducted until an adequate number of healthy shoots were achieved. To determine genetic fidelity, Inter-Simple Sequence Repeat (ISSR) markers were used. Genomic DNA was extracted from silica gel–dried leaves using the CTAB method. PCR conditions for ISSR1 and ISSR2 primers were optimized. The most intense and reproducible band patterns were obtained using undiluted DNA samples (450–500 ng/µl). Clear and consistent amplification products confirmed the reliability of the protocol. This study presents the first micropropagation and genetic assessment work on *S. bayburtensis*. The results provide a scientific basis for ex situ conservation and offer potential for future restoration and reintroduction programs. In vitro propagation combined with molecular verification techniques represents a powerful tool for conserving rare and endangered plant genetic resources.

Keywords: Conservation Biology, Genetic Fidelity, Micropropagation, *Stachys bayburtensis*

Acknowledgment: This work was supported by the Scientific and Technological Research Council of Turkey (TUBITAK project no (grant number) 124C308).

OP-015

In Vitro Propagation and Conservation Strategies for the Endemic Orchid *Ophrys lycia* in Turkey

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Abstract

This study focuses on developing effective conservation methods for *Ophrys lycia*, a threatened endemic orchid species in Turkey. The research encompasses (1) comprehensive field surveys to map natural populations, (2) optimization of seed propagation techniques, and (3) establishment of integrated conservation protocols. Mature seeds were collected from artificially pollinated parent plants, then subjected to viability testing using tetrazolium assays, which revealed an exceptionally high viability rate of 95-100%. Following the development of an optimized sterilization protocol, seeds were germinated asymbiotically on six distinct culture media. Protocorms showing successful development were transferred to a secondary growth medium. They were maintained in this medium until reaching the critical threshold of 0.5 cm tuber diameter, which was established as the minimum size requirement for successful soil transfer. The acclimatization process using a specialized soil mixture has yielded promising results, with transferred plantlets maintaining viability beyond eight weeks under controlled conditions. This study introduces several significant innovations: (1) a reliable protocol for high-efficiency asymbiotic germination of *O. lycia*, (2) clear criteria for selecting viable plantlets (tuber size ≥0.5 cm) to ensure successful soil transfer, and (3) a comprehensive conservation model combining in vitro propagation with potential habitat restoration. The 95-100% seed viability rate underscores the exceptional quality of the collected genetic material and the effectiveness of the storage protocol. These findings provide a robust framework for conserving not only *O. lycia* but also other threatened Mediterranean orchids with similar life history traits. Future research will focus on refining the tuber induction phase and evaluating long-term survival rates in natural habitats.

Keywords: Asymbiotic Germination, In Vitro Propagation, *Ophrys lycia*, Orchid Conservation, Seed Viability, Tuber Development.

Acknowledgment: I thank the Mediterranean Conservation Society for their support.

OP-016

Important Invasive Plant Species in the Eastern Black Sea Region and Their Possible Effects on Tea Agriculture

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Abstract

The Black Sea region is important in terms of having suitable climate conditions and habitats for invasive plant and animal species. Invasive plant species have a high probability of spreading and threatening native flora in humid, forested and monoculture agriculture. This situation can cause the natural structure of the region to change and the habitats of endemic and rare plant species to shrink. As a result of long-term research and recent field studies, it has been observed that 3 invasive plant species have spread significantly in the Eastern Black Sea region (agricultural areas, tea gardens). These species are Sicyos angulatus (bur cucumber), Persicaria perfoliata (Persikarya) and Tradescantia fluminensis (Telegraph flower). Bur cucumber can spread easily in wetlands, stream banks, fields and forest areas, which are native to North America. Persikarya is native to Asia (China, India and Japan) and is known for its rapid spread in agricultural areas, forest areas and roadsides. The Telegraph Flower is a plant whose homeland is South America and is generally used as an ornamental plant and has recently spread in the Eastern Black Sea region. These species can influence tea cultivation areas in the Eastern Black Sea region and the endemic species in the natural structure of the region. The spread of these species, especially in tea cultivation areas, causes economic losses, need for more manpower and mixing with tea leaves during tea harvest, causing efficiency losses both qualitatively and quantitatively and affect production quality. The fact that there is no control for species in the field and the fact that any chemical control agent cannot be applied due to Çaykur policy makes it even more grave. For this reason, it is necessary to carry out serious studies on the spreading areas and dynamics of these species and their situation should be monitored in detail.

Keywords: Eastern Black Sea, Invasive Plants, *Sicyos angulatus*, *Persicaria perfoliata*, *Tradescantia fluminensis*

OP-017

Ethnobotanical Assessment of Economically Important Plants in the Flora of Adıyaman

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Abstract

Adıyaman Province is located in the Southeastern Anatolia Region of Türkiye, situated in a transitional zone between the Taurus Mountains and the Euphrates River. This ecological setting, characterized by a convergence of Mediterranean and continental climate features, provides favorable conditions for rich plant diversity. This study is based on the biodiversity inventory of Adıyaman, ethnobotanical theses, and relevant literature published between 2018 and 2025. Within the scope of the research, approximately 225 plant taxa of economic value—out of 756 taxa naturally distributed in the province—were evaluated in terms of their traditional uses by the local population. Among these, 10% are endemic and 0.4% are locally endemic to the region. According to findings derived from field observations and literature review, many economically valuable plant species are used for more than one purpose. The results show that 53% of the species are utilized for both medicinal and nutritional purposes, 13% for household items, 12% as ornamental plants, 11% as animal feed, and 8% as fuel. Recent studies also reveal that some newly recorded species in the flora of Adıyaman have begun to be used by local communities. One such species is Rheum telianum, newly described for Türkiye in 2020, which is traditionally known for its blood sugar-lowering effects. This study provides valuable insights into the contribution of economically significant and culturally utilized plants to the biodiversity and rural economy of Adıyaman. The findings are expected to inform local development policies and promote the sustainable use of natural plant resources in the region.

Keywords: Adıyaman Province, Economic plants, Endemic species, Ethnobotany, Traditional plant use.

Acknowledgment: We gratefully acknowledge the support of the Ministry of Agriculture and Forestry (Nature Conservation and National Parks, 3rd Regional Directorate, Adıyaman Branch) and the Adıyaman University Scientific Research Projects (BAP) Coordination Unit, which both contributed to this study through their respective projects.

OP-019

Ethnobotanical Study of 72 Villages in Tokat Province

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Abstract

Tokat Province lies in a transition zone between the Euro-Siberian and Irano-Turanian phytogeographical regions. Under the nationwide "Documentation of Traditional Knowledge Based on Biological Diversity" Project, fieldwork was carried out in 72 villages selected to represent Tokat comprehensively. Face-to-face interviews with 550 informants—215 women and 335 men—generated 2 858 raw use reports; after standardisation and elimination of duplicates, 2 099 unique taxon–use combinations were retained. The dataset comprises 504 plant species from 73 families, eight animal genera and three fungal taxa. 65 % of the records (n=1364) relate to human health: wound care (23%), burn treatment (15%), respiratory complaints (10%) and rheumatic pain (9%) predominate, with *Pinus nigra* J.F.Arnold resin, *Alkanna tinctoria* (L.)Tausch root ointment, *Plantago lanceolata* L. poultice and *Hypericum perforatum* L. oil cited most frequently. Informant Consensus Factor (ICF) values reached 0.81 for dermatological problems and 0.84 for digestive disorders. Nutritional uses account for 16% (n=341) of the corpus, led by the wild vegetables *Polygonum cognatum* Meisn. and *Urtica dioica* L.; animal rennet remains in use for traditional cheese making in 21 villages. Industrial–craft (12%) and agro-veterinary (6 %) records are illustrated by three key practices: plant-based dyes—*Juniper* bark and *Rubia* roots as natural pigments for kilims and wool yarn; resin-based adhesives and waterproofing agents—pine tar from *Pinus sylvestris* var. *hamata* Steven used as a durable glue on threshing sledges; and bio-pesticidal preparations—a field spray made from decoction of Urtica dioica combined with grape vinegar. Comparison with regional literature revealed 249 previously undocumented species–use records. Informants aged ≥ 60 contributed 40% of all data, whereas the 18–35 cohort provided 12%; women reported 68% of household and food uses. The curated dataset has been uploaded to the Ministry of Agriculture and Forestry's National Biodiversity Database, offering a robust foundation for pharmacological, ecological and conservation research while guiding value-added product development and community-based tourism centred on Tokat's biocultural heritage.

Keywords: Biodiversity, Ethnobotany, Informant Consensus Factor, Tokat Province, Traditional Knowledge

Acknowledgment: This study was carried out under the project "Documentation of Traditional Knowledge Based on Biological Diversity in Tokat Province," coordinated by the 11th Regional Directorate of the General Directorate of Nature Conservation and National Parks, Ministry of Agriculture and Forestry, Türkiye.

OP-020

Ethnobotany of Buldan as a Pilot Project for the Biocultural Heritage

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Abstract

Within the scope of Türkiye's Cultural Inventory Project initiated by the Turkish Academy of Sciences in 2000, it was accepted that ethnobotanical studies should be included, as well as other cultural assets. In 2002, a pilot study started at Buldan, a town of Denizli, and the project was completed within two years, with a team six people from Pamukkale and Balıkesir universities. Although, 450 samples collected, and 258 useful species were identified, of which 21 are endemic, the most important part was discovering this knowledge as part of the cultural heritage. With some overlapping uses, 97 food, 108 medical, 11 fuel, 41 feed and 38 handicraft plants were recorded, as well as 46 plant species are useful in other areas. During our visits of Buldan, we conducted research not only in the town centre, but also in thirteen villages and the Yenice district. In particular, observations were made and recipes were recorded relating to Buldan's unique culinary culture, the ethnographic materials associated with it, the healing practices, and its traditional weaving culture. In addition to conducting in-depth interviews with 130 people, of which most were women, market visits were carried out on Thursdays, and visual recordings were completed. Educational activities were carried out in schools. Questionnaires were distributed to students so that they could fill them out with their grandparents in order to facilitate intergenerational communication. These studies, conducted to reveal the multifaceted relationship between humans and plants, have enabled us to compile an inventory of our biocultural heritage. While work continued in Buldan, workshops were also held in Istanbul with academics from various fields interested in the subject, about the techniques tested in this project, database formats, and framework questions which were used during the interviews. For more than 20 years, the techniques of this pioneering pilot project have been partially modified and developed, and applied in many studies conducted in Türkiye, ensuring that ethnobotanical studies are accepted as cultural heritage.

Keywords: Biocultural Heritage, Buldan, Cultural Inventory, Ethnobotany.

OP-021

Traditional Uses of Boraginaceae Species in Turkey: An Ethnobotanical Assessment

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Abstract

The Boraginaceae Jussieu family is a diverse group of flowering plants characterized by hairy leaves, spiral inflorescences, and often vivid blue or purple flowers. Many of these plants have traditional medicinal and cultural significance around the world. The present study focuses on the traditional uses of Boraginaceae species by local communities across different regions of Turkey and explores their significance in folk medicine.A comprehensive review of 218 literature sources, encompassing theses and scientific articles, was conducted using keywords such as "ethnobotany," "folk medicine," and "Turkey" in both Turkish and English. A comprehensive Web of Science search yielded 316 ethnobotanical records, encompassing 21 genera and 71 taxa. These records were subsequently classified into three categories: medicinal uses (137), culinary uses (159) and other uses (20). The present study focused specifically on the 137 medicinal-use reports to document traditional practices and assess their potential relevance today. Among the 34 genera grown in Turkey, 15 of these been documented to have medicinal uses. Alkanna, *Onosma*, and *Anchusa* are the most frequently cited genera in traditional medicine. The Boraginaceae family is characterized by a wide range of both internal and external traditional uses. Reports of external applications are more frequent than those of internal uses. In general, crushed plant parts or poultices are applied to treat wounds, burns, and bites from scorpions and snakes. Internally, decoctions and infusions are used to address respiratory infections and gastrointestinal disorders such as stomachache or constipation. Numerous pharmacological and phytochemical studies have confirmed that the traditional uses of these genera are supported by scientific evidence. The integration of traditional knowledge with modern research highlights the therapeutic potential of Boraginaceae species and their bioactive compounds. As a result, the family represents a valuable resource for the development of new plant-based medicines and natural treatment strategies.

Keywords: *Alkanna*, Ethnobotany, Folk Medicine, *Onosma*, Turkey

OP-022

Digitisation of Biocultural Collections: Research and Access Potential of BIAA Digital Archives

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Abstract

Since 1947, the British Institute at Ankara (BIAA) has built extensive archives and library collections through interdisciplinary collaboration, encompassing archaeological and botanical data, photographs, and researcher notes. A cornerstone of these holdings is a unique botanical reference collection (Index Herbariorum code: BIA), assembled by archaeobotanist Gordon C. Hillman and colleagues from 1970-1990 during archaeological excavations in Türkiye. This collection, which includes herbarium specimens, wood, and charcoal samples, significantly reflects Anatolia's biodiversity. To preserve and enhance access to these resources, BIAA undertook the Herbarium Digitisation Project (2021–2022), making the collection publicly available through its Digital Repository. Following The Herbarium Digitisation Project, efforts have been started to digitise an extensive slide collection with the “Lost Villages of the Upper Euphrates: Digital Archive Project.” These slides provide a unique foundation for studying plant-human interactions, ethnographic/ethnobotanical activities, and changes in the landscape and vegetation. This paper highlights the benefits of converting physical archives into open digital resources, showcasing how these projects contribute to documenting and disseminating Türkiye's plant biodiversity and the history of archaeobotanical and ethnobotanical research. Emphasising the role of biocultural collections and digitisation, it illustrates their enhanced public accessibility and research potential through the linking of diverse data types, including library materials, photographs, notebooks, and plant specimens.

Keywords: archaeobotany, ethnobotany, biocultural and photographical collections, digitisation

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OP-023

An Ethnobotanical Study in Kocaeli Province

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Abstract

Kocaeli Province boasts a diverse range of plant life, thanks to its elevation reaching up to 1,601 meters, the variety of terrestrial and aquatic habitats, and the influence of both Mediterranean and Oceanic climates. The region is home to 1,477 vascular plant taxa, with an endemism rate of 3.39%. This study was conducted as part of the Traditional Knowledge Documentation Project in Kocaeli, led by the Kocaeli Directorate of Provincial Agriculture and Forestry. It covers traditional uses of plants based on their biological diversity in the fields of health (folk medicine), nutrition (food, spices, beverages, etc.), industry (dyes, textiles, fuels, handicrafts, etc.), and agriculture-livestock. In this study, field research conducted in 40 villages across 10 districts of Kocaeli Province recorded 104 plant taxa belonging to 48 families and 4 mushroom species belonging to 4 families. The most common medicinal uses of the plants are for treating colds, strengthening the immune system, and promoting wound healing. The plants used for these purposes are *Urtica dioica* L., *Plantago major* L., and *Tilia rubra* (Weston) DC. The plant species used for nutritional purposes are *Cornus mas* L., *Borago officinalis* L., and *Urtica dioica* L. These plants are mostly used in making meals, jams, and marmalades. In addition, plants are mostly used for fuel, clothing and textiles, and basket making. For these purposes, *Carpinus betulus* L., *Corylus avellana* L., and *Quercus coccifera* L. are the most commonly preferred species. In addition, the most commonly used plant species in feed, veterinary, and biological control are *Helleborus orientalis* Lam., *Zea mays* L., and *Quercus robur* L.

Keywords: Kocaeli, ethnobotany, plants, traditional knowledge, folk medicine,

Acknowledgment: The data used in this study were obtained through the 'Documentation of Traditional Knowledge Based on Biological Diversity in Kocaeli Province Project' conducted by the Republic of Turkey Ministry of Agriculture and Forestry, Kocaeli Provincial Directorate of Agriculture and Forestry, with financial support provided by the institution. The data in this study were collected through face-to-face survey studies.

OP-024

Phenolic content and Bioactive Potential of some *Sideritis* species from the Karaman Region

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Abstract

The genus *Sideritis* (Lamiaceae) encompasses over 150 species predominantly distributed across temperate and tropical regions of the Northern Hemisphere. In Türkiye, 46 species have been documented, with a remarkable rate of endemism (40 taxa). Ethnopharmacological records indicate that various *Sideritis* preparations have been traditionally employed in the management of gastrointestinal ailments and are reputed for their diverse bioactivities, including antioxidant, anti-inflammatory, and antimicrobial effects. These pharmacological properties are primarily attributed to a complex phytochemical repertoire comprising phenolic compounds, terpenoids, flavonoids, and volatile constituents, positioning *Sideritis* as a promising phytotherapeutic reservoir. This study was designed to conduct a comparative evaluation of the phenolic profiles, antioxidant capacities, and cytotoxic activities of methanolic extracts obtained from four *Sideritis* taxa (*Sideritis phyrgia, S. erictrantha* subsp. *erictrantha, S. vuralii* and *S. hololeuca*) naturally occurring in the Karaman province and its vicinity. Extracts were prepared via Soxhlet extraction. The analysis of phenolic constituents was performed using High-Performance Liquid Chromatography (HPLC). Antioxidant activity was assessed through the DPPH (2,2-diphenyl-1-picrylhydrazyl) free radical scavenging assay, while cytotoxic potential was investigated employing the MTT [3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide] assay on the DLD1 colorectal adenocarcinoma cell line. HPLC analysis identified and quantified eleven phenolic compounds, with Rutin emerging as the most abundant phenolic constituent. DPPH radical scavenging assays demonstrated that all extracts possessed notable antioxidant capacities, albeit with varying efficacies. Furthermore, MTT assay results revealed that the extracts exhibited dose- and time-dependent cytotoxicity within the tested concentration range (0.0625–1 mg/mL), suggesting a potential antiproliferative effect against colorectal cancer cells. In conclusion, the findings of this study highlight the considerable pharmacological promise of *Sideritis* taxa as sources of bioactive compounds with antioxidant and cytotoxic properties. Further in-depth investigations are warranted to isolate the active constituents and elucidate the molecular pathways underlying their cytotoxic effects.

Keywords: Cytotoxicity, Iron grass, Karaman, Medicinal plants, Türkiye.

Acknowledgment: This research was funded by the BAP (Scientific Researching Projects) Foundation of Selçuk University (Project number 22401077).

OP-025

Pharmacognostical Investigations on *Cuscuta hyalina* Roth

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Abstract

Medicinal and aromatic plants are used in traditional medicine practices or as raw materials for drugs in the pharmaceutical industry due to their valuable biological activities. It is important to standardize plants that are useful in traditional folk medicine for use as drugs. This study aimed to conduct pharmacognostic research on the *Cuscuta hyalina* Roth (zar bostanbozan) species detected in the Medicinal and Aromatic Plants Garden of Inonu University Faculty of Pharmacy. Plants belonging to the *Cuscuta* L. (cinsaçı) genus belonging to the Convolvulaceae family are holoparasites and cause the death of the plant they infect. *Cuscuta* has spread throughout the world by harvesting seed-bearing host plants and planting infected seeds. Although extremely harmful to agricultural products, they are used in traditional folk medicine. It is used in liver and kidney damage, stomach ache, ulcers, diarrhea, constipation, jaundice, eye, skin, heart diseases, hypertension, bone fractures, rickets, sciatica disorder treatment, regulating sexual functions, preventing hair loss and dandruff, preventing aging and miscarriage during pregnancy, as a antihelmintic, antiinflammatuar, diaphoretic and tonic. In Turkey, it is traditionally used in the treatment of jaundice, stomach disorders, as a diuretic, gastric and bile expectorant. *In vivo* and *in vitro* studies conducted on different *Cuscuta* species show that these species have various biological activities such as analgesic, antiaging, antibacterial, antidiabetic, antihypertensive, antimicrobial, antimutagenic, antioxidant, antiinflammatory, antipyretic, antiproliferative, hepatoprotective, antiulcer, anticancer, antinociceptive. In this study, total qualitative analysis was performed on *C. hyalina* and the active ingredient groups (flavonoid, starch, oz and tannin) were determined. Powder drug analysis was performed to determine the characteristic structures in its content. The pharmacognostical results obtained can be used to confirm the diagnosis and detect possible adulteration for *C. hyalina* species that can be used as a drug raw material. It is expected to shed light on researchers who will develop new drugs in the future.

Keywords: *Cuscuta*, Pharmacognosy, Powder microscopy, Total qualitative analysis

OP-026

Docking-Based Investigation of Syringic Acid Against Cancer-Related Proteins

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Abstract

Syringic acid is a phenolic compound that occurs naturally in various medicinal and aromatic plants, and it is recognized for its antioxidant and anticancer properties. This study explores the interaction between syringic acid and PIM1 serine/threonine kinase (PDB ID: 4TY1), a key cell signaling protein implicated in cancer. PIM1 is an oncoprotein that plays a role in cell proliferation, the suppression of apoptosis, and tumor development, and it is overexpressed in numerous tumor types. The development of PIM1 inhibitors is critically essential for revolutionizing cancer treatment and enhancing patient outcomes. Molecular docking studies were conducted using AutoDock4 software, directing the optimized structure of syringic acid to the active site of the PIM1 protein. The protein crystal structure was sourced from the Protein Data Bank, and the binding site was defined according to the position of the co-crystal ligand. The docking results indicate that syringic acid exhibits a strong binding affinity for the PIM1 protein. This interaction is characterized by hydrogen bonds and hydrophobic interactions with essential amino acids located within the active site. The data obtained indicate that syringic acid may function as a natural inhibitor of PIM1 and possesses the potential to modulate signaling pathways associated with cancer. This study represents a significant contribution to the evaluation of plant-derived phenolic compounds as prospective agents for next-generation anticancer therapies.

Keywords: Syringic acid, phenolic compounds, molecular docking, natural inhibitor, PIM1.

OP-027

Cytotoxic Effects of *Fritillaria imperialis* L. and *Fritillaria pinardii* Boiss. Extracts on A549, MCF-7 and HT-29 Cell Lines: An In Vitro Study

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Abstract

The aim of this study is to evaluate the in vitro cytotoxic effects of different extract fractions obtained from *Fritillaria imperialis* L. and *Fritillaria pinardii* Boiss. on lung cancer (A549), human breast cancer (MCF-7) and human colorectal adenocarcinoma (HT-29) cell lines. The study was conducted using three different extract fractions for each plant species: methanol, tertiary alkaloid and quaternary alkaloid extracts.A549, MCF-7, HT-29 and J774 cells were cultured in RPMI-1640 or DMEM-High Glucose media supplemented with 10% FBS at 37 °C, 5% CO_2, and 95% humidity. After reaching appropriate confluence, cells were harvested and seeded into 96-well plates at a density of 1×10^5 cells/mL, then incubated for 24 hours. The cytotoxic effects of the extracts (10–100 µg/mL) were evaluated using the MTT assay. After 48-hour incubation with extracts, MTT solution and DMSO were added, and absorbance was measured at 570 nm. Results were reported as mean ± SD from triplicate experiments. According to the results, the most effective *F. imperialis* fractions on the A549 cell line was the methanol extract at a concentration of 80 µg/mL, showing 44.81% cytotoxicity. For *F. pinardii*, the highest effect was observed in the tertiary alkaloid fraction with 44.59% cytotoxicity. On the MCF-7 cell line, the most effective *F. imperialis* fraction was the quaternary alkaloid extract at 80 µg/mL, showing 50.24% cytotoxicity. For *F. pinardii*, the highest cytotoxic effect was observed in the tertiary alkaloid fraction with 50.32%. On the HT-29 cell line, the most effective *F. imperialis* fraction was the tertiary alkaloid extract at 80 µg/mL, showing 43.77% cytotoxicity. For *F. pinardii*, the highest cytotoxic effect was observed in the tertiary alkaloid fraction with 49.29%. These findings suggest that specific fractions of *Fritillaria* species may possess potential anticancer properties warranting further investigation.

Keywords: Cytotoxic Activity, *Fritillaria imperialis*, *F. pinardii*, A549, MCF-7, HT-29

OP-028

Phenolic and Antioxidant Properties of *Sambucus nigra* Tea Prepared under Different Conditions

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Abstract

Sambucus nigra L. is known as black elder, elderberry, European elder. The flowers of *S.nigra* is used to relieve the early symptoms of the common cold, primarily as herbal tea. Furthermore, it is used as a beverage and food flavouring for its pleasant fragrance. The plant is rich in phenolic compounds, which contribute to its strong antioxidant capacity. This study investigates the impact of the extraction period and amount of water on the phenolic profile and antioxidant potential of Sambuci flos, commonly consumed as herbal tea. The sample used in this investigation was obtained commercially as herbal tea. Totally 6 infusions were prepared: 2 grams of the sample were mixed with 200 mL, 400 mL, and 800 mL of boiling water and brewed for 10 and 30 minutes. Lyophilized samples were stored at 4 °C until analysis. The yields were determined between 12.56% and 23.04%. The total phenolic content was determined using the Folin-Ciocalteu method. The total flavonoid content was measured using the Aluminium Chloride method. The antioxidant activities of the samples were evaluated using 2, 2-diphenyl-1-picrylhydrazyl Scavenging Activity (DPPH) and Ferric Reducing Antioxidant Power (FRAP) methods. It was determined that the sample prepared with 200 mL hot water for 30 minutes has the highest values, with 195.665 mg GAE/g total phenolic content, whereas the highest flavonoid content (63.576 mg QE/g) was found in the infusion obtained with 800 mL of hot water for 30 minutes. The FRAP activities ranged from 352.810 to 391.317 mg TE/g, whereas the IC_{50} values for DPPH radical scavenging activity were between 0.0247 and 0.0316 mg/mL. Brewing parameters were observed to influence the efficiency of phenolic profiles and antioxidant activities.

Keywords: Antioxidant activity, herbal tea, phenolic compounds, *Sambucus nigra*

OP-029

Tissue-Specific Distribution of Bioactive Compounds in *Hedysarum* Species: Focus on Phenolics, Flavonoids, and Antioxidant Potential

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Abstract

Turkey is internationally recognized for its medicinal and aromatic plants, attributable to its strategic geographic location, climatic heterogeneity, and high floristic diversity. Its floristic diversity supports the natural distribution of these species, which play vital roles in ecosystem stability and human health. Medicinal and aromatic plants are widely used as raw materials in various industries, particularly in the pharmaceutical, food, and cosmetic sectors. In this context, Erzincan is recognized as a region of significant botanical interest in Turkey due to its high level of plant diversity. The region's geological structure, topographic complexity, and climatic variability play a critical role in shaping its diverse and ecologically distinct vegetation. In this study, four endemic species of the genus *Hedysarum* (i.e., *H. candidissimum*, *H. erythroleucum*, *H. nitidum*, and *H. yilmazunalii*), which are naturally distributed in Erzincan and known for their traditional medicinal use, were investigated. The plants were divided into root, stem, and leaf parts; and their methanolic extracts were analyzed for total phenolic and flavonoid contents as well as antioxidant activities using DPPH and FRAP assays. Among the leaf extracts, *H. candidissimum* demonstrated the highest activity (220.84 ± 1.07 mg GAE/g, 107.26 ± 0.77 mg QE/g, 192.47 ± 0.91 µg TE/g, IC50: 5.43 ± 0.18 µg/mL). In stem and root extracts, the highest values were found in *H. yilmazunalii*, with 176.80 ± 0.53 µg TE/g, IC_{50}: 9.16 ± 0.30 µg/mL and 106.78 ± 0.18 µg TE/g, IC_{50}: 112.96 ± 2.19 µg/mL, respectively. The findings demonstrate that antioxidant activity in *Hedysarum* species varies depending on both the species and the plant organ. The results highlight that the investigated species represent a valuable endemic phytochemical source in terms of phenolic content and antioxidant capacity. These findings also indicate that organ- and species-specific differences can serve as a valuable reference for future phytochemical and pharmacological research.

Keywords: Antioxidant capacity, *Hedysarum*, Medicinal and Aromatic Plants and Phenolic Composition.

Acknowledgment: This study was supported by the Erzincan Binali Yıldırım University of Türkiye, Scientific Research Projects Coordination Unit (Project Number: FBA-2024-989).

OP-030

Assessment the Vegetation Syntaxonomy of Türkiye According to the Existing Datas and Updated Developments

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Abstract

Vegetation research in Türkiye according to the Br.-Bl. approach began in 1960. 417 works have been published by local and foreign researchers. The vegetation section given in the Illustrated Flora of Turkey in 2014 is known as the source work that provides the most comprehensive information. There are also reviews giving the vegetation classes of Türkiye in some studies. After the evaluation of the vegetation classes according to the new vegetation nomenclature code, it was necessary to examine the classes in Türkiye. In the vegetation researches carried out in Türkiye to date, approximately 2200 plant associations have been defined. While 27 classes are mentioned in Türkiye according to the Illustrated Flora of Turkey, according to our findings, the number of classes whose existence is certain is 54. However, the number of classes given as probable habitats in various sources is approximately 35, including their repetitions. Again, although not mentioned in any source, habitats known as individual observations and evaluated as a separate class in Türkiye are evaluated in 16 separate classes. In the light of all these informations, it has been evaluated that the number of vegetation classes that should be present in Türkiye should be around 80. The same situation applies to the order and alliance numbers. Vegetation studies in Türkiye are still very insufficient. Alliances proportional to the number of species in Türkiye have not been defined and need to be re-evaluated. Although the most researched habitats in Türkiye are forests and steppes, there are still very important deficiencies and gaps even for these two habitats. The classes that define very special habitats, although they cover a small area, need to be investigated further. Thus, it has been evaluated that the existing studies in Türkiye should be reviewed and more research is needed.

Keywords: Assessed Information, Revision of Vegetation Research, Vegetation of Türkiye

OP-031

Chemical Characterization and Anticataractogenic Potential of Rose-Scented Geranium (*Pelargonium graveolens* L'Herit. ex Aiton.) Essential Oil

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Abstract

Pelargonium graveolens L'Herit. ex Aiton, commonly known as rose-scented geranium and referred to as ıtır in Turkish, is a perennial aromatic plant widely recognized for its essential oil, which is extensively utilized in the fragrance and perfume industries. It is predominantly cultivated for horticultural purposes. The United States Food and Drug Administration (FDA) has classified geranium essential oil as "generally recognized as safe" (GRAS) at concentrations ranging from 1.6 to 200 ppm. In addition to its known stress-relieving properties in aromatherapy, recent clinical investigations have highlighted the therapeutic potential of rose-scented geranium essential oil, including anti-inflammatory, analgesic, anxiolytic, antidepressant and anti-allergenic activities. The present study aimed to evaluate the essential oil yield, chemical composition, and aldose reductase inhibitory activity (as an indicator of anti-cataract potential) of *P. graveolens* essential oil sourced from the Aegean region of Turkey. Hydro distillation of air-dried leaves of *P. graveolens* yielded 0.36% essential oil. Gas chromatography–mass spectrometry/flame ionization detection (GC-MS/FID) analysis identified the primary constituents as citronellol (39.5%), geraniol (14.1%), citronellyl formate (9.2%), isomenthone (5.7%), and geranyl formate (4.6%). The essential oil exhibited significant inhibitory activity against aldose reductase—an enzyme centrally involved in the pathogenesis of diabetic cataracts—with an IC_{50} value of 19.43 µg/mL. The major constituents, citronellol and geraniol, were also evaluated individually and demonstrated IC_{50} values of 19.81 µg/mL and 16.94 µg/mL, respectively. These results are particularly promising when compared to epalrestat, a commercially available aldose reductase inhibitor, which showed an IC_{50} of 9.57 µg/mL.

Keywords: Aldose reductase, Cataractogenesis, Essential oil, Geranium, *Pelargonium graveolens*.

OP-032

Genome-Wide Computational Analysis of Vacuolar Iron Transporters (VITs) in Sugar Beet (*Beta vulgaris* L.)

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Abstract

Vacuolar iron transporters (VITs) are involved in iron homeostasis in plants through translocation of cytosolic ferrous ions into the vacuole. There are 2 tonoplast-localized iron transporter classes including VITs, and VIT-like (VTL) in plants. Sugar beet (*Beta vulgaris* L.) is an economically important crop widely cultivated for the production of table sugar, animal feed, bioethanol, and biofertilizers. It is known as salt- or drought-tolerant crop and is used to develop abiotic stress–resilient varieties. This study aims to identify *vacuolar iron transporters (VITs)* in the *B. vulgaris* genome through bioinformatics methods. The study examined their physical and chemical properties, evolutionary relationships, subcellular localization, chromosomal distribution, conserved motifs, gene structure, *cis*-acting regulatory elements in promoters, protein-protein interaction and GO enrichment The amino acid sequences and other necessary data were downloaded from the Phytozome, Ensembl Plants and NCBI databases. The physicochemical properties of genes and proteins were predicted using the ProtParam tool (https://web.expasy.org/protparam/). For the prediction of *cis*-acting elements in promoter regions, the PlantCARE tool was used. MEGA11 software (https://www.megasoftware.net/) was employed for phylogenetic analysis, and WoLF PSORT (Protein Subcellular Localization Prediction Tool) was used to predict subcellular localization Here, seven *VIT* genes in sugar beet have been identified for the first time, and named *BvVIT1, BvVIT2, BvVIT3, BvVIT4, BvVIT5, BvVIT6,* and *BvVIT7*. The protein lengths varied from 194 (BvVIT4) to 245 (BvVIT6) amino acids, while molecular weights were between 20.66 and 25.81 kDa. The *BvVIT1-5* and *VIT7* genes consisted of a single exon, *BvVIT6* contained four exons and three introns. PlantCARE promoter analysis suggested that the *BvVITs* are associated with hormone regulation, light response, stress response, meristem and endosperm expression, flavonoid biosynthesis and zein metabolism The findings presented above collectively offer insights into the potential functions of beet *VITs*, contributing to a deeper understanding of iron homeostasis.

