

 **INSTITUTE OF BIODIVERSITY AND ECOSYSTEM RESEARCH - BAS**

 **UNION OF SCIENTISTS IN BULGARIA  
SECTION BIOLOGY**



 **INTERNATIONAL SEMINAR OF  
ECOLOGY- 2023**

**“Cutting Edge Research of Ecology”  
September 28<sup>th</sup> - 29<sup>th</sup>, 2023, Sofia, Bulgaria  
*Hybrid Event***

**Program & Abstracts**



**INTERNATIONAL SEMINAR OF ECOLOGY – 2023  
“CUTTING EDGE RESEARCH OF ECOLOGY”**

**The Seminar of Ecology is organized by  
the Institute of Biodiversity and Ecosystem Research –  
Bulgarian Academy of Sciences and the Section “Biology” –  
Union of Scientists in Bulgaria, Sofia.**

**The International Seminar of Ecology – 2023,  
“Cutting Edge Research of Ecology” was partially funded by  
the Agreement between Bulgarian Academy of Sciences and  
Ministry of Education and Science (Bulgaria) as well as**





## **INTERNATIONAL SEMINAR OF ECOLOGY – 2023 “CUTTING EDGE RESEARCH OF ECOLOGY”**

This book includes the program and abstracts submitted and accepted for presentation at the International Seminar of Ecology – 2023, “Cutting Edge of Ecological Research”, 28-29 September 2023, Hotel of the Bulgarian Academy of Sciences, 50 “Shipchenski prohod” blvd, Sofia, Bulgaria.

The Seminar is organized by the Institute of Biodiversity and Ecosystem Research – Bulgarian Academy of Sciences, Sofia, Bulgaria and Section “Biology”, Union of Scientists in Bulgaria with the partial financial support according to the Agreement between Bulgarian Academy of Sciences and Ministry of Education and Science (Bulgaria); BIO-Save project, as well as DIACHIM and BULGAP EOOD companies.

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# INTERNATIONAL SEMINAR OF ECOLOGY – 2023 “CUTTING EDGE RESEARCH OF ECOLOGY”

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# INTERNATIONAL SEMINAR OF ECOLOGY – 2023 “CUTTING EDGE RESEARCH OF ECOLOGY”

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**INTERNATIONAL SEMINAR OF ECOLOGY – 2023  
“CUTTING EDGE RESEARCH OF ECOLOGY”**

**HYBRID EVENT  
28 – 29 September 2023  
Sofia, Bulgaria**

**SCIENTIFIC PROGRAM  
28 September 2023**

**8<sup>00</sup> – 9<sup>00</sup> Registration (Hotel of Bulgarian Academy of Sciences,  
50 “Shipchenski prohod” blvd, Sofia, Bulgaria)**

**9<sup>00</sup> – 9<sup>30</sup> Opening Ceremony – *Prof. Stephka Chankova, PhD***

**9<sup>30</sup> – 9<sup>40</sup> Family photo**

**THEMATIC SESSION I**

**BIOTIC AND ABIOTIC IMPACT ON THE LIVING  
NATURE. BIOMONITORING. ECOLOGICAL RISK.**

***Chairpersons: Prof. Stephka Chankova, PhD and Prof. Abdel  
Tawab Mossa, PhD***

***Technical support: Tsvetan Tsvetanov and Martin Dimitrov***

**Plenary presentation**

**9<sup>40</sup>-10<sup>00</sup> WHAT ARE THE KEY FACTORS DETERMINING  
THE DIVERSITY AND ABUNDANCE OF SOIL  
MICROBIAL COMMUNITY ALONG A GRADIENT  
OF HEAVY METAL CONTAMINATION? *Galina Radeva,  
Radina Nikolova, Evan Gatev, Kiril Kirilov, Anelia Kenarova,  
Silvena Boteva, Nikolai Dinev* **PL01\_01****




**INTERNATIONAL SEMINAR OF ECOLOGY – 2023  
“CUTTING EDGE RESEARCH OF ECOLOGY”**

**Oral presentations**

**10<sup>00</sup>-10<sup>10</sup> DIFFERENTIAL RESPONSE OF *CHLAMYDOMONAS REINHARDTII* AND *SACCHAROMYCES CEREVISIAE* TO CADMIUM CHLORIDE SHORT-TERM TREATMENT.** *Teodora Todorova, Petya Parvanova, Krassimir Boyadzhiev, Martin Dimitrov, Stephka Chankova* **L01\_01**

**10<sup>10</sup>-10<sup>20</sup> *PISUM SATIVUM* L. STRESS RESPONSE TO SINGLE AND COMBINED TREATMENT WITH HEAVY METALS.** *Petya Parvanova, Teodora Todorova, Krassimir Boyadzhiev, Martin Dimitrov, Stephka Chankova* **L01\_02**

**10<sup>20</sup>-10<sup>30</sup>  IMPACT OF HEAVY METALS ON THE STRUCTURE OF SOIL BACTERIAL COMMUNITIES IN THE AREA OF NON-FERROUS METAL PLANT.** *Radina Nikolova, Kiril Kirilov, Nikolai Dinev, Anelia Kenarova, Silvena Boteva, Galina Radeva* **L01\_03**

**10<sup>30</sup>-10<sup>40</sup> DOES NATURAL CLINOPTILOLITE INDUCE TOXICITY IN SMALL MAMMALS?** *Michaela Beltcheva, Peter Ostoich, Tsvetelina Gerasimova, Iliana Aleksieva, Tsenka Chassovnikarova* **L01\_04**

**10<sup>40</sup>-11<sup>00</sup> Discussion**

**11<sup>00</sup>-11<sup>20</sup> Coffee break**

***Chairpersons: Prof. Stephka Chankova, PhD and Prof. Victoria L. Korogodina, PhD***

***Technical support: Tsvetan Tsvetanov and Martin Dimitrov***



**INTERNATIONAL SEMINAR OF ECOLOGY – 2023  
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**Plenary presentation**

**11<sup>20</sup>-11<sup>40</sup> GENOTOXIC POTENTIAL OF Bisphenol A IN EUKARYOTIC CELLS.** *Andrea Sevcovicova, Jana Makuková, Stanislav Kyzek, Ivana Ďurovcová PL01\_02. Online*

**Oral presentations**

**11<sup>40</sup>-11<sup>50</sup> DNA DAMAGING CAPACITY OF PbCl<sub>2</sub> AND THE ROLE OF MISMATCH REPAIR SYSTEM.** *Teodora Todorova, Petya Parvanova, Krassimir Boyadzhiev, Stephka Chankova L01\_05*

**11<sup>50</sup>-12<sup>00</sup> DNA DAMAGING/PROTECTIVE CAPACITY OF AMORPHA FRUTICOSA AND AILANTHUS ALTISSIMA EXTRACTS DEPEND ON THE TYPE AND CHEMICAL COMPOSITION.** *Teodora Todorova, Krassimir Boyadzhiev, Petya Parvanova, Stephka Chankova L01\_06*

**12<sup>00</sup>-12<sup>10</sup> Cd, Pb, Cu AND Zn BIOACCUMULATION AND IMPACT ON CLINOPODIUM VULGARE L. GROWN ON CONTAMINATED SOILS.** *Krum Bardarov L01\_07*

**12<sup>10</sup>-12<sup>20</sup> THYMUS VULGARIS FEATURES AS ANTI-GENOTOXICITY, ANTI-INFLAMMATORY AND ANTIOXIDANT WITH ITS CHEMICAL COMPOSITIONS.** *Abeer Y Ibrahim, Kalina Danova, Kawther A Diab, Saber F Hendawy and Amr M Aboelhamd L01\_08*

**12<sup>20</sup>-12<sup>30</sup> MICROPLASTIC INGESTION BY MYA ARENARIA (LINNAEUS, 1758), MYTILUS GALLOPROVINCIALIS (LAMARCK, 1819) AND CERASTODERMA GLAUCUM (BRUGUIÈRE, 1789) FROM LAKE VARNA.** *Svetlana Mihova, Albena Alexandrova, Valentina Doncheva, Kremena Stefanova, Nesho Chipev, Petya Ivanova L01\_09. Online*

**12<sup>30</sup>-12<sup>50</sup> Discussion**

**12<sup>50</sup>-14<sup>00</sup> Lunch break**





**INTERNATIONAL SEMINAR OF ECOLOGY – 2023  
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**THEMATIC SESSION II**

**CLIMATE CHANGE MITIGATION  
APPROACHES**

*Chairpersons: Corr. member Dimiter Ivanov, DSc and  
Assoc. prof. Ventsislava Petrova, PhD*

*Technical support: Teodora Todorova and Radka Fikova*

**Plenary presentation**

**14<sup>00</sup>-14<sup>20</sup> CLIMATE SIGNALS FROM FOSSIL PLANTS – AN  
OVERVIEW OF METHODS AND PROXIES.** *Dimiter Ivanov*  
**PL02\_01**

**14<sup>20</sup>-14<sup>40</sup> THE CLIMATE CHANGE: NUMBERS BEHIND  
AND GLOBAL IMPACT ON ECOSYSTEM.** *Ventsislava  
Yankova Petrova* **PL02\_02**

**14<sup>40</sup>-15<sup>00</sup> GLOBAL WARMING OPENS A WAY TO THE  
MOUNTAINS AND BACTERIA SPECIATION.** *Victoria  
Korogodina, V. Arakelyan, A. Chilingaryan, R. Danielyan, M. Gustova,  
S. Kaplina, G. Khachatryan, G. Melik-Andreasyan* **PL02\_03.** *Online*

**Oral presentation**

**15<sup>00</sup>-15<sup>10</sup> UNIVERSITY – BUSINESS ALLIANCE IN MODERN  
BIOTECHNOLOGY APPROACHES FOR CLIMATE  
CHANGE MITIGATION SOLUTIONS – BIO-SAVE.**  
*Ventsislava Petrova, Trayana Nedeva, Anna Kujumdzieva, Kliment  
Petrov, Alexander Savov, Samantzis Babis, Zoi Georgiou, Diana Di  
Goya, Branko Kaucic, Gamze Yücel Işıldar, Deniz Işıldar* **L02\_01**

**15<sup>10</sup>-15<sup>30</sup> Discussion**



**INTERNATIONAL SEMINAR OF ECOLOGY – 2023  
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**THEMATIC SESSION III**

**ECOLOGICAL AGRICULTURE.  
ECOLOGICAL EDUCATION.**


*Chairpersons: Assoc. prof. Trayana Nedeva, PhD and  
Assoc. prof. Ganka Chaneva, PhD*

*Technical support: Teodora Todorova and Radka Fikova*

**Plenary presentation**

**15<sup>30</sup>-15<sup>50</sup> *COLEUS FORSKOHLII* PRODUCTION AS  
AFFECTED BY LOCATION CONDITIONS IN EGYPT.  
*Saber Hendawy, Maria Geneva, Mohamed Salah Hussein and Abeer  
Ibrahim* PL03\_01**

**Oral presentation**

**15<sup>50</sup>-16<sup>00</sup>  AROMATIC HERBS IN THE BULGARIAN  
WORMWOOD WINE – TRADITIONAL ECOLOGICAL  
KNOWLEDGE AND SCIENCE. *Vanya Boneva, Dessislava  
Dimitrova, Mariya Slavcheva, Neli Grozeva, Teodora Ivanova* L03\_01**

**16<sup>00</sup>-16<sup>10</sup> BULGARIAN AROMATIC PLANTS GENETIC  
RESOURCES – PRESERVATION OF LOCAL  
LANDRACES AND RELATED TRADITIONAL  
KNOWLEDGE. *Dessislava Dimitrova, Teodora Ivanova,  
Vanya Boneva, Yulia Bosseva, Mihail Chervenkov, Neli Grozeva*  
L03\_02 Online**

**16<sup>10</sup>-16<sup>30</sup> Discussion**

**16<sup>30</sup> – 17<sup>00</sup> Coffee break**

**17<sup>00</sup> – 18<sup>30</sup> Poster session and Discussion**



**INTERNATIONAL SEMINAR OF ECOLOGY – 2023  
“CUTTING EDGE RESEARCH OF ECOLOGY”**

***Chairpersons: Assoc. prof. Yanka Vidinova, PhD; Assoc. prof. Galina Radeva, PhD and Assoc. prof. Kalina Danova, PhD  
Technical support: Petya Parvanova and Tsvetan Tsvetanov***

**POSTER SESSION**

**THEMATIC SESSION I**

**P01\_01 SECONDARY METABOLITES PRODUCTION IN RELATION TO INDIGENOUS PREREQUISITES AND ENDOGENOUS PROCESSES IN THE PLANT ORGANISM. EXAMPLES OF TISSUE CULTURE MODELS OF MEDICINAL AND AROMATIC PLANTS. Kalina Danova, Antoaneta Trendafilova, Viktorya Ivanova, Milka Todorova**

**P01\_02 IMPACT OF DIFFERENT CONCENTRATIONS OF SODIUM NITROPRUSSIDE ON THE PHOTOSYNTHETIC PERFORMANCE OF TWO MAIZE VARIETIES UNDER SALT STRESS. Georgi Rashkov, Martin Stefanov, Preslava Borisova, Anelia Dobrikova, Emilia Apostolova**


**P01\_03 ASSESSMENT OF SEASONAL CHANGES OF THE OXIDATIVE STATUS OF RED MULLET (*MULUS BARBATUS* L.) FROM THE BULGARIAN BLACK SEA COASTAL AREA. Elina Tsvetanova, Albena Alexandrova, Almira Georgieva, Madlena Andreeva, Hristiyana Kanzova, Nesho Chipev**

**P01\_04 IMPACTS OF MULTISTRESSORS ON THE ECOLOGICAL STATUS AND SPATIAL DISTRIBUTION OF MACROALGAL COMMUNITIES ALONG THE BULGARIAN BLACK SEA COAST. Dimitar Beroy, Stefania Klayn, Ventislav Karamfilov**




**INTERNATIONAL SEMINAR OF ECOLOGY – 2023  
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**P01\_05 A COST-EFFECTIVE AND HARMLESS METHOD FOR EXTRACTION OF MICROPLASTICS FROM SEDIMENTS USING SUNFLOWER OIL AND FREEZING.** *Nikola Bobchev, Dimitar Berov, Stefania Klayn, Ventsislav Karamfilov*

**P01\_06  CHANGES IN BIOACTIVE POTENTIAL OF THE CYANOPROKARYOTE *ARTHRONEMA AFRICANUM* UNDER THE INFLUENCE OF LIGHT.** *Zornitsa Karcheva, Zhaneta Georgieva, Desislava Raykova, Aqif Mani, Viktoria Vladimirova, Anna-Maria Nedelcheva, Elina Koleva, Detelina Petrova, Miroslava Zhiponova, Tanya Toshkova-Yotova, Ganka Chaneva.*

**P01\_07 STUDY OF ANTIBACTERIAL POTENTIAL OF THE MEDICINAL PLANT *ACHILLEA THRACICA* VELEN UNDER DIFFERENT GROWING CONDITIONS.** *Detelina Petrova, Mariya Rogova, Milena Petrova, Miroslava Zhiponova, Ganka Chaneva.*


**P01\_08 ANTIBACTERIAL ACTIVITY OF *NEPETA NUDA* LEAF EXTRACTS.** *Tereza Georgieva, Detelina Petrova, Ganka Chaneva, Miroslava Zhiponova, Lyubomira Yocheva.*

**P01\_09  FIRST SEROLOGICAL EVIDENCE FOR WEST NILE VIRUS INFECTION AMONGST HORSE POPULATION IN NORTHERN BULGARIA.** *Plamen M. Kirov, Ionica Iancu, Elitsa Panayotova, Mirela Imre, Viorel Herman, Alexandru Gligor, Rusko Petrov, Radostina Alexandrova, Hristo K. Hristov, Abdulkadir Abudalleh. Online.*




**INTERNATIONAL SEMINAR OF ECOLOGY – 2023  
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**THEMATIC SESSION III**

**P03\_01**  **ANALYSIS OF THE INFLUENCE OF PHYSICO-CHEMICAL SOIL PARAMETERS ON PLANT PHYSIOLOGY AND PATHOGEN RESISTANCE IN THE MODEL SPECIES *SOLANUM TUBEROSUM* AND *PHASEOLUS VULGARIS*. Dimitar Danchev, Momchil Paunov, Svetoslav Anev, Ana-Maria Nedelcheva, Victoria Vladimirova, Desislava Raykova, Miroslava Zhiponova, Ganka Chaneva**

**P03\_02** **EVALUATION NANOPARTICLES OF METALS AND METAL OXIDES FOR ANTIFUNGAL EFFECT ON *VERTICILLIUM DAHLIAE*. Katya Vasileva, Zhana Ivanova-Doneva, Veneya Stoeva**

**P03\_03**  **YEAST PHYTASES – VALUABLE ENZYMES FOR THE IMPROVEMENT OF PLANT GROWTH AND NUTRITION. Nadezhda Nankova, Veronika Ivanova, Emilia Pisareva, Ventsislava Petrova, Anna Tomova**

**P03\_04** **AGRICULTURAL ROBOT FOR REMOVING WEEDS IN THE FIELD IN A NON-CHEMICAL WAY. Veselin Georgiev, Stoyan Tanev, Plamen Trendafilov, Stanko Stanev, Rossen Kolev, Rossen Dimov, Stefan Stoychev**

**P03\_05** **AGROECOLOGICAL PRINCIPALS TOWARDS A SUSTAINABLE RURAL LANDSCAPE. Irina Paparo. Online**



**INTERNATIONAL SEMINAR OF ECOLOGY – 2023  
“CUTTING EDGE RESEARCH OF ECOLOGY”**

**29 September 2023**

**THEMATIC SESSION IV**

**ECOSYSTEM RESEARCH AND SERVICES.  
LANDSCAPE ECOLOGY.**

*Chairperson: Prof. Spassimir Tonkov, DSc and  
Assoc. prof. Ventzislav Karamfilov, PhD*

*Technical support: Petya Parvanova and Martin Dimitrov*

**Plenary presentation**

**9<sup>00</sup>-9<sup>20</sup> BIODIVERSITY, ECOSYSTEM FUNCTIONS AND SERVICES – AN ECOCENTRIC APPROACH.** *Ventzislav Karamfilov PL04\_01*

**9<sup>20</sup>-9<sup>40</sup> VEGETATION INDICES.** *Borislav Grigorov PL04\_02*

**Oral presentations**

**9<sup>40</sup>-9<sup>50</sup> TESTING A METHODOLOGICAL APPROACH FOR DETERMINATION OF THE CONDITION OF BEECH FORESTS IN PERNIK DISTRICT.** *Borislav Grigorov, Adam Rusinko, Kiril Vassilev, Assen Assenov L04\_01*

**9<sup>50</sup>-10<sup>00</sup> MORPHOMETRIC CHARACTERISTICS OF BLOCK STREAMS IN VLADAYSKA RIVER VALLEY, VITOSHA MOUNTAIN.** *Petko Bozhkov L04\_02*

**10<sup>00</sup>- 10<sup>10</sup> PHYTOGEOGRAPHICAL REPORT IN AHAGGAR REGION (ALGERIAN SAHARA).** *Asmaa Benaissa L04\_03*

**10<sup>10</sup>-10<sup>30</sup> Discussion**

**10<sup>30</sup>-10<sup>50</sup> Coffee break**



**INTERNATIONAL SEMINAR OF ECOLOGY – 2023  
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**THEMATIC SESSION V**

**BIODIVERSITY. CONSERVATION BIOLOGY.**

*Chairpersons: Prof. Marina Stanilova, PhD and  
Prof. Danijela Mišić, PhD*

*Technical support: Petya Parvanova and Tsvetan Tsvetanov*

**Plenary presentation**

**10<sup>50</sup>-11<sup>10</sup> PALEOECOLOGICAL DATA ON THE  
DISTRIBUTION OF *PINUS PEUCE* GRISEB. IN  
SOUTHWESTERN BULGARIA FOR THE LAST 30000  
YEARS. *Spassimir Tonkov* PL05\_01**

**11<sup>10</sup>-11<sup>30</sup> INTEGRATION OF METABOLOMICS,  
TRANSCRIPTOMICS, AND DNA BARCODING DATA  
TO DESCRIBE THE DIVERSITY OF IRIDOIDS  
WITHIN THE GENUS *NEPETA* (NEPETOIDAE, FAM.  
LAMIACEAE). *Danijela Mišić, Neda Aničić, Dragana Matekalo,  
Uroš Gašić, Marijana Skorić, Branislav Šiler, Tijana Banjanac,  
Jasmina Nestorović Živković, Slavica Dmitrović, Biljana Filipović,  
Milica Milutinović, Jelena Božunović, Luka Petrović, Miloš Todorović,  
Tamara Lukić* PL05\_02**

**Oral presentations**

**11<sup>30</sup>-11<sup>40</sup> HUMAN PRESENCE AS A FACTOR  
DETERMINING THE CIRCADIAN ACTIVITY OF  
MAMMAL SPECIES IN THE „SINITE KAMANI“  
NATURE PARK. *Nikolay Dolapchiev, Diana Zlatanova, Milen  
Chanev* L05\_01**

**11<sup>40</sup>-12<sup>00</sup> Discussion**

**12<sup>00</sup>-13<sup>00</sup> Lunch break**



**INTERNATIONAL SEMINAR OF ECOLOGY – 2023  
“CUTTING EDGE RESEARCH OF ECOLOGY”**

**THEMATIC SESSION VI**

**OTHER RELATED TOPICS**

*Chairpersons: Prof. Saber Hendawy, PhD and  
Assoc. prof. Teodora Todorova, PhD*

*Technical support: Petya Parvanova and Tsvetan Tsvetanov*

**Plenary presentation**

**13<sup>00</sup>-13<sup>20</sup> STRATEGIES FOR THE SAFE DISPOSAL OF  
EMPTY CONTAINERS AND WASTES OF PESTICIDE.**

*Samia M. M. Mohafrash, Abdel-Tawab H. H. Mossa PL06\_01*

**Oral presentations**

**13<sup>20</sup>-13<sup>30</sup> INVESTIGATION OF THE RADIOACTIVITY OF  
SOILS COLLECTED FROM THE SHUMEN PLATEAU,  
BULGARIA. Seniha Salim, Nina Arhangelova L06\_01. Online**

**13<sup>30</sup>-13<sup>40</sup> SOLID-LIQUID PHASE EQUILIBRIUM IN LiBr-  
CaBr<sub>2</sub>-H<sub>2</sub>O SYSTEM AT 35 AND 50°C. Christomir Christov,  
Tsvetan Tsenov, Nina Ivanova, Stanislav Donchev L06\_02. Online**

**13<sup>40</sup>-13<sup>50</sup> THERMODYNAMIC MODELS FOR SOLUTION  
BEHAVIOR AND SOLID-LIQUID EQUILIBRIUM IN  
RUBIDIUM BINARY SYSTEMS FROM LOW TO VERY  
HIGH CONCENTRATION AT 25°C. Christomir Christov,  
Tsvetan Tsenov, Stanislav Donchev L06\_03. Online**

**13<sup>50</sup>-14<sup>00</sup> THERMODYNAMIC MODELS FOR SOLUTION  
BEHAVIOR AND SOLID-LIQUID EQUILIBRIUM IN  
SELENATE BINARY SYSTEMS FROM LOW TO VERY  
HIGH CONCENTRATION AT 25°C. Christomir Christov,  
Tsvetan Tsenov, Stanislav Donchev. L06\_04. Online**

**14<sup>00</sup>-14<sup>20</sup> Discussion**

**14<sup>20</sup>-14<sup>50</sup> Coffee break**





**INTERNATIONAL SEMINAR OF ECOLOGY – 2023  
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**14<sup>50</sup>-16<sup>30</sup> Poster session and Discussion**

***Chairpersons: Assoc. prof. Yanka Vidinova, PhD;***

***Assoc. prof. Galina Radeva, PhD and***

***Assoc. Prof. Kalina Danova, PhD***

***Technical support: Petya Parvanova and Ivan Yanchev***

**POSTER SESSION**

**THEMATIC SESSION IV**

**P04\_01 PRESENTATION OF THE AGE STRUCTURE OF THE MALE CAPERCAILLIES (*TETRAO UROGALLUS* L., 1758) FROM MUSEUM COLLECTIONS IN BULGARIA.**

***Milena Gospodinova, Atidzhe Ahmed, Albena Vlasseva***

**P04\_02 DAILY ACTIVITY, SEX AND AGE STRUCTURE OF THE HERDS OF THREE UNGULATES SPECIES (ARTIODACTILA) INHABITING THE TERRITORY OF THE SHE „ROSITSA“ IN STARA PLANINA MOUNTAIN, BULGARIA.** *Atidzhe Ahmed, Rossen Andreev, Blagoy Koychev, Elitsa Popova, Albena Vlasseva*


**P04\_03 BLACK SEA ECOSYSTEM STATUS USING THE ECOPATH WITH ECOSIM (EWE) MODEL.** *Yoana Georgieva, Georgi Daskalov, Stefania Klayn*



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**THEMATIC SESSION V**

**P05\_01 ESTABLISHMENT OF AN *EX SITU* COLLECTION OF *GLYCYRRHIZA GLABRA* L. AS A PREREQUISITE FOR FIELD CULTIVATION IN BULGARIA.** *Asya Kozhuharova, Milena Nikolova, Strahil Berkov, Stoyan Stoyanov, Elina Yankova-Tsvetkova, Vladimir Ilinkin, Marina Stanilova*

**P05\_02  GRADUAL RANGE DECLINE OF THE MEADOW VIPER *VIPERA URSINII* (BONAPARTE, 1835), INFERRED FROM ECOLOGICAL NICHE MODELLING.** *Kostadin Andonov, Angel Dyugmedzhiev, Nefeli Kotitsa, Simeon Borissov*

**P05\_03 BIOTECHNOLOGICAL APPROACHES FOR CONSERVATION OF OLD LOCAL PLUM AND GRAPEVINE GENOTYPES.** *Lilyana Nacheva, Nataliya Dimitrova, Svetoslav Malchev, Marko Mihaylov*

**P05\_04 GENETIC DIVERSITY OF RED MULLET *MULLUS BARBATUS* (PERCIFORMES, MULLIDAE) POPULATIONS ALONG BULGARIAN BLACK SEA COAST BASED ON MICROSATELLITE ANALYSIS.** *Petya Ivanova, Nina Dzhembekova, Ivan Atanassov, Krasimir Rusanov, Violin Raykov, Ivelina Zlateva, Dimitar Dimitrov, Mariya Yankova and Jordan Raev. Online*



**INTERNATIONAL SEMINAR OF ECOLOGY – 2023  
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**THEMATIC SESSION VI**

**P06\_01 PLUM POX VIRUS STRAINS DISTRIBUTED ON PEACH IN SOUTH CENTRAL REGION OF BULGARIA.**

*Snezhana Milusheva, Nataliya Dimitrova, Svetla Pandova*

**P06\_02  GC-MS ANALYSIS AND SEPARATION OF EPIMERIC AMARYLLIDACEAE ALKALOIDS OF HAEMANTHAMINE TYPE.** *Rumen Denev, Strahil Berkov*

**P06\_03  EFFECT OF LIGHT ON PLANT GROWTH.**

*Anka S. Georgieva-Hristeva, Todorka L. Dimitrova. Online*

**16<sup>30</sup>-17<sup>00</sup> Film**

**17<sup>00</sup> Closing Procedure – *Prof. Stephka Chankova, PhD***



## INTERNATIONAL SEMINAR OF ECOLOGY – 2023 “CUTTING EDGE RESEARCH OF ECOLOGY”

PL05\_02

### **Integration of metabolomics, transcriptomics, and DNA barcoding data to describe the diversity of iridoids within the genus *Nepeta* (Nepetoideae, fam. Lamiaceae)**

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**Aim:** The chemical richness of iridoids in the genus *Nepeta*, the exclusive representative of the subfamily Nepetoideae (Lamiaceae) that produces iridoids, has complex roles in nature, facilitating interactions with insects, phytopathogens, and other co-occurring plants. On the other hand, *Nepeta* species are used widely by humans as medicines, flavour additives, fragrances, as well as toys for cats, and their bioactivities are usually assigned to nepetalactones. Data on the distribution and diversity of iridoids across the genus *Nepeta* are quite fragmental and only rarely, the two subgroups, iridoid glycosides (IGs) and iridoid aglycones (IAs), are simultaneously analysed. Our aim was to develop and adopt non-targeted metabolomics methods to comprehensively acquire, analyse and interpret the overall diversity of iridoids in selected phylo diverse *Nepeta* taxa, and thus facilitate reconstruction of this diversity at the molecular level.

**Material and methods:** Metabolomics data were acquired adopting UHPLC/Orbitrap MS, UHPLC/QToF MS, and GC/MS. Leaves of phylo diverse/chemo diverse *Nepeta* taxa were subjected to RNA-Seq. DNA barcoding analysis was performed using chloroplast markers (*matK*, *rbcL*, *trnL-trnF*) and nuclear ribosomal ITS marker.

**Main results:** *Nepeta* taxa were robustly grouped into three major chemotypes: (1) producers of both IGs and IAs; (2) taxa exclusively producing IGs; and (3) taxa lacking iridoids. Chemotype A clade was further roughly classified into several sub-chemotypes based on the stereochemistry of the major compound – nepetalactone. Phylogenetic relations between the analysed taxa were reconstructed adopting a selected set of DNA barcoding markers. Transcriptomes of



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leaves of the distinguished *Nepeta* chemotypes were searched for transcripts of iridoid-related biosynthetic genes to facilitate the assessment of factors responsible for the presence/absence of IAs and IGs in these plants.

**Conclusion:** Integration of metabolomics, transcriptomics and DNA barcoding data revealed no clear regularities between chemotype affiliation and phylogenetic relatedness in analysed *Nepeta* taxa and pointed to several key genes in the iridoid's biosynthetic pathway as significant determinants of the their diversity within the genus.

**KEYWORDS:** *Nepeta*, iridoids, diversity, metabolomics, transcriptomics, DNA barcoding

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