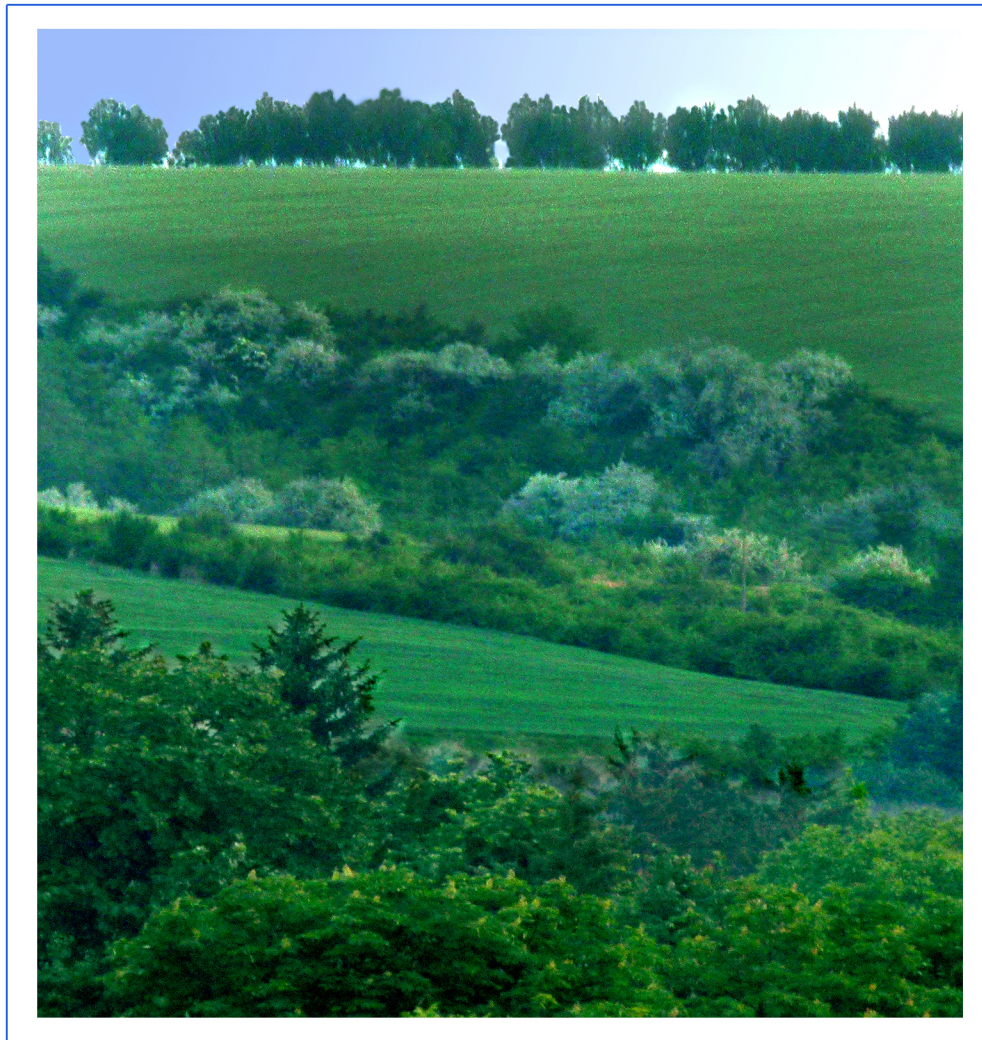


**UNION OF SCIENTISTS IN BULGARIA
SECTION BIOLOGY
INSTITUTE OF BIODIVERSITY AND ECOSYSTEM RESEARCH – BAS**



SEMINAR OF ECOLOGY - 2015

with INTERNATIONAL PARTICIPATION

23-24 April 2015

**Програма/Program
Абстракти/Abstracts**



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**“SEMINAR OF ECOLOGY – 2015”
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PROGRAM