Keywords: Bioinformatics, Genome-wide analysis, Sugar beet, Vacuolar iron transporters

P-033

Polygenic Discrimination of Leaf Morphotypes in Alpine *Heldreichia bupleurifolia* (Brassicaceae) across its Natural Range

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Abstract

Leaf morphology is a critical adaptive trait in plants, yet its genetic basis and environmental drivers remain poorly resolved in natural populations. *Heldreichia bupleurifolia*, a polymorphic alpine species in Türkiye, displays three distinct leaf morphotypes (entire, mixed, lobed/dissected) along a west-to-east gradient. This study investigates genome-wide SNP variation (61,286 SNPs from 131 individuals across 20 populations) to identify candidate loci and environmental associations linked to morphotypes. Genetic structure analysis revealed three clusters aligned with geography but not traditional subspecies. DAPC and Random Forest achieved perfect morphotype discrimination, identifying 167 informative loci (90 from DAPC, 83 from RF, 5 shared), many located in protein-coding regions enriched for GO terms related to ion homeostasis and transmembrane transport—key functions in nutrient-poor alpine soils. Morphotype distribution also correlated with substrate: lobed morphotypes occurred exclusively on volcanic soils, while entire and mixed types were associated with limestone. These findings suggest that morphotype-associated genetic differentiation may involve stress-related physiological processes shaped by edaphic conditions. Although further validation is required to confirm causal links, the results underscore the role of genotype–phenotype–environment interactions in shaping local adaptation in alpine systems and highlight the importance of integrating genomic and ecological approaches in plant conservation.

Keywords: Alpine plants, Brassicaceae, gene ontology (GO), polygenic traits, population genomics.

Acknowledgment: This study was supported by TÜBİTAK under the 1001 Research Projects Support Program (Project No: 120Z561).

OP-034

Genetic Diversity of *Alnus* Populations in Türkiye Based on ITS gene Region Analyses

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Abstract

The genus *Alnus* is ecologically significant due to its nitrogen-fixing symbiosis with *Frankia spp*. and its widespread presence across diverse environments. The genus *Alnus* Miller (*Betulaceae*) is represented by 35 species worldwide. In Turkey, this genus is represented by six taxa. This study investigates the genetic diversity of *Alnus glutinosa* and *Alnus orientalis* populations in Türkiye using molecular markers: the nuclear ITS1 gene region. To assess population-level genetic diversity, a total of 240 individuals were collected from eight distinct regions in Türkiye (Artvin, Gümüşhane, Kahramanmaraş, Kastamonu, Kırklareli, İstanbul, Mersin, and Muğla). Genomic DNA was extracted from leaves, and the ITS1 region was amplified and sequenced. Sequences were trimmed based on a 50% gap threshold and aligned using the DECIPHER package of R programme. Single nucleotide polymorphisms (SNPs) were detected by comparing sequences to a consensus, resulting in 220 polymorphic positions. SNP-based distance matrices and Neighbor-Joining trees indicated a low level of polymorphism but revealed subtle genetic structuring. Pairwise F_{ST} values and heatmaps supported the presence of population differentiation. AMOVA results confirmed significant genetic variation among populations (Φ_{ST} = 11.28, p = 0.001), while DAPC analysis revealed distinct genetic clusters. Overall, this study provides valuable baseline data on the genetic structure of *Alnus* species and populations in Türkiye, contributing to conservation strategies and future research on ecological resilience in forest ecosystems. Also, this study will form the basis for future Alnus and Frankia symbiont researches.

Keywords: *Alnus glutinosa*, *Alnus orientalis*, ITS, SNP analysis, genetic diversity

Acknowledgment: This study was supported by the TÜBİTAK (Project Number: 122Z395).

OP-035

Development of an Androgenesis-Based Doubled Haploid (DH) Protocol for Main *Brassica* Vegetables

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Abstract

Brassica vegetables are cool season crops. This vegetable group includes cauliflower (*B. oleracea* var. *botrytis*), broccoli (*B. oleracea* var. *italica*), kale (*B. oleracea* L. var. *acephala*), white cabbage (*B. oleracea var. capitata* f. *alba*) and red cabbage (*B. oleracea* var. *capitata* f. rubra). These plants are mainly produced for their leaves and floral organs containing high levels of health promoting bioactive chemicals. Majority of commercial varieties used in the production of *Brassica* vegetables are F1 hybrids developed by seed companies. F1 hybrids are produced via crossing homozygous parental lines. Development of pure lines via classical selfing technique is time consuming and difficult. Anther/microspore culture based-androgenesis technique can be utilized to produce fully homozygous lines. We attempted to develop a single anther culture-based androgenesis procedure that can be used in the production of doubled haploid (DH) plants from cauliflower, broccoli, kale, white and red cabbage breeding materials. The flower buds with anthers containing uninucleate stage mikrospores were determined via DAPI (4′,6-diamidino-2-phenylindole) staining. Surface sterilized flower intact anther explants were isolated from surface sterilized flower buds and placed in Petri dishes containing solidified induction cultures (B5 with 1 mg l^{-1} of dichlorophenoxyacetic acid (2,4-D), α-naphthalene acetic acid (NAA), 6-Benzylaminopurine (BAP)). Cultures were covered with aluminium foil and exposed to a combination of cold (5ºC/24 hours) and heat (32ºC/24 hours) pre-treatments in dark. The cultures were kept in a growth room adjusted for constant 25ºC. Androgenesis responses were obtained about one month after culture initiation. All donor materials were responsive to anther culture-based androgenesis. Majority of the regenerants were determined as spontaneous diploids. There were also haploid, mixoploid (for haploid and diploid cells) and tetraploid androgenic plants. Androgenic DH plants obtained from cauliflower, broccoli, kale, white and red cabbages were acclimatized to greenhouse conditions. They will be self-pollinated to produce seeds.

Keywords: Androgenesis, *Brassica*, Doubled Haploid, Flow Cytometry

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OP-036

Gynogenesis Responses of Turkish Onion (*Allium cepa*) and Seed Şhallot (*A. cepa* var. *aggregatum*) genotypes

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Abstract

Onion (*A. cepa* L.) ve shallot (*A. cepa* var. *aggregatum*) are economically important vegetables. These close relatives have diploid (2n=2x=16) number of chromosomes and large genomes (~32 pg DNA/cell). Development of new onion and shallot cultivars is a long and difficult process. It is possbile to produce haploid plants from onion and shallot via gynogenesis-based haploidization technique. Conversion of haploids to doubled haploids via spontaneous or induced chromosome doubling allows production of completely homozygous plants. In this project, responses of nine onion and three shallot genotypes to gynogenesis induction were studied. Except for one onion genotype, gynogenesis response was obtained from all onion and shallot genotypes. Responses of onion genotypes to induction varied between 0% and 2%. In shallot, responses of genotypes varied between 0,07 % and 1,1 %. It was found that about half of the gynogenic onion and shallot plants had haploid number of chromosomes. Twenty-five percent of the plants were determined to be spontaneous diploids. One gynogenic onion plant was a tetraploid. The remaining plants were mixoploids. Some of the gynogenic plants transferred to in vivo survived and grew up. In general, gynogenic plants showed similarity to their donor plants. The findings obtained showed that onion and shallot genotypes grown in Turkey show low to medium responses to gynogenesis induction. These findings confirm that haploidization technique can be used in the improvement of new Turkish onion and shallot varieties.

Keywords: *Allium*, Doubled haploid, Gynogenesis

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OP-037

Androgenic Carrot (*Daucus carota* L.) Production

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Abstract

Carrot (*Daucus carota* L.) is a diploid cool season species with a two-year life cycle. It is mainly produced for its nutritious root. Although carrot has hermaphrodite flowers, it shows high tendency towards cross-pollination. Therefore, development of homozygous carrot lines is a very difficult and time-consuming process. Production of genetically stable carrot inbreds may take seven-eight generations. Doubled haploid (DH) technique can be used in the development of homozygous individuals from heterozygous plants in one generation time. Our research group conducted a detailed study to determine the androgenesis potential of various carrot genotypes. For this purpose, anthers containing uninucleate stage microspores used in androgenesis induction experiments. A total of 2160 anthers isolated from five donor carrot genotypes were cultured in 65 x 15 mm Petri dishes containing androgenesis induction medium (modified B5). The anther cultures were kept in a dark growth room at 25°C until androgenic embryos were visible. Androgenic response was observed in four genotypes (three with orange roots and one with black roots), while no androgenesis response was observed in one donor genotype with black (DC Ereğli yerli). The highest androgenic response was obtained from donor DC Biyom01 with 12.59%. Moderate androgenesis responses were observed in the DC Çakır (7.49%) and DC Hatay yerli (4.81%) genotypes. Marot F1 (0.18%) showed a low response. A total of 2146 androgenic plantlets were obtained in the study, of which 2017 developed into plants. Flow cytometry analysis showed that the majority of androgenic plants were spontaneous diploid. Most of the androgenic carrot plants were acclimatized to the outdoor environment and grown in a greenhouse. Selfed seeds were obtained from flowering DH plants grown under anti-insect nets.

Keywords: Androgenesis, Carrot, Haploid

Acknowledgment: This research (project no. 2019FEBE054) was supported by Pamukkale University Scientific Research Projects Coordination Unit.

OP-038

Investigation of Androgenic Plant Production Potential in Chickpea (*Cicer arietinum* L.) Breeding Materials

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Abstract

Climate change is causing significant yield losses in agricultural plant species. Although chickpea is a species cultivated in marginal agricultural areas, it is experiencing significant declines in yield and quality due to increased biotic and abiotic stresses. The development of new chickpea varieties that can adapt to changing climate conditions is of great importance. The potential application of the doubled haploid (DH) technology used in accelerated breeding studies was investigated in chickpea (*Cicer arietinum* L.), widely cultivated in Türkiye, and in a wild species, *C. echinospermum*. For this purpose, the first step was to identify flower buds with anthers containing microspores suitable for androgenesis. It was determined that the anthers of buds measuring 3.500-4.50 mm in cultivated chickpeas and 2.00-3.00 mm in wild species contained single-nucleate microspores. The highest androgenic callus formation rate (~35%) in adrogenesis induction experiments was observed in the anther culture of the Gökçe genotype. Responses ranging from 0% to ~16% were obtained depending on the bud sizes and induction media from which anthers were taken in commercial and local chickpea genotypes. Flow cytometry analyses performed to determine the amount of nuclear DNA revealed that the genome size of the kabuli type chickpea was ~1.75 pg/2C and that of C. echinospermum was 1.35 pg/2C. Nuclear DNA samples isolated and analyzed from androgenic calli developed from anther cultures were found to be diploid and have higher ploidy levels.

Keywords: Chickpea, Doubled haploid, Flow cytometry, Nuclear DNA amount, Uninucleate microspore.

Acknowledgment: This research (project no. 2022ÖNAP002) was supported by Pamukkale University Scientific Research Projects Coordination Unit.

OP-039

Allergenic Mercurialis Pollen; A Risk for the Eastern Mediterranean Basin?

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Abstract

Mercurialis is a genus of plants in the family Euphorbiaceae, native to Europe, North Africa, and Asia. The purpose of this study is to put forward the airborne *Mercurialis* pollen pollination periods, atmospheric concentrations, and relations of allergenic *Mercurialis* pollen with meteorological variables on the Mediterranean coast of Turkey. The aerobiological study was performed in seven cities along the Mediterranean coast of Turkey, by using a volumetric Hirst type sampler. The main pollen season (MPS) was calculated according to Andersen's 95% method. Spearman's correlation analysis was performed to check the relationships between the daily pollen counts with the concurrent meteorological parameters.*Mercurialis* pollen was started to flowering in late autumn and mostly represented in the air of the eastern Mediterranean from October to next year's August. Although the ratio of *Mercurialis* pollen to the annual pollen index was not very high in general; It was noteworthy that it was represented among the dominant pollen (1,10-4,95%) in the most eastern stations (Hatay, Osmaniye, Mersin). MPS starting dates were detected at the end of January, and ending dates were at the end of May, with 100-121 days. Statistically, significant results were found particularly between daily mean relative humidity/daily total precipitation with daily *Mercurialis* pollen concentrations. It is observed that *Mercurialis* is flowering almost all year through the extreme hot regions of the Mediterranean basin. Here, *Mercurialis* pollen deserves particular emphasis because of being herbaceous, allergenic, the earliest and is visible most of the year.

Keywords: Aerobiology, Aeropalynology, Mercuries, Pollen allergy, Pollen monitoring

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OP-040

Atmospheric Cypress Pollen in S-Turkey

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Abstract

Cupressaceae is represented by 15 genera and approximately 140 taxa in the world, and in Turkey, only *Cupressus* and *Juniperus* spread naturally. *Cupressus* pollen grains are known as an important aero-allergen and are considered to be as responsible for winter pollinosis around the Mediterranean basin. The purpose of this study is to put forward the Main Pollen Season (MPS) and durations, concentrations, and particularly intra-diurnal variation for Cupressaceae family pollen in the Southern part of Turkey.The aerobiological study performed in 10 cities of South Turkey by using a volumetric Hirst type sampler. Slides counted in twelve transversal lines, and pollen amounts calculated for m^3 air. The MPS was calculated according to Andersen method, and bi-hourly data were used to show the intra-diurnal variations of pollen grains. Airborne Cupressaceae pollen were represented with one or two peaks annually. MPS starting dates were detected mainly in the second half of January-first half of February term, and ending dates were mostly clustered in the second half of April-second half of May term with interesting exceptions of four stations. MPS durations found in an extensive range and varied between 75 to 305 days. Cypress pollen recorded at the highest levels at morning hours in western stations and at night in eastern stations. Intra-diurnally, morning-high pollen concentrations of the Mediterranean phytogeographical region stations and night-high concentrations in the Irano-Turanian phytogeographical region stations found interesting and suggest the possibility of long-range transport to this barren, extreme hot area.

Keywords: Aerobiology, Aeropalynology, Cupressaceae, Intradiurnal variation, Pollen monitoring

Acknowledgment: This study is supported by TUBITAK109S086, TUBITAK212T135, TUBITAK117Z252 projects

OP-041

The Essential Role of Melissopalynology in Origin Verification of Geographically Indicated Honeys

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Abstract

The geographical indication (GI) status of honey reflects not only the place where it is produced, but also its unique botanical and environmental characteristics. Turkey, with its rich plant diversity and growing number of GI-certified honeys (PDO or PGI), faces a significant need to verify the botanical origins of these products. Melissopalynology (pollen analysis in honey) offers a powerful analytical method for identifying the floral and geographical origins of honey. This study investigates the significance of pollen analysis in confirming the botanical authenticity of honey products designated as geographical indications in Turkey. Therefore, the technical files of a total of 33 honeys registered as GI in Turkey were systematically examined to determine whether they contained descriptive information about pollen content. Files providing pollen data were compared in terms of botanical diversity, level of identification, and compatibility with regional flora. The findings reveal that all technical files included information on the pollen content of honey and specifically mentioned the most prominent taxa. This shows that pollen analysis is actually used as an important verification tool in the GI application process. Registered honeys are divided into three main categories: 15 monofloral honeys, 3 honeydew (especially pine) honeys, and 17 polyfloral honeys. It was determined that information on pollen composition was generally provided at the family level, although some files contained detailed taxonomic information down to the genus and even species levels. Additionally, while pollen diversity was limited in monofloral and honeydew honeys, a wider taxonomic diversity was observed in polyfloral honeys. The pollen profile of Bingöl Honey, which contains 117 taxa, is a notable example of floristic richness among the files that were assessed. However, there are also technical files that list only four taxa. This situation points to a significant limitation that could make it difficult to distinguish and verify honey varieties with GI certification, especially those produced in geographically neighboring regions. In conclusion, the findings demonstrate that there is a concrete need to increase the level of detail and standardization of data presented in technical files regarding pollen analysis for the scientific differentiation of geographically indicated honeys.

Keywords: Botanical Origin, Geographical Indication, Honey, Melissopalynology, Pollen

OP-042

Taxonomic Evaluation of *Paronychia dudleyi* and *P. adalia* Based on nrDNA ITS Data in Türkiye

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Abstract

The taxonomic status of the Turkish endemics *Paronychia dudleyi* and *P. adalia* are evaluated using both molecular and morphological data. A total of nine population including five of *P. dudleyi* and four of *P. adalia* were used for both molecular and morphological investigation. Doyle & Doyle's modified CTAB extraction procedure was used to achieve total DNA isolation for molecular investigations. The sequence analysis of the amplified nrDNA ITS region was conducted through service procurement, utilizing special primers. The obtained sequences were aligned using MUSCLE. Phylogenetic analyses were performed employing the Maximum Likelihood (ML) method. The analyses placed all the samples within a single strongly supported clade. Morphologically, both taxa are perennial herbs with basally branched stems, arista-less leaves and sepals, and glomerulate inflorescences. Petal size is the primary distinguishing character: var. *dudleyi* exhibits petals ≥ 0.9 mm, while var. *adalia* has petals ≤ 0.6 mm. No other consistent morphological differences were observed. Besides the molecular results confirm that these taxa are closely related and need to to treat at varietal level (*P. dudleyi* var. *dudleyi* and *P. dudleyi* var. *adalia*) rather than distinct species. This study highlights the role of molecular data in resolving taxonomic boundaries in morphologically similar and geographically overlapping taxa such as *P. adelia* and *P dudleyi*.

Keywords: Endemic, ITS, *P. dudleyi*, *P. adalia*, Taxonomy.

Acknowledgment: This study was supported by TUBITAK with project number 111T820.

OP-043

Notes on *Astragalus chamaephaca* (Fabaceae) Based on Seed, Pollen and Hair Micro-morphological Characters

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Abstract

In the Flora of Turkey and Aegean Islands, the section *Macrosemium* of the genus *Astragalus* was initially represented by two species: *A. paradoxus* and *A. chamaephaca*. However, this number increased to three with the addition of *A. tuna-ekimii*, described as a new species in recent studies. *A. chamaephaca*, an endemic species to Central Anatolian, was previously recorded from a single locality along the Ankara-Konya. However, field studies have also confirmed its presence in the Ankara-Ayaş region. It is a perennial species that flowers early in the season, typically in April. Although it resembles species of sect. *Caprini* in general appearance, it is classified under sect. *Macrosemium* due to distinctive floral features, particularly the fusion of basal part of keel and wings with the staminal tube. In this study, the micromorphological features of pollen, seed and hairs were examined in samples collected from Ankara-Ayaş region using both light microscope (LM) and scanning electron microscopy (SEM), and the results were documented micrographs. The pollen grains are trizonocolporate; the seeds are oblong in shape with rugulate surface ornamentation pattern. The plant is generally glabrous, however, papillae were observed on a few basifixed hairs located at the tips of the calyx teeth. This type of hair has also been reported in sect. *Ankylotus*, particularly among annual *Astragalus* species. According to phylogenetic studies, this type of hair is characteristic of phylogenetically more primitive groups. Additional analyses at the molecular level are needed to clarify the phylogenetic position of this species. In *A. chamaephaca*, the fully fused keel blade at apex observed in many members of the genus is not completely developed. As a result, the staminal tube is not entirely enclosed by the keel, which leads to pollen grains being exposed to external factors and decreases reproductive efficiency. The fruits are generally glabrous, bearing only a few hairs along the ventral side. Although each fruit contains an average of 3–4 seeds inside hard valves, only one of them was found to be viable and capable of germination. The observation that only one seed per fruit is viable indicates a significant limitation in reproductive success. This reproductive limitation may help explain the small population size and limited distribution of the species.

Keywords: *Astragalus chamaephaca*, Hair, Micromorphology, Pollen, Seed

OP-044

Fruit Anatomy of Turkish *Tragopogon* Species (Asteraceae) and Its Taxonomic Significance

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Abstract

In this study mature peripheral achenes of the capitula collected from the field and/or selected from herbarium specimens belonging to 27 *Tragopogon* L. taxa were studied. Cross-sections were taken from the middle part of the achene bodies, stained with safranin-fast green, and mounted in entellan to produce permanent slides. The examined taxa were categorized into four groups based on the overall morphology of the achenes in cross-section. Photographs of cross-sections were taken, and drawings were created. Nineteen anatomical characteristics were identified and measured on the cross-sections. Principal Component Analysis (PCA) of 19 anatomical traits revealed that the maximum and minimum wideness of the achene, along with pericarp wideness in the primary rib area, are the most diagnostic features in delimiting the examined taxa. The narrowest pericarp in the primary rib area was found in the *T. graminifolius* DC. and the wideness in *T. pterocarpus* DC. The narrowest mechanical tissue in the primary rib area was found in *T. graminifolius*, the wideness in *T. artvinensis* Makbul, Gültepe & Coşkunç. Air cavities were observed in the primary rib area of *T. oligolepis* Hartvig & Strid, and at intermediate rib area of the rest examined taxa. Dendrogram generated from fruit anatomical data largely correspond with traditional taxonomic classifications. However, the findings also indicate that while fruit anatomy alone may not be sufficient for precise species identification, it provides valuable support for distinguishing certain closely related taxa.

Keywords: Comparative anatomy, Fruit structure, *Tragopogon*, Türkiye

Acknowledgment: This study was supported by the Scientific and Technological Research Council of Turkey (TÜBİTAK) with project numbers 110T954 and 120Z001.

OP-045

Defense Strategies of Forest Tree Species against Harmful Pathogens: Comparative Insights from Fast-Growing Hybrid Poplar and Slow-Growing Sessile Oak

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Abstract

Biotic stress, caused by harmful pathogens such as *Phytophthora* spp. and *Ophiostoma* spp., represents a substantial threat to forest ecosystems. This study investigated defense responses of two broadleaved forest tree species, fast-growing hybrid poplar (*Populus tremula* × (*Populus* × *canescens*)) and slow-growing sessile oak (*Quercus petraea*), following artificial inoculations with *Phytophthora cactorum*, *Phytophthora plurivora*, and *Ophiostoma quercus*, respectively. In hybrid poplar, we assessed the emission of specific bark volatile organic compounds and the *Phytophthora*-induced synthesis of tree defense-related proteins and enzymes. 2-hydroxybenzaldehyde was the most abundant volatile organic compound in the volatile blend emitted from the bark. This compound exhibits strong antimicrobial and antioxidant properties. Proteomic profiling revealed that the induced emission of 2-hydroxybenzaldehyde correlated with the pathogen-induced synthesis of proteins associated with the family of heat shock proteins, scavengers of reactive oxygen species, pathogenesis-related activity, and lignin biosynthesis. In sessile oak, long-term field observations demonstrated the pathogenicity of an aggressive isolate of *Ophiostoma quercus*, which induced extensive bark necroses, vessel colonization, and enzymatically mediated cracks in vessel pit membranes. The inoculated trees responded by forming protective barrier zones, vessel tyloses, and significant local accumulation of lignin, suberin, and tannin compounds. The content of ellagic acid, a tannin with antioxidant and antiproliferative properties, increased up to 12.5-fold in the infected woody tissue. Both tree species activated multi-layered defense strategies involving anatomical, biochemical, and molecular responses. These findings shed interesting insights into the mechanisms of forest tree defense, but there is a long way to go in developing highly efficient strategies for forest tree protection against highly aggressive pathogens.

Keywords: Bark Canker, Lignin, *Ophiostoma quercus*, *Phytophthora cactorum*, *Phytophthora plurivora*, Tannin, 2-hydroxy-benzaldehyde

OP-046

Ecophysiological Responses of Some Lamiaceae Species (*Mentha x piperita, Ocimum basilicum, Salvia officinalis* and *Thymus vulgaris*) to UV Light and Their Potential Uses in Astrobotanical Applications

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Abstract

UV radiation, one of the stress factors in space environment, is an important risk factor especially in environments without atmosphere. Understanding the effects of these rays on plant species is of critical importance in terms of space agriculture and medicinal plant production. In this study, UV-A, UV-B and UV-A+UV-B exposures applied to seeds of some plants from Lamiaceae family: *Mentha x piperita* L., *Ocimum basilicum* L., *Salvia officinalis* L. and *Thymus vulgaris* L. Experiments were carried out in sterile Petri dishes, using distilled water and in climate chambers operating at a constant temperature of 21°C. Seeds were exposed to UV light for 15, 30 and 60 minutes; germination rates were observed daily and germination percentages, biomass, root and shoot growth were measured at the end of the fourth week. The results showed that for *Mentha x piperita*, UV-B applications showed germination rates (%14) close to the control group, while UV-A radiation significantly reduced germination (%3,2). *Ocimum basilicum*, however, a 60 min UV-A application provided the highest germination rate (16,25) compared to other groups. For germination rates in *Salvia officinalis* decreased with the extension of UV-A+UV-B exposure time, and UV-A and UV-A+UV-B applications caused inhibition in shoot development, while UV-B application was stimulating growth. It was revealed that there was a decrease in germination rates in *Thymus vulgaris* with the extension of the exposure time to UV-A and UV-B rays. *Salvia officinalis* exhibited higher UV tolerance compared to other three taxa. The results showed that *Salvia officinalis* taxa can adapt and survive under UV stress. These flavonoid-rich plants, when evaluated as an antioxidant source in space, can provide significant contributions to both astronaut nutrition ant the prevention of radiation-induced cellular damage.

Keywords: Astrobotany, Lamiaceae, UV-A, UV-B

OP-047

Stigma Receptivity and Enzymatic Profiles across APG-IV Angiosperms: A Comparative Evolutionary Study

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Abstract

Pollen–stigma interaction in angiosperms is a crucial process that influences reproductive success. This study comparatively examined the enzymatic activities of esterase, dehydrogenase and peroxidase, as well as hydrogen peroxide (H_2O_2) accumulation as a representative reactive oxygen species (ROS), in the stigmas of ten species representing different evolutionary levels within the Angiosperm Phylogeny Group IV (APG-IV) system. Four floral developmental stages were defined for each species, and a total of 4,800 stigma samples were analysed using chromogenic enzymatic assays (p-NPA, MTT, TMB and DAB) and aniline blue fluorescence staining to detect pollen germination. The results revealed that NADPH oxidase-mediated ROS production occurred rapidly and at higher levels in both basal angiosperms and monocots. H_2O_2 accumulation generally increased after anthesis across all groups. In eudicots, enzymatic activities and ROS levels exhibited a more consistent pattern. Stigma receptivity varied according to floral stage and correlated with the intensity of enzymatic activity. Pollen germination was most frequently observed at the third developmental stage, which corresponded with peak stigma receptivity and enzymatic activity. These findings suggest that enzymatic markers of stigma receptivity differ according to phylogenetic lineage and floral development. Furthermore, the dynamic localisation of ROS and hydrolytic enzymes on the stigma surface may play a functional role in pollen recognition and successful fertilisation. Taking an evolutionary perspective on these interactions contributes to our broader knowledge of plant reproductive strategies and may inform future applications in conservation biology and agriculture.

Keywords: Stigma receptivity, APG IV, esterase, peroxidase, ROS, H_2O_2 pollen–stigma interaction.

Acknowledgment: The present study was supported by the Ege University Scientific Research Projects Coordination (Project No: 28463), the Scientific and Technological Research Council of Turkey (TUBITAK 1002-A Project No: 222Z235)

OP-048

Germination Responses to Smoke and Light in 94 Plant Taxa from a Fire Prone Site in Southwestern Anatolia (Türkiye)

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Abstract

Fire is an important factor shaping the dynamics of plant communities in Mediterranean-type ecosystems, with fire-induced germination common in many species. Chemical compounds in ash and smoke can trigger seed germination in these ecosystems. Here, we investigated the germination responses of 94 plant taxa in a recently burned area in south-western Anatolia (Milas, Muğla, Türkiye) to smoke and light treatments. Annual and perennial herbaceous, woody, and geophyte species were exposed to smoke solutions at three concentrations (1:1, 1:10, and 1:100) and two light regimes (darkness and photoperiod conditions). Treatments were applied in four replicates of 25 seeds per taxon, incubated at 20°C for 45 days. The results were analysed using a generalized linear model based on binomial distribution. Effects of the treatments were classified as positive (increased germination relative to control), neutral (no change), or negative (decreased germination). Smoke treatments positively affected 25% and negatively affected 11% of taxa, while 24% responded positively and 24% negatively to the light treatment. Overall, 59% of taxa showed a response (positive or negative) to smoke and/or light, with two out of five taxa exhibiting enhanced germination. These findings advance our understanding of germination strategies in fire-prone Mediterranean plant communities and highlight the potential use of smoke-induced germination in ecological restoration. These results provide a basis for understanding the role of fire-related cues in shaping germination patterns of diverse plant communities in fire-prone landscapes of south-western Anatolia.

Keywords: Fire ecology, fire-stimulated germination, smoke, seed ecology, Mediterranean Basin.

Acknowledgment: This study was supported by Rufford Small Grant (Project No: 13663-1) and Hacettepe University Scientific Research Unit (Project No: 11051).

OP-049

Floral Biodiversity and Endemism in a Border Region: Iğdır Province (Türkiye) Through the Lens of Bibliometrics

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Abstract

Iğdır is one of the rare cities in the world that shares borders with three countries simultaneously (Armenia, Azerbaijan–Nakhchivan, and Iran). This study was conducted to evaluate the scientific research on the flora of Iğdır from a bibliometric perspective and to identify existing research gaps. Owing to its strategic location and microclimatic conditions, Iğdır is presumed to possess significant plant biodiversity. However, botanical research specific to the province remains relatively limited. Most floristic studies on Iğdır were conducted after the year 2000, likely due to its administrative separation from Kars and gaining provincial status in 1992. As part of this study, the most up-to-date list of endemic taxa in Iğdır was compiled, and their scientific names were verified using internationally recognized botanical databases such as https://bizimbitkiler.org.tr/list.html and https://powo.science.kew.org. Their endemism statuses and threat categories were checked against the IUCN Red List. Literature records indicate that Iğdır hosts a total of 1,345 taxa, 139 of which are endemic. Some of these species are endemic to Turkey, while others are locally endemic to Iğdır. In terms of family representation, Asteraceae (14 genera – 20 taxa), Boraginaceae (4 genera – 18 taxa), Brassicaceae (6 genera – 15 taxa), and Caryophyllaceae (9 genera – 15 taxa) are the most diverse. Based on a bibliometric analysis of data retrieved from databases such as Web of Science, Scopus, and Google Scholar, this study presents priority research areas and strategic conservation recommendations regarding the plant biodiversity of Iğdır. It is expected that this work will contribute to future scientific studies on the floristic richness of the region.

Keywords: Bibliometric Analysis, Border Region, Endemism, Iğdır, Plant biodiversity.

OP-050

Digitized Herbarium Records as a Strategic Tool in Urban Biodiversity Assessment: A Case Study from Beykoz Grove, Istanbul

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Abstract

This study presents the results of a plant diversity assessment conducted in Beykoz Grove (Istanbul), as part of the Istanbul Biodiversity Project coordinated by the Urban Ecological Systems Branch of the Istanbul Metropolitan Municipality. A total of 237 plant taxa from 75 families were identified. Among them, 17 taxa are listed under IUCN threat categories, while Cyclamen coum subsp. coum and Crocus pulchellus are included in the Bern Convention and CITES Appendix II. A distinctive feature of this study is the integration of digitized herbarium data into field-based biodiversity evaluation. Specimens collected since 1985 were examined alongside records housed in the Forestry Faculty Herbarium (ISTO), enabling comparisons based on flowering periods and species persistence. This historical approach revealed phenological shifts and ecological pressures affecting the grove. Specimens collected between March 2023 and February 2025 were digitized at the Nezahat Gökyiğit Botanical Garden Herbarium (NGBB), creating a modern, accessible reference system for long-term monitoring. These records ensured taxonomic accuracy, supported phenological tracking, and provided insights into changes in species distribution over time. By combining historical archives with newly digitized collections, the study enhances our understanding of urban biodiversity dynamics and underscores the importance of herbarium data in conservation planning. This integrated method offers a replicable model for urban ecological research and monitoring in other metropolitan contexts.

Keywords: Digitized Herbarium, Flowering Phenology, Urban Flora.

Acknowledgment: This study was conducted within the scope of the project coordinated by the Urban Ecological Systems Branch Directorate of the Istanbul Metropolitan Municipality Parks and Gardens Department, titled “Identification of Flora, Fauna, Lichen Species, Soil Analyses, and Ecological Risk Assessment in ISKI Drinking Water Basins, Urban Forests, and Groves of Istanbul.”

OP-051

Preliminary Assessment of Vegetation Diversity, Species Richness, and Habitat Heterogeneity in the Valleys of the Armutlu Peninsula (Türkiye)

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Abstract

Turkey, renowned for its exceptional plant diversity, faces critical challenges in biodiversity conservation. Quantifying this diversity and uncovering the natural and anthropogenic factors influencing it are essential steps toward sustainable ecological management. With ongoing climate change and human impacts reshaping natural habitats, safeguarding this unique ecological heritage is increasingly urgent. The Armutlu Peninsula, situated within the Euxinian Province of the Euro-Siberian floristic region, exhibits climatic and vegetational contrasts. While the southern lowlands experience Mediterranean climate influence, an east–west watershed divides the peninsula into two distinct vegetation zones. North-facing slopes are dominated by humid forest communities, whereas dry forest formations prevail in the south. This study aims to assess differences in plant diversity between northern and southern valley systems and to identify their underlying ecological and climatic drivers.Four river basins were selected: Kocadere and İncirli (Karpuz) in the north, Yamandere and Büyükkumla in the south. Within these basins, twelve 400 m² quadrats were established and further subdivided into forty-eight 100 m² subplots. Plant specimens were collected from valley interiors and identified through herbarium comparisons. Alpha diversity (H′) was calculated using the Shannon–Wiener index via BİÇEB software, while beta diversity employed the universal Shannon entropy-based formula (Hara), and gamma diversity was assessed with the H_γ index. Preliminary surveys recorded 122 plant species across the study area. The Kocadere basin exhibited the highest alpha diversity (H′ =3.39243), whereas the Yamandere basin showed the highest beta (H_β = 1.26606) and gamma (H_γ = 3.64200) diversity values. A decreasing trend in alpha diversity from lower to upper valley courses was observed in northern basins, while southern valleys displayed higher overall plant diversity. Ongoing research aims to further clarify these spatial diversity patterns and their ecological determinants.

Keywords: Alpha diversity, Anatolia, Beta diversity, Plant diversity, Gamma diversity

OP-052

The Bryophyte Diversity of Western Anatolia

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Abstract

Bryophytes—mosses (*Bryophyta*), liverworts (*Marchantiophyta*) and hornworts (*Anthocerotophyta*)—form one of the oldest lineages of terrestrial plants. Globally they comprise roughly 20,000–25,000 taxa and occur from the poles to deserts, occupying an extraordinary range of substrates and microhabitats. In Türkiye more than 1,200 taxa have been recorded, making bryophytes the second-largest plant group after angiosperms. Western Anatolia is among the best-studied regions for bryophytes. Synthesising surveys conducted largely by our team, we assessed regional species richness, the environmental factors that shape it, habitat-defining taxa and ecologically sensitive species. Xeric sites are dominated by drought-tolerant moss families such as Pottiaceae, Orthotrichaceae, Grimmiaceae and Brachytheciaceae. The area also functions as an important genetic reservoir for liverworts of the genus *Riccia*, while *Phaeoceros laevis* is the most widespread hornwort across habitats. Notably, several taxa otherwise typical of the humid Black Sea region persist here in shaded, perennially moist microsites—refugia that are likely to register the earliest biological responses to global climate change. The pronounced presence of epiphytic species on tree bark and the discovery of regionally rare, habitat-specific taxa underscore the high ecological integrity of many localities. Our results highlight the critical role of microhabitats in sustaining bryophyte diversity and stress the necessity of integrating bryophytes into conservation strategies for biodiversity hotspots. In summary, western Anatolia harbours remarkable bryophyte diversity. By linking distribution patterns to habitat preferences and identifying vulnerable species, this study provides a foundation for targeted conservation and for using bryophytes as early-warning indicators of environmental change.

Keywords: Mosses, liverworts, hornworts, *Riccia*, *Orthotrichum*,

Acknowledgments: The data for this research were obtained through multiple projects supported by TÜBİTAK (Projects No: 107T872, 108T256, 119Z393, 122Z190, 123Z053) and the Scientific Research Projects Coordination Unit (BAP) of Aydın Adnan Menderes University (Projects No: FEF-21033, FEF-18035, FEF-11006, FEF-16023). The studies were conducted at the Botanical Garden and Herbarium Research and Application Center of Aydın Adnan Menderes University. We express our sincere gratitude to these two esteemed institutions for enabling this work and for their continuous support of the scientific community.

OP-053

Biogeographical Regions of the Brassicaceae Family in Türkiye

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Abstract

Türkiye is regarded as the Brassicaceae family's center of origin because of its remarkable species diversity and high degree of endemism. In order to better understand the floristic and biogeographical patterns of the Brassicaceae, this study intends to examine the family's geographic distribution throughout Türkiye and pinpoint the biogeographical areas associated with it. To this end, records of Brassicaceae species in Türkiye were compiled from Flora of Turkey, various studies, and national herbaria. The records, which include a total of 15,547 occurrence points, were cleaned, organised, geographically coordinated according to 0.5°x 0.5° grids, and made suitable for analysis. The prepared data were analysed using the Infomap Bioregion algorithm, and the parameters were selected as follows during the analyses: minimum cell size 0.5°, maximum cell size 1°, minimum number of observations per cell 10, maximum number of observations per cell 100, number of trials 10, and number of cluster cost 0.90. Based on the results of Infomap Bioregions v2, potential transition zones between bioregions were visually assessed. Subsequently, similarity analyses were performed at the cell and bioregion levels to clearly define the transition zones. As a result of the bioregionalisation analyses, it was determined that the family is divided into 13 bioregions in Türkiye, the transition zones in these bioregions were identified, and the most common and most distinctive species in each bioregion were determined. The pattern of biogeographical regions largely overlaps with the phytogeographical regions in Türkiye, and it is observed that biogeographical region boundaries are more fragmented and transition zones are more prominent in regions with high ecological and topographical diversity, such as the Aegean, Mediterranean, and Southeastern Anatolia. Biogeographic region analyses have identified a large part of the Iran-Turan floristic region, which is the probable centre of origin of the family, as a single biogeographic region, supporting predictions about the family's biogeographic history.

Keywords: Brassicaceae family, Bioregions, Transition zones, Türkiye.

OP-054

Uşak University 1 Eylul Campus Landscape Flora

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Abstract

Uşak province is a province located in the inner-west Anatolian region of Turkey. Uşak University, 1 Eylül Campus is located in the western part of Uşak province. 1 Eylül Campus covers an area of 485,968.12 m^2. The total forest area on the campus is 1,101,036.00 m^2. 8773.35 m^2 is garden, 73871, 97 m^2 is grass area, 17849, 44 m2 is lavender and shrub plants, 36071, 87 m^2 is empty area. The dominant plant of the natural forest area in this campus area is *Pinus brutia* Ten. The number of taxa belonging to 27 families in the landscape plants planted later is 75. The families with the most taxa are Rosaceae, Cupressaceae, Poaceae, Pinaceae. In this study, the plants in the campus flora were identified and their characteristics were given.

Keywords: Uşak University, Landscape, Flora, Urban Ecology, Plant biodiversity.

OP-055

Climate Crisis at the Doorstep: Conservation of Native Flora on Sedef Island

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Abstract

Sedef Island, the smallest among the Princes' Islands in the Sea of Marmara, harbors a surprisingly rich and vulnerable plant diversity despite its limited size. Since July 2024, we have been conducting a multidisciplinary conservation study titled "Protection of the Flora of Sedef Island: Plant Diversity Assessment and Ecological Awareness". As part of this initiative, we identified 211 native plant taxa, including several rare and habitat-specific species, and compared this data with the floristic profiles of neighbouring islands. The project aims not only to document species richness and map critical habitat zones, but also to propose sustainable conservation strategies in the face of increasing climate pressure. Key actions include phenological monitoring of species vulnerable to environmental changes, wildfire risk assessment and management proposals, community-based education programs with local residents, and the integration of citizen science in botanical data collection. Special emphasis was placed on conserving native flora and enhancing ecosystem resilience under fire and drought stress. Our study presents a model for small-island conservation, highlighting the urgency of habitat protection in the context of the climate crisis and proposing policy-oriented action plans to ensure ecological resilience and safeguard biodiversity against natural threats.

Keywords: Climate Change, Conservation, Flora, Sedef Island.

Acknowledgment: This study was supported by the Flora Research Society and the Sedef Island Residents Association.

OP-056

The Bryophyte Diversity of Lapseki (Çanakkale) Mountains

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Abstract

The present study was conducted to record the moss flora of the Lapseki Mountains (Çanakkale), an area hitherto unknown for its bryophyte flora. Fieldwork was carried out during different vegetation periods in 2022-2023 in 78 localities. In the course of the fieldwork, about 3000 bryophyte specimens were gathered, identified taxonomically on the basis of the pertinent floras and revisionary papers, and prepared as herbarium material. 200 taxa of 103 genera and 52 families were found. They comprised 162 moss taxa (Bryophyta), 37 liverwort taxa (Marchantiophyta), and 1 hornwort taxon (Anthocerotophyta). *Riccia cavernosa* (Marchantiophyta) and *Codonoblepharon forsteri* (Bryophyta) were collected for the third time, and their habitat is very specific and ecologically valuable. The bryophyte flora of the Lapseki Mountains is influenced by the occurrence of two distinct climatic zones and a variety of habitat types. Nevertheless, the comparatively low maximal altitude of the region (720 m) can potentially restrict further bryophyte diversification. Liverwort genus *Riccia* was the most common among liverworts, whereas the prevailing moss genera were *Brachythecium, Orthotrichum, Lewinskya, Grimmia, Tortula, Syntrichia, Didymodon,* and *Fissidens*. Although there is a large amount of bryological work in Turkey, some areas are still poorly investigated. This study adds new floristic records from an unresearched region, highlighting the ecological importance and vulnerability of bryophyte-dominated habitats. Any disruption of such habitats may not only endanger the moss species themselves but also the microfauna and related organisms that are reliant upon them.

Keywords: Mosses, Liverworts, Hornworts, Bryophytes, Çanakkale

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OP-057

Flora of Beytepe Gendarmerie and Coast Guard Academy Campus (Ankara – Çankaya)

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Abstract

Although numerous studies have investigated plant diversity in Ankara and its surrounding areas, no floristic research had previously been conducted within the Beytepe Gendarmerie and Coast Guard Academy Campus (Ankara – Çankaya) or its immediate vicinity. The study area is situated within the Irano-Turanian phytogeographical region, and is considered a special zone where natural habitats are relatively well preserved against anthropogenic pressures compared to surrounding areas. To thoroughly assess the plant diversity of the campus and its surroundings, 13 field studies were conducted between October 2022 and September 2023, during which a total of 661 plant specimens were collected. These specimens were processed into herbarium material and deposited in various herbaria, primarily the Herbarium of Hacettepe University, Department of Biology (HUB). Following taxonomic identification shows that the specimens were found to represent 50 families, 177 genera, 294 species, and 300 taxa in total. The number of endemic species identified in the study area was 25, corresponding to 8.50% of the total species recorded. Among these, *Glaucium grandiflorum* var. *torquatum* and *Verbascum leptocladum* were classified as endangered (EN) and require conservation attention. The Asteraceae family, represented by 48 species and constituting 16.2% of the total recorded flora, emerged as the most taxonomically diverse family in the study area. Similarly, the genus *Astragalus*, with 9 species, was identified as the most species-rich genus in the area. Floristic analysis revealed that 52 species were characteristic of the Irano-Turanian phytogeographical region, followed by 21 species from the Mediterranean and 9 species from the Euro-Siberian phytogeographical regions, respectively. Genera and species identification keys were developed for all taxa identified in the study. Additionally, genomic DNA was extracted from endemic taxa for future phylogenetic studies. Among these, ribosomal Internal Transcribed Spacer (ITS) sequences were obtained for taxa that had not previously been examined using molecular systematic approaches.

Keywords: Ankara, Beytepe, Plant Diversity, Plant Systematics, Taxonomy

Acknowledgment: This Master's Thesis study has been supported by the Scientific Research Projects Coordination Unit of Hacettepe University under grant number FYL–2023–20648.

OP-058

The Determination of Genetic Diversity in *Rhaponticoides gokceoglui, Rhaponticoides aytachii* and *Rhaponticoides wagenitziana* Populations via Molecular Methods

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Abstract

In this study, *Rhaponticoides gokceoglui, Rhaponticoides aytachii* and *Rhaponticoides wagenitziana* naturally distributed in Türkiye are closely related to each other taxonomically. To determine genetic differentiation among populations and intra/interpopulation genetic diversity of these species, nuclear (ETS) and two chloroplast (*rpl32-trnL* and *ycf3-trnS*) DNA gene regions were used. According to the targeted partial intron sequences (ETS, *rpl32-trnL* and *ycf3-trnS*), low nucleotide (Pi) diversity was detected in all populations and relatively high genetic differentiation among populations of the species. Network analyses based on chloroplast regions show that, unlike the nuclear region, *R. aytachii* and *R. gokceoglui* have a common haplotype. In the phylogenetic analyses based on the ETS region, *R. aytachii* and *R. gokceoglu* and *R. iconiensis*, which are geographically close to each other, were also included. While *R. aytachii* and *R. wagenitziana* were more closely related to each other in the phylogenetic tree, *R. gokceoglui* was more closely related to *R. iconiensis*. This situation suggested that there may be hybridization between taxa located in geographically close locations. As a result, it has been revealed that a more comprehensive study (such as RAD-Seq or low pass WGS) based on populations of species belonging to the *Rhaponticoides* is necessary in order to fully elucidate the early hybridizations among species, determine species delimitations and reveal genetic diversity more clearly.

Keywords: Asteraceae, cpDNA, Endemic, nrDNA, Population Genetics, Türkiye

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OP-059

PGPB-Mediated Enhancement of Nickel Tolerance and Phytoremediation in Safflower

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Abstract

Nickel contamination is a widespread environmental issue that poses a serious threat to ecosystems and organisms. Elevated nickel levels in agricultural soils can reduce crop yields and bioaccumulate through the food chain, causing significant health problems in humans. Phytoremediation, a method that exploits plants' ability to accumulate and tolerate various contaminants, is used to reclaim and remediate these sites. In this study, two plant growth-promoting bacteria, *Streptomyces pseudovenezuelae* and *Streptomyces griseorubiginosus*, isolated from the nickel-hyperaccumulator *Centaurea ensiformis* P.H. Davis, were inoculated into *Carthamus tinctorius* L. cv. Yenice (Safflower) to improve its nickel tolerance and phytoremediation capacity, based on their effects on the plant's nickel accumulation, morphological traits, and physiological responses. Plants were grown hydroponically in Hoagland's nutrient solution in a controlled environment (25°C, 16/8 h light/dark cycle, 250–350 µmol·m^{-2}·s^{-1} light intensity, 45–55% humidity) without nickel for 14 days, after which 0.75 mM nickel was applied for 7 days to the stress groups. According to results, nickel accumulates predominantly in the roots of safflower plants. Moreover, nickel toxicity decreased biomass in both roots and shoots, reduced pigment contents, and impaired photosynthetic energy flow, based on chlorophyll *a* fluorescence kinetics measurements. While the root concentration of nickel remained consistent across all nickel-treated groups, the shoot concentration of nickel increased by 29.9% with *S. griseorubiginosus* and decreased by 21.2% with *S. pseudovenezuelae*. Root and shoot dry biomass, along with chlorophyll *a* and *b* content, were increased by 33%, 61%, 94%, and 108%, respectively, with *S. griseorubiginosus* inoculation, whereas *S. pseudovenezuelae* did not cause any significant changes in these parameters. Additionally, *S. griseorubiginosus* improved photosynthetic efficiency. In summary, due to increased nickel accumulation and translocation in plants, *S. pseudovenezuelae* is a promising enhancer for phytoremediation applications, and *S. griseorubiginosus* can be suitable for safe safflower cultivation in nickel-contaminated areas.

Keywords: *Carthamus tinctorius* L., Chlorophyll *a* fluorescence, Heavy metal, *Streptomyces*

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OP-060

Bioactive Compound Contents in Broccoli (*Brassica oleracea* L. var. *italica*)

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Abstract

This study was carried out in greenhouse environment and Monet broccoli (*Brassica oleracea* L. var. *italica*) variety was used as examining materials. Broccoli plants were grouped into four groups; as control group, vermicompost group, coelomic fluid applied group, and coelomic fluid + vermicompost applied group. Organic fertilizers were applied to the vegetative organs of the broccoli seedlings. In the determination of total antioxidant activity, the differences were not found among the groups to be statistically significant ($p>0.05$). Considering the results, the highest analysis value was observed in the control group. The group treated with vermicompost and coelomic fluid exhibited higher levels of secondary metabolites specifically, total phenols (75.19 mg/mL), antioxidant compounds (61.97%), and flavonoids (0.014 mg/mL) while exhibiting a lower total microbial colony count (200 CFU/mL). According to the results of the vitamin analysis, data could not be obtained for α-tocopherol and γ-tocopherol contents, as their levels were below the detection limit. However, based on β-tocopherol content, the highest value was detected in the plants treated with coelomic fluid + vermicompost. All plant samples exhibited color changes, and total phenol analysis indicated that antioxidant activity was higher in the coelomic fluid + vermicompost treatment group compared to the control. The mineral substance analysis revealed that phosphorus, cadmium, and lead concentrations in the coelomic fluid + vermicompost-treated samples were found below the established thresholds, whereas aluminum, iron, magnesium, potassium, and sodium levels exceeded those in the control group plants.

Keywords: Bioactives Compounds, Broccoli, Coelom Liquid, Flavonoids, Vermicompost

Acknowledgement: The authors thank the Pamukkale University Scientific Research Projects unit for supporting this thesis project under project number 2020FEBE013.

OP-061

Phylogeny and Taxonomic Implications of *Ajuga* L. (Lamiaceae)

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Abstract

The genus *Ajuga* (Lamiaceae: Ajugoideae) includes approximately 64 species with a broad distribution across Eurasia, Africa, and Australia. Despite its ecological and morphological diversity, infrageneric relationships within *Ajuga* have remained unresolved. This study presents the first global phylogenetic reconstruction of *Ajuga* based on seven chloroplast DNA markers (*matK*, *ndhF*, *psbA-trnH*, *rbcL*, *rpl32-trnL*, *rps16 intron*, and *trnL-trnF*) and two nuclear ribosomal regions (ITS and ETS). A total of 69 accessions representing 51 species were analyzed using Bayesian Inference and Maximum Likelihood methods. The results confirm the monophyly of *Ajuga* and identify two major, well-supported clades. Traditional infrageneric classifications, based on morphology, were not supported by molecular data. Morphological characters such as corolla structure and flower number per verticillaster were assessed, but synapomorphies for most clades remain ambiguous. The study proposes the elevation of *Ajuga decumbens* var. *oblancifolia* to species rank as *A. oblancifolia*, and suggests the transfer of *A. vestita* to sect. *Ajuga* based on phylogenetic and morphological evidence. The observed cyto-nuclear discordance, likely due to hybridization and incomplete lineage sorting, highlights the need for genome-wide data and integrative approaches. These findings emphasize the necessity of a revised taxonomic framework for *Ajuga*, reflecting both molecular and morphological evidence.

Keywords: Ajugeae, Lamiaceae, Molecular Phylogeny, Taxonomy

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OP-062

Taxonomic Status of Taxa Belonging to the Genus Silene (Caryophyllaceae) in the Flora of Türkiye

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Abstract

There are approximately 870 species of the *Silene* L. (Transplant) genus on earth, 145 species (167 taxa) grow in the Flora of Türkiye. The gene center of the genus is Anatolia and its surroundings. Numerous taxonomic studies have been conducted on the genus. In this study, a study covering the whole of Türkiye was conducted. Previously collected plant samples were examined from 28 herbariums from Turkey, six from outside Turkey and 11 online sites, and the taxonomic status of the taxa was clarified. The descriptions of the species were expanded, seeds and pollen were examined with scanning electron microscope (SEM). With our research, the validity status of the species, new recorded species confirmed for the Flora of Türkiye, taxonomic changes in the categories of some species, and endemism status were revealed. At the end of the study, two varieties and one subspecies (*S.olympica* var.*erciyesdaghensis*, *S.caramanica* var.*idaea*, *S.confertiflora* subsp.*thiebautii*) were found together with the synonyms of 26 species were identified as synonyms (*S.amana, S.eminentis, S.aydosensis, S.brevicalyx, S.cirpicii, S.goksuensis, S.inclinata, S.koycegizensis, S.ispartensis, S.yildirimlii, S.kucukodukii, S.sipylea, S.bitlisensis, S.konuralpiae, S.apetala, S.bithynica, S.bocquetiana, S.magenta, S.guerbuezii, S.karakotchanensis, S.pompeiopolitana, S.sangaria, S.sumbiliana, S.trinervia, S.choruhensis, S.atropurpurea*), 11 taxa are new species or new records (*S.kemahensis, S.nemrutensis,* etc.), 26 taxa have changed status or are synonymous (S.*aegyptiaca* subsp.*ruderalis, S.araratica* subsp.*davisii,* etc.), and 2 species (*S.fuscata, S.fabaroides*) are not in the Flora of Türkiye.

Keywords: Flora, Seed, Pollen, *Silene*, Türkiye, Taxonomy.

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OP-063

Multilocus Phylogenetic Reconstruction of the Genus *Omphalodes* (Cynoglossoideae), with a Focus on Turkish Taxa

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Abstract

The genus *Omphalodes* comprises 11 species (16 taxa) worldwide and five species (9 taxa) in Türkiye. *Omphalodes davisiana* and *O. nedimeae* are endemic species, while three of the five *O. luciliae* subsp. *luciliae*, subsp. *pisidica* and subsp. *cilicica* are endemic taxa. *O. luciliae* subsp. *kurdica* is found in Iran and Iraq, while *O. luciliae* subsp. *scopulorum* is found in Greece. Within the genus *Omphalodes*, which is more than half present in Türkiye, there are taxa whose evolutionary relationships are still unknown. Additionally, the distribution of some *O. luciliae* subspecies overlaps. The presence or absence of bracts, leaf hairs, fruiting calyx diameter, nutlet marginal ornamentation, many leaf characters and nutlet shape are diagnostic features in intraspecific diversification. In this study, genomic DNA was obtained from a total of 87 individuals from 32 *Omphalodes* populations distributed throughout Türkiye. The *trn*L, *trn*L-*trn*F, *trn*G-*trn*S and *rps*16 regions of the chloroplast genome, as well as the the ribosomal ITS1-5.8S rRNA-ITS2 DNA sequences, were obtained. The evolutionary relationships of the species were revealed by calculating phylogenetic trees using both the "maximum likelihood" and "Bayesian" approaches. Detailed morphological studies were carried out. In the phylogenetic tree calculated by including the genera *Asperugo*, *Memoremea*, *Nihon*, *Gyrocaryum*, *Mimophytum*, *Selkirkia*, *Myosotidium* and *Iberodes* as outgroups, the genus *Omphalodes* producted a monophyletic lineage. In the phylogenetic tree based on the ribosomal dataset, *Omphalodes* taxa are divided into two major lineages. The first lineage comprises the species *O. cappadocica*, *O. lojkae*, *O. nitida*, *O. verna* and *O. runemarkii*. *O. cappadocica*, which is widespread in Türkiye, forms a monophyletic lineage, but gene flow occurs among its populations. The other main lineage includes Anatolian endemics and subsp. *scopulorum*. *O. ripleyana* and *O. davisiana* form monophyletic lineages, but the other taxa do not. Based on chloroplast data, these taxa are nested within each other.

Keywords: Anatolia, Boraginaceae, Endemic, Omphalodeae, Phylogeny.

Acknowledgments: This study is supported by Hacettepe University Scientific Research Projects Coordination Unit (BAP) under the grant number FKB-2024-21016. The authors thank to Hacettepe University BAP for their supports.

OP-064

A Taxonomic Revision and Phylogenetic Relations of *Campanula* (Campanulaceae) subgen. *Roucela*

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Abstract

Campanula L. is the largest genus of the family Campanulaceae Juss. and is composed of ca. 420 species. Türkiye is one of the richest countries in the Mediterranean Basin in terms of *Campanula* genus diversity. More than half of the *Campanula* species in Türkiye are endemic. The genus *Campanula* was divided into 6 subgenera, which are: subgen. *Megalocalyx* Damboldt, subgen. *Rapunculus* (Fourr.) Charadze, subgen. *Roucela* (Dumort.) Damboldt, subgen. *Brachycodonia* (Fed.) Damboldt, subgen. *Sicyodon* (Feer) Damboldt, and subgen. *Campanula*. Roucela is represented by 13 species worldwide and is distributed mainly in the Mediterranean Basin. *Roucela* are mainly small, annual plants with appendageless calyxes. The most widespread taxon in this clade, *Campanula erinus*, occurs in the Azores, southern Europe, northern Africa and the Arabian Peninsula. Its distribution largely corresponds to the Mediterranean climate zone, but extends eastwards to Iran. In this study, a comprehensive study was conducted with new methods by sampling all taxa of *Campanula* subgen. *Roucela* taxa distributed worldwide, especially in Türkiye. A very comprehensive phylogenetic tree was created for the target taxa. On the other hand, interpretations were made regarding the evolutionary processes of the target taxa in question was made to shed light on the evolutionary history of the taxa in question. In addition, biogeographic studies were conducted on these subgenera with the comprehensive sample obtained. Within the scope of this study, possible new taxa from Muğla, Antalya and Kahramanmaraş has been discovered. *C. kastellorizana*, which is taxonomically complex and a new record for Türkiye, was also found in Antalya in this study. Detailed differential characters of these taxa are given here. By conducting comprehensive morphological studies, the taxonomic positions of the existing species were also re-evaluated in this study, and new characters were evaluated here for a better understanding of their taxonomy.

Keywords: *Campanula*, Phylogenetics, Revision, *Roucela*, Taxonomy

Acknowledgments: We thank to the Scientific and Technological Research Council of Turkey (TÜBİTAK) which has supported our research [Project Number (1001): 223Z047 and Tuğkan Özdöl's 2214-A project]. Also we are grateful for Ege University Scientific Research Project Coordination Unit (Project Number: FM-GAP-2023-29604) to supporting our project. In addition we like to thank to NSF for supporting this project (Project Number: 2348709).

OP-065

Achene properties of some *Hieracium* ser. *bifida* (Asteraceae) taxa from Türkiye

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Abstract

The macro- and micro-morphological features of achenes belonging to 10 taxa of series *Bifida* (Pugsley) Sell & West of the genus *Hieracium* L. from Türkiye were investigated using the Light and Scanning Electron Microscopy. Achenes were obtained from specimens stored in the Herbarium of Biology at Karadeniz Technical University (KTUB). The examined achenes are 3-4 mm long, cylindrical, truncate or acute at apex, ribbed, dark brown, conspicuous longitudinal ribs and glabrous. Pappus are creamy, 5-7 mm long of barbellate bristles. Periclinal walls are elongated parallel to the long axis of the achenes. The anticlinal walls are concave, convex or straight. Ornemantation of periclinal walls is granulate-rugose in *H. oblongum* Jordan, *H. gentile* Jordan ex Bor., *H. ovalifrons* (Woronow & Zahn) Juxip, *H. cryptonaevum* (Bornm. & Zahn) Sell & West, and *H. medianiforme* (Litw. & Zahn) Juxip; rugose in *H. laxifurcans* (Bornm. & Zahn) Sell & West; granulate-rough in *H. subsilvularum* (Zahn) Sell & West, *H. sylvularum* Jordan ex Bor., and *H. gentiliforme* (Zahn) Sell & West; granulate-smooth in *H. tossianum* (Zahn) Sell & West. This study is the first report dealing with achene micromorphological features of Turkish *Hieracium* ser. *Bifida* members. The results showed that the anticlinal and periclinal surface of the achenes are valuable for differentiation the species examined.

Keywords: Achene, *Bifida*, *Hieracium*, Micromorphology, Türkiye

OP-066

Taxonomic Revisions of Turkish *Polygonum* L. Sensu Lato (Polygonaceae): Insights from New Biosystematic Evidence

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Abstract

The genus *Polygonum* has been subjected to different classifications by scientists due to its taxonomic complexity caused by insufficient distinctive characters and hybridization. This study aims to investigate the taxonomic problems of Turkish *Polygonum* using new morphological, palynological and molecular data. The plant materials were collected from Türkiye during the vegetation period between 2020-2023. All morphological, palynological and molecular examinations were performed on the herbarium materials stored in the Herbarium of Biology Department at Recep Tayyip Erdogan University. Morphological and palynological data were also evaluated using numerical analysis and phylogenetic analysis. Present morphological, palynological and molecular data supported that *Bistorta*, *Fallopia*, *Koenigia*, *Persicaria*, and *Polygonum* should be classified under a separate genera. Present findings also revealed that the genus *Bistorta* and *Fallopia* is represented by two, the genus *Koenigia* by 1, the genus *Persicaria* by 11 and the genus *Polygonum* is represented 35 taxa in Türkiye.

Keywords: Palynology, *Polygonum*, Revision, Taxonomy, Türkiye.

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OP-067

The Genus *Iberis* L. (Brassicaceae) in Türkiye

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Abstract

The genus *Iberis* L. (Brassicaceae) is represented by 32 species worldwide. It consists of annual and perennial herbaceous plants and/or evergreen shrubs. The common name for *Iberis* L. is candytuft. *Iberis* is the only genus in the tribe *Iberideae* and is typical of the Brassicaceae family with its zygomorphic flower structure. Therefore, bilateral symmetry is not observed in the genus. Flower colours are white, pinkish, or purplish. Corymbose infructescences, angustiseptate, and two-seeded fruits are important diagnostic characteristics for identifying *Iberis* species. The genus *Iberis* L. is currently being revised by the author for the Illustrated Flora of Türkiye. Consequently, all *Iberis* specimens in herbaria worldwide, particularly those in Türkiye, as well as in E, K, and G herbaria, have been examined, and taxonomic results have been obtained. The genus *Iberis* is currently represented by eight species in Turkey: *Iberis attica* Jord., *Iberis carica* Bornm., *Iberis halophila* Vural & H. Duman, *Iberis odorata* L., *Iberis saxatilis* L., *Iberis sempervirens* L., *Iberis simplex* DC. and *Iberis spruneri* Jord.. This study summarises the current information on taxonomical, anatomical, pollen morphological, phylogenetic-phylogeographic and climate-based niche modelling studies of *Iberis* species naturally found in Türkiye.

Keywords: Anatomy, Palynology, Phlogeography, Taxonomy, ENM

Acknowledgments: Molecular analysis of the *Iberis* samples was supported by the Hacettepe University Research Project Coordination Unit ("Phylogeography of *Iberis simplex* DC.)," Project No: FHD-2018-17. The author would also wish to thank Dr. Barış Özüdoğru, Dr. Golshan Zare, Dr. Edibe Özmen Baysal and Dr. Çağaşan Karacaoğlu for their valuable collaboration in our various studies on the genus *Iberis* in Türkiye.

OP-068

Integrative Species Delimitation in *Heldreichia bupleurifolia* Using Genomic and Morphological Data

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Abstract

Heldreichia bupleurifolia Boiss., the only species within the monotypic genus *Heldreichia*, is an alpine plant native to Anatolia, and is found predominantly along the Taurus Mountains and the Anatolian Diagonal.The genus is currently classified into five subspecies and one variety. However, inconsistencies in morphological traits, especially in basal leaf shape and fruit characteristics, as well as discrepancies between observed and recorded distributions, have led to taxonomic ambiguity, particularly among populations from the Central Taurus and Anatolian Diagonal regions. To address these issues, we carried out an integrative study combining morphometric and genomic data across 38 populations. orphological variation was examined using multivariate methods such as Factorial Analysis of Mixed Data (FAMD) and Canonical Discriminant Analysis (CDA). Concurrently, genome-wide SNP data obtained via RAD-seq were used to assess genetic structure and phylogenetic relationships. Admixture analyses revealed three main primary genetic clusters. a finding further supported by SNAPPER species delimitation and species tree analysis. These integrative results consistently point to the recognition of three distinct subspecies (*H. bupleurifolia* subsp. *bupleurifolia*, subsp. *bourgeai*, and subsp. *malatyana*) along with four varieties. This study clearly demonstrates the value of integrating modern analytical tools to resolve complex taxonomic challenges.

Keywords: Anatolia, Brassicaceae, integrative taxonomy, RAD-seq, species delimitation

Acknowledgments: This study was supported by TÜBİTAK under the 1001 Research Projects Support Program (Project No: 120Z561).

OP-069

The Impact of Forest Fires on Bryophytes in the Sandras Mountain Region: Preliminary Findings on Biodiversity Loss

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Abstract

In 2021, a large-scale forest fire occurred in the Sandras Mountain region, located within the borders of Muğla Province (Southwestern Turkey). This event not only affected trees and maquis vegetation but also severely impacted the forest understory, including bryophytes, which play a critical role in maintaining ecosystem integrity. Based on field observations and sampling conducted in the burned areas, this study evaluates the effects of the fire on bryophyte diversity and habitat conditions. Post-fire comparisons between closely located burned and unburned habitats revealed a significant loss of commonly observed species, parallel to substrate destruction. Microhabitats such as rock crevices and decaying wood surfaces were degraded, and moisture retention capacity was severely reduced. As a result, a marked decline in species diversity was observed, and in some places, completely sterile surfaces emerged. In addition, monitoring studies were initiated across seven different burned sites to track the presence and recovery of bryophyte populations, and preliminary data from these surveys are included in this study. Bryophytes contribute significantly to water regulation, nutrient cycling, and soil formation within ecosystems, and they provide microhabitats for various fauna. Therefore, the impact of wildfires on bryophytes is not only species-specific but also relevant to the overall ecological functioning of the system. Our study highlights the short-term effects of post-fire changes in biotic and abiotic conditions on bryophyte biodiversity and emphasizes the need for long-term monitoring. The inclusion of bryophytes—sensitive and often overlooked plant groups—in post-fire ecological restoration plans is essential for maintaining overall biodiversity and ecosystem resilience.

Keywords: Mosses, Liverworts, Hornworts, Ecosystem Integrity, Post-Fire Monitoring

Acknowledgments: The data for this research were obtained from the project titled *"Sandras Dağı'nın Karayosunları Florası, Epilitik Karayosunları Vejetasyonunun Belirlenmesi ve Seçilmiş Yangın Alanlarındaki Öncü Karayosunlarının İzlenmesi"* (Project No: 123Z053), supported by TÜBİTAK. We extend our sincere gratitude to this distinguished institution for making this study possible and for its unwavering support of scientists.

OP-070

The Variations of *Allium muratozelii* in different ecological conditions

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Abstract

Approximately 250 taxa of the *Allium* genus are distributed in Türkiye. *Allium muratozelii* (Azizabdal Soğanı) used in our study was identified from Tunceli in 2021 and was also discovered in Bingöl in further studies. Ten bulbs of *Allium muratozelii* were collected from its natural habitat from Tunceli. They were planted in Konya (Ereğli) in the first year, Aydın (Buharkent) in the second year and Tunceli in the third year. They were harvested in May-June and morphological measurements were made. As a result of this study conducted in three different localities, changes were observed in the number of leaves, leaf dimensions, leaf shape and scape length of *Allium muratozelii*. Any variations were not observed in flower, fruit and seed characters.

Keywords: *Allium*, Ecological, New Species, Variation.

OP-071

Identification of Brassicaceae (Mustard Family) Spreading in Van Yüzüncü Yıl University Campus with the Help of Artificial Intelligence

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Abstract

Developing technological equipment and methods have tended to affect almost all of our lives, and have also greatly affected plant identification and recognition techniques. Many applications currently in use have demonstrated that deep learning-based models can achieve high accuracy rates in identifying plant species and that such an approach has significant potential in taxonomic studies. Innovative approaches such as hybrid feature extraction, mobile applications and Federated Learning, along with the effective use of deep learning models in autonomous identification of plant species, open new horizons in plant taxonomy and biodiversity studies. This study aims to identify members of the Brassicaceae family spread across the Van Yuzuncu Yil University campus with artificial intelligence applications. In addition to visual materials produced with different equipment in the campus area, visual materials related to relevant taxa taken from the general network environment constituted the material of our study. The identification of target plants was achieved by querying the library of the artificial intelligence database using a large number of visual materials produced and stored for each species. In addition, as another concrete result of this study, an Android-based APK (Android Package Kit) application named PlantLN (Plant Diagnostic Lens) has been developed. This application provides a user-friendly interface for field workers and plant scientists, enabling real-time identification of Brassicaceae species. The application is integrated with our deep learning model, allowing users to take plant photos and access classification results instantly. Such mobile solutions provide great convenience, especially in field studies, and make a significant contribution to biodiversity monitoring studies. The developed APK application is consistent with previous studies in similar fields, and provides an original contribution in terms of offering an approach specific to the Brassicaceae family.

Keywords: Artificial Intelligence, Brassicaceae, Campus Flora, Plant Identification, Van

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OP-072

The Effect of Different Extraction Methods on the Biological Activity of *Viburnum opulus L.* Fruits

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Abstract

Türkiye is one of the countries with a rich variety of plants used for medicinal purposes. *Viburnum opulus L.*, commonly known as "gilaburu," is one such plant and has been traditionally used for medicinal purposes in many regions, particularly in Kayseri. In this study, the anti-inflammatory and antimicrobial effects of extracts obtained from *V. opulus* fruits using two different extraction methods (CO_2 extraction and 70% methanol extraction) were investigated. Antimicrobial activity was evaluated using the agar well diffusion method on *E. coli, S. aureus, P. aeruginosa, C. albicans*, and *C. krusei* strains; neither extract showed significant activity against these microorganisms. The anti-inflammatory effect was tested *in vitro* using the 5-lipoxygenase (5-LOX) enzyme inhibition method. The 70% methanol extract showed the highest activity, particularly at a concentration of 100 µg/mL, with 40.3% inhibition. The CO_2 extract showed 26.7% inhibition at the same concentration. In the LC-MS/MS analysis, chlorogenic acid (44,386.07 ng/mL), quinic acid (19,584.34 ng/mL), catechin (2,013.84 ng/mL), and hesperidin (1,725.62 ng/mL) were identified as the main phenolic compounds in the methanol extract. Although CO_2 extraction stands out as an environmentally friendly and selective method, the higher anti-inflammatory activity of methanol extract has been associated with its rich phenolic content. This study contributes to a better understanding of the therapeutic potential of *V. opulus* by comparing the effects of different extraction methods on content and biological activity.

Keywords: Antimicrobial, Anti-inflammatory, Extraction method, Phenolic compounds, *Viburnum opulus*.

Acknowledgments: This study was supported by Scientific Research Projects Coordination Unit of Kocaeli Health and Technology University. Project number: KOSTU-BAP-2025/1.

OP-073

Molecular and Morphological Description of endemic *R. sessilifolium* from Türkiye

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Abstract

Rhodothamnus L. is represented worldwide by two species, both of which exhibit a limited distribution. *R. sessilifolius* is a rare and endemic plant species belonging to the Ericaceae (heath) family. In Türkiye, it is mainly found in the high mountainous regions of the Eastern Black Sea Region, particularly in the provinces of Rize and Artvin. It also occurs in the western and southwestern mountainous regions of Georgia, especially within the Lesser Caucasus ecosystem. This species typically grows at altitudes between 2100 and 2800 meters, in rocky and stony areas under cool and humid climatic conditions. It is usually found in alpine meadows alongside species such as *Rhododendron* and *Vaccinium*. Preferring acidic soils, *R. sessilifolius* is considered a species in need of conservation due to its limited distribution and threats to its natural habitat. Although morphological characteristics of this species have been studied, there is a lack of research on its molecular structure and phylogenetic relationships. This study aims to identify the distinct features of *R. sessilifolius* compared to other species through an integrated approach using both morphological and molecular data. *R. sessilifolius* is morphologically distinguished from the other species by having two different types of hairs especially on the leaf edges, by its thin and petiole-less leaf blade, and by its height, which is a maximum of 10 cm. The leaf blade measures 0.7–1.2 x 0.3–0.5 cm, the flower stalk is 0.5–1 cm, and the calyx is 4.5–5 mm. The chloroplast genome matK gene region sequences of the specimen were determined and compared with those of similar taxa. Molecular studies focused on the matK gene region, as this region had not been studied before. It has been observed that in the GENBANK database, only the nuclear gene region of the species *R. sessilifolius* has been studied, while for the other species, *R. chamaecistus*, both the chloroplast and nuclear gene regions have been analyzed; however, the number of studied specimens is at most seven. Gene sequence data from these studies were used for comparison. The MEGA Maximum Likelihood and dendrogram analyses show that the total sample is divided into two distinct groups. Consistent with their morphological similarities, phylogenetic analyses revealed that the species *R. sessilifolius* and *R. chamaecistus* form completely separate clades. Diagnostic characters, description, and conservation status of *R. sessilifolius* are provided.

Keywords: Caucasus, Molecular, Morphological, *Rhodothamnus*, Türkiye.

OP-074

Weed Flora of Legume Cultivation Areas in Türkiye

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Abstract

Weeds are major biological constraints in agricultural production, reducing yield and quality by competing for essential resources such as nutrients, light, and water. Türkiye, located within the Fertile Crescent, is an important gene centre for legumes and offers significant potential for legume cultivation due to its diverse climate and soils. This study presents a comprehensive compilation and analysis of weed taxa recorded in legume cultivation areas across Türkiye. Based on an extensive literature review, 694 unique weed taxa were compiled from 34 different sources, resulting in a total of 1,978 weed records associated with legume fields. Among these taxa, 632 are native to Türkiye, 18 have become naturalized, 5 are introduced, 10 are classified as cultivated, and 2 require further confirmation. Additionally, 12 endemic and 19 invasive taxa have been identified. This extensive dataset provides a valuable foundation for developing region-specific weed management strategies and supports efforts in weed control and agricultural planning. Moreover, documenting endemic taxa contributes to their conservation and highlights the importance of protecting Türkiye's unique plant diversity. The findings also offer critical information for researchers, policymakers, and agricultural stakeholders working toward the sustainable production of legumes.

Keywords: Biodiversity, Flora, Legumes, Türkiye, Weeds

OP-075

First vouchered record of *Hyalopodium colchicum* (Albov) L.J.Gillespie & Soreng (Poaceae) from northeastern Anatolia, Türkiye

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Abstract

Hyalopodium colchicum (Albov) L.J.Gillespie & Soreng (zenginsalkım) is documented here for the first time with voucher specimens from Türkiye. Previously, this species was indicated from Türkiye only on Grossheim's distribution map (Artvin, Çoruh) without any supporting collections. During recent fieldwork conducted across Eastern Anatolia and the Black Sea region of Türkiye, *H. colchicum* was collected only in Artvin Province (Borçka District, near Camili, Mount Karçal, Lekuban plateau, and above Fındık plateau) at elevations ranging from 2700 to 2900 m. This represents the first confirmed and vouchered occurrence of the species in the flora of Türkiye. A detailed morphological description, together with ecological and phenological observations, and a distribution map of *H. colchicum* in Türkiye are provided, along with diagnostic comparisons to related taxa. These new records contribute to a better understanding of the distribution and phytogeographical relationships of *Hyalopodium* in northeastern Anatolia, highlighting the importance of continued taxonomic and floristic studies on this genus in the region.

Keywords: *Coleanthinae*, *Hyalopodium*, Poaceae, Türkiye

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OP-076

Conservation-Focused Evaluation of Genetic Diversity in the Rare Endemic *Aethionema turcica*

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Abstract

This study presents the first comprehensive analysis of the genetic diversity of *Aethionema turcica* H. Duman & Aytaç, a threatened edaphic endemic species restricted to marly soils in Central Anatolia, using ISSR markers. Fieldwork (2016–2018) documented population locations, sizes, and associated threats. Soil samples underwent physicochemical analyses (pH, EC, gypsum, texture, $CaCO_3$), alongside bioclimatic evaluations based on local climate data. Fresh leaf material was collected for DNA extraction, followed by ISSR-PCR to generate molecular banding profiles. 46 individuals from two natural populations of *A. turcica* were investigated by using 16 inter simple sequence repeats (ISSR) primers. Genetic diversity within and among populations was quantified through metrics such as observed number of alleles (Na), effective number of alleles (Ne), Nei's gene diversity (H), Shannon's information index (I), percentage and number of polymorphic loci, as well as the presence of private bands. These analyses were conducted at both the population and species levels using POPGENE and GenAlEx software. The genetic structure and differentiation of populations were further assessed via cluster analysis (UPGMA), Principal Coordinates Analysis (PCoA), Analysis of Molecular Variance (AMOVA), and Mantel tests to evaluate genetic distances and their correlation with geographic separation. Consequently, a high level of genetic differentiation among populations was observed (GST = 0.499; ΦPT = 0.687), alongside limited gene flow (Nm = 0.501). AMOVA results attributed 69% of the genetic variation to among-population differences while 31% was observed within populations. Clustering analyses (UPGMA and PCoA) revealed two distinct groups, and the strong Mantel correlation ($r = 0.968$; $p < 0.001$) suggests this differentiation is likely due to geographic distance. STRUCTURE analysis ($\Delta K = 2$) identified two distinct genetic clusters as the most likely population structure. These findings informed proposed strategies for the conservation and genetic management of the species.

Keywords: *Aethionema turcica*, Central Anatolia, Endemic, Genetic diversity, ISSR

Acknowledgments: This research was supported by "Ankara University Research Fund (Project no: 18L0430010)" and Republic of Turkey Ministry of Agriculture and Forestry Ninth Regional Directorate of Nature Protection and Natural Parks (Species Action Plan and Monitoring Project).

OP-077

Comparison of Antioxidant Activity of *Salvia tomentosa* L., *Salvia bracteata* L. *and Salvia cilicica* L.

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Abstract

Salvia bracteata L., *S. tomentosa* L., and *S. cilicica* L. are three *Salvia* species native to Türkiye, all belonging to the genus *Salvia* within the family Lamiaceae, which is well known for its aromatic, medicinal, and ethnobotanical value. *S. tomentosa* is widely used in traditional and natural health remedies for its therapeutic properties. *S. bracteata* and *S. cilicica* are also reported to contain bioactive compounds, particularly flavonoids and phenolic acids, which may contribute to their antioxidant potential. The purpose of this study was to investigate the total flavonoid and total phenolic contents, as well as the antioxidant activity, of these three species. *S. bracteata*, *S. tomentosa*, and *S. cilicica* were collected from southwestern Türkiye (Denizli), south-central Türkiye (Karaman), and the Taurus Mountains in southern Türkiye, respectively. The plant materials were shade-dried in a properly ventilated area, ground into fine powder, and extracted using three different solvents. The resulting extracts were stored at 4 °C until analysis. Total phenolic content was determined using the Folin–Ciocalteu reagent and expressed as gallic acid equivalents. Flavonoid content was measured using the aluminum chloride colorimetric method, with results expressed in quercetin and rutin hydrate equivalents. Antioxidant activity was evaluated using the DPPH free radical scavenging assay. All measurements were performed in triplicate, and the data were statistically analyzed. This study contributes to the growing knowledge on Turkish Salvia species by providing comparative insights into their antioxidant potential and phytochemical profiles. The high levels of phenolic and flavonoid compounds detected highlight their promise as natural sources of bioactive substances.

Keywords: Antioxidant activity, Flavonoids, *Salvia bracteata*, *Salvia tomentosa*, *Salvia cilicica*

OP-078

Determination of Total Flavonoid, Total Phenolic Content and Antioxidant Activity of *Cephalaria gokturkii* Semiz & Uysal (Caprifoliaceae)

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Abstract

Plants play an important role in traditional and modern medicine due to their bioactive compound content. *Cephalaria gokturkii*, an endemic species with limited distribution in the Turkish flora, is of special interest for phytochemical research. This study aimed to determine the total flavonoid and total phenolic contents and antioxidant activity of extracts obtained from different parts of *C. gokturkii*. The plant material was collected from Girdev Mountain in Muğla, southwestern Türkiye, during the flowering period (July-August). The samples were dried in the shade in a well-ventilated area. The dried samples were separated into pieces (flowers, leaves and stem), ground into a fine powder and extracts were obtained using different solvents. The obtained extracts were stored at +4. The total phenolic content was determined using the Folin-Ciocalteu reagent and the results were expressed as gallic acid equivalents. Total flavonoid content was measured using the aluminum chloride method and reported as quercetin and routine hydrate equivalents. Antioxidant activity was assessed using the DPPH radical scavenging test. All experiments were performed in triplicate and the data were statistically analyzed. The identification of phenolic compounds and flavonoids is thought to provide a basis for the potential industrial use of this ethnobotanically important species in future studies. Furthermore, it is suggested that it may serve as a natural source of bioactive agents as an alternative to synthetic agents used in the pharmaceutical, cosmetic and food industries.

Keywords: Antioxidant activity, *Cephalaria gokturkii*, DPPH assay, Flavonoids, Total phenolic content.

OP-079

Comparative pollen morphology of the genus *Erigeron* L. (Asteraceae) in Türkiye: Implications for taxonomy and phylogeny

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Abstract

There are 457 accepted, annual, biennial, and perennial species in the taxonomically complex genus *Erigeron* L., the majority of which are found in temperate regions. It has long been believed that the genera *Erigeron* and *Conyza* Less. are distinct but closely related. However, some authors include *Conyza* within the broadly defined genus *Erigeron*, as it has been demonstrated that *Conyza* is polyphyletic and is now placed within *Erigeron*. It is widely acknowledged that the broad definition of *Erigeron* encompasses species formerly classified as *Conyza*. The purposes of the present study are as follows: (1) to verify the pollen types presented by representatives of the *Erigeron* taxa; (2) to discuss these findings within a phylogenetic and phylogeographic context. Light microscopy (LM) and scanning electron microscopy (SEM) were used to examine the pollen samples collected from the anthers. Minitab Statistical Software was used for all statistical analyses. According to LM and SEM studies, *Erigeron* and *Psychrogeton* taxa are characterized by monad, isopolar and radially symmetrical pollen grains. Pollen grains in all taxa examined are tricolporate and all were defined as echinate. Pollen grains of taxa belonging to the genus *Erigeron* mostly have suboblate and oblate-spheroidal shapes. Polar and equatorial axis (excluding spine lengths) lengths vary between 15.64 - 22.64 µm and 17.50 - 24.30 µm, respectively. These results reveal that the taxa examined have small-sized pollen grains (in the range of 10-25 µm). Hierarchical clustering analysis (HCA) was performed using 15 pollen characters. 5 main taxonomic clusters were created in the HCA analysis. According to Principal Component Analysis (PCA), the first four components explain 86.8% of the pollen character diversity among 17 taxa. According to the results, *Psychrogeton* taxa formed a separate group from the *Erigeron* and *Conyza* taxa.

Keywords: *Erigeron*, HCA, PCA, Pollen, Türkiye

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OP-080

Taxonomic Problems of the Genus *Erigeron* L. (Asteraceae) in Türkiye

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Abstract

The genus *Erigeron* L. (Asteraceae: *Astereae*), commonly known as fleabanes (Şifaotu in Turkish), comprises over 400 species distributed mainly in temperate regions of the Northern Hemisphere. Within Türkiye, *Erigeron* (which includes *Conyza* Less. and *Psychrogeton* Boiss.) is represented by 15 taxa, 3 of which are endemic. Despite its relatively modest representation in the Turkish flora, the genus poses significant taxonomic challenges due to a combination of morphological plasticity, overlapping diagnostic characters, and a complex nomenclatural history. Many of the Turkish *Erigeron* species were described in the 19th and early 20th centuries based on limited herbarium material, often without comprehensive population-level analyses. Consequently, type specimens are frequently incomplete, poorly preserved, or missing, leading to uncertainties in species delimitation. Several taxa are suspected to be synonyms, varieties, or misidentifications of more widely distributed Eurasian species. Furthermore, the genus exhibits a high degree of intraspecific morphological variation, especially in traits such as leaf shape, pubescence, and capitulum structure. This comprehensive assessment underscores the necessity for a modern revision of the genus *Erigeron* in Türkiye, combining classical taxonomy with contemporary approaches. Such a revision is not only critical for accurate floristic documentation but also has implications for conservation planning and the understanding of biogeographical patterns within the Asteraceae family in the Eastern Mediterranean region.

Keywords: *Erigeron*, Taxonomy, Revision, Türkiye.

Acknowledgments: This study was supported by the Scientific Research Coordination Unit of Pamukkale University under project number 2022FEBE022.

OP-081

Investigation of The Effect of Some Needle Traits on *Thaumetopoea wilkinsoni* Tams. Host Preference in *Pinus brutia* Ten.

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Abstract

Turkish red pine (*Pinus brutia* Ten.) is an economically and ecologically important species that plays a critical role in Türkiye's forest ecosystem. However, this red pine forest is threatened by the pine processionary moth (*Thaumetopoea wilkinsoni* Tams.), a pest that is especially widespread in the Mediterranean Basin and in pine forests in Türkiye. The moth can cause serious damage to the forest ecosystem by feeding on the needles of pine trees. This thesis aims to better understand the mechanism of pine processionary moth (PPM) infestation in *P. brutia*. Determining the visual cues that PPM uses in its host preference is a key focus of this study. Within the scope of this thesis, detailed analyses of photosynthetic pigment content, specific leaf area and color scales of needles were carried out in *P. brutia* genotypes that are resistant and non-resistant to PPM infestation. The results of the analysis revealed that leaf specific area, chlorophyll-a, chlorophyll-b, total chlorophyll and carotenoid values were higher in infested clones than in non-infested clones. Statistically significant differences in these values were observed especially in the late summer and fall months (August, September, October and November) when the larval period of the insect is the most intense. The our results suggest that PPM may also use visual cues of clones/trees in host selection. The data obtained in this study should contribute to the ecological literature on PPM.

Keywords: Chlorophyll content, Host Preference, *Pinus brutia*, Specific Leaf Area, *Thaumetopoea wilkinsoni*.

Acknowledgments: This study was supported by the TUBİTAK under project number 121Z362.

OP-082

Molecular Docking Study on the Interaction of Pesticide Derivatives with Bacterial Enzymes

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Abstract

Pesticides are toxic chemicals used to eliminate pests that damage agricultural products and increase product yield. As a result of the widespread use of pesticides containing chemicals such as insecticides, herbicides, and fungicides, the soil structure is deteriorated, and usable agricultural land is significantly reduced. At the same time, pesticides mix with groundwater, seep into the sea, and are incorporated into the food chain. They negatively affect terrestrial and aquatic life and have adverse effects on human health. Microorganisms have enzymes that break down these chemicals, and microbial enzymes are promising for the biological degradation of pesticides. While microorganisms themselves can be utilized in this process, microbial enzymes can also be employed in phytoremediation, a biotechnological method for removing pesticide pollution. The genes encoding the enzymes that facilitate the biological degradation of pesticides can be transferred to specific plants to help clean the soil of these chemicals. In this study, the interaction between enzymes from the bacterial species *Thermus thermophilus* HB27 and *Pseudomonas putida* and the pesticides acetochlor, malathion, lindane, and vinclozolin was investigated using the molecular docking method. According to the obtained data, it was determined that the oxidoreductase group enzyme belonging to the bacterium *Thermus thermophilus* HB27 showed binding energies of -7.2 kcal/mol with vinclozolin, -6.3 kcal/mol with acetochlor, -5.3 kcal/mol with malathion and -5.2 kcal/mol with lindane. It was determined that the oxidoreductase group enzyme belonging to the bacterium *Pseudomonas putida* showed binding energies of -6.8 kcal/mol with vinclozolin, -5.1 kcal/mol with lindane, -5.1 kcal/mol with malathion and -4.8 kcal/mol with acetochlor. The findings show that enzymes from the bacterial species *Thermus thermophilus* HB27 and *Pseudomonas putida* exhibit strong interactions with the pesticides acetochlor, malathion, lindane, and vinclozolin.

Keywords: Pesticide, Phytoremediation, Molecular Docking, *Thermus thermophilus*, *Pseudomonas putida*

OP-083

Palynological Evaluation of Guano Contents in Two Different Caves in Bursa Province

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Abstract

The karst formations in Bursa, particularly in Uludağ, attract significant attention. Recent palynological studies have demonstrated that bat guano accumulating in caves contributes to pollen deposition within these environments, but the sources of the accumulation remain a matter of curiosity. Consequently, Bursa province, known for its numerous caves due to the geological structure of Uludağ, has emerged as a crucial area for copropalynological research. In this study, guano samples were collected from two caves located in different areas of Bursa, approximately 75 km apart as the crow flies, and their palynological contents were analyzed. A varying number of taxa were identified in the guano samples from each cave. While the dominant taxa, including Poaceae, Cupressaceae/Taxaceae, *Pinus*, *Abies*, *Quercus*, *Taraxacum*, Apiaceae, and Amaranthaceae/Chenopodiaceae, were similar across both caves, other dominant taxa exhibited notable differences. Statistical analyses on palynological data of guano indicated no significant differences between the two caves, suggesting that the pollen deposited via guano was statistically comparable, despite variations in percentage representation. Therefore, the palynological findings derived from bat guano are indicative of the region's vegetation. Additionally, our results suggest that detailed information regarding the vegetation surrounding the caves can also be gleaned from the guano. This indicates that both caves not only represent the regional vegetation but also reflect the flora of their immediate environments.

Keywords: Bat guano, Copropalynology, Karst formations, Pollen monitoring, Speleology

OP-085

Conservation Assessment of Endemic *Festuca* L. Species in Türkiye: Current Status and Ongoing Efforts

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Abstract

Festuca L. is one of the dominant components of steppe vegetation, particularly in alpine steppe ecosystems. Despite its ecological significance and wide applications in agriculture and landscape architecture, the genus remains understudied and underrepresented in conservation efforts. Of the currently known 58 *Festuca* L. taxa in Türkiye, 32 are endemic, comprising of 21 endemic species, 5 endemic subspecies, and 3 endemic varieties. In addition, five more species present in Türkiye are rare regional endemics of the Caucasus region. Although fescues are well-adapted to harsh environmental conditions, they are not immune to threats. Based on field observations from approximately 400 observation points across Türkiye, the primary threats identified include overgrazing, global warming, urbanization, tourism development, and various infrastructure projects. Currently, no fescue species in Türkiye is subject to species-specific conservation measures. Only two species *F. xenophontis* Markgr.-Dann. and *F. pontica* E. Alekseev ex Markgr.-Dann. are listed as Endangered (EN) on the IUCN Red List of Threatened Species. Also, just a few fescue species have significant portions of their population located within protected areas such as national parks. As part of the ongoing "Türkiye's Endemic Plants Red List" project, we are conducting IUCN Red List assessments for all endemic *Festuca* L. taxa in the country. These evaluations aim to determine the conservation status of each taxon according to IUCN criteria and formally submit the results for inclusion in the global Red List. Preliminary assessments indicate that 6 taxa are Critically Endangered (CR), 14 are Endangered (EN), 5 are Vulnerable (VU), 2 are Near Threatened (NT), 3 are Data Deficient (DD), and 2 are of Least Concern (LC). According to the results, majority of the Türkiye's endemic fescue taxa are facing some level of threat and are in urgent need for targeted conservation actions and habitat protection measures.

Keywords: Biodiversity, Conservation Assessment, Endemism, *Festuca* L., Türkiye.

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OP-086

Trait Covariations In 100 *Olea europaea* L. Varieties: Effect Of Genetic And Geographic Origins On Phenotypic Structure

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Abstract

Understanding why and how functional traits vary within species is a fundamental question in ecology and evolutionary biology. In this study, we investigated intraspecific trait variation and covariation in *Olea europaea* L., a Mediterranean sclerophyllous woody crop and one of the oldest domesticated perennial species. Thanks to its large genetic and phenotypic diversities, the olive tree provides a great system for exploring how genetic background and geography affect traits variation and coordination. We analysed 13 morpho-anatomical, structural and physiological traits measured at the leaf, stem/branch and whole plant levels. The study focused on 100 cultivated olive varieties originating from 12 Mediterranean countries, representing the main genetic pools of the Mediterranean Basin and maintained in the world olive germplasm bank of Marrakech, Morocco. Our results showed clear distinctions on the different axes of trait variation, in terms of genetic and geographical structures, highlighting the influence of geographical factors and the genetic background on phenotyping structuring. The correlation network revealed significant relationships between certain traits, revealing the formation of functional modules. Strong associations between structural leaf and stem traits were identified, notably a positive covariation between wood density and leaf dry matter content. Overall, our results highlight that both functional coordination among traits, geographical and genetic origins play a major role in shaping the phenotypic diversity observed in cultivated olive trees.

Keywords: Common Garden, Functional Traits, Genetic Diversity, Intraspecific Variation, *Olea europaea* L.

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OP-087

Green Synthesis of Zinc Oxide Nanoparticles Using Peppermint Extract: Characterization and Antimicrobial Properties

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Abstract

The growing need for environmentally friendly nanomaterials has led to the exploration of plant-based synthesis methods for nanoparticles. This study investigates the green synthesis of zinc oxide nanoparticles (ZnONPs) using Mentha piperita (peppermint) extract as a natural reducing and stabilizing agent. The use of plant extracts eliminates the need for toxic chemicals, making the synthesis process eco-friendly and sustainable. The synthesized ZnONPs were characterized using scanning electron microscopy (SEM), transmission electron microscopy (TEM), energy-dispersive X-ray spectroscopy (EDXS), X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), and UV-Vis spectroscopy. These analyses confirmed that the ZnONPs possessed a well-defined wurtzite crystalline structure and a particle size ranging from 20 to 50 nm. Bioactive compounds in the peppermint extract, including flavonoids, terpenoids, and polyphenols, played a crucial role in nanoparticle stabilization and formation. The antimicrobial activity of ZnONPs was assessed using the well-diffusion method against bacterial strains at varying concentrations (35 mg/ml, 25 mg/ml, and 15 mg/ml). The results demonstrated a concentration-dependent antibacterial effect, with the highest concentration (35 mg/ml) producing the most significant inhibition zone of 0.2 mm. The antibacterial activity is attributed to the release of Zn^{2+} ions, which disrupt bacterial membranes and metabolic functions. This study highlights the potential of green-synthesized ZnONPs for applications in antimicrobial activitiescoatings. The ongoing research should focus on optimizing synthesis conditions and exploring the broader applications of ZnONPs in plant protection fields.

Keywords: Antimicrobial Properties, Green Synthesis, Nanotechnology, Peppermint Extract, Zinc Oxide Nanoparticles (Znonps)

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ABSTRACTS OF POSTER PRESENTATIONS

PP-101

Molecular Phylogenetic Position of *Crepis hakkarica* (Asteraceae: Cichorieae) Endemic to Turkey

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Abstract

Crepis hakkarica is a locally distributed endemic species, unique to the Southeast Anatolia (Hakkari and Bitlis). Among approximately 44 Crepis species in the Flora of Turkey, this species draws attention with both its limited geographical distribution and unique morphological features (i.e., pectinate phyllaries). However, the molecular phylogenetic position of C. hakkarica within the genus has not been reported at the molecular level. In this study, *C. hakkarica* plant materials were collected from Hakkari during fieldwork in Türkiye and loaned from ANK (Ankara University) and VANF (Van Flora Application and Research Center). Total genomic DNA was isolated from the samples and the nuclear ITS region was sequenced. In addition, the phylogenetic position of *C. hakkarica* was determined using comparative sequence data obtained from various species belonging to the subtribe *Crepidinae*. Phylogenetic analyses were performed using the Maximum Likelihood (ML) method. The analysis results showed that *C. hakkarica* formed a monophyletic clade with high support value and was included in the same clade with samples belonging to the section *Mesophylion* (*C. bungei*, *C. nigrecscens*, *C. tectorum).* However, there are significant morphological differences between these species and molecular similarity does not coincide with morphological similarity. These findings reveal that the species is not only a local endemic but also a genetically isolated taxon that should be protected phylogenetically. This study provides an important contribution in terms of determining the taxonomic position of the species at the molecular level.

Keywords: *Crepis*, Endemic, ITS, nrDNA, Phylogeny

Acknowledgements: The authors would like to express special thanks to TUBITAK (Grant no. *122Z966*) for financial support.

PP-102

Biosystematic Characteristics of *Garhadiolus hamosus* (Asteraceae: Cichorieae)

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Abstract

Garhadiolus hamosus is a member of subtribe *Crepidinae* (Asteraceae), distributed in the Eastern-Southeastern Anatolian regions of Turkey (Mardin, Gaziantep, Diyarbakır, Siirt) and the neighboring part of Syria to Turkey (Aleppo). The aim of this study was to reveal the morphological, micromorphological and molecular characteristics of *Garhadiolus hamosus*. For this purpose, molecular studies were carried out on 2 different *G. hamosus* populations preserved in Karadeniz Technical University Biology Department and Van Flora Application and Research Center herbaria, and morphological and micromorphological studies were carried out on a selected population. Achene samples were coated with gold and imaged with scanning electron microscope, and total DNA isolation for molecular studies was obtained using the modified CTAB extraction protocol of Doyle & Doyle. The sequence analysis of the amplified nrDNA ITS region using ITSA and ITSB primers was performed through service procurement. The alignment of the obtained sequences was performed using MAFFT v.7.407 software. Phylogenetic analyses were performed using the Maximum Likelihood (ML) method. Using the comparative nrDNA ITS sequence data of species belonging to the *Crepidinae* subtribution in the GenBank database, the phylogenetic position of *Garhadiolus hamosus* within this group was determined. Taraxacum sp. was used as the outgroup in the phylogenetic analysis. According to micromorphological data, the achene of *G. hamosus* is smooth-surfaced, subulate, involute and there is no pappus. According to morphological data, it is different from the species in the same genus, *G. hedypnois*, in terms of its pale-yellow ligule flowers being 2 times longer than the involucre and the phyllaries spreading in a star-shaped manner during the fruiting period. As a result of the phylogenetic analyses, it was determined that two accession belong to *Garhadiolus hamosus* grouped together with a high support value and were closely related to *G. hedypnois*.

Keywords: *Garhadiolus*, Morphology, Micromorphology, nrDNA
Acknowledgements: The authors would like to express special thanks to TUBITAK (Grant no. *122Z966*) for financial support.

PP-103

Flora of Akıncı Village, Beşiktaş Creek (Sakarya) and Its Surroundings

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Abstract:
In this study, it was tried to determine the floristic characteristics of Akıncı village and Beşiktaş stream (Sakarya) located within the borders of Geyve district in the south of Sakarya province. According to Davis' Grid system, 400 plant specimens were collected at the end of the field work carried out between 2024 and 2025 at the research site located in the A3 square. Plants were collected and photographed as much as possible when they were flowering or fruiting; It was then pressed and dried in accordance with the current rules. The dried specimens were stored in a cooler to protect them from pests such as insects and turned into herbarium material. 126 genera, 204 species and subspecies taxa belonging to 52 families growing naturally in and around Akıncı Village Beşiktaş Creek have been identified. Of the taxa detected in the area, 2 belong to the pteridophyta and 117 belong to the Spermatophyta division, 1 of them belongs to the Gymnospermae and 116 of them belong to the Angiospermae subdivision. Of the taxa belonging to the Angiospermae subdivision, 20 belong to the class Monocotylodonae, while the remaining 96 taxa belong to the class Dicotilodonae. The richest families in terms of the number of taxa in the research area were Poaceae with 14 taxa (11.29%), Fabaceae with 10 taxa (8.06%), Lamiaceae with 7 taxa (5.65%), Rosaceae with 6 taxa (4.84%), Brassicaceae with 5 taxa (4.03%), Caryophyllaceae with 5 taxa (4.03%), Asteraceae with 4 taxa (3.23%), Boraginaceae with 4 taxa (3.23%), Ranunculaceae with 3 taxa (2.42%), Plantaginaceae (2.42%) with 3 taxa. The study area is in a transition zone between the Mediterranean and the European-Siberian phytogeographical regions, which allows it to contain a mixture of different plant species. Climate and topographic diversity favor the coexistence of various plant species in this region. Since the transition regions are rich in biodiversity, they contain plant species belonging to the Iranian-Turanian phytogeographical region, as well as the plant species of both the Mediterranean phytogeographic region and the European-Siberian phytogeographic region. The number of endemic taxa was 11 and the endemism rate was calculated as 7.75%.

Keywords: Akıncı Village, Flora, Sakarya

PP-104

Educational Activities and Observations on Campus Flora at MoniBostan Ecological Children's Campus (Ankara, Türkiye)

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Abstract

MoniBostan is an ecological children's campus established in 2019 on a 17-decare area in Ballıkpınar, Gölbaşı, Ankara. Designed to enhance children's ecological literacy through direct interaction with nature and hands-on production experiences, the campus offers nature-based learning opportunities, particularly for children from disadvantaged areas of Ankara. Practical activities such as plant cultivation and composting are integrated into the program, alongside active agricultural practices. The campus implements organic certified farming, soil restoration, and local seed preservation efforts, while also conducting Eco-Guide programs and nature-focused workshops for children. These initiatives aim to promote sustainable living and ecological literacy awareness. This study focuses on identifying the native flora and cultivated plant species within the MoniBostan area, with the goal of creating a specialized herbarium collection for educational purposes. Fieldwork began on 06.03.2025 and continues weekly. Specimens in flowering and fruiting stages, with intact roots, stems, and leaves, were collected, dried using herbarium techniques, and scientifically identified. Preliminary findings indicate that there are more than 150 species on-site and the most common plant families are Brassicaceae, Asteraceae, and Fabaceae. Due to the limited area and prevalence of cultivated plants, the diversity of native species has significantly declined. However, the site remains influenced by the surrounding steppe flora, with some species gradually recolonizing. Among cultivated plants, taxa from the Rosaceae family were most frequently observed. The study provides an overview of the activities conducted at MoniBostan Ecological Children's Campus and the documentation of the natural and cultivated flora.

Keywords: Ankara, Ecological Education, Flora

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PP-105

Some Endemic Plants from the Flora of the Kartaltepe Zone (Polatlı/Ankara) of the Sakarya Battlefield Historical National Park

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Abstract

Floristic studies examine plant species that grow naturally within certain boundaries. These studies are important in determining whether plant species are rare or endangered and whether they need to be protected. In particular, endemic plants, which are among the most important elements of plant genetic diversity, should be well known and protective measures should be taken against the threat of extinction. The area covered by our study is the Kartaltepe Region of the Sakarya Battlefield Historical National Park, located within the boundaries of the Polatlı and Haymana districts of Ankara, where some of the most important stages of the War of Independence took place and which is now protected as a historical national park. The soil structure of the area is limestone, and the study is located within the Irano-Turanian phytogeographic region. The aim of this study is to determine the current status of endemic plant species growing in one of the most important historical areas of our country and to evaluate them in terms of IUCN threaten categories.

Keywords: Ankara (Polatlı), Endemism, Flora, IUCN.

Acknowledgments: This study is a part of the master's thesis titled “The Flora of Sakarya Battlefield Historical National Park - Kartaltepe Zone (Polatlı, Ankara)” prepared by Esra Çakırlar Altuntaş under the supervision of Assoc. Prof. Emre Çilden at Hacettepe University.

PP-106

Karyological studies of Endemic *Ajuga xylorrhiza* Kit Tan and *Ajuga vestita* Boiss. (Lamiaceae)

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Abstract

Ajuga xylorrhiza (endemic) and *Ajuga vestita* which have been studied. Root-tip meristems were provided from seed by germinating them on wet filter paper in Petri dishes at room temperature. Firstly root tips pretreated for 16 h in α-monobromonaphthalene at 4°C, fixed in 3:1 absolute alcohol/glacial acetic acid, then the root tips were hydrolyzed with 1 N HCl for 11 min at room temperature and stained with 2% aceto-orcein for 2 h at room temperature. Stained root tips were squashed in a drop of 45% acetic acid and permanent slides were made by mounting in Depex. The karyotypes were measured by Software Image Analyses (Bs200ProP) loaded on a personal computer. Ideograms of these taxa were arranged in decreasing length. The samples of *A. xylorrhiza* which naturally grow in the province of Diyarbakır numbered as 6045 has been studied. The number of diploid chromosome for sample was detected as 2n=32. The average chromosome length for 6045 plant sample was 0.56 µm while its haploid chromosome length was 18 µm. Additionally, example of *A. vestita* numbered as 6043 was studied. Diploid chromosome number of this taxon which naturally grow in the province of Mardin was 2n=24. The average chromosome and haploid chromosome lengths were 1.28 µm and 30.93 µm for the same example. Karyotype analysis of both samples was also made by the Image Analysis System.

Keywords: *Ajuga*, Chromosome, Endemic, Karyology

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PP-107

Floristic Richness and Biogeographical Significance of the Genus *Euphorbia* L. (Euphorbiaceae) in Çanakkale, Turkey

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Abstract

The Euphorbiaceae is one of the largest families within the class *Magnoliopsida* (dicotyledons), exhibiting a cosmopolitan distribution across all continents except Antarctica. Comprising approximately 340 genera and over 7,500 species worldwide, the family is characterized by a wide range of morphological and ecological diversity. Among its members, the genus *Euphorbia* L. stands out as the most prominent, anatomically distinguished by the presence of branched latex canals distributed throughout the stem and leaf tissues. This structural adaptation has contributed to its common designation in Turkish vernacular as "sütleğen" (spurge). In traditional medicine, the latex of various *Euphorbia* species has been employed in the treatment of dermatological conditions, jaundice, asthma, and rheumatism. Turkey is recognized as one of the global hotspots of plant diversity, owing to its unique geographical position at the intersection of three major phytogeographical regions: the Mediterranean, Irano-Turanian, and Euro-Siberian. This convergence generates a remarkable range of ecological niches that harbor a high number of plant taxa, including a significant proportion of endemics. Within this biogeographical framework, Çanakkale Province emerges as a floristically significant region, particularly notable for the confluence of Mediterranean and Euro-Siberian elements, which together enhance its botanical richness and endemicity. According to *Flora of Turkey* (Vol. 7), 109 taxa of *Euphorbia* are recorded; with subsequent taxonomic additions, this number has reached approximately 120, of which 18 are endemic to the region. Floristic surveys conducted within the borders of Çanakkale Province have documented the presence of 26 naturally occurring *Euphorbia* taxa, underscoring the region's importance in the distribution and conservation of this ecologically and medicinally significant genus.

Keywords: Biodiversity, Çanakkale, *Euphorbia*, Flora, Systematic

PP-108

Preliminary Observations on Fruit, Seed and Pollen Morphology of *Thalictrum sultanabadense* (Ranunculaceae) from Türkiye

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Abstract

Thalictrum sultanabadense Stapf is a species naturally occurring in Türkiye, yet little is known about its micro-morphological characteristics. Among the species of *Thalictrum*, *T. sultanabadense* is distinguished by its uniquely recurved fruit morphology. In this study, we present preliminary findings on the fruit, seed and pollen morphology of this species based on light microscopy analyses. Achenes and seeds were examined and measured under a stereo microscope, while the pollen preparations prepared according to the Wodehouse method were analyzed and photographed using a light microscope. The fruit is an achene, measuring 3–9 mm in length, with a distinctively crescent-shaped or curved form and prominently 8-9 ribs. The seeds are reddish-brown, measuring 2.20–2.50 × 0.70–1.00 mm. Seed coat ornamentation is reticulate at the margins and rugose in the central region. Pollen grains are pantoporate, apolar, and spheroidal in shape, with an average diameter of 19.26 µm. The number of pores varies from 6 to 9. Each pore is circular, with an average diameter of 3.48 µm. The distance between pores is approximately 10.3 µm. The exine thickness is about 1.1 µm. Ornamentation is described as microechinate-perforate. These micromorphological findings provide valuable taxonomic information for *Thalictrum sultanabadense* and serve as a basis for further comparative studies within the genus *Thalictrum*.

Keywords: Achene, Fruit morphology, Pollen morphology, Reticulate, *Thalictrum sultanabadense*

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PP-109

Taxonomic Assessment of *Ranunculus* L. (Ranunculaceae) Species in Çanakkale, Turkey

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Abstract

Ranunculaceae Juss. comprises a diverse group of flowering plants with a broad global distribution. With over 2,500 species classified under 59 genera, this family is particularly notable for its adaptability to a wide range of ecological conditions, especially across the Northern Hemisphere. Among its members, the genus *Ranunculus* L. is cosmopolitan in distribution and currently includes approximately 1,761 accepted species worldwide. *Ranunculus* taxa are widely distributed both globally and within the flora of Turkey. According to the most recent records, 105 taxa of this genus are recognized in Turkey. Among these, 22 taxa (20,95 %) have been classified based on detailed morphological characteristics, including achene traits (such as achene and beak shape, pericarp structure, and indumentum), floral morphology (number and color of sepals and petals, as well as the presence of glossy petals), root structures (e.g., tuberous roots), and fruit anatomy. Çanakkale Province, located in the Marmara Region of Turkey, occupies a biogeographically significant position at the intersection of the Euro-Siberian and Mediterranean phytogeographic zones. This transitional location contributes to the region's high species richness and supports the presence of indicator species from both zones.In this study, *Ranunculus* species occurring naturally in Çanakkale were investigated. According to the records in Flora of Turkey and the East Aegean Islands, 18 *Ranunculus* species had previously been reported for the province. However, based on a comprehensive evaluation of specimens collected in previous years, new field collections, and herbarium materials housed in the Çanakkale Botanical Garden Herbarium (CBB), the presence of 26 taxa, has been confirmed for the region. Two of these taxa are endemic, and the species are distributed across a variety of habitats. This study focuses on the habitat diversity and distributional features of the taxa.

Keywords: Biodiversity, Çanakkale, *Ranunculus*, Taxonomy

PP-110

***Distribution and Habitat Characteristics of the Rare Bryophyte* taxon "*Riccia cavernosa*"**

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Abstract

The genus *Riccia* comprises 250 species with a worldwide distribution from the Arctic to the Antarctic (Soderstrom et al., 2016). It is widely distributed in Europe with 36 taxa (33 species and 3 varieties) (Schumacker and Vaňa, 2000), in the Mediterranean with 40 taxa (36 species and 4 varieties) (Ros et al., 2007), and Southwest Asia with 33 taxa (31 species, 1 variety, and 1 subspecies) (Frey et al., 2006; Kurschner and Frey, 2011). *Riccia* is the largest genus among the Turkish liverwort flora with 26 species and 2 varieties (Ozenoğlu et al., 2019; Özenoğlu and Kırmacı, 2022). Members of the *Riccia* genus, one of the richest genera in our country in terms of taxa number, have a more recent distribution in geographies where the Mediterranean climate type prevails. *R. cavernosa* was recently given as a new record for both Turkey and Southwest Asia by Özenoğlu and Kırmacı in 2016. Recording of *R. cavernosa* from the transition zone between the Middle Black Sea and the Central Anatolia regions in Turkey is significantly worth mentioning in terms of the zone having a Mediterranean climate. *Riccia cavernosa*, which was first recorded from Sinop province and then recorded for the second time from Karabük (Arslan et al., 2018), has been recorded for the third time from Lapseki. The taxon, which has a very specific habitat preference, is specialized to live on the soil where the water recedes along streams and stagnant waters. The taxon collected from Sinop and Lapseki is collected in late summer, which is in contrast to other members of the genus, which are usually seen in early spring. Studies to be conducted in similar localities in different parts of the country will show that the distribution area of the species is even wider. In addition, additional studies are needed on the biology of this species.

Keywords: Biodiversity, Plant, Liverworts, Ecology

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PP-111

Ocrea morphology of Turkish *Persicaria* Mill. (Polygonaceae) Taxa

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Abstract

The genus *Persicaria* is represented by 11 taxa in Türkiye. The ocrea is a characteristic feature of the genus *Persicaria* and its morphology contributes significantly to the delimitation of different plant taxa. Present study aims to examine the ocrea macro- and micro-morphological properties of Turkish *Persicaria* taxa to elucidate the taxonomic value for the genus. The plant materials were collected from the natural distribution of Türkiye in 2020–2021 and deposited in the Herbarium of Recep Tayyip Erdoğan University, Department of Biology (RUB). All macro- and micro-morphological investigations were carried out on herbarium samples. Furthermore, the ocrea characteristics of all taxa were examined using light and scanning electron microscopy. It was determined that apex shape (truncate or oblique), pubescense (glabrous or pubescent), number of nervs (6-25), epidermal cell shape (rectangular, pentagonal or hexagonal) and ornemantation (rough, striate, smooth, or crystaly epicuticular wax) are important characters to separate the examined *Persicaria* taxa. The findings showed that the ocrea macro-micro morphology varies among the examined taxa and supply taxonomical support to delimiting the examined taxa at specific level.

Keywords: Ocrea, *Persicaria*, Morphology, Türkiye.

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PP-112

Contribution to Biosystematics Properties of *Epilobium obscurum* (Onagraceaea) from Türkiye

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Abstract

This study presents an updated macro-micro-morphological and palynological features, distribution map and threat category of *Epilobium obscurum* Schreber from Türkiye. Plant materials were collected from natural habitats during the project on the revision of Turkish *Epilobium*. All morphological investigations were performed on the herbarium samples deposited in Recep Tayyip Erdoğan University, Biology Department Herbarium by using stereo and scanning electron microscope. The distribution map and threat category was created using herbarium records, extent of occurrence (EOO), area of occupancy (AOO) and field observations. *E. obscurum* is characterized with 2-4 raised stem, lanceolate leaves occurring hairy only throughout nervs and margins, raceme nodding in bud and strigillose hairy, clavate stigma, without beaked fruit. Pollen grains are tetrahedral tetrad, 3-zonoporate; pollen shape is suboblate; ornamentation baculate-pliate. Seeds are 0.74–0.86 mm, ovate, crest-like papillate, surface granulate-rugose. *Epilobium obscurum* was assessed as Vulnerable (VU) based on the information of 5 distinct populations, EOO is < 179192.603 km^2 and AOO is < 15000 km^2. This is the first report dealing with morphological and palynological features together with threat category and distribution map of *E. obscurum* from Türkiye.

Keywords: *Epilobium obscurum*, IUCN, Pollen, Türkiye

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PP-113

A Taxonomic Revision of *Campanula* (Campanulaceae) subgen. *Brachycodonia* Distributed in Türkiye

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Abstract

The genus *Campanula* was divided into 6 subgenera, which are: subgen. *Megalocalyx* Damboldt, subgen. *Rapunculus* (Fourr.) Charadze, subgen. *Roucela* (Dumort.) Damboldt, subgen. *Brachycodonia* (Fed.) Damboldt, subgen. *Sicyodon* (Feer) Damboldt, and subgen. *Campanula*. *Brachycodonia* is represented by 2 species worldwide. The subgenus grows only on gypsum. It is a subgenus with a wide distribution from Spain to Türkiye in Transcaucasia, North Africa and Central Asia. *Brachycodonia* is a subgenus characterized by its annual or biennial life form, long calyxes from the corolla without appendages, and fastigiate densely leafed branches. Türkiye hosts both species of this subgenus. One of the species, *Campanula fastigiata* Dufour, is the first species published (as the genus *Brachycodonia*) and the species that determined its characteristics. Another species, *Campanula sivasica* Kit Tan & Yildiz, is distributed only in Türkiye. There is no other publication on the *Brachycodonia* subgenus except for *C. fastigiata* in the revision in Flora of Turkey and *C. sivasica*, which was defined later. Apart from the Niğde population, which is the only known population of *C. fastigiata* in Türkiye, the species also spread in Eskişehir, Ankara and Tunceli and Erzincan in Turkey. In addition, *C. sivasica* populations were visited in Sivas. At the end of all this study, it was concluded that *C. sivasica* is a synonym of *C. fastigiata*. Detailed morphological studies were completed within the scope of this study. In addition, phylogenetic studies were also conducted on Turkish samples within the scope of this study. However, when the populations in Spain were examined, differences with the *C. fastigiata* in Türkiye were noticed. For this reason, more detailed population genetic studies have been started and the taxonomy of the group is discussed here.

Keywords: *Campanula*, Revision, *Roucela*, Taxonomy, Türkiye

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PP-114

A New Distribution Area of *Rhaponticum serratuloides* and Some Interesting Observations

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Abstract

Rhaponticum serratuloides (Georgi) Bobrov species is known from only one locality according to the Flora of Turkey. It was also recorded from the Kızılırmak Delta in 2006. During our studies in Çankırı province, this species was found in Çankırı. The population of the species was observed in the Acıçay stream flowing between the gypsum hills of Çankırı. This locality is in the form of salt marshes and halophytic pans formed by alluvial material formed by stream floods. Here, within the salt meadows dominated by *Juncus* sp. and *Phragmites australis* species, there is a population of the species in an area of approximately 1 km^2. It was observed that there were approximately 2000 individuals in the area. In the observations made regarding the population of the species, some ecological and morphological differences were observed. *Juncus* sp. while the individuals in the dominant area consist of shorter and morphologically smaller individuals, it was observed that the individuals in the *P. australis* dominant area are morphologically taller and larger individuals. Again, it was observed that there is a difference in the phyllary colors of the individuals in these two populations. What is even more interesting is that these two populations are side by side and only a few meters apart. In the morphological examination of the species, scabrid hairs that are not mentioned in its description were detected. Again, the flowering period is given as 6.-7. months. However, it was observed that the species blooms in 4.-5. months in Çankırı, and the seeds that mature in 6. month have already been shed. According to the findings obtained, the southernmost distribution of the species in the world is the localities found in Turkey. In this respect, it can be said that the flowering period of the species changes as it moves south. In this respect, it clearly that further observations and studies are needed regarding the ecology and physiology of the species.

Keywords: Morphological Difference, New Distribution, New Record

PP-115

IUCN Red List of Threatened Endemic Species Categories of Anamur (Mersin)

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Abstract

Human have used the plants in nature in cuisines, medicine or some other aims in history. Especially endemic taxa are world heritage for humanity. Besides their values, they have potential cultural and genetic resource values. These taxa have to be protected in their geography, in their own habitats, beyond national policies and interests, in accordance with international conventions. In some parts of Anamur the research for plants not only for meals but also medicine has developed the local culture. This research has been made to determine 81 endemic taxa of Anamur according to IUCN categories.The flora of Anamur and its' plateaus (Kaş, Abanoz, Akpınar, Halkalı, Elbalak, Beşkuyu, Kırkkuyu, Gözlügöl, Kaşpazarı, Eğrice, Çamurlu). As a result of the examination of 2000 plants specimens were collected from the research area between 2015-2019, which 611 taxa belong to 109 families and 390 genera have been determined. One of 109 families is in the Lycopodiophyta division, 5 of them Pteridophyta and 103 of them are in the Magnoliophyta division. Three of the families included in the Magnoliophyta division belongs to Pinophytina, 100 of them are from Magnoliophytina subdivision. In the research area the number of endemic taxa is 81 (13.25 %). The phytogeographic region of plants in this area are represented as follows; widespread or unknown 331 taxa 54,17 %, Mediterranean 220 taxa 36,00 % (East Mediterranean 91 taxa 14,89 %, West Mediterranean 2 taxa 0,32 %), Irano-Turanian 38 taxa 6,21 %, Euro-Siberian 22 taxa 3,60 %. The most taxa from families of the research area are; Asteraceae 54 taxa (8,83 %), Lamiaceae 47 taxa (7,69 %), Fabaceae 42 taxa (6,87 %), Brassicaceae 37 taxa (6,05 %), Caryophyllaceae 27 taxa (4,41 %), Boraginaceae 24 taxa (3,92 %), Poaceae 20 taxa (3,27 %), Orchidaceae 18 taxa (2,94 %), Campanulaceae 18 taxa (2,94 %), Rosaceae 16 taxa (2,61 %), Ranunculaceae 16 taxa (2,61 %).The most taxa from genus of the research area are; *Silene* (10), *Campanula* (10), *Astragalus* (8), *Orchis* (7), *Phlomis* (7), *Ophrys* (6), *Viola* (6), *Salvia* (5), *Geranium* (5), *Ornithogalum* (5), *Centaurea* (5), Arabis (5), *Allium* (5). According to the IUCN 2022 criteria, approximately 117 of our endemic species are in the category critically endangered (CR) and 155 in the endangered (EN) category. In this research this area's citerias classified and listed about their IUCN categories (EN, VU, LR, DD). In this study, applications on the conservation of endemic taxa of seeded plants in Anamur were examined, some problems detected in the application processes were stated and solutions were suggested.

Keywords: Anamur, Biodiversity, Endemic, Flora, Mersin, Systematic, Turkey.

PP-116

Investigation of *Triticum* Species of Türkiye using DArTSeq Markers

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Abstract

Among the wild wheats, there are species groups that are very close to each other and difficult to identify. Wild wheat species (*Triticum urartu, T. baeoticum, T. dicoccoides, T. araticum*) and local varieties, einkorn and emmer wheat (*T. monococcum* and *T. dicoccon*), were the material of our study. The study aimed to reveal genetic and morphological differences within the wheat gene pool. To achieve this, Diversity Arrays Technology was used to sequence 250 accessions representing Turkish wheat populations. This was done in order to contribute to their taxonomy. Seeds were gathered from the Turkish Seed Gene Bank (TSGB), germinated in climate chambers, and 100 mg of fresh leaf tissue was taken from the resulting seedlings for genomic DNA isolation. The isolated and purified DNA samples were sent to Diversity Arrays Technologies for DArTseq analysis. Following quality filtering, 8,952 and 136,103 loci were obtained from the SNP and SilicoDArT datasets, respectively. ADMIXTURE software was then used to reveal intra- and interspecific population structures. Analysis of molecular variance was then performed to reveal the variance between *Triticum* species. A principal coordinate analysis was conducted to visualise the main sources of variation between populations in 2 dimensions. The SNP/SilicoDArT dataset was then used to reconstruct phylogenetic dendrograms using the maximum likelihood statistical method to reveal the evolutionary relationship. As a result of this study, six groups were obtained, clustered under three major clades. Some accessions were re-evaluated and misidentifications were corrected by comparing our results with the herbarium specimens of the same accessions. The results demonstrated that DArTseq is a fast, low-cost and highly accurate method that can be used for species and population discrimination, making it an effective tool for plant systematics.

Keywords: DArTseq, Next generation sequencing, *Triticum*, Türkiye

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PP-117

Historical Changes in Halophytic Plant Diversity around Lake Tuz Based on Herbarium Records

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Abstract

Lake Tuz is one of Turkey's most important centers of endemism. Of the 16 monotypic genera identified across the country, three are found exclusively in and around Lake Tuz, clearly reflecting the floristic uniqueness of the region. The area harbors a distinct halophytic flora adapted to high salinity. These halophytic species have developed physiological adaptations to cope with environmental stressors such as drought, salinity, radiation, and extreme climatic conditions. This study aims to examine changes in the geographical distribution, ecological characteristics, morphological variation, and habitat preferences of halophytic plant species. Additionally, the possible effects of factors such as declining water levels, agricultural activities, habitat loss, and environmental pollution on the floristic structure of the area are evaluated. Temporal changes in halophytic species distributed around Lake Tuz are investigated using herbarium records from different time periods. The data have been compiled from GBIF, JSTOR Global Plants, the Nezahat Gökyiğit Botanical Garden Herbarium (NGBB), the TAGEM Herbarium, and scientific collections of various Turkish Universities. Among the species studied are rare and regionally endemic taxa such as *Halocnemum strobilaceum* (Pall.) M.Bieb., *Astragalus demirizii* R.Kramer & Podlech, *Centaurea tuzgoluensis* Aytaç & H.Duman, *Limonium iconium* (Boiss. & Heldr.) Kuntze, and *Kalidium wagenitzii* (Aellen) Freitag & G.Kadereit. The findings are expected to highlight the potential of herbarium data in monitoring long-term changes in halophytic species and contribute to a better understanding of the ecological risks affecting the Lake Tuz region.

Keywords: Floristic change, Halophytic Plants, Herbarium Records, Lake Tuz.

PP-118

Altering ROS Levels and Fluorescent Imaging in Different *Arabidopsis thaliana* Ecotypes and *Schrenkiella parvula* to Elucidate Redox Regulation of Halotropism

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Abstract

Plants are sessile organisms that cannot escape environmental stress by movement. Instead, they rely on directional growth responses called tropisms to adapt to their environment. Among these tropisms, halotropism, the growth of roots away from high salinity zones, is a crucial adaptive mechanism supporting plant survival under salt stressGlycophytes avoid saline zones by bending their roots away, while halophytes are adapted to or even grow towards saline conditions. However, despite the importance of reactive oxygen species (ROS) as signalling molecules in various plant stress responses, their specific roles in regulating halotropism remain unclear.We conducted 48-hour halotropism assays on *Arabidopsis thaliana* ecotypes (Col-0, Wt-5, Uod-7) and the extreme halophyte *Schrenkiella parvula*. To elucidate the role of ROS during halotropism, seedlings were treated with ascorbic acid (a ROS scavenger), diphenyleneiodonium (DPI; an NADPH oxidase inhibitor), and rotenone (a mitochondrial ROS inhibitor). We visualized ROS distribution in root tissues using the fluorescent dyes Amplex UltraRed (AUR), which detects extracellular hydrogen peroxide in the apoplast, and dihydrorhodamine 123 (DHR123), which detects intracellular ROS in the cytoplasm. DPI treatment weakened the halotropic response in all *Arabidopsis thaliana* ecotypes but slightly increased it in *Schrenkiella parvula* and caused root growth inhibition in all plants. Ascorbic acid treatment altered the direction of tropic responses in Col-0 and Uod-7 ecotypes and increased tropism intensity across all plants. Under NaCl stress, Col-0 and Wt-5 showed positive halotropism, whereas Uod-7 and *S. parvula* showed enhanced negative responses. Rotenone did not significantly affect halotropism. Fluorescent imaging revealed ecotype and treatment specific changes in ROS distribution correlating with halotropic behaviour. Overall, this study is the first to investigate ROS dynamics during halotropism in the extreme halophyte *Schrenkiella parvula* and different *Arabidopsis thaliana* ecotypes, elucidating their differential effects on root orientation under salt stress.

Keywords: *Arabidopsis thaliana*, Halotropism, *Schrenkiella parvula*, Reactive oxygen species

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PP-119

Effect of Spermidine on Catalase Activity against Root Crown Rot Disease in Pepper

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Abstract

One of the most important disease agents that causes great economic losses in pepper-growing areas in many countries of the world is *Phytophthora capsici*, which causes root crown rot. In this study, before inoculation (10^4 zoospore ml^{-1}), 0.1 mM and 1 mM spermidine were applied to Sirena RZ-F1 and Sera demre-8 pepper seedlings with different susceptibilities to the pathogen by superficial spraying method. Distilled water was applied to the control groups. In the leaves of Sirena RZ-F1 seedlings infected with *Phytophthora capsici*, catalase activity increased on the 3rd, 5th and 7th days following infection compared to controls.The highest enzyme activity in this application was determined on the 5th day following infection. On the other hand, the highest catalase activity was determined in 0.1mM spermidine + *Phytophthora capsici* and 1 mM spermidine + *Phytophthora capsici* applications compared to only *Phytophthora capsici* application on the 5th and 7th days. Catalase activity in the leaves of Sera Demre-8 seedlings infected with *Phytophthora capsici* increased on the 5th and 7th days compared to the control and the highest enzyme activity was determined on the 7th day following infection. In spermidine applications applied before inoculation, the highest activity increase compared to control and only *Phytophthora capsici* was determined on the 3rd day in the 0.1 mM spermidine + *Phytophthora capsici* application. In this study, changes in catalase activity in pepper genotypes indicate that spermidine is effective in plant defense against *Phytophthora capsici.*

Keywords: Antioxidant, *Capsicum annuum* L., *P. capsici*

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PP-120

Traditional Use and Antioxidant Activity of *Marrubium vulgare*

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Abstract

Marrubium vulgare, commonly known as Bozot, itsineği or Karaderme among the public, is a perennial herbaceous plant belonging to the Lamiaceae family. This species, which usually grows in regions with a Mediterranean climate, has gray-green hairy leaves and small white flowers. It is widely used in traditional medicine in the treatment of respiratory diseases, digestive problems and cough. *M. vulgare* has a strong antioxidant capacity thanks to the phenolic compounds, flavonoids and diterpenoids it contains. Thanks to these properties, it is among the plants that attract attention in the pharmaceutical and food industries as a natural antioxidant source. In this study, two different extracts of *Marrubium* samples collected in ethanol and ethanol-water (7:3) solvents obtained by maceration method were evaluated comparatively. Antioxidant power and capacity of the extracts were determined by DPPH, CUPRAC and FRAP methods, and total phenolic compound content was determined by FCR. The study results showed that the obtained ethanol-water (7:3) extract contained more total phenolic substances and had higher antioxidant capacity than the ethanol extract.

Keywords: Antioxidant, DPPH, Lamiaceae, *Marrubium.*

PP-121

LC/MS Analysis of Some Propolis Produced in Bolu, Türkiye

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Abstract

Propolis, also known as bee glue, is a versatile compound that has been used in medicine, the food industry, and to increase the durability of goods since ancient times. Important thinkers of the period such as Aristotle, Hippocrates, and Galen expressed the benefits of propolis for human health. Today, it is used in the treatment of diseases such as colds, flu, ulcers, and psoriasis, while bees use propolis to close cracks and holes in hives and protect themselves from external dangers. In this study, phenolic compounds in 24 propolis samples obtained from beekeepers in different locations in Bolu province were examined by LC/MS. For LC/MS analyses, 2 grams of propolis were dissolved in 20 ml of 70% ethyl alcohol for 24 hours and then filtered. The extracts obtained were examined by LC/MS. As a result of the analysis conducted within this scope, a total of 16 phenolic compounds were identified. According to the obtained data, the highest trans-ferulic acid level was detected in the propolis sample obtained from Yeniçağa district, and this value was determined to be approximately twice the average trans-ferulic acid level in other propolis samples examined. The highest catechin amount was detected in the propolis sample obtained from Gerede district, and it was determined to be approximately four times the average catechin amount in other propolis samplex examined. These results show that there are differences in phenolic compound contents among the propolis samples examined. As a result of these findings, it is thought that one of the reasons for the differences in the concentrations of phenolic compounds may be the changes in the plant flora in the region.

Keywords: Bee, Compound, Flavonoid, Phenolic

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PP-122

LC/MS Analysis of Some Propolis Produced in Bartın, Türkiye

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Abstract

Propolis is a resinous substance that honeybees collect plant secretions from the branches, buds and leaves of plants, combine them with their own enzymes and add beeswax. The use of propolis dates back to 300 BC. Egyptians, Incas and Greeks used propolis in their daily lives and this use has survived to the present day. Although the content of propolis varies depending on the source from which it is collected, it generally consists of 50% resin, 30% beeswax, 10% essential oil, 5% pollen and 5% various organic substances. According to some data, it has been stated that the phenolic compounds in propolis resin come from three sources: Plant secretions collected by bees, substances that emerge during propolis formation and compounds secreted from bee metabolism. In this study, phenolic compounds in 12 propolis samples taken from different locations in Bartın province were examined by LC/MS method. 2 grams of propolis was dissolved in 20 ml of 70% ethyl alcohol and extracts were prepared by filtering. The prepared extract was analyzed with ODS4 (3 µm; 2.1 × 50 mm) column at 40 °C column temperature; using mobile phases of water containing 1% formic acid (Mobile Phase A) and methanol containing 1% formic acid (Mobile Phase B) at a flow rate of 0.4 mL/min and by injecting 10 µL. As a result of the analysis, a total of 16 phenolic compounds were detected. As a result of the analysis, samples collected in Merkez, Ulus, Kurucaşile and Amasra districts attracted attention with their high concentrations of various phenolic compounds. It is thought that these differences may be related to the vegetation, climatic conditions and plant sources preferred by bees in the regions where propolis was collected.

Keywords: Plant, Essential oils, Botanical origin, Regional variation

Acknowledgments: His study was supported by the Kastamonu University the project titled "Determination of Physico-chemical and Palynological Properties of Honey and Propolis from the Western Black Sea Region and Investigation of the Quality and Yield of Honey" with the code KÜ-İHT/2023-10.

PP-123

Investigation of the SUMOylation Mechanism in the Halophyte *Schrenkiella parvula*

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Abstract

Climate change today causes an increase in biotic and abiotic stress factors for plants. Understanding the survival, adaptation, and productivity capabilities of plants under abiotic stresses such as drought, extreme temperature, salinity, and nutrient deficiencies has become even more important. The regulation of protein activity, stability, and cellular localization through post-translational modifications (PTMs) is of critical importance for plants to respond rapidly to these adverse environmental conditions. SUMOylation is a post-translational modification. It occurs through the covalent binding of SUMO to target proteins and triggers various biotic and abiotic stress responses. The conjugation of SUMO peptides is important in the formation of plant stress responses by changing the properties of target proteins such as activity, stability, and transport, thereby enabling the reorganization of the proteome. Recent studies have shown that the SUMOylation mechanism plays a role in increasing stress tolerance under high salinity conditions. Halophytic plants that can grow and survive under high salinity conditions thrive in saline water areas or dry desert regions. Due to these characteristics, many researchers are working to understand how these plants withstand salt stress and to transfer this knowledge to agricultural plants. In this study, the SUMOylation mechanism of the salt-tolerant halophyte *Schrenkiella parvula* was investigated. The increase in the expression of SUM2, which encodes the SUMO peptide, and SIZ1, which encodes the SUMO E3 ligase enzyme, following salt treatment indicates that they have a regulatory role.

Keywords: SUMOylation, Halophytic plants, *Schrenkiella parvula.*

PP-124

Comparative Investigation of ER Stress and Photorespiration Interaction in C_3 and C_4 Plants

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Abstract

Plants have developed various physiological and molecular mechanisms to adapt to environmental changes throughout the evolutionary process. Since C_3 and C_4 plants have emerged in different climates, they differ structurally and functionally, in addition to their climatic requirements. Photorespiration is a process that causes energy loss, especially in C_3 plants; whereas C_4 plants have evolved mechanisms to minimize these losses. Furthermore, endoplasmic reticulum (ER) stress occurs as a result of dysfunctions during protein folding, which in turn triggers the unfolded protein response (UPR). UPR is a fundamental adaptation mechanism to helps maintain cellular homeostasis and eliminate damaged proteins. In this study, the relationship between UPR mechanism and photorespiration in C_3 and C_4 plants was comparatively examined. *F. robusta* (C_3) and *F. bidentis* (C_4) two species belonging to the Flaveria genus, were used to minimize the effects of other variables. Tunicamycin (Tm), known to trigger ER stress, and aminoacetonitrile (AAN), an inhibitor of glycine decarboxylase—one of the basic enzymes involved in photorespiration—were applied separately and in combination to leaf discs taken from *F. robusta* and *F. bidentis* species. Following the treatments, physiological and molecular differences between species were assessed through analysis such as lipid peroxidation, H_2O_2 concentration, photosynthetic parameters and expression of UPR-related genes by qRT-PCR. Simultaneous targeting of ER stress and photorespiration revealed multilayered effects on oxidative balance, photosynthetic efficiency and membrane integrity in *F. robusta* and *F. bidentis*. For example, Tm application gradually weakened PSII, while ROS production decreased with AAN treatment. However, lipid peroxidation increased despite low ROS levels under the combined treatment. Moreover, qRT-PCR results indicated distinct molecular responses to ER stress between *F. robusta* and *F. bidentis*. The findings suggest that the stress responses of *F. robusta* and *F. bidentis* are not linear but dynamic and interactive.

Keywords: *Flaveria robusta*, *Flaveria bidentis*, Photorespiration, ER stress

Acknowledgments: This project supported by The Scientific and Technological Research Council of Türkiye - TÜBİTAK with Grant no: 121C268

PP-125

Effect of *Pseudomonas thivervalensis* on Nickel Toxicity and Tolerance in Canola

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Abstract

Nickel is an essential trace element for plants; however, at elevated concentrations, it induces toxic effects. Phytoremediation, offers an effective strategy for mitigating nickel contamination. One approach to enhance the efficiency of this technique involves the use of plant growth-promoting bacteria, which can improve metal accumulation and tolerance in plants. In this study, the phytoremediation potential of canola (*Brassica napus* L. cv. Samibey) exposed to nickel stress was investigated in the presence of the rhizospheric bacterium *Pseudomonas thivervalensis*. Throughout the 24-day experimental period, seedlings were grown under controlled conditions: 25 °C temperature, 50% humidity, a 16-hour light/8-hour dark photoperiod, and a light intensity of 200–250 µmol m^{-2} s^{-1}, using Hoagland's nutrient solution. *P. thivervalensis*-inoculated and non-inoculated groups were exposed to 0.25 mM and 0.50 mM concentrations of nickel during the last 6 days of the experiment. Based on the findings, nickel predominantly accumulated in the root tissues; however, bacterial inoculation enhanced its translocation to the shoots by 56%. Nickel stress decreased relative water content, chlorophyll a levels, and biomass by approximately 25%, 45%, and 50%, respectively, while *P. thivervalensis* inoculation led to a 20% increase in chlorophyll a content. In addition, bacterial inoculation significantly reduced electrolyte leakage by 28.5% and enhanced photosynthetic efficiency by 61.2%, compared to non-inoculated, nickel-stressed plants. Furthermore, although nickel stress increased antioxidant enzyme activities, inoculation with *P. thivervalensis* resulted in reductions of up to 27.2% in superoxide dismutase, 23.5% in guaiacol peroxidase, and 17.5% in glutathione reductase activities relative to stressed control plants. In conclusion, canola co-treated with *P. thivervalensis* demonstrated strong potential for nickel phytoextraction and tolerance, highlighting the synergistic role of plant–microbe interactions in phytoremediation applications.

Keywords: Antioxidant, Chlorophyll *a* Fluorescence, PGPB, Phytoremediation

Acknowledgments: This study was supported by Akdeniz University Scientific Research Projects Coordination Unit (Project No: FKA1-2022-5932).

PP-126

Physiological, Biochemical, and Molecular Responses of *Allium sativum* to Biotic and Abiotic Stress Factors

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Abstract

Garlic (*Allium sativum* L.) is widely cultivated and consumed worldwide for its nutritional benefits. It is also widely used in the fields of pharmacology, medicine, and cosmetics due to its rich nutritional value and medicinal properties. Garlic shows optimum growth in loose, well-drained soils rich in organic matter. The direct interaction between the root and stem systems and the soil plays a critical role in the plant's life cycle, which is essential for both nutrient uptake and pathogen recognition. Garlic is exposed to biotic stress factors, such as soil pathogens, and abiotic stress factors, including drought, salinity, heavy metals, or extreme temperatures. Biotic stress factors that garlic may encounter in nature include pathogens such as fungi, bacteria, viruses, and nematodes. When exposed to biotic stress, they typically exhibit morphological symptoms, such as leaf yellowing, necrosis, senescence, root rot, and stunting. Under stress conditions, at the physiological level, a decrease in photosynthesis rate, water content, and enzymatic activity is observed due to excessive accumulation of reactive oxygen species. In addition to factors that negatively affect growth and development under stress, antioxidant systems such as phenolic compounds, flavonoids, superoxide dismutase, and catalase are activated to reduce oxidative damage. In addition, studies on garlic have reported that jasmonic acid, salicylic acid, and gibberellins are used as defense mechanisms against stress. In addition, in response to fungal pathogens, which are biotic stress agents, garlic develops defense mechanisms, including strengthening the cell wall, producing phytoalexins, and secreting antifungal proteins. It has been reported that the expression of genes related to defense and stress response, such as PR5, WRKY, ALDH, and invertase in garlic, increases under stress conditions. In this review, the physiological, biochemical, and molecular responses of garlic to biotic and abiotic stress factors were examined.

Keywords: Abiotic stress, Biotic stress, Garlic, Stress mechanisms

Acknowledgments: This study was supported by the Scientific and Technological Research Council of Türkiye (TÜBİTAK) with project number 124O362.

PP-127

A Multi-Species Action Plan for Crop Wild Relatives in the Karacadağ Steppe, Türkiye: A Participatory In-Situ Conservation Approach

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Abstract

Crop wild relatives (CWRs) are a vital source of genetic diversity that is essential for plant breeding and supporting food security and sustainable production in the face of global population growth and climate change. As part of the 'Conservation and Sustainable Management of Türkiye's Steppe Ecosystems' project, we developed a multi-species action plan (MSAP) focusing on CWRs in the Karacadağ steppe. This MSAP is a participatory in-situ conservation approach for crop wild relatives in the Karacadağ steppe in Türkiye. Field surveys have identified the following six priority taxa: wild emmer (*Triticum dicoccoides*), wild einkorn (*T. baeoticum*), goat grass (*Aegilops speltoides* var. *ligustica*), field pea (*Pisum sativum* subsp. *sativum* var. *arvense*), wild lentil (*Lens culinaris* subsp. *orientalis*) and the endemic wild chickpea (*Cicer echinospermum*). Comprehensive data has been collected on their taxonomy, ecology, phenology, spatial distribution and key threats. The MSAP coordinates conservation actions to protect groups of threatened species that share similar habitats. These actions prioritise habitat protection, sustainable grazing, and community involvement with the aim of ensuring the long-term viability of these species. Three major hotspots were identified: the Soydan Relic Oak Forest glades, the Karacadağ Honey Forest glades, and the Simo Creek Valley, where at least three of these taxa coexist. Overgrazing (especially excessive and early grazing) and reduced precipitation driven by climate change were identified as the most critical threats, severely impacting seed production and regeneration. This novel, participatory, in-situ framework provides a robust foundation for preserving genetic diversity and improving food security. It offers a scalable model for protecting CWRs in other dryland ecosystems. The framework also emphasises monitoring and adaptive management, enabling continuous learning and adjustment in response to environmental and socio-economic changes.

Keywords: crop wild relatives (CWRs), biodiversity, in-situ conservation, Karacadağ steppe, multi-species action plan (MSAP).

Acknowledgments: This research was funded by FAO with financial support from GEF, under Grant number [GCP/TUR/061/GFF].

PP-128

The Future of Endemic and Localized Geophytes: A Geographical Distribution Analysis of Three Grape Hyacinth Species

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Abstract

Endemic and localized geophytes play a crucial role in maintaining regional biodiversity but are often susceptible to habitat loss and environmental changes. In this study, the geographical distribution and population status of three endemic grape hyacinth species (*Leopoldia mira*, *Muscari sandrasicum*, and *M. serpentinicum*) were examined to provide insights into their conservation needs. Field surveys were conducted, and three populations of *L. mira* were identified in Dirmil, Aliveren, and Eşeler Mountain. The area of occupancy was calculated as 6.9 km², with a total population estimated at approximately 17600 individuals. *M. sandrasicum* was recorded in three populations located in Sandras Mountain, Bozdağ, and Eşeler Mountain, covering an area of 18.8 km² and totaling 40164 individuals. For *M. serpentinicum*, eight populations were documented across Şaphane Mountain, Çakmak, Koru Plateau, Karanfilli Plateau, Aliveren, Milas, Sandras Mountain, and Yılanlı Mountain, with an area of occupancy calculated at 1.6 km² and a total population of 14505 individuals. The differences in area of occupancy and population sizes among the species were evaluated, highlighting varying ecological requirements and degrees of vulnerability. The restricted ranges and localized populations were emphasized, underlining the need for targeted conservation strategies to mitigate threats such as habitat fragmentation and climate change. This study provides essential baseline data for conservation planning, underscoring the importance of detailed biogeographical and population structure analyses in the protection of endemic geophytes.

Keywords: Biodiversity, Endemic species, Geographic distribution, Geophytes, Population analysis

Acknowledgments: This study is supported by the Scientific Research Projects Coordination Unit of Pamukkale University (Project No: 2022FEBE028).

PP-129

A Bibliometric Analysis of Scientific Publications on Kocaeli Flora: A Focus on Endemic Plant Species

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Abstract

This study aims to evaluate scientific publications concerning endemic plant species within the borders of Kocaeli Province, a region under significant pressure due to intense industrial activities. Habitat fragmentation, environmental pollution, and the frequent recreational use of protected areas pose substantial threats to the region's botanical diversity. In this context, identifying and scientifically assessing Kocaeli's endemic plant potential is essential for ecological balance and sustainable conservation policies. The study utilized a bibliometric approach by compiling literature from academic databases such as Web of Science, Google Scholar, Scopus, and the National Thesis Center. The collected data were analyzed using the R programming language, allowing for the classification and quantitative evaluation of scientific outputs. Based on the reviewed records, the number of currently known endemic plant taxa in Kocaeli was identified as 79, belonging to 23 families and 51 genera. Among the families, Asteraceae, Apiaceae, and Iridaceae contain the highest number of endemic taxa, while Asteraceae, Apiaceae, and Lamiaceae are the most represented in terms of genera. Additionally, 10 taxa were classified as Endangered (EN) and 3 as Critically Endangered (CR). Threats such as quarrying, land-use changes, climate change, overgrazing, agricultural expansion, the use of agrochemicals, flower picking, seed collection, and the aggressive spread of invasive species jeopardize the survival of these endemic and rare taxa. Moreover, the lack of technical knowledge regarding the propagation and cultivation of these species remains a significant barrier to effective conservation. As a result, this study identifies priority research areas and provides scientific policy recommendations for endemic plants in Kocaeli, with the expectation that the findings will guide future studies.

Keywords: Biodiversity, Conservation, Endemic Plants, Kocaeli Flora, R Programme

PP-131
Antalya's New Species

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Abstract

Anatolian biogeography has an important place in the world terrestrial ecosystem with its species diversity. The fact that it has hotspots, microclimate localities and is the intersection point of 3 biogeographic areas makes diversity inevitable. The Antalya Region, which is a part of the southern Mediterranean, stands out as an indicator of this diversity and especially its rarity value as endemicity. With each passing year, new species are discovered in this region and added to the literature. Antalya is a very rich province in terms of natural vegetation and endemic species. As a result of scientific studies, it has been determined that there are over 12,000 plant species in Turkey, 35% of which have endemic status, and there are 862 endemic plant locations in Antalya province, and Antalya's endemism rate was found to be 8.9%. Approximately 2350 plants were collected in the center of Antalya between 1992 and 1994 and 130 families, 569 genera and 1023 species were identified in the Antalya city flora and the total number of taxa was 1065. 863 of the 1023 species are natural and 160 of them are cultivated plants. Knowing, promoting and protecting endemic and rare species is of great importance for the continuation of biodiversity. In addition, there are 44 critically endangered plant species distributed in Antalya, which is one of the richest provinces in terms of plant biodiversity in Turkey. These species are subjected to human pressure due to factors such as agriculture, tourism, transportation, etc. In this study, Google Scholar was searched to identify new species that have been introduced to the scientific world in the last 10 years. Confirmed through IPNI & POWO. As a result of the studies, 4 taxons from Apiaceae, 3 taxons from Alliaceae, 2 taxons from Campanulacea and 2 taxons from Caryophyllaceae from different locations of Antalya. From the diversified families, 20 taxons have been introduced to the scientific world in the last 10 years.

Keywords: Antalya, Natural Areas, New Species, Southern Anatolia

PP-132

Learning to Read Nature Through Biological Indicators: An Applied Nature Education Project for High School Students

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Abstract:
Biological indicators are organisms or biological systems that provide information about the health of the environment in which they live. They respond to changes in environmental conditions—such as air and water pollution, climate change, or habitat degradation—through observable shifts in their abundance, morphology, physiology, or distribution. Due to their sensitivity, they have served as valuable tools for monitoring ecological balance and environmental quality. This project, titled “Learning the Language of Nature with Plants: Biological Indicators”, was developed within the scope of the TÜBİTAK 4004 Nature Education and Science Schools Support Program. The main objective was to raise awareness among high school students (grades 10 and 11) by teaching them how to observe, identify, and interpret biological indicators in their local environments. Participants were introduced to various photosynthetic organisms—including plants, lichens, cyanobacteria, and protists—as key biological indicators reflecting changes in ecosystems. The program enhanced students' ecological literacy and fostered a deeper connection with nature through hands-on, outdoor learning activities. By examining the morphological adaptations of organisms shaped by millions of years of evolution, students developed critical observation skills and gained an appreciation for the complexity of natural systems. The project also highlighted the role of basic sciences in understanding and preserving biodiversity. Held between July 7–11, 2025, the program brought together 24 selected students from across Turkey and was implemented by a multidisciplinary team including researchers, educators, guides, and healthcare staff. Through this immersive experience, students improved their ability to read biological signals in nature and emerged as more environmentally conscious individuals.

Keywords: Biological indicators, nature education, ecological awareness, high school students, biodiversity, sustainability

Acknowledgments: These educational projects were supported under the TÜBİTAK (The Scientific and Technological Research Council of Türkiye) 4004 Nature and Science Schools Program with project number 224B001.

PP-133

Enhancing Awareness of Endemic Species Using Nature Education: A Focus on Tülüşah (*Rhaponticoides mykalea* (Hub.-Mor.) M.V. Agab.&Greuter)

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Abstract

Endemic plants are species that are naturally found only in a specific geographic region and nowhere else in the world. Their limited distribution makes them particularly vulnerable to environmental changes, habitat destruction, and climate change. Endemic flora often evolve in isolated ecosystems such as islands, mountains, or unique climatic zones, leading to high levels of specialization and adaptation. Because of their ecological importance and contribution to regional biodiversity, endemic plants are key indicators in conservation biology and are often prioritized in biodiversity protection strategies. Turkey holds a significant position globally with approximately 12,000 plant taxa, about one-third of which are endemic. While endemism can be classified at different scales (e.g., Mediterranean or continental endemics), national borders are generally used as the basis for identifying endemic species. Accordingly, nearly 4,000 plant species are known only from Turkey. This botanical richness is primarily attributed to the country's unique geographical location, climatic diversity, geological and geomorphological features, and historical processes. With the aim of promoting awareness of Turkey's plant diversity and educating high school students about endemic species, several nature education projects have been conducted with the support of TÜBİTAK (The Scientific and Technological Research Council of Türkiye). One such project focuses on *Tülüşah*, also known as *Aydın Gaşağı* (*Rhaponticoides mykalea* (Hub.-Mor.) M.V. Agab. & Greuter), an endangered endemic species facing severe urbanization pressure. In response to the threat, a species-specific conservation action plan supported by the General Directorate of Nature Conservation and National Parks was implemented between 2018 and 2022. Although the official action plan has concluded, conservation strategies and monitoring efforts are ongoing. As part of the education projects, students actively participated in fieldwork contributing to ongoing conservation activities. This hands-on approach allowed them to gain first-hand experience in scientific research and conservation practices. Ultimately, the project aimed to foster ecological awareness by enabling students to perceive biodiversity through the lens of endemic plant richness, emphasizing the importance of preserving such natural heritage for future generations.

Keywords: Endemic, nature education, conservation

Acknowledgments: These educational projects were supported under the TÜBİTAK (The Scientific and Technological Research Council of Türkiye) 4004 Nature and Science Schools Program in the years 2020, 2021, 2022 and 2024 with project numbers 119B710, 121B813, 122B645 and 224B359.

PP-134

Determination of the Spore Production Capacity of *Timmiella anomala* (Pottiaceae/Bryophyta)

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Abstract

The term bryophytes are used to describe three closely related groups, also known as liverworts (Marchantiophyta), mosses (Bryophyta) and hornworts (Anthocerotophyta). With around 20,000-25,000 taxa, they have the highest plant diversity after flowering plants and are globally distributed. Numerous floristic studies have been carried out since 1829 when the first record of mosses from Turkiye was given. The data obtained from these studies revealed that the bryophytes of our country are represented by 1244 taxa (1025 mosses, 215 liverworts and 4 hornworts). One of these taxa is *Timmiella anomala* (Pottiaceae), which was selected as the study material. The Mediterranean perennial taxon forms dense cover especially on moist soil banks in Western Anatolia and maintains its ability to grow continuously by remaining alive even in dry periods. This species, which curls over the stem when dry, can survive long dry periods without damage due to its anatomical features. It has a yellowish-green glossy color when dry and greenish when wet. It has a cosmopolitan distribution from Southwest Asia to Europe (especially in the south), from Tropical and North Africa to South America. In this study, the spore production capacity of the taxon, which is frequently encountered in arid and open habitats, was evaluated in natural habitats; capsule density, number of spores in capsules were determined and the relationship between the results and environmental factors was investigated.

Keywords: Capsule Density, Distrubution, Environmental Factor, Mediterranean, Mosses

PP-134

Determination of Astrobiological Adaptation of *Triticum aestivum* L. cv. Cobra (Poaceae) to Different Durations of UV Stress

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Abstract

Space exploration continues uninterruptedly by leading nations, with increasing emphasis not only on understanding the physical characteristics of space but also on the sustainability of life beyond Earth. In this context, numerous studies have focused on plant cultivation in space environments. It is particularly important to grow nutritionally rich plants that can serve as food for astronauts, help reduce carbon dioxide levels, and contribute to the remediation of liquid and solid waste.This study investigates the ecophysiological responses of *Triticum aestivum* cv. Kobra (wheat) to seedbeds containing water, soil, extreme salinity, and boric acid under varying durations of UV radiation. Boric acid was included due to its frequent use in experiments simulating Mars-like conditions, including extreme salinity, UV radiation, and temperature extremes.After radicle emergence, seedlings were transferred to seedbeds containing water, soil, high salinity (5000, 10000, and 12500 ppm NaCl), and boric acid (8–16 ppm H_3BO_3). They were grown in a climate chamber at 21°C with a 16-hour light/8-hour dark photoperiod for 16 days. Subsequently, seedlings were exposed to UV-A and UV-B radiation for varying durations (Control (0 min), 15, 20, and 30 minutes) and allowed to grow for an additional three days under the same conditions.At the end of the experiment, various ecophysiological parameters were measured, including root and shoot development, relative growth rate, and biomass. Results showed that chlorosis occurred in the high-salinity groups that were not exposed to UV, whereas no chlorosis was observed in groups exposed to UV radiation. However, in the boric acid-treated groups, chlorosis could not be prevented, even with UV exposure.

Keywords: Astrobiology, *Triticum aestivum* cv. Kobra, UV-A, UV-B

PP-136

Defensive VOC and Proteome Responses of Hybrid Poplar to *Phytophthora* Infection

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Abstract

Volatile organic compounds (VOCs) emitted by plants are increasingly recognized as valuable indicators of physiological responses and defense mechanisms against biotic stress. Their antimicrobial and antioxidant properties make them promising tools for non-invasive and rapid phenotyping in resistance breeding programs. This study investigated the emission of bark-derived volatile organic compounds (VOCs) and the bark proteome profile of field-grown hybrid poplar [*Populus tremula* × (*Populus* × *canescens*)] in response to inoculation with *Phytophthora cactorum* and *Phytophthora plurivora*. Among the VOCs released, 2-hydroxy-benzaldehyde was the most prominent, known for its antioxidant, antifungal, and antimicrobial activities. Proteomic analysis identified over 3,100 proteins in the bark tissue, with 164 proteins uniquely associated with *P. cactorum* infection and 239 specific to *P. plurivora*. A strong correlation was observed between the emission of 2-hydroxy-benzaldehyde and the abundance of defense-related proteins, which were categorized into four main functional groups. The first group comprised heat shock proteins, notably HSP70 and HSP81. The second one included scavengers of reactive oxygen species such as superoxide dismutase, L-ascorbate peroxidase, and thioredoxins. The third group encompassed pathogenesis-related proteins like PR-1, endochitinase B, and thaumatin-like proteins. The fourth group consisted of lignin biosynthesis enzymes, including caffeoyl-CoA O-methyltransferase, cinnamyl alcohol dehydrogenase, and peroxidases. These findings highlight the contribution of specific VOCs and defense-related proteins to the innate tolerance of hybrid poplar against aggressive *Phytophthora* species.

Keywords: 2-hydroxy-benzaldehyde, bark canker, heat shock proteins, peroxidase, plant immunity.

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PP-137

Investigation of Leaf Anatomy of Some Grapevine Varieties Grown in Turkey

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Abstract

Grapevine has been used as an important food source by humans throughout history. Grapevine fruit can be consumed directly and also provides the opportunity to obtain food sources that can be stored for long periods such as fruit pulp, raisins, must and wine. It is thought that grapevine was cultivated in the Mesopotamian region and spread to the world from there. Today, the number of grapevine varieties has exceeded 10 thousand due to studies to create species more compatible with various usage areas and ecological conditions. Recent studies emphasize the importance of anatomical studies as well as morphological studies in the identification of grapevines. In this study, leaf anatomy of 8 different grapevine varieties grown in Toklümen village of Kırşehir province was examined and compared. The leaf samples examined were collected from one-year shoots in October. The samples cut with paraffin in microtome were stained with Fastgreen and Safranine O and then examined under a light microscope. The leaf blade of the examined species generally consists of upper epidermis, generally single-row palisade parenchyma, sponge parenchyma consisting of several cells and lower epidermis. Druse crystals and raphide bundles are evident on the leaves. Stomata are hypostomatically positioned in all species examined and are amaryllis type, anomocytic in structure. Four to eight vascular bundles are seen on the midrib. In general, those in the abaxial and adaxial regions of these vascular bundles are more developed than those in the lateral region. The petiole is generally seen in a five-lobed structure. Two auxiliary vascular bundles in the adaxial region are clearly separated from the others. When examined together with the existing literature, the findings obtained reveal that leaf anatomy can have reliable characters in the distinction of grapevine varieties.

Keywords: Leaf Blade, Paraffin Method, Petiole, Taxonomy, Viticulture

PP-138

Investigation of Stem Anatomy of Some Grapevine Varieties Grown in Turkey

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Abstract

Anatomical studies contribute greatly to the understanding of both ontogenic and phylogenetic developments. The use of microscopes has enabled the presentation of tissues and cell structures. Grapevines, which have a cosmopolitan distribution today, have diversified considerably as a result of cultivation studies. Grapevines are largely distinguished today by ampelographic methods. Ampelgraphics, which are largely based on morphological features, cause taxonomic difficulties, especially in the interpretation of subjective characters such as color. Anatomical studies stand out as an important indicator of plant development as well as taxonomic distinction. In addition to anatomical characters, anatomical characters can contribute to the interpretation of the responses of a species to its ecological environment and environmental stresses. In this study, the stem structures of eight different grapevine varieties grown in Tokümen vineyards in Turkey were examined anatomically. The examined samples were obtained from one-year shoots during the autumn pruning period. 10-12 µm thick sections taken with the help of a microtome were stained with Fastgreen and Safranine O dyes and examined under a light microscope. In the examined varieties, the stem anatomy is generally similar from the center to the outside: pith, primary xylem, secondary xylem, phloem, periderm, primary phloem fibrils, and cortex. The distinction between primary and secondary xylem was observed more clearly in other varieties compared to Narince and Syrah varieties. Periderm is of variable thickness along the stem and sometimes thins and sometimes completely disappears. Sclerenchyma elements in the vascular bundles have thick cell walls and are clearly connected to each other by simple passages. There are scalariform type passages in the tracheae. In addition, ring and spiral type wall thickenings were observed. The measurements show that the vascular bundle dimensions, xylem and phloem lengths, diameter of trachea and tracheid cells and cell wall thicknesses differ among the varieties.

Keywords: Grape, Kırşehir, Microtome, Vineyards, Viticulture

PP-139
A General Review on the Flora of Bingöl

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Abstract

Bingöl, located in the Irano-Turanian phytogeographic region, is a special region with a very rich plant diversity due to its rich ecological habitats such as different climatic elements, topographic structure and wetlands. In order to clearly reveal this richness, the results of 11 flora studies conducted within the borders of Bingöl province were evaluated and the general plant diversity of the province was determined. Accordingly, a total of 2 212 taxa (2 044 species) belonging to 99 families, 283 of which are endemic (endemicity rate 13%), together with subspecies categories were identified in Bingöl province. The families with the highest number of taxa within Bingöl are *Asteraceae* (297 taxa) with 13.4%, *Poaceae* (204 taxa) with 9.2%, *Fabaceae* (194 taxa) with 8.7%, *Brassicaceae* (149 taxa) with 6.7%, *Caryophyllaceae* (133 taxa) with 6%; the richest genera are *Astragalus* L. (61 taxa), *Trifolium* L. (39 taxa), *Allium* L. (37 taxa), *Silene* L. (33 taxa), *Verbascum* L. (26 taxa). The distribution and proportions of taxa according to phytogeographic regions are as follows; Irano - Turanian element 702 taxa (31,7%), the Euro - Siberian element 189 taxa (8,5%), Mediterranean element 132 taxa (6%), and multi-regional or unknown region 1 189 taxa (53,8%). These numbers are expected to increase in the light of the data to be obtained with the continuation of flora and vegetation studies in the region.

Keywords: Bingöl, Plant diversity, Flora, Taxonomy, Türkiye

PP-140

Comparative anatomy of leaves and stems in *Senecio castagneanus* DC and *Senecio tauricolus* V.A.Matthews (Asteraceae)

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Abstract

In this study, the leaf and stem anatomy of *Senecio castagneanus* DC and *Senecio tauricolus* V.A.Matthews belonging to the genus Senecio L. (Asteraceae) distributed in Turkey was examined for the first time. Transverse and superficial sections taken from the stems and leaves of the taxa were examined with a light microscope and anatomical characters were identified, contributing to the solution of the taxonomic problems of the genus. *Senecio castagneanus* DC has bifacial (dorsiventral) leaf type, while *S. tauricolus* V.A.Matthews has ecvifacial leaf type, amphistomatic type, anomocytic type according to the status of neighboring cells, and amaryllis type stomata were encountered. Stomata were observed in the epidermis of young stems. Protruding structures were encountered on the stem. It was observed that multicellular covering and glandular hairs were dense.

Keywords: Asteraceae, Leaf, Plant anatomy, Senecio, Stem

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PP-141

Anatomical Comparison of Grafting Compatibility Performances of Rootstocks with Different Growth Vigor in Bozkurt Almond Variety

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Abstract

In this study, the graft compatibility performances of Bozkurt almond variety, one of our important local varieties, grafted onto some rootstocks with different developmental strengths (Seedling, Rootpac R, Rootpac 90, Rootpac 70, Rootpac 40 and Rootpac 20) were investigated anatomically. The seedling rootstock, Rootpac R and Rootpac 90 are vigorous, Rootpac 70 and Rootpac 40 are medium and medium vigorous, and Rootpac-20 is weakly developed. The anatomical analysis of scion/rootstock combinations were examined by taking cross sections for 30 days and 12 months after T-budding in June. A common situation in all rootstock combinations; it was determined that the callus cells developed in the cross sections of budded parts at 30 days after budding but the cambial continuity between the rootstock and scion tissues had not occurred yet. It was determined that cambial relationship was established and graft fusion was completed 12 months after budding. In all investigated rootstock combinations, vascular differentiation was observed in the sections where the cambial relation was established at 12 months after the budding, callus cells were seen to gain regular parenchymatic tissue properties and scleroid (petrosal cell) cells and sclerenchyma bundles were encountered in parenchymatic cells. It had been determined that there was no problem in terms of rootstock-scion incompatibility in Bozkurt almond variety which was budded on seedling and Rootpac clone rootstocks (Rootpac R, Rootpac 90, Rootpac 70, Rootpac 40 and Rootpac 20).

Keywords: Almond, Clonal Propagation, Graft Compatibility Performances, Rootpac Clone Rootstocks

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PP-142

Anatomical notes on *Vinca soneri* Koyuncu (Apocynaceae) in Türkiye

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Abstract

The genus *Vinca* L. (Apocynaceae), which is native to Europe, north-west Africa and south-west Asia is represented by seven species in Türkiye. It comprises low creeping evergreen and deciduous perennial subshrubs and herbs that not evaluated by its anatomical characters. The current study aimed to investigate the anatomical features of *Vinca soneri* Koyuncu for the first time. The transverse sections were taken by a rotary microtome or hand and paraffin sections were stained treating safranin-fast green staining procedure while handmade sections were dyed with floroglusin-HCL. Chosen best sections were photographed by a light microscope and the measurements were made using Kameram programme. *V. soneri* had rounded shaped stems in cross-section. The epidermal layer of species was consisting of a single row of oval-rectangular shaped cells. The collenchymatic layer was encloses stem in three or four in row and the vascular bundles were designed in a single rowed. There is a pith cavity in the center of stem in cross sections. This is the first anatomical report dealing with the taxa of *Vinca* genus in Türkiye.

Keywords: Anatomy, Leaf, Periwinkle, Vinceae.

PP-143

The anatomical characters of endemic *Psephellus hadimensis* (Asteraceae) in Türkiye

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Abstract

In this study, the anatomical features of the stem and leaf of the endemic species *Psephellus hadimensis* were revealed for the first time. For anatomical studies, the paraffin method was applied to the vegetative organs of the samples collected from the Hadim (Konya) region. Staining of the samples, whose anatomical sections were prepared, was done with the safranin-fast green staining method. Some stem sections were also taken by hand and stained with phloroglucin-HCL. Also, the superficial sections of leaf were prepared and investigated to determine the type of stomata. Best sections were photographed by a light microscope and the measurements were made using Kameram programme. The shape of transverse section obtained from stem was circular. Epidermis layer encloses stems in a single row. Collenchyma which is lamellar type was present at protrusion areas in stem cross sections. Cortex cells were located between collenchymatic cells. A sclerenchymatous cap was found around the vascular bundles and an endodermis layer was seen above the sclerenchymatic cap. The center of stem was covered only pith cells in cross sections. The shape of epidermal cells from both adaxial and abaxial face was either rectangular or oval and also was uniseriate. The mesophyll which was equifacial type was tightly arranged palisade cells in two rows both surface of leaves. The reduced spongy parenchyma was placed between palisade parenchyma. The vascular bundles were arranged in a single row. Stomata were observed at the same level with epidermis cells in superficial sections. The anatomical characters determined for *P. hadimensis* were compared with previous results obtained in the literature to determine the extent to which anatomical characters were important.

Keywords: Anatomy, Cardueae, Compositae, Sclerenchymatic Cap.

PP-144

Examination of the Seed Morphology of Some Grape Varieties Grown in Türkiye

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Abstract

The grapevine (*Vitis vinifera*), the most well-known and economically important species of the *Vitis* genus, has been a part of the human diet for centuries. Grapevine seeds exhibit considerable morphological diversity. Seed traits are among the micromorphological markers that aid in species identification in both systematic taxonomy and phylogenetic analyses. In this context, a detailed examination of the seed morphology of *Vitis* species enhances the accuracy of taxonomic classification and provides deeper insight into genetic diversity. In this study, samples were collected from vineyards in the village of Toklümen, located in Kırşehir province. Eight different grapevine cultivars were analyzed. Photographs of the dried seeds were taken using a stereomicroscope, and various morphometric measurements were recorded. The seeds of the examined cultivars generally exhibited similar priform shapes, with a distinct beak-like projection in the hilum region. A rounded calaza-scutellum structure was observed on the dorsal surface. The seed surfaces displayed varying types of ornamentation, including striate-reticulate, rugulate, and psilate-rugulate patterns. Based on the measurements, the longest seeds were found in the Öküzgözü variety, while the shortest were observed in the Syrah variety. The widest beak was recorded in the Sauvignon Blanc variety, and the narrowest in Malbec. In dorsal view, the longest calaza-scutellum was measured in Öküzgözü, whereas the shortest was found in both Viognier and Malbec. From the lateral view, Öküzgözü also had the thickest seeds, while Viognier had the thinnest. Seed weights were generally similar, with Öküzgözü having the heaviest seeds and Viognier the lightest.

Keywords: Grape, Micromorphological, Taxonomy, Diversity, *Vitis vinifera*

PP-145
Morphological and Anatomical Adaptations of Xerophytic Bryophytes

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Abstract

Bryophytes are used to refer to three closely related groups: liverworts, hornworts, and mosses. They represent the second largest group of plant biodiversity after flowering plants, with approximately 20,000–25,000 taxa. These plants show a wide distribution across all ecosystems, from deserts to the poles, and this distribution is based not only on the life strategies they have developed but also on their morphological and anatomical adaptations. Bryophytes are the most primitive living forms of the plant kingdom, and unlike other non-vascular groups, they have not declined in number during the evolutionary process because they do not compete with vascular plants. On the contrary, the number of bryophytes has increased alongside flowering plants, as they often use more developed plants as substrates. One of the strategies that gives bryophytes an advantage in survival and diversification is the morphological and anatomical adaptations they have acquired to cope with arid environments. In this study, families such as Grimmiaceae, Pottiaceae, Orthotrichaceae, and Hedwigiaceae, which include many xerophytic (drought-tolerant) taxa and are distributed especially in the Mediterranean climatic zone of Turkey, will be examined. Numerous anatomical and morphological characters associated with drought resistance such as leaf curling, thick cuticles, hyaline cells, papillose surfaces, and photosynthetic laminal cells will be presented along with their forms depending on the group to which they belong.

Keywords: Arid Environment, Hornworts, Liverworts, Mosses

PP-146

Taxonomic Importance of Leaflet Anatomical Characters of the Genus *Hedysarum* L. (Fabaceae)

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Abstract

The genus *Hedysarum* L., is one of the largest genera in the family Fabaceae belongs to the tribe Hedysareae includes approximately 225 species in worldwide. In Türkiye alone, 32 taxa of *Hedysarum* were recognized by different scientists until now. The present study was designed to evaluate the leaflet anatomical characteristics of nine *Hedysarum* species distributed in Türkiye using light microscopy (LM) for their systematic and taxonomic importance for correct identification. Paraffin method was performed to obtain anatomical sections of studied species. All the slides were observed by Leica DM 1000 light microscope. Measurements were made with Kameram 21 programme and photos were taken with a Canon EOS 450D camera attached to the light microscope. In leaflet transverse sections, the general shapes of the leaflet was determined linear or V-shaped. The epidermis is composed of single layer and epidermal cells of both surfaces are rectangular to oval. The species investigated showed equifacial leaf type that palisade parenchyma located under the epidermis in both sides composed of 2–3 layers. The spongy parenchyma was located between palisade parenchyma cells. The results showed that leaflet anatomy has important potential role to accurately identify and classify investigated the members of the genus *Hedysarum*.

Keywords: Anatomy, Endemic, Leguminosae, Sweet-vetch.

PP-147

Studies on Root, Stem and Leaf Anatomy of *Tuberaria* (Dunal) Spach Genus Distributed in Türkiye

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Abstract

The Cistaceae family primarily consists of shrubs, subshrubs, and rarely herbaceous plants. *Tuberaria* (Dunal) Spach is the only genus in the family consisting entirely of herbaceous species Anatomical studies in the literature emphasize the importance of trichome structures as key morphological traits for species differentiation within this family. Additionally, the shape of the petiole and the type and distribution of stomata on the leaf surface are important diagnostic features. The star-shaped trichomes have been identified as unicellular but clustered "false bicellular" structures and are considered a significant taxonomic characteristic of the family. In this study, anatomical features of *Tuberaria genus* were examined in detail, including surface structures and transverse sections of the leaf, stem, and root. Plant specimens were preserved in 70% ethanol, and freehand sections were prepared and stained with astra blue and safranin before observation under a light microscope. On the leaf surface, covering trichomes were observed to be mainly unicellular, either star-shaped or long and cylindrical. In cross-section, the leaf showed a thin cuticle and a single-layered epidermis. The mesophyll was of bifacial type, with 1–2 layers of cylindrical palisade parenchyma on the adaxial side and 2–4 layers of spongy parenchyma on the abaxial side. The midrib was prominent and protruding, with vascular bundles surrounded by a bundle sheath.In the stem, vascular bundles were arranged in a circular pattern; the phloem was bordered by sclerenchyma, and the xylem was oriented inward. The pith tissue occupied a large central area. In root sections, a thin periderm was present, and well-developed xylem and phloem tissues were observed beneath the cortex. Tracheary elements were clearly distinguishable, and abundant druse-type calcium oxalate crystals were detected in the cortical tissues of both stem and root. These anatomical findings contribute to the morphological and systematic understanding of the genus *Tuberaria*.

Acknowledgments: This study is supported by the TUBITAK 1001 project titled "Taxonomic Revision of the *Fumana* Spach and *Tuberaria* (Dunal) Spach (Cistaceae) Genera in Türkiye".

Keywords: Anatomy, *Tuberaria*, Cistaceae, Türkiye

PP-148

Comparative Pollen Morphology of *Tanacetum oxystegium* and *Tanacetum pinnatum*

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Abstract

Tanacetum L. (Asteraceae) is one of the most prominent genera of the Anthemideae tribe and is represented by approximately 160 taxa worldwide. In Türkiye, this genus comprises 61 taxa, 27 of which are endemic, indicating an endemism rate of 44%. The objectives of the present study are to determine the pollen morphological characteristics of *Tanacetum pinnatum* Boiss. and the endemic species *T. oxystegium* (Sosn.) Grierson with the light microscopy (LM) and scanning electron microscopy (SEM), and to contribute to the systematic of species from a palynological perspective. Plant materials were collected within the scope of a TÜBİTAK project and are preserved in the Herbarium of Faculty of Science, Gazi University (GAZI). Pollen slides were prepared following the Wodehouse method, and more than 50 pollen grains were measured for each morphological character under LM. For SEM analysis, pollen were mounted on stubs, coated with gold, and examined using an FEI INSPECT F50 scanning electron microscope. The pollen grains of both species are radially symmetrical and isopolar. The aperture type is trizonocolporate. The pollen dimensions of these species range from 24 to 31 µm in the polar axis and 26 to 33 µm in the equatorial axis. Their shape is oblate-spheroidal. Exine sculpturing is echinate, and the ornamentation of inter-spinal area is perforate in both species. In this study pollen morphology of these two *Tanacetum* species, which are distributed in the same habitat was examined for the first time. The findings will shed light on future research concerning other species within the genus *Tanacetum*, and the palynological features will serve as valuable systematic markers for species differentiation.

Keywords: Asteraceae, Endemic, Pollen, *Tanacetum*

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PP-149

Investigation of the Pollen Morphology of Some Grapevine Varieties Grown in Türkiye

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Abstract

Grapevine (*Vitis vinifera* L.) is a perennial plant that is widely cultivated across the world and holds significant economic and cultural value. Naturally growing in temperate climates, this species is utilized in various areas such as grape production, winemaking, drying, and fresh consumption. Cultivation of grapevine dates back to ancient times, and due to its genetic diversity and high adaptability, it has spread across diverse geographical regions. Pollen morphology is an important criterion in plant classification, particularly in distinguishing closely related species. In this study, pollen samples were collected from vineyards located in the village of Toklümen in Kırşehir province. For morphological analysis, flower samples were dried as herbarium material, and pollen preparations were subsequently made. The results revealed that the pollen grains were generally prolate-spheroidal in shape and possessed a trizonocolporate aperture. In all samples, reticulate ornamentation was predominantly observed in the polar regions. In contrast, various ornamentation types such as rugulate, reticulate, microreticulate, and perforate were identified in the equatorial regions and around the apertures. Among the studied grapevine varieties, the pollen with the largest polar axis was found in the Öküzgözü variety, while the shortest was recorded in the Syrah variety. The Narince variety exhibited the longest equatorial axis, whereas the Sauvignon Blanc variety had the shortest. The longest colpus was measured in the Öküzgözü variety, and the shortest in Boğazkere. The widest colpus was observed in the Viognier variety, while the narrowest was again in Öküzgözü. Kalecik Karası had the largest pore dimensions in terms of both length and width. Öküzgözü pollen grains had the largest mesocolpium area, whereas Syrah had the smallest.

Keywords: Ornamentation, Pollen micromorphology, Grape, *Vitis vinifera*

PP-150

Determining the Sources of Dominant Pollen Found in Bat Guano (Oylat Cave)

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Abstract

Bat guano, a valuable biological deposit found in cave ecosystems, provides unique insights into local vegetation and pollination dynamics through palynological analysis. This study examines the dominant pollen taxa present in guano samples collected from Oylat Cave, located in Bursa Province, Turkey, and explores their potential sources and associated pollination syndromes. The objective is to understand how pollen types reflect both the surrounding flora and the ecological interactions within the cave environment. Guano samples were processed using standard palynological techniques, and pollen grains were identified under a light microscope. Taxa representing more than 1% of the total pollen count were classified as dominant. These were further categorized based on their pollination syndromes: anemophilous (wind-pollinated), entomophilous (insect-pollinated), and ambophilous (pollinated by both wind and insects). A total of 21 dominant taxa were identified, including 11 anemophilous, 4 entomophilous, and 6 ambophilous species. The findings indicate that bat guano serves as a reliable archive of airborne pollen, reflecting both natural vegetation and agricultural activity in the surrounding area. Moreover, the study highlights the ecological role of cave-dwelling bats in pollination networks, particularly in regions where nocturnal pollination remains underexplored. These results contribute to a broader understanding of cave ecosystems and demonstrate the potential of palynological analysis on guano in ecological and environmental research.

Keywords: Bat guano, Palynology, Pollination syndrome

Acknowledgments: This study is supported by TUBITAK223Z280.

PP-151

Palynological and Micromorphological Characteristics of *Rhaponticoides ruthenica* (Lam.) M.V. Agab. & Greuter (Asteraceae)

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Abstract

Rhaponticoides ruthenica (Lam.) M.V.Agab. & Greuter (Asteraceae) has been considered endemic to a limited area between Erzurum and Oltu in Türkiye. However, during recent botanical field surveys, new populations of this species were identified in Ağrı (Patnos) and Muş (Malazgirt). In this study, palynological (including aperture type, polar and equatorial diameter, P/E ratio, colpus and pore length and width, exine and intine thickness, mesocolpium and apocolpium length, and exine ornamentation) and micromorphological (achene and pappus morphology) characteristics were investigated based on samples collected from natural populations in Ağrı and Muş. Randomly selected individuals were used for all measurements, and minimum, maximum, mean, and standard deviation values of the characters were calculated. Pollen grains from both populations are tricolporate with echinate ornamentation and oblate-spheroidal shape. In the Ağrı (Patnos) population, the polar axis (P) ranges from 38.49 to 44.60 µm and the equatorial axis (E) from 41.42 to 48.85 µm. Exine thickness ranges from 1.05 to 1.99 µm, and intine thickness from 1.05 to 1.83 µm. Achenes are cylindrical, measuring 5.40–8.32 × 1.04–9.60 mm, brown, laterally compressed, and yellowish at the base. The pappus is multiseriate, scabrous, and brownish. In the Muş (Malazgirt) population, the polar axis ranges from 35.38 to 43.55 µm and the equatorial axis from 37.82 to 46.62 µm. Exine thickness varies from 1.06 to 2.26 µm, and intine thickness from 1.21 to 1.89 µm. Achenes are cylindrical, 7.02–9.92 × 1.10–3.15 mm, brown, laterally compressed, and yellowish at the base. The pappus is also multiseriate, scabrous, and brownish. This study presents the first comprehensive palynological and micromorphological characterization of *R. ruthenica* based on newly discovered populations, thereby contributing novel data to the taxonomic and morphological understanding of the species.

Keywords: Asteraceae, *Rhaponticoides ruthenica*, Micromorphology, Palynology, Türkiye

PP-152

Palynological and Micromorphological Characteristics of *Rhaponticoides amasiensis* (Bornm.) M.V. Agab. & Greuter (Asteraceae)

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Abstract

Rhaponticoides amasiensis (Bornm.) M.V.Agab. & Greuter, (Asteraceae) has been previously considered endemic to a restricted region within Amasya and Bolu provinces in Türkiye. However, recent botanical field surveys have confirmed the presence of natural populations in both locations. In this study, palynological (aperture type, polar and equatorial diameters, P/E ratio, colpus and pore length and width, exine and intine thickness, mesocolpium and apocolpium length, and exine ornamentation) and micromorphological (achene and pappus morphology) features were investigated using samples collected from these newly confirmed populations. Randomly selected individuals were used for all measurements, and the minimum, maximum, mean, and standard deviation values were calculated for each character. Pollen grains from both populations are tricolporate with echinate ornamentation and exhibit an oblate-spheroidal shape. In the Amasya population, the polar axis (P) ranges from 31.25 to 41.25 µm, and the equatorial axis (E) from 34.72 to 43.85 µm. Exine thickness ranges from 0.94 to 1.60 µm, and intine thickness from 0.94 to 1.77 µm. In the Bolu population, the polar axis ranges from 32.61 to 44.92 µm and the equatorial axis from 37.49 to 46.42 µm. Exine thickness varies from 1.20 to 2.26 µm, and intine thickness from 1.18 to 1.76 µm. This study provides the first detailed palynological and micromorphological characterization of *R. amasiensis*, offering novel data that enhances the taxonomic and morphological understanding of the species.

Keywords: Asteraceae, *Rhaponticoides amasiensis*, Micromorphology, Palynology, Türkiye

PP-153

Pollen and Achene Morphology of the Endemic *Tanacetum oltense* (Asteraceae)

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Abstract

The genus *Tanacetum* L. is represented by approximately 160 species worldwide. In Türkiye, this genus includes 61 taxa, 27 of which are endemic. The aims of this study are to investigate the pollen and achene morphological characteristics of the endemic *Tanacetum oltense* (Sosn.) Grierson utilizing light microscopy (LM) and scanning electron microscopy (SEM), and to contribute to the resolving of taxonomic problems within the genus based on these properties. The plant materials were collected within the scope of the TUBITAK project and are deposited in the Herbarium of Gazi University, Faculty of Science (GAZI). Pollen preparations were carried out following the Wodehouse method and examined under a light microscope, with at least 60 pollen grains measured for each morphological character. For achene macromorphology, at least 20 mature fruits were examined under a stereomicroscope, and their lengths, widths, and corona lengths were recorded. For surface micromorphological analysis, pollen and achenes were placed on stubs, coated with gold, and photographed using an FEI INSPECT F50 scanning electron microscope. The pollen grains of *T. oltense* are isopolar, radially symmetrical, and trizonocolporate. They exhibit a suboblate shape, with the polar axis 25–30 µm and the equatorial axis 28–33 µm. The exine ornamentation is echinate, and perforate is between the spines. Achenes are straw-yellow, oblong-obconical, and 2.23–3.23 x 0.84–1.17 mm. The achene surface displays colliculate-striate ornamentation. The present research represents the first detailed examination of the pollen and achene morphology of *T. oltense*. The data obtained will provide valuable insight for future studies on the other taxa within the genus *Tanacetum*, and the palynological and achene macro- and micromorphological features will contribute to the systematic character for separation from each other taxa.

Keywords: Endemic, Fruit, Morphology, Palynology, *Tanacetum*

Acknowledgments: We would like to thank TÜBİTAK for supporting this research within the scope of project number 123Z282.

PP-154

Comparison of Palynomorphological Characters of the Section *Mesocentron* From the Genus *Centaurea* (Asteraceae)

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Abstract

The genus *Centaurea*, a key member of the tribe Cardueae within the Asteraceae family, includes a diverse range of herbaceous species along with some shrubby forms. These plants are typically recognized by their unarmed leaves. One of the most significant morphological traits for species identification in this genus is the shape of the scarious bract appendages. Türkiye is a major centre of diversity for this genus, and recent research has documented 247 taxa within the country. Notably, 145 of these taxa are endemic to Türkiye, reflecting an endemism rate of 58.7%. Within Türkiye, the section *Mesocentron* was historically represented by three taxa, but with the addition of *Centaurea verutum* L., this number has increased to four. Among them, two taxa are endemic, resulting in an endemism rate of 50%. The present study aimed to identify palynomophological characters of the section of *Mesocentron* (Asteraceae) from Türkiye by comparing microscopically techniques and to evaluate the importance of these properties for taxonomic implications. The studied taxa have radially symmetric, monad, isopolar, sometimes heteropolar, and generally 3-colporate, occasionally 4-colporate pollen grains. Only prolate pollen shaped pollen grains were observed in all of the studied species. While the colpus and porus morphology of pollen grains were the same in studied taxa the density of spinule on the pollen were changeable. The results showed that pollen characters were effective in distinguishing species in the section *Mesocentron*.

Keywords: Compositae, Endemic, Knapweed, Micromorphology, Pollen.

Acknowledgments: The authors wish to thank the Financial Unit of Selçuk University for their support of this study (Project no: 23201052).

PP-155

Karyomorphological Features of *Centaurea* Section *Mesocentron* (Asteraceae) in Türkiye

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Abstract

This study aims to examine chromosome morphologies. Chromosome counts were performed during somatic metaphase using squash technique. The clearest metaphase stages were identified, and the chromosomes were analyzed using an imaging system. Karyomorphological characteristics of four taxa were examined, and correlation coefficients among these traits were calculated. To group the taxa, a cluster analysis was conducted using the UPGMA method based on standardized variables and similarity measures. A total of 16 quantitative karyomorphological characters were selected to differentiate members of *Mesocentron*. The clustering process was carried out using Euclidean distance metrics and the UPGMA algorithm in PAST version 4.03. The chromosome number for *C. solstitialis* subsp. *carneola* was found to be 2n=18, while the other taxa were determined to have 2n=16. *C. verutum* was differentiated from taxa with the same chromosome number based on its karyotype formula (6m + 2 sm). Among the studied taxa, *C. solstitialis* subsp. *carneola* had the highest chromosomal asymmetry. In conclusion, it can be inferred that the data obtained from karyomorphological studies contribute to the differentiation of taxa.

Keywords: Chromosome, Compositae, Knapweed, Star-thistle

Acknowledgments: This study was financially supported by Selçuk University (BAP—Project Number: 23201052).

PP-156

Effect of Woody Terrestrial Plant Sources on Activated Carbon Adsorption Capacity: Biotechnological Optimization Approach

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Abstract

The use of plant materials from trees to produce activated carbon and its impact on the ability to absorb substances is highlighted from a biotechnological improvement perspective. The methods for producing activated carbon include heating it (pyrolytic conversion), using chemicals such as KOH, H_3PO_4, or $ZnCl_2$ to activate it, and employing biological methods with enzyme complexes and bacteria. Each method affects the material's properties, which are crucial for its ability to adsorb substances. The reflection of the chemical composition of the raw material—especially the cellulose/lignin ratio, ash content, and structural heterogeneity—on the adsorption performance of activated carbon was evaluated through isotherm and kinetic modeling for model pollutants, including methylene blue, phenolic compounds, and heavy metal ions. Also, it has been shown that the surface features (like pH-PZC, surface oxygen and nitrogen groups) and pore structure (the volume of micro- and mesopores, and the balance between water-attracting and water-repelling properties) of activated carbons are essential factors for their use in biotechnological applications (such as detoxifying bioreactors, holding cells in place, and supporting enzyme systems). Studies have shown that using woody materials with a high lignin content makes carbon more aromatic, which enhances its chemical strength and surface properties, leading to improved long-term stability and increased reuse in biological applications. Prospective studies on innovative applications, including the integration of woody wastes into the value chain, process optimization using response surface methodology, multi-cycle carbon regeneration, and energy storage and carbon capture, are emerging in the context of the circular bioeconomy. In summary, selecting the right raw material is a crucial factor that directly influences both the absorption of healthy substances and the overall effectiveness and sustainability of biotechnological processes.

Keywords: Activated Carbon, Adsorption Capacity, Biotechnological Optimization, Lignocellulosic Waste, Pore Structure.

PP-157

Some Biological Activity Studies on Endemic *Salix purpurea* L. subsp. *leucodermis* Yalt. (Salicaceae)

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Abstract

The genus *Salix* L. is a rich group distributed around the world with approximately 500 species. Antioxidant and anti-inflammatory studies conducted on *Salix* species in Türkiye have shown significant potential. In this study, we aimed to determine the total phenolic contents, total flavonoid contents and antioxidant activity of the endemic *Salix purpurea* subsp. *leucodermis* in solvents of different polarities. The total amount of phenolic substances contained in the extracts was determined by the Folin-Ciocalteu method, the total amount of flavonoids by AlCl3 colorimetric method, and the antioxidant level by the DPPH method. According to the results, the highest amounts of phenolic contents were found in ethanol (223.54 mg GAE/g) and methanol (183.12 mg GAE/g) extracts. The highest flavonoid contents were determined in n-hexane (152.34 mg RU/g; 116.03 mg QE/g), methanol (109.84 mg RU/g; 81.57 mg QE/g) and ethanol (109.13 mg RU/g; 80.99 mg QE/g) extracts. According to antioxidant tests, the IC50 value of methanol extract was 11.86 µg/ml, the IC50 value of water extract was 19.81 µg/ml, the IC50 value of ethanol extract was 34.96 µg/ml, the IC50 value of chloroform extract was 175.66 µg/ml and the hexane extract IC50 value was found to be 420.44 µg/ml. This study is the first bioactivity study conducted on the endemic *S. purpurea* subsp. *leucodermis*.

Keywords: Antioxidant Capacity, Biological Activity, Purple Willow, *Salix purpurea* subsp. *leucodermis*

PP-158

Determination of Total Flavonoid, Total Phenolic Content and Antioxidant Activity of *Anthemis rosea* Sm. subsp *carnea* (Boiss.) Grierson

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Abstract

The genus *Anthemis* L. (Asteraceae) in Türkiye includes 50 species, 27 of which are endemic, totaling 80 taxa. Among them, *Anthemis pestalozzae* and *A. rosea* subsp. *Carnea* (Boiss) are dwarf species native to southwestern Türkiye. *Anthemis* species are traditionally used as herbal teas, food flavorings, and in cosmetics and pharmaceuticals due to their antispasmodic, anti-inflammatory, and antibacterial effects. Previous studies have reported flavonoids in these species. This study examines the antioxidant capacity and bioactive compounds of *A. rosea* subsp. *carnea* collected from the Karkın Plateau (Çameli). The plant samples were dried in a well-ventilated, shaded area and then ground into a fine powder. Extracts were prepared using different solvents and stored at +4 °C. The total phenolic content was determined using the Folin-Ciocalteu reagent, and the results were expressed as gallic acid equivalents (GAE). The total flavonoid content was measured by the aluminum chloride method and reported as quercetin and rutin hydrate equivalents (QE, RU). Antioxidant capacity was evaluated by the DPPH free radical scavenging assay. All analyses were performed in triplicate, and the data were statistically analyzed. The identification of phenolic compounds and flavonoids is considered to provide a scientific basis for future studies on the potential industrial applications of this ethnobotanically important species. This study has thus contributed to the existing literature by providing new insights into the bioactive properties of this endemic species

Keywords: *Anthemis rosea* subsp *carnea*, Antioxidant capacity, Biological activity, Flavonoids, Phenolic.

PP-159

Evaluation of Antioxidant and Antimicrobial Activities of *Viscum album* L. (Santalaceae)

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Abstract

Viscum album L. is a common evergreen, hemiparasitic shrub in Europe and Asia, whose leaves, young twigs, and preparations from the shrub are used to treat circulatory and respiratory issues. *Viscum* subspecies can be differentiated by host trees. *V. album* L. subsp. *album* L. parasitizes deciduous trees and shrubs such as *Carpinus betulus* L., *Populus nigra*, L., *Salix alba* L., and *Tilia cordata* Mill. *V. album* subsp. *austriacum* (Wiesb.) Vollm. is found only on the genera *Pinus* and *Picea*. *V. album* also lives on various fruit trees, including apple, plum, pear, and cherry. The present work reports the antioxidant activities, antimicrobial effects, and total phenolic content of extracts from the aerial parts of *V. album* subsp. *album* and *V. album* subsp. *austriacum*. Total phenolic content in extracts prepared from aerial parts of *V. album* was determined by the Folin-Ciocalteu method, and total phenolic content equivalent to gallic acid varied between 31.4 and 90.9 mg GAE/g extract. To measure antioxidant activity, the $DPPH^{\cdot}$ technique was used. Ethanol and methanol extracts exhibited higher total phenol content and antioxidant activity compared to ethyl acetate extracts. The extracts and antimicrobial compounds were tested for their minimum inhibitory concentrations (MIC). Antimicrobial activity testing was modified according to the guidelines of broth microdilution methods. *Escherichia coli* ATCC 8739, *Staphylococcus aureus* ATCC 6538, *Candida tropicalis* ATCC 750, *C. albicans* ATCC 90028 *C. krusei* ATCC 14243, as well as antimicrobial standards, such as ciprofloxacin and fluconazole were used in this study. Extracts were found to be more effective against *Candida* species. The results of this study may partially support the traditional use of *V. album* providing insight into an alternative species.

Keywords: Antimicrobial, Antioxidant, *Viscum album*

PP-160

An Interdisciplinary Approach to the Genus *Helichrysum* (Asteraceae) in the Flora of Türkiye: An Evaluation in the Light of Systematic, Physiological, Pathological, and Molecular Data

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Abstract

Türkiye, which is the intersection of 3 of the world's biodiversity hotspot regions, is quite rich in terms of species diversity and endemism. Due to this feature, it offers an important distribution area for species-rich taxa such as the *Helichrysum* (Immortelle) species of the Asteraceae family. At the same time, this genus, which includes medicinal and aromatic plant species, offers a wide range of uses, from folk medicine to cosmetics. The *Helichrysum* species is represented by 542 species in the world, 34 species in Türkiye, and 18 are endemic to Türkiye. The diversity of endemic species has been adapted to serpentine and high-altitude habitats. The *Helichrysum* species has a high level of genetic diversity and complex structure; intra- and inter-species genetic differences have been revealed with ISSR, SSR, and cpSSR markers. For this reason, species distinctions are made together with morphological and procedural copying. Species belonging to the *Helichrysum* species have developed various biochemical adaptation software against stress stress. Under severe stress conditions, significant changes are observed in *Helichrysum* species both morphologically and metabolically. The benefits of these species against pathogens can be found directly through growing conditions, soil structure, and stress factors. However, enrichment in secondary metabolites provides natural resistance against some pathogens. Nevertheless, monoculture production increases the possible risk of stress-related defense weakness and incorrect agricultural practices. Therefore, it is necessary for the sustainability of integrated policies and policies. This study systematically addresses the distinct stress responses (drought, salinity), organic varieties, and genetic diversity structure of *Helichrysum* species from a holistic perspective. As a result, the genus Helichrysum is a model taxon that can be evaluated in a multifaceted way within the flora of Türkiye, and the integration of systematic, physiological, and molecular data is of great importance in terms of conservation and utilization strategies.

Keywords: Flora of Türkiye, Genetic diversity, *Helichrysum*, Plant pathology, Plant physiology, Plant systematics,

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PP-161

Antioxidant Activity of *Hypericum auriculatum* (N. Robson & Hub.-Mor.) N. Robson and *Sideritis lanata* L.

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Abstract

Hypericum auriculatum and *Sideritis lanata* are two endemic plant species native to Türkiye, known for their traditional uses and pharmacologically active compounds. *H. auriculatum*, a member of the Hypericaceae family, is particularly noted for its flavonoids and phenolic acids. *S. lanata*, belonging to the Lamiaceae family, is recognized for its antioxidant, antimicrobial, and anti-inflammatory properties. Both species are gaining scientific attention due to their potential as sources of natural antioxidants. In this study, the total phenolic and flavonoid contents, as well as antioxidant activity of these species, were evaluated. Plant materials were collected from Karaman (*H. auriculatum*) and Buharkent (*S. lanata*) during their flowering periods. After air-drying in a shaded and ventilated space, the plant parts were ground into fine powder and extracted using solvents of varying polarity. Extracts were stored at 4°C prior to analysis. Total phenolic content was determined using the Folin–Ciocalteu method and expressed in gallic acid equivalents. Flavonoid content was measured by the aluminum chloride assay, with results given as quercetin and rutin hydrate equivalents. Antioxidant activity was assessed via the DPPH radical scavenging method. All analyses were performed in triplicate, and data were statistically evaluated. The findings suggest that both species have significant antioxidant potential and could be utilized as natural alternatives to synthetic antioxidants in the pharmaceutical, food, and cosmetic industries.

Keywords: Antioxidant activity, Flavonoids, *Hypericum auriculatum*, Phenolic compounds, *Sideritis lanata*

PP-162

In Vitro Evaluation of Antioxidant and Cytotoxic Activities of *Helichrysum plicatum* subsp. *pseudoplicatum*

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Abstract

Helichrysum plicatum subsp. pseudoplicatum (genus *Helichrysum*), belonging to the family of Asteraceae. In Turkish traditional medicine, *Helichrysum* species have been used as diuretics, for kidney stones, stomach ailments, and anti-asthmatic properties, in the form of infusion and decoction. No scientific evidence has been reported for the cytotoxic activity of *H. plicatum* subsp. *pseudoplicatum*. Therefore, this study aimed to evaluate the in vitro antioxidant and cytotoxic activities of the ethanol extracts of *H. plicatum* subsp. *pseudoplicatum*, which were collected at three different growth stages: pre-flowering, flowering, and post-flowering.The antioxidant activity of extracts was assessed using DPPH and ABTS radical-scavenging assay, and results showed high radical scavenging activity in a concentration-dependent manner within the 0.025-4 mg/mL range. Additionally, the cytotoxic activity of extracts on MDA-MB231 (human breast cancer) cell lines was determined by MTT method and extracts were observed that cytotoxic activity significantly increased at the dose ranges of 3,96-1000 µg/mL. These findings indicate that *H. plicatum* subsp. *pseudoplicatum* exracts exhibits strong antioxidant activity and shows cytotoxic effects against breast cancer cell line. The results suggest that *H. plicatum* subsp. *pseudoplicatum* may have potential for therapeutic applications, after being supported by further studies.

Keywords: Antioxidant, Asteraceae, Cytotoxicity, *Helichrysum.*

Acknowledgments: The research was supported by the Erciyes University Scientific Research Projects Unit under the project code TYL 2025-14797 and was conducted as part of a master's Thesis (*Helichrysum plicatum* subsp. *pseudoplicatum* Türünün Farmakognozik Açıdan İncelenmesi) in the Department of Pharmacognosy, Erciyes University.

PP-163

Evaluation of Antioxidant and Antimicrobial Activities of *Rosa canina* L. (Rosaceae) Fruits

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Abstract

Rosa canina L. is a member of the Rosaceae family, known for its high phenolic content. *R. canina* (Rosehip) has blood purifying, intestinal softening, deworming properties, and is used for hemorrhoids, rheumatism, and scurvy, as well as regulating the body's development due to its vitamin C content and as a protector against colds. In addition to its medical use, rosehip is also consumed as fresh or dried fruit, and jam and marmalade of the fruit are especially prepared in many regions. *R. canina*, which grows spontaneously in many parts of Anatolia, is resistant to cold and is a plant seen as a cure for many ailments.The present study reports the antioxidant activities, antimicrobial effects and total phenolic content of extracts and decoction samples obtained from *R. canina* fruits collected from Eskişehir and Bursa. The total phenolic content was determined using the Folin-Ciocalteu method, and the total phenolic content equivalent to gallic acid varied between 32,1 and 113,5 mg GAE/g extract. The DPPH$^{\cdot}$ radical scavenging test was used to measure antioxidant activity. According to the results, the ethanol extract prepared from the Bursa sample showed a higher total phenol content and better antioxidant activity (IC_{50} 0.196±0.02mg/mL). The 70% ethanol, ethyl acetate extracts, and decoction of *Rosa canina* fruits were tested against Gram-positive (*Staphylococcus aureus* ATCC 29213, *Bacillus subtilis* NRRL B478), Gram-negative bacteria (*Pseudomonas aeruginosa* ATCC 27853, *Escherichia coli* ATCC 35218), and *Candida* species (*Candida albicans* ATCC 90028, *Candida glabrata* ATCC 90030) by the microdilution method. All extracts were screened for antimicrobial activity in the range of 0.125-8 mg/mL. *Rosa canina* extracts, especially prepared with ethyl acetate, are effective against *S. aureus, B. subtilis*, and *Candida* species in the range of 0.250-4 mg/mL, while MIC values are higher (1-8 mg/mL) in species *E. coli* and *P. aeruginosa.*

Keywords: Antimicrobial, Antioxidant, *Rosa canina*

Acknowledgments: This study was supported by the Scientific Research Coordination Unit of Anadolu University under the project number BAP No: TYL-2025-2878, ID: 2878.

PP-164

Evaluation of *In Vitro* Enzyme Inhibitory Activities and Antioxidant Capacities of Turkish Sea Buckthorn Twig and Leaf Extracts

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Abstract

Elaeagnus rhamnoides (L.) A. Nelson (synonym: *Hippophae rhamnoides*) (Elaeagnaceae), known as sea buckthorn, is an important plant with bioactive phytochemicals and is a thorny shrub or small tree native to Europe and Asia. Especially the berries of the plant attract the attention of researchers. However, not only sea buckthorn berries but also leaves and twigs of this plant contain large amounts of nutrients and bioactive compounds, including phenolic compounds. In the current study, the dichloromethane and ethanol extracts were prepared from the twig and leaf of *Elaeagnus rhamnoides* (L.) A. Nelson growing in Türkiye. The extracts were screened against acetylcholinesterase (AChE), butyrylcholinesterase (BChE), and tyrosinase (TYRO), the enzymes linked to neurodegenerative diseases, at 200 µg ml^{-1}. Screening of alpha-glucosidase inhibitory activity for antihyperglycemic effect was performed in the concentration range of 100-800 µg ml^{-1}. Antioxidant capacity was tested using radical scavenging activity against 2,2-diphenyl-1-picrylhydrazyl (DPPH) and 2,2'-azinobis(3-ethylbenzothiazoline)-6-sulfonic acid (ABTS). Also, total phenol quantification of the extracts was calculated. In the present study, none of the extracts showed AChE and TYRO inhibition, while hydroalcoholic leaf and twig extracts showed 5.30 ± 0.35% and 20.77 ± 1.54% BChE inhibition, respectively. Ethanolic leaf extracts displayed alpha-glucosidase inhibition between 26.97 ± 1.17% and 62.41 ± 2.62%, while dichloromethane leaf extracts displayed no inhibition. The ethanolic extract from the twig was the most effective against alpha-glucosidase, showing an inhibition of 75.23 ± 1.58% when tested at 800 µg ml^{-1}, while the dichloromethane twig extracts had an inhibition between 37.02 ± 5.60% and 64.56 ± 3.32%. The current findings show that extracts from the leaves and twigs of sea buckthorn can block alpha-glucosidase activity, particularly the polar extracts, which may be a good source of natural substances that help lower blood sugar levels.

Keywords: Alpha-glucosidase, Anticholinesterase, Antioxidant, *Elaeagnus rhamnoides*, Sea Buckthorn

PP-165

Evaluation of the Fragrant Plant Potential of the Gaziantep Flora

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Abstract

There are approximately 12,000 vascular plant taxa in the flora of Turkey, one-third of which are endemic. The national inventory of "fragrant plants," compiled from a literature review, includes 34 families, 289 genera, and 2.480 taxa. The highest species richness is concentrated in Lamiaceae, Asteraceae, and Apiaceae. In the updated floristic list for Gaziantep Province, 2.476 taxa were identified, 1,803 of which were found to have potential for essential oil or fragrance compounds. This rate corresponds to 72.8% of the total flora of the province. Thus, the flora of Gaziantep represents fragrant plant families throughout Turkey. The fact that Gaziantep is located at the intersection of the Mediterranean and Irano-Turanian phytogeographic belts, combined with semi-arid climatic conditions, and limestone-dominated geology, supports the diversification of phenolic and terpenoid synthesizing species. *Salvia*, *Origanum*, and *Thymbra* are found within the Lamiaceae family; *Helichrysum* and *Artemisia* are found in the Asteraceae family; and in the Apiaceae family, *Ferula* and *Foeniculum* are the primary sources of essential oils. The findings provide a scientific priority list for establishing the "Fragrance Gardens" theme within the Gaziantep Metropolitan Municipality's Gastrobotanical Garden. Thus, it will be possible to preserve the local aromatic heritage in ex situ, to supply standardized materials for essential oil research, and to create experiential areas for gastronomic tourism. It is envisioned that this initiative will both contribute to the academic literature by documenting the region's biodiversity with up-to-date data and create added value in the cultural and creative industries. This study has been prepared to reveal the quantitative potential of Gaziantep's fragrant plants on a national scale and to inform sustainable development models based on aromatic flora.

Keywords: Fragrant Plants, Flora of Gaziantep, Aromatic Plant Diversity, Essential Oil Potential, Gastrobotanical Fragrance Gardens, Sustainable Development

PP-167

Ethnobotanaical Features of Senoz Valley of Çayeli (Rize-Türkiye)

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Abstract

Ethnobotanical studies are important for several key reasons, as they bridge the gap between traditional knowledge and modern science. This study aims to identify the plants used by the people of Senoz Valley for various purposes and compare their usages. Ethnobotanical data were gathered through semi-structured interviews with 31 informants during the field trip between 2024 and 2025. During the field travel, botanical features of the plants that may be required for identification were recorded and photographed. Together with, suitable samples belonging to only native plants were deposited in the herbariums of Recep Tayyip Erdoğan University, Faculty of Science. With this study, a total of 110 taxa belonging to 52 families with ethnobotanical usages were identified. The most utilized families were Asteraceae, Fabaceae, Lamiaceae, Rosaceae, and Rutaceae, respectively. Also, in Senoz Valley 110 taxa from 52 families were recorded with the following uses: 80 as food, 26 as medicinal, 19 as animal feed, 9 as objects, 7 as ornamental, 3 as toys, and 12 with other ethnobotanical uses. The taxa with the highest use value are *Brassica oleraceae* var. *acephala* (0.35), *Tilia rubra* (0.29), *Urtica dioica* (0.45) and, *Vaccinium arctostaphylos* (0.26), respectively. The highest frequency of citation value (0.6) was found in oncological diseases. The data obtained revealed that Senoz Valley is an important area in terms of ethnobotanical characteristics. In this study, Senoz Valley which is one of the areas of Rize province with important plant diversity, was investigated in detail in terms of ethnobotanical characteristics for the first time.

Keywords: Etnobotany, Folk Medicine, Rize, Senoz Valley.

PP-168

An Ethnobotanical Research on Plants Used for Food Purposes in Ayvacik (Canakkale)

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Abstract

The material of this research consists of plants of ethnobotanical value obtained from nature and local markets, used for various purposes by the people of Ayvacik (B1, Canakkale) district center and the towns and villages affiliated to the district. Ethnobotanical information was tried to be obtained from local people living in Ayvacik and surrounding villages. Within the scope of the research, 67 source people were reached and the local names, morphological characteristics, parts used and usage prescriptions of the plants spread in the region were determined. 59 plant taxa belonging to 22 families used for food purposes were identified in the study. It was seen that the plants consumed as food mostly belong to the Apiaceae, Asteraceae and Lamiaceae families. The most well-known plants by the source people are *Anethum graveolens*, *Eruca sativa*, *Chenopodium album* subsp. *album*, *Papaver rhoeas*, *Origanum majorana*, *Melissa officinalis* subsp. *altissima*; the least known plants are *Erodium cicutarium* subsp. *cicutarium*, *Silybium marianum* and *Taraxacum officinale*. These plants are consumed raw, cooked, as spices, frozen, dried, pickled and canned. As a result, ethnobotanical research is of great importance in terms of revealing our cultural richness in our country, which is very rich in terms of flora, recording plant use information and determining the contributions of plants with economic value to our country. In addition, the results obtained from the studies will be recorded in the Ethnobotanical Database and thus contributed to science and economy.

Keywords: Ayvacik, Canakkale, Ethnobotany, Food Plants.

PP-169

Ethnobotanical Appraisal of Gaziantep's Flora

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Abstract

Turkey is home to 169 families, 1,326 genera, and approximately 13,656 taxa of vascular plants, as it is located at the intersection of the European-Siberian, Iranian-Turanian, and Mediterranean phytogeographic regions; 31% of these taxa are endemic. This vast biological base interacts with traditional knowledge accumulated over the centuries, making the country an ethnobotanical "hot spot" on a global scale; National reviews reveal that records of use are predominantly directed at medical and food purposes. Gaziantep province, with its unique location at the intersection of the Euphrates Basin, the Amanos belt, and the steppe steppes, offers a heterogeneous habitat diversity that combines Mediterranean and Iranian-Turanian phytogeographical elements. Literature data and indirect regional citations suggest that approximately 450 taxa benefit from the local population. A significant portion of these taxa is included in the Asteraceae, Lamiaceae, Fabaceae, Poaceae, and Brassicaceae families, which are compatible with the ethnobotanical family distribution defined in Turkey. Of the recorded uses, 58% were medicinal and 35% were for food or spice purposes. This points to a strong applied ethnobotanical practice supported by the deep-rooted herbal-spice trade and rich gastronomic heritage, while side categories such as broom making, dyeing, and cosmetics reflect the province's craftsmanship tradition. However, urbanization, agrarian modernization, and the disconnect in intergenerational knowledge transmission pave the way for the rapid erosion of traditional knowledge. The Gastrobotanical Garden, established by the Gaziantep Metropolitan Municipality, aims to partially mitigate existing risks and provide infrastructure for research, pharmacognosy, and ecogastronomy studies through the ex-situ protection of living collections within the scope of ethnobotany specific to the region. Expanding detailed field inventories including micro-endemic populations to assess the province's ethnobotanical potential sustainably; It is recommended that the data obtained should be compiled in a standard format under the roof of a digital "Gaziantep Ethnobotanical Data Bank" and ecological monitoring data should be used in the integration of biological resources into the economic chain. It is considered that this holistic approach will provide a solid scientific basis for both the protection of biocultural heritage and rural development strategies, including medicinal plant agriculture, local food branding, and craft.

Keywords: Biocultural Heritage, Ethnobotany, Gaziantep, Gastrobotanical Garden, Plant Diversity

PP-170

Effect of Sucrose on Microbial Contamination during *in vitro* Culture of Tea (*Camellia sinensis*)

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Abstract

Tea (*Camellia sinensis* (L.) Kuntze) is one of the most economically important crops worldwide, cultivated extensively for its commercial value and global consumption. Contamination is one of the most critical challenges in the in vitro micropropagation of tea (*Camellia sinensis*), as it can severely hinder plant development. While surface sterilization at the initiation stage is generally effective in controlling fungal contamination, bacterial contamination frequently emerges in subsequent subcultures, negatively affecting shoot growth. This study aimed to investigate the effect of sucrose on bacterial contamination and shoot proliferation during the micropropagation of tea. The *Camellia sinensis* 'Zihni Derin' clone used in this study was obtained from the Atatürk Tea and Horticultural Research Institute in May. Explants were surface sterilized using 70% ethanol followed by 30% commercial bleach. They were then cultured on Murashige and Skoog (MS) medium supplemented with 3 mg/L BAP, in two treatment groups: with and without sucrose. The cultures were maintained for 12 weeks. The results showed that bacterial contamination was reduced in the sucrose-free medium, and a higher number of shoots was observed. The highest average number of shoots, 3 per explant, was recorded in the sucrose-free MS medium supplemented with 3 mg/L BAP. These findings suggest that omitting sucrose from the culture medium can help minimize bacterial contamination while promoting shoot proliferation in tea micropropagation.

Keywords: *Camellia sinensis*, Contamination, Endophytes, Micropropagation, Tea.

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PP-171

Organogenesis in the Endemic Species of *Sabulina mesogitana subsp. flaccida*

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Abstract

The Caryophyllaceae family ranks sixth among the plant families with the highest endemism rates in Türkiye. One of its members, *Sabulina mesogitana* subsp. *flaccida* (McNeill) Koç & Hamzaoğlu (synonym *Minuartia mesogitana* subsp. *flaccida* McNeill), is an endemic species. Due to its medicinal properties, it has potential pharmacological and economic value. This study aimed to investigate the in vitro organogenesis of the endemic species *S. mesogitana* subsp. *flaccida*, for which no prior studies were found in the literature. For in vitro organogenesis studies, specimens of *S. mesogitana* subsp. *flaccida* were collected from the Küre Mountains, Bartın province (41°40'18.4"N 32°45'49.5"E). Seeds were sterilized and germinated on Murashige and Skoog (MS) medium without plant growth regulators. Explants, including root, hypocotyl, cotyledon, epicotyl, first leaf, and apical meristem, were obtained from 30-day-old aseptic seedlings and cultured on MS media supplemented with different concentrations of BAP (0.5, 1, and 1.5 mg/l), kinetin (0.5, 1, and 1.5 mg/l), and 2,4-D (0.1, 0.4, 0.7, and 1 mg/l). The first signs of shoot development were observed 10 days after the explants were transferred to the media. The first shoots appeared 10 days after the explants were introduced into the culture media. A 100% shoot development rate was observed in apical meristems cultured on 1.5 mg/l BAP, while shoot development rates were 85% and 83% in explants cultured on 0.7 mg/l and 1 mg/l 2,4-D, respectively. Root explants cultured on 1.5 mg/l kinetin showed a 60% shoot development rate. Hypocotyls cultured on 0.7 mg/l 2,4-D showed 18% shoot development, while cotyledon explants showed 11%. No shoot development was observed in epicotyl and first leaf explants. Based on the data obtained from this study, *Sabulina mesogitana* subsp. *flaccida* was successfully introduced into tissue culture conditions. Consequently, in vitro shoot organogenesis was established for this endemic species, enabling the production of clonal plants. These findings provide essential baseline data for future biotechnological studies and offer valuable contributions to the scientific community.

Keywords: Endemic Species, In vitro, Organogenesis, *Sabulina mesogitana* subsp. *flaccida*

PP-172

Plant-Based Approaches to Pest Control in Organic Agriculture: An Ecological Perspective

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Abstract

Today, climate change, the increasing emission of greenhouse gases, and the ecological pressure of agricultural activities have brought sustainable and environmentally friendly practices to the forefront. In particular, the use of chemical pesticides and fungicides in agricultural production has led to soil, water, and air pollution, a decline in biodiversity, and the disruption of ecological balance. In this context, the development of alternative methods for pest control is of critical importance for both human health and environmental sustainability. This study presents a literature-based evaluation of biological control strategies aimed at reducing chemical inputs in the management of plant pathogens and pests. The research specifically focuses on plant-based biological control approaches. Nitrogen-fixing plants (e.g., alfalfa, peas) contribute to soil nutrient cycling while supporting beneficial microbial activity. Aromatic and volatile oil-bearing species (such as mint, garlic, and basil) exhibit repellent effects against pests, while plants suitable for habitat manipulation (e.g., corn, lettuce) provide shelter for beneficial insects. Additionally, selected plant varieties with natural resistance mechanisms help reduce pest pressure and lower environmental burdens. This study highlights the role of plants in biological pest control within organic farming systems and emphasizes the significance of holistic approaches that support ecological balance. Furthermore, literature-based recommendations regarding alternative plant uses are provided, contributing to the promotion of sustainable and environmentally responsible agricultural practices.

Keywords: Biodiversity, Biological Control, Ecological Balance, Organic Agriculture, Plant-Based Approaches

PP-173

The Effects of the Organic Fertilizer for Monet Broccoli (*Brassica oleracea* L. var. italica) Productivity

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Abstract

In this study; Monet broccoli (Brassica oleracea L. var. italica) variety was used as plant material. Broccoli plants were divided into four groups; as control, vermicompost, coelomic fluid, and coelomic fluid + vermicompost. Each group has ten broccoli seedlings. Our special prepared organic fertilizer was applied to the vegetative organs of the separated each groups at the specific concentrations. In order to analyze the plant growth, measurements were carried out at specific time intervals. To enhance productivity in broccoli cultivation, studies have been conducted using vermicompost and coelomic fluid as an alternative to the conventional fertilizers. When the recorded data were examined during the growth stages of broccoli seedlings; differences were observed in plant height, leaf length, and leaf width among the groups. This study has shown that coelomic fluid and vermicompost affect the physiological and morphological traits, as well as the productivity of broccoli plants. Considering the periodic development of broccoli seedlings over a four-month period (April–July), among the treatment groups (control, vermicompost, coelomic fluid, and vermicompost + coelomic fluid applied groups); vermicompost and coelomic fluid combination applied group was shown more effective developments. The growth of plants height in this group were greater and plants development were occured faster according to the other groups. The group exhibiting the least growth was identified as the control group, which received no treatment. Plants in the control group were observed to be shorter and exhibited slower development compared to treated groups.

Keywords: Broccoli, Future Agriculture, Organic fertilizer, Productivity, Vermicompost

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PP-174

Comparison of Quality Parameters of Safflower (Carthami flos) Samples Sold in the Market with Pharmacopoeia tests

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Abstract

Carthamus tinctorius L. (Asteraceae) is used worldwide for the treatment of bronchitis, rheumatism, diabetes, depression, menstrual disorders, postpartum hemorrhage, mastalgia, scabies, skin disorders, and baldness; as an analgesic, antipyretic, wound healer, laxative, and antidote for poisoning (1,2). *C. tinctorius* is listed in many pharmacopoeias worldwide, including the Turkish Pharmacopoeia 2023 (3). This study aims to evaluate the quality parameters of ten *C. tinctorius* flower samples obtained from five different provinces with pharmacopoeial tests based on the Turkish Pharmacopoeia 2023. Morphological studies, microscopic analysis, and several physicochemical tests (absorbance, foreign matter, loss on drying, total ash, and insoluble ash in hydrochloric acid) of all samples were carried out as described in the pharmacopoeia. The samples showed the morphological characteristics and microscopic components specified in the pharmacopoeia. On the other hand, it was found that all samples included contaminants, including insects, hair remnants, stone fragments, and other plant organs. The absorbance values for yellow pigment ranged between 0.296 and 0.442, with only one sample meeting pharmacopoeial criteria. The absorbance readings for the red pigment ranged between 0.180 and 0.295, with none of the samples satisfying the pharmacopoeial standards. The total ash values of all samples were under 10%, and the insoluble ash values in hydrochloric acid were below 3%. The ash content tests of the samples complied with the limits specified in the pharmacopoeia. Taken collectively, commercially available *C. tinctorius* samples fail to satisfy pharmacopoeial criteria. The public obtains herbal products for therapeutic use from unregulated sources such as herbalists, the internet, and social media. Products supplied under these circumstances show significant quality issues, as demonstrated by our study's findings. We recommend that herbal products be cultivated under supervision, adhering to established good agricultural practices, and that they be sold only after preparation in accordance with GMP.

Keywords: *Carthamus tinctorius*, microscopic analysis, pharmacopoeia, total ash, quality-control

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PP-175

Biopiracy of Heirloom Seeds: Ecological Risks and the Biological Necessity for Conservation Policies

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Abstract

This study aims to examine the impacts of the recent increase in biopiracy and bio-smuggling activities on heirloom seeds and to evaluate the implications of these practices on ecological balance and food sovereignty. In particular, the illegal collection of plant genetic resources and their patenting followed by re-sale to their countries of origin have brought the concept of biopiracy to the forefront. Such practices pose significant threats to local agricultural systems, farmers' rights, and biological diversity. This research, which is based on an extensive review of the literature, emphasizes that the preservation of heirloom seeds is not only a cultural and agricultural necessity but also a critical component of sustaining ecological balance. The smuggling of heirloom seeds abroad and their subsequent genetic modification and commercial cultivation in different geographical regions not only undermines the biological heritage of the source countries but also disrupts ecological systems. When cultivated outside their native habitats, these plants may exhibit invasive species behavior or trigger ecological imbalances in new environments. Moreover, this process exacerbates the degradation of already fragile local ecosystems, especially in the context of climate change. This study highlights the urgent need for comprehensive national and international policies to protect heirloom seeds in biodiversity-rich countries such as Türkiye. Based on literature-derived data, the study presents a set of policy recommendations developed by the authors to combat biopiracy through legal, scientific, and social awareness frameworks. These recommendations offer strategic guidance for both nature conservation and sustainable agricultural policymaking.

Keywords: Biopiracy, Ecological Balance, Heirloom Seeds, Plant Genetic Resources, Sustainability

PP-174

Liverwort Flora of the Balçova Therapy Forest (İzmir)

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Abstract

This study was conducted in the Therapy Forest located in the Balçova district of İzmir, Turkey. The Therapy Forest is considered a continuation of the Bozdağ Mountains and is situated in square B6 according to the Henderson grid system. As a result of field studies carried out between 2022 and 2024, a total of 22 liverwort species belonging to 16 different families within the division *Marchantiophyta* were identified among the 118 collected specimens. The family with the highest number of species was *Fossombroniaceae*, represented by three species. Three of the recorded species represent new records for İzmir Province.

Keywords: Liverwort, İzmir, *Marchantiophyta*, Therapy Forest

PP-177

Fern Flora of Balçova Therapy Forest (Izmır)

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Abstract

Located in the Balçova district of Izmir, the Therapy Forest is seen as an extension of the Bozdag Mountains that form the Menderes Massif. The research area is located in the Aegean Region. Among the floristic climate types, Mediterranean is dominant. 178 fern specimens were collected during the field studies on cryptogam members between 2021 and 2025. As a result of the identification of the collected specimens, 11 species belonging to 7 different families belonging to the class of ferns of the Tracheophyta section were identified. *Cystopteris fragilis* and *Dryopteris filix-mas* are new records for Izmir.

Keywords: Fern, Izmir, Polypodiopsida, Therapy Forest, Tracheophyta

PP-178

Pollen Morphology of Some Rosaceae Species Distributed in Kastamonu, Türkiye

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Abstract

The Rosaceae family is an ecologically and economically important plant group represented by more than 100 genera and 3,000 species worldwide. In Türkiye, it contains 37 genera and 297 species. The use of a significant portion of Rosaceae members as food has led to the cultivation of many species. For this reason, it is recommended to conduct genetic, molecular and palynological studies in addition to morphological characters in the taxonomic distinction of species. Pollen morphology plays a fundamental role in botany and palynology studies in terms of identifying plant species, classifying them, and understanding their evolutionary relationships. In this study, it was aimed to examine the morphological characteristics of pollen belonging to five different Rosaceae taxa collected from Kastamonu province. The samples used in this study were selected to represent different genera from herbarium materials of five taxa in the Rosaceae family (*Prunus cerasus*, *Pyrus communis*, *Fragaria* × *ananassa*, *Malus domestica*, and *Potentilla inclinata*) housed in the Herbarium of the Biology Department at Kastamonu University. Pollen preparations were made from these herbarium specimens using the Wodehouse method. The preparations were then examined under a Leica DM500 light microscope using a 100× objective. Isopolar, trizonocolpate, and monad pollen types were observed in all taxa. The polar axis length ranged from 18.3 to 39.3 µm, while the equatorial axis ranged from 21.9 to 49.0 µm. Pollen shapes were identified as oblate (2 taxa) and suboblate (3 taxa). The largest pollen was found in *Malus domestica*, and the smallest in *Potentilla inclinata*. Exine ornamentations were observed as striate and psilate. The findings show that micromorphological features such as pollen size, shape, and exine ornamentation are distinctive at the genus level in the Rosaceae family. This study may contribute to different fields such as taxonomy, aeropalynology, melisopalynology, and forensic palynology.

Keywords: Botany, Micromorphology, Palynology, Taxonomy

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PP-179

Evaluation of DPPH Radical Scavenging Activity in Certain Lamiaceae Taxa

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Abstract

Teucrium chamaedrys L. subsp. *lydium* O.Schwarz (*Tcl*), *Cyclotrichium nivenum* (Boiss.) Manden. & Scheng. (*Cn*), *Mentha longifolia* subsp. *longifolia* (*Mll*) are belonging to the Lamiaceae family. *Tcl* is traditionally used as a digestive aid, antispasmodic, and anti-inflammatory agent. *Mll* is widely employed in the treatment of gastrointestinal disorders, respiratory conditions, and various inflammatory diseases. *Cn* is commonly used in folk medicine for relieving symptoms of flu, colds, nausea, and muscle pain. This study aims to evaluate the antioxidant capacity of T. chamaedrys, *C. nivenum*, *Mentha longifolia* by assessing their ability to scavenge DPPH radicals. The plants were first subjected to maceration using 80% methanol to obtain the total extract, which was then evaporated under reduced pressure using a rotary evaporator to yield a powdered form. This crude extract was subsequently fractionated into methanolic, ethyl acetate, and aqueous sub-extracts. Each sub-extract was concentrated using rotary evaporation and freeze-drying (lyophilization) to obtain the final samples. The antioxidant capacity of these samples was then assessed by measuring their DPPH radical scavenging activity at various concentrations. The IC_{50} values for the total extracts of *Tcl*, *Mll*, and *Cn* were determined as 0.067 µg/mL, 0.106 µg/mL, and 0.155 µg/mL, respectively. Ascorbic acid, used as a positive control, inhibited 92% of DPPH radicals at a concentration of 50 µg/mL. Among the plant extracts, the highest comparable inhibition was observed with *Tcl*, which showed 88% inhibition at a concentration of 200 µg/mL.

Keywords: *Cyclotrichium*, DPPH, *Mentha*, *Teucrium*

PP-180

Anticancer Activity of Naringenin Derived from *Citrus* Fruits and Aromatic Herbs in Uterine and Endometrial Cancers

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Abstract

Naringenin (2,3-dihydro-5,7-dihydroxy-2-(4-hydroxyphenyl)-4H-1-benzopyran-4-one), a member of the flavanone class known for its broad biological effects on human health, is a hydrophobic compound with a molecular weight of 272.25 g/mol ($C_{15}H_{12}O_5$). Primarily present in its aglycone form, naringenin is derived from the hydrolysis of naringin and narirutin, and it is soluble in organic solvents such as dimethyl sulfoxide and ethanol. It exhibits a wide range of biological activities, including enhancement of antioxidant defenses, anti-atherogenic and anti-inflammatory effects, and regulation of lipid and carbohydrate metabolism. Furthermore, its ability to cross the blood–brain barrier, interact with protein kinase C signaling pathways, and undergo conversion to phase II metabolites enhances its pharmacological significance. In this study, the anticancer potential of naringenin was evaluated in uterine (HTB-114) and endometrial (Ishikawa) cancer cell lines, while endothelial cell line (HUVEC) were used as a healthy control. Cytotoxicity was assessed using the MTT assay, revealing EC_{50} values of 318.50 µM for Ishikawa cells and 246.80 µM for HTB-114 cells. No EC_{50} value was obtained for HUVEC cells. These EC_{50} values were subsequently employed in apoptosis assays, where naringenin induced apoptosis at rates of 6.9% in HTB-114 and 19.49% in Ishikawa cells. Overall, these findings suggest that naringenin may exert complementary anticancer effects in uterine and endometrial cancers by targeting multiple pathways involved in cell proliferation and apoptosis. However, further advanced in vivo and clinical studies are required to validate these results and facilitate their translation into clinical applications.

Keywords: Anticancer activity, Endometrial cancer, Flavanone, Naringenin, Uterine cancer

PP-181

Ethnobotanical Characteristics of Ayrancı (Karaman) District

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Abstract

This study, which was carried out in the borders of Ayrancı district of Karaman province in 2023-2025, aims to reveal the plant usage habits of the people in the region. Within the scope of the research, face-to-face interviews were conducted with 127 resource persons living in 23 different settlements, and the parts used and local names of the plants used in the study area were determined and their usage purposes were focused on. The plants used were identified, their Latin names were determined and herbarium samples are preserved in the herbarium of Karamanoğlu Mehmetbey University Biodiversity Application and Research Center. A total of 137 taxa belonging to 48 families were identified for various purposes by the people. 85 of these plants are used for food, 44 for medicine and 35 for other different purposes. In addition, according to the data obtained from the study area, 12 taxa used are endemic. This study was carried out to understand how people in the borders of Ayrancı district use plants for various purposes and to better evaluate the biodiversity in the region. The findings revealed the local people's knowledge of plant natural resources, their protection strategies and how they benefit from them.

Keywords: Ayrancı, Ethnobotany, Karaman, Source Persons, Türkiye.

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PP-182

Determination of Total Flavonoid, Total Phenolic Content and Antioxidant Activity of *Arceuthobium oxycedri* (D.C.) M. Bieb (Santalaceae)

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Abstract

Arceuthobium genus, known as dwarf mistletoe, is one of the most evolutionarily specialized genera from the family Loranthaceae, which has been recently classified more under Santalaceae. The *Arceuthobium* species are grown in central Spain, Europe, North Africa, the Himalayas, North America, and Western China. They are semi-parasitic plants, generally live on Juniperus species and some other hosts from the Cupressaceae family. In this study, total flavonoid content, total phenolic substance content and antioxidant activity of *Arceuthobium oxycedri*, a hemiparasitic plant species, were determined. Plant samples were collected from Acıpayam district of Denizli and the samples are stored in the herbarium. The collected samples were dried at room temperature. The dried samples were ground into a powder and extracts were obtained using different solvents. The obtained extracts were stored at +4. Total phenolic content was determined using the Folin-Ciocalteu reagent and the results were expressed as gallic acid equivalents. Total flavonoid content was measured using the aluminum chloride method and reported as quercetin and rutin hydrate equivalents. Antioxidant activity was evaluated using the DPPH radical scavenging test. All experiments were repeated three times and the data were statistically concluded. Due to the widespread occurrence of *A. oxycedri* in nature and its accessibility through host plants, it is considered as a potential natural antioxidant source for use in pharmaceutical and cosmetic industries. Furthermore, this study is expected to contribute to the limited literature on the biological components and chemical potential of parasitic plant species.

Keywords: Antioxidant Activity, *Arceuthobium oxycedri*, DPPH Assay, Flavonoids, Total Phenolic Content

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