23 April 2015

8⁰⁰ - 9⁰⁰ Registration (IBER-BAS)

9⁰⁰ - 9³⁰ Opening Ceremony

Family photo

THEMATIC SESSION I

MECHANISMS OF ADAPTATION OF LIVING SYSTEMS

Chairmen: Prof. Snezhana Grozeva and Prof. Svetlana Bancheva

Plenary presentations

9³⁰-9⁴⁵ MECHANISMS OF GENOTYPE RESISTANCE TO OXIDATIVE STRESS

Stephka Chankova - PL1_01

Oral presentation

9⁴⁵-10⁰⁰ THE ACTIVITIES OF THE ASPARTATE AMINOTRANSFERASE, ALANINE AMINOTRANSFERASE AND ALKALINE PHOSPHATASE ENZYMES IN THE BLOOD SERUM OF RATS IN CONDITIONS OF CHRONIC LEAD POISONING
Snezana Stavreva Veselinovska - L1_01

10⁰⁰-10¹⁰ DNA DOUBLE STRAND BREAKS REPAIR CAPACITY IN YEAST *SACCHAROMYCES CEREVISIAE* AFTER ZEOCIN TREATMENT *Teodora Todorova, Daniela Miteva, Margarita Pesheva, Stephka Chankova - L1_02*

10¹⁰-10²⁰ DO ENDOGENOUS CYTOKININS REGULATE TERPENOID BIOGENESIS AND THYLAKOID MORPHOGENESIS IN *ARTEMISIA ALBA* IN VITRO MODEL SYSTEM? *Sashka Krumova, Tonya Andreeva, Tsvetelina Oreshkova, Václav Motyka, P.*

Dobrev, Milka Todorova, Antoaneta Trendafilova, Nia Petrova, Stefka Taneva, Kalina Danova - L1_03

10²⁰-10³⁰ DNA DAMAGING EFFECT OF UV-B IN DIFFERENT *CHLORELLA* GENOTYPES *Daniela Miteva, Zhana Mitrovska, Stephka Chankova - L1_04*

10³⁰-10⁴⁰ BIOCHEMICAL AND MOLECULAR MARKERS FOR ASSESSMENT OF OXIDATIVE STRESS IN TWO GENOTYPES *PHASEOLUS VULGARIS* L. *Tsveta Angelova, Petya Parvanova, Zhana Mitrovska, Daniela Miteva, Diana Svetleva, Nadezhda Yurina, Stephka Chankova - L1_05*

10⁴⁰-11¹⁰ Discussion

11¹⁰-11²⁵ Coffee break

THEMATIC SESSION II

ANTHROPOGENIC IMPACT ON LIVING NATURE

Chairman: Prof. Vlada Peneva and Assoc. Prof. Galina Satchanska

Plenary presentations

11²⁵-11⁴⁰ MICROBIAL PROCESSES AND BIODIVERSITY OF MICROORGANISMS IN HOST ROCKS FOR GEOLOGICAL DISPOSAL OF RADIOACTIVE WASTE *Galina Radeva - PL2_01*

Oral presentations

11⁴⁰-11⁵⁰ ECOLOGICAL STATUS OF ATANASOVSKO LAKE (BULGARIA) BASED ON THE MACROZOOBENTHOS COMMUNITY *Monika Subeva, Lyubomir Kenderov, Vesela Evtimova, Zdravko Hubenov, Ivan Pandourski - L2_01*

11⁵⁰-12⁰⁰ SHORT-TERM AND LONG-TERM EXPERIMENTS IN ENVIRONMENTAL STUDIES *Daniela Miteva, Stephka Chankova - L2_02*

12⁰⁰-12¹⁰ DIFFERENTIAL SIGNIFICANCE OF AGE AND RADIATION EXPOSURE FACTOR IN THE HYPERMETHYLATION OF VARIOUS GENES IN HUMAN BLOOD LEUKOCYTES *Nina Kuz'mina, Nellya Lapteva, Alexander Rubanovich - L2_03*

12¹⁰-12²⁰ ANALYSIS OF SEDIMENTS IN THE MARITSA RIVER BASIN *Petya Dimitrova, Vesela Tsvetanova, Iliana Velcheva, Gana Gecheva, Irina Karadjova - L2_04*

12²⁰-12³⁰ PHYTOCHELATINS DYNAMIC IN *CLINOPODIUM VULGARE* AS A FUNCTION OF CD STRESS. GLUTATHION TO BE USED AS BIO INDICATOR FOR ELEVATED SOIL CD *Krum Bardarov, Rumjana Djingova - L2_05*

12³⁰-13⁰⁰ Discussion

13⁰⁰-13³⁰ Lunch

THEMATIC SESSION III

ECOSYSTEM RESEARCH AND SERVICES

Chairmen: Prof. Roumiana Metcheva and Assoc. Prof. Margarita Pesheva

Plenary presentations

13³⁰-13⁴⁵ THE ECONOMIC SIGNIFICANCE OF NATURAL ECOSYSTEMS *Iva Apostolova, Desislava Sopotlieva, Nikolay Velev - PL3_01*

Oral presentations

13⁴⁵-13⁵⁵ ECOSYSTEM SERVICES PROVIDED BY GREEN INFRASTRUCTURE IN URBAN ENVIRONMENTS – FOCUS ON CARBON STORAGE *Miglena Zhiyanski - L3_01*

13⁵⁵-14⁰⁵ METHODOLOGY FOR ASSESSMENT AND MAPPING OF ECOSYSTEMS AND THEIR SERVICES – BULGARIAN APPROACH *Svetla Bratanova-Doncheva, Nesho Chihev, Kremena Gocheva, Stoyan Verguiev - L3_02*

14⁰⁵-14¹⁵ ENHANCING ECOSYSTEM SERVICES MAPPING FOR POLICY AND DECISION MAKING – ESERALDA *Stoyan Nedkov, Svetla Bratanova-Doncheva - L3_03*

14¹⁵-14⁴⁵ Discussion

14⁴⁵-15⁰⁰ Coffee break

THEMATIC SESSION IV

LANDSCAPE ECOLOGY

Chairmen: Prof. Elisaveta Stoimenova and Assoc. Prof. Maryana Lyubenova

Plenary presentations

15⁰⁰-15¹⁵ IMPACT OF CLIMATE CHANGE ON VULNERABILITY OF FORESTS AND ECOSYSTEM SERVICE SUPPLY IN TWO REPRESENTATIVE LANDSCAPES IN WESTERN RHODOPEs *Tzvetan Zlatanov, Che Elkin, Florian Irauschek, Manfred J. Lexer - PL4_01*

Oral presentations

15¹⁵-15²⁵ ASSESSMENT OF THE STATUS AND POTENTIAL OF LANDSCAPES OF RILA SOUTHEASTERN SLOPES' PARTS FOR ACHIEVING CONSERVATION AND RECREATIONAL ACTIVITIES *Dragomira Stoyanova - L4_01*

15²⁵-15³⁵ REMOTE SENSING IN LANDSCAPE ECOLOGY *Rumiana Kancheva, Georgi Georgiev, Denitsa Borisova - L4_02*

15³⁵-15⁴⁵ DISCUSSION OVER SIMULATION WITH FOREST GAP MODEL PICUS IN TERMS WITH BULGARIAN CASE STUDY *Antonia Goleva - L4_03*

15⁴⁵-15⁵⁵ SUBMARINE LANDSCAPE DIVERSITY OF VARNA SUBLITTORAL ZONE: PRESENT-DAY CONSERVATION ISSUES AND RECOMMENDATIONS FOR SUSTAINABLE MARINE SPATIAL PLANNING *Iliyan Kotsev - L4_04*

15⁵⁵-16²⁵ Discussion

16²⁵-17⁰⁰ Coffee break and Poster session

17⁰⁰-18³⁰ Poster session I and Discussion

Chairmen: Assoc. Prof. Margarita Topashka-Ancheva, Chief Assist. Radka Fikova, Chief Assist. Petya Parvanova

POSTER SESSION I

MECHANISMS OF ADAPTATION OF LIVING SYSTEMS

P1_01 PRO-OXIDATIVE/ANTIOXIDATIVE CAPACITY OF WATER EXTRACT OF POPPY (*PAPAVER RHOEAS* L.) *Olga Angelova, Zhana Mitrovska, Stephka Chankova*

P1_02 EVALUATION OF THE PHOTOSYNTHETIC CHARACTERISTICS OF TEN DIFFERENT FERN SPECIES AND THEIR CHANGES UNDER DROUGHT STRESS, HEAT STRESS AND APPLICATION OF EXOGENOUS ABSCISIC ACID *Stella Dimitrova, Kolyo Dankov, Vasilij Goltsev*

P1_03 HIGH LIGHT INDUCED PHOTBLEACHING OF PHOTOSYNTHETIC PIGMENTS IN *ARABIDOPSIS THALIANA* THYLAKOID MEMBRANES, WT AND LUTEIN DEFICIENT MUTANT LUT2 *Konstantin Dobrev, Daniela Stanoeva, Antoaneta Popova*

P1_04 STUDY ON THE MICROSTRUCTURE OF LEAF SURFACE, LIPIDS COMPOSITION AND PIGMENTS SPECTRUM OF *ERYNGIUM MARITIMUM* L. *Albena Ivanova, Lilia Babenko, M. Shcherbatiuk, Irina Kosakivska*

P1_05 VARIATIONS IN ANTIOXIDANT CAPACITY DURING PEA VEGETATIVE GROWTH AT HIGH AIR TEMPERATURE *Boryana Mihaylova, Ivan Goshev, Lyubomira Atanasova*

P1_06 PROTEIN PROFILING AND ANTIOXIDANT ENZYME ACTIVITY OF ARTEMISIA ALBA CULTURES *Yuliana Raynova, Krassimira Idakieva, Yuliana Markovska, Evelyn Wolfram-Schilling, Kalina Danova*

P1_07 SCREENING OF THE ANTIMICROBIAL ACTIVITY OF MEDICINAL PLANT CULTURES COMMON TO THE FLORA OF BULGARIA AND TUNISA *Hammami Majdi, Azaiez Sana, Ben Slimene-Debez Imen, Limam Ferid, Tounsi Moufida, Mliki Ahmed, Bouamama Badra, Jebara Moez, Borji Manel, Danova Kalina*

P1_08 THE EFFECTS OF HEAVY METALS ON THE CHLOROPLASTS ULTRASTRUCTURE OF PEA LEAVES MESOPHYLL *Vodka Marina Valerievna*

P1_09 HIGH-LIGHT INDUCIBLE PROTEINS HLI A/HLI B ARE ESSENTIAL FOR LIGHT STRESS-ADAPTATION IN CYANOBACTERIUM SYNECHOCYSTIS PCC 6803 *Dascha Akulinkina, Nadezhda Yurina*

P1_10 ASSESSING THE IMPACT OF SALT STRESS ON THE PHOTOSYNTHETIC APPARATUS OF PAULOWNIA LINES *Martin Stefanov, Ekaterina Yotsova, Georgi Rashkov, K. Ivanova., Yuliana Markovska, Emilia Apostolova*

P1_11 ENERGY FLOW AND BALANCE OF BIOGENIC ELEMENTS THROUGH TWO SYNTHOPIC POPULATIONS OF THE HOUSE MICE MUS MUSCULUS MUSCULUS AND MUS SPICILEGUS *Michaela Beltcheva, Roumiana Metcheva*

ANTHROPOGENIC IMPACT ON LIVING NATURE

P2_01 GENOTOXIC POTENTIAL OF HERBICIDE 2,4-D IN VIVO IN SOME COMMON IN THE AGROECOSYSTEMS SMALL MAMMAL SPECIES *Tsvetelina Gerasimova, Margarita Topashka-Ancheva*

P2_02 ASSESSMENT OF GENOTOXICITY IN EXFOLIATED BUCCAL EPITHELIAL CELLS OF AGRICULTURAL WORKERS *Kemajl Kurteshi, Kasum Letaj*

P2_03 ECOLOGICAL STATUS OF THE MAIN RIVERS IN "BALGARKA" NATURAL PARK (BULGARIA) *Pencho Pandakov, Teodora Teofilova, Lyubomir Kenderov*

P2_04 ANTIBACTERIAL ACTIVITY OF NANOSTRUCTURED MATERIAL FOR MEDICAL APPLICATION *Venelina Savcheva, Iliana Ivanova*

P2_05 ENVIRONMENT POLLUTION FROM A PACKAGING USED IN THE DAILY LIFE OF THE PEOPLE *Snezhana Todorova*

P2_06 STUDY ON PRIORITY AND OTHER SUBSTANCES IN TOPOLNITSA RESERVOIR WATERS, BULGARIA *Vesela Yancheva, Petya Dimitrova, Iliana Velcheva, Elenka Georgieva, Stela Stoyanova, Marin Marinov*

P2_07 SENSITIVITY OF GREEN ALGAE AND CYANOBACTERIA TO PHENYLUREA HERBICIDES *Ekaterina Yotsova, Martin Stefanov, Anelia Dobrikova, Georgi Rashkov, Irina Pouneva, Emilia Apostolova*

P2_08 LEAD IN SANDER LUCIOPERCA AND SILURUS GLANIS DANUBE FISH *Roza Hristova, Teodora Yankovska and Galina Satchanska*

P2_09 CONTENT OF MERCURY IN HORSE MACKEREL FISH DETERMINED BY ATOMIC ABSORPTION SPECTROMETRY *Daniel Yordanov, Atanas Bliznakov, Ioana Georgieva, Tencho Tenev, Galina Satchanska*

ECOSYSTEM RESEARCH AND SERVICES

P3_01 SIZE, GROWTH AND DIET OF BLUEFISH (POMATOMUS SALTATRIX) IN THE BLACK SEA, BULGARIA *Ioana Georgieva, Georgi Daskalov*

P3_02 LONG-TERMS TREND IN THE HYDROLOGICAL CONNECTIVITY BETWEEN THE LOWER DANUBE AND WATER BODIES FROM THE BULGARIAN FLOODPLAINS *Stefan Kazakov, Luhezhar Pehlivanov*

P3_03 META ANALYSES OF SESSILE OAK DENDROCHRONOLOGICAL SERIES FOR ASSESSMENT OF TREE EUSTRESS *Mariyana Lyubenova, Simona Peteva*

P3_04 HIGH RESOLUTION VEGETATION ANALYSES OF MANAGED ARRHENATHERION COMMUNITY *Tsvetelina Terziyska, Desislava Sopotlieva, Yasen Stoyanov, Iva Apostolova, Shandor Bartha*

P3_05 ABIOTIC ENVIRONMENTAL FACTORS AND ITS RELATIONS TO PRIMARY PRODUCTIVITY OF CARP FISH PONDS *Doychin Terziyski, Roumen Kalchev, Angelina Ivanova, Liliana Hadjinikolova*

P3_06 PERSPECTIVES FOR ECONOMICAL VALUATION OF URBAN FORESTS - CASE STUDY FOR SANDANSKI *Vladimir Stojanovski, Miglena Zhiyanski*

LANDSCAPE ECOLOGY

P4_01 WIRELESS SENSOR NETWORKS FOR WILDFIRES DETECTION *Rumiana Kancheva, Georgi Georgiev*

24 April 2015

THEMATIC SESSION V

BIODIVERSITY AND CONSERVATION BIOLOGY

Chairmen: Prof. Stephka Chankova and Assoc. Prof. Marina Stanilova

Plenary presentations

9⁰⁰-9¹⁵ IBER – NATIONAL CENTER FOR SCIENTIFIC INVESTIGATION IN THE FIELD OF BIODIVERSITY AND ECOSYSTEM RESEARCH *Anna Ganeva - PL5_01*

9¹⁵-9³⁰ PLANT DIVERSITY OF BULGARIA *Svetlana Bancheva - PL5_02*

9³⁰-9⁴⁵ BIODIVERSITY OF VERTEBRATES IN ANTARCTICA *Roumiana Metcheva - PL5_03*

9⁴⁵-10⁰⁰ CATALOG OF THE PLANT SPECIES IN NEW BULGARIAN UNIVERSITY CAMPUS. BIOLOGICALLY ACTIVE SUBSTANCES *Galina Satchanska, Nikolai Nikolov, Iliana Mitova, Konstantin Hadjigenchev - PL5_04*

Oral presentations

10⁰⁰-10¹⁰ CONDITION AND THREATS TO THE POPULATIONS OF FIVE BALKAN ENDEMIC PLANTS ON MT FALAKRO, NORTHERN GREECE *Asen Asenov - L5_01*

10¹⁰-10²⁰ BACTERIOPLANKTON DIVERSITY AND COMMUNITY COMPOSITION IN OKOTO LAKE, SEVEN RILA LAKES *Silvena Boteva, Mihaella Alexova, Anelia Kenarova, Galina Radeva - L5_02*

10²⁰-10⁵⁰ Discussion

10⁵⁰-11⁰⁵ Coffee break

Chairmen: Prof. Iva Apostolova and Prof. Boyko Georgiev

11⁰⁵-11¹⁵ ECOLOGICAL CONDITIONS OF THE RIVERS IN “CENTRAL BALKAN” NATIONAL PARK (BULGARIA) BASED ON THE BOTTOM MACROINVERTEBRATES *Dimitrii Dashinov, Tihomir Stefanov, Lyubomir Kenderov - L5_03*

11¹⁵-11²⁵ DIVERSITY OF CESTODES PARASITISING BIRDS FROM ETHIOPIA *Yana Dimitrova, Gergana Vasileva, Jean Mariaux, Boyko Georgiev - L5_04*

11²⁵-11³⁵ HABITAT DIVERSITY IN MALA PLANINA *Borislav Grigorov, Assen Assenov - L5_05*

11³⁵-11⁴⁵ BRYOPHYTE FLORA OF SUB-MEDITERRANEAN RIVERS IN BULGARIA *Yordanka Hristeva, Gana Gecheva, Karin Pall - L5_06*

11⁴⁵-11⁵⁵ THE RIVERS TROPHIC RESOURCES - LEADING FACTOR IN FORMATION OF FUNCTIONAL FEEDING GROUPS OF THE MACROZOOBENTHOS *Maria Kerakova, Emilia Varadinova - L5_07*

11⁵⁵-12⁰⁵ USING BENTHIC MACROINVERTEBRATES TO ASSESS THE ENVIRONMENTAL AND TROPHIC CONDITIONS IN A DONOR AND RECIPIENT RIVERS FOR REINTRODUCTION OF BULLHEAD (*COTTUS GOBIO* LINNAEUS, 1758) *Lyubomira Lyubomirova, Lyubomir Kenderov, Eliza Uzunova, Tihomir Stefanov - L5_08*

12⁰⁵-12³⁵ Discussion

12³⁵-13¹⁵ Lunch

Chairmen: Assoc. Prof. Margarita Topashka-Ancheva and Assoc. Prof. Gergana Vasileva

13¹⁵-13²⁵ DIVERSITY OF HYMENOLEPIDID CESTODES (CYCLOPHYLLIDEA, HYMENOLEPIDIDAE) FROM RAILS (GRUIFORMES, RALLIDAE) IN BULGARIA *Margarita Marinova, Boyko Georgiev, Gergana Vasileva - L5_09*

13²⁵-13³⁵ HABITAT PREFERENCES AND IMPACTS OF THE INVASIVE ALIEN SPECIES OF *FALLOPIA* (POLYGONACEAE) IN BULGARIA *Tsvetelina Naydenova, Svetlana Bancheva, Vladimir Vladimirov - L5_10*

13³⁵-13⁴⁵ FLORA AND HABITATS OF KONGURA RESERVE IN BELASITSA MTS *Hristo Pedashenko, Kiril Vassilev, Svetlana Bancheva, Vladimir Vladimirov, Malina Delcheva - L5_11*

13⁴⁵-13⁵⁵ FLORA, VEGETATION AND NATURAL HABITAT TYPES IN KUTELKA RESERVE (EAST STARA PLANINA (BALKAN) MTS.) *Desislava Sopotlieva, Hristo Pedashenko, Anna Ganeva, Aleksandra Aleksandrova - L5_12*

13⁵⁵-14⁰⁵ HELMINTHS OF CAUCASIAN DWARF GOBY *KNIPOWITSCHIA CAUCASICA* (BERG) FROM ATANASOVSKO LAKE, BULGARIA *Borislav Stoyanov, Plamen Pankov, Boyko Georgiev - L5_13*

14⁰⁵-14¹⁵ FLORA AND HABITATS OF ORELYAK RESERVE IN PIRIN MTS *Kiril Vassilev, Hristo Pedashenko, Svetlana Bancheva, Vladimir Vladimirov, Malina Delcheva - L5_14*

14¹⁵-14²⁵ CONTRIBUTION TO THE KNOWLEDGE OF EPHEMEROPTERA, PLECOPTERA AND TRICHOPTERA (EPT) SPECIES FROM REPUBLIC OF MACEDONIA *Yanka Vidinova, Valentina Slavevska-Stamenković, Biljana Rimcheska, Violeta Tyufekchieva, Stoe Smiljkov, Dana Prelić, Milica Ristovska, Momir Paunović - L5_15*

14²⁵-14⁵⁵ Discussion
14⁵⁵-15¹⁰ Coffee break

THEMATIC SESSION VI

ECOLOGICAL AGRICULTURE

Chairmen: Prof. Spassimir Tonkov and Assoc. Prof. Galina Radeva

Plenary presentations

15¹⁰-15²⁵ DISEASE RESISTANT CROPS AND ECOLOGICAL (ORGANIC) AGRICULTURE Elisaveta Stoimenova - PL6_01

THEMATIC SESSION VII

ECOLOGY AND EDUCATION

Chairmen: Prof. Spassimir Tonkov and Assoc. Prof. Galina Radeva

Plenary presentations

15²⁵-15⁴⁰ ECOLOGICAL EDUCATION IN SECONDARY SCHOOL – REGULATIVE FRAMEWORK AND CURRICULUM ASPECTS Natasha Tsanova - PL7_01

Oral presentations

15⁴⁰-15⁵⁰ PROJECT-BASED LEARNING ON THE SUBJECT OF “ADVERTISING CAMPAIGN: SEPARATE WASTE COLLECTION Trifon Sotirov, Martin Maznilev, Milena Milekova - L7_01

15⁵⁰-16⁰⁰ FRAMEWORK TO ENSURE AND MAINTAIN THE QUALITY OF NON-FORMAL EDUCATION FOR SUSTAINABLE DEVELOPMENT Kamelia Yotovska, Asya Asenova, Hristina Bancheva - L7_02

16⁰⁰-16¹⁰ MACEDONIAN STUDENTS’ PERCEPTION OF POLLUTION AND THE ENVIRONMENT THROUGH TEACHING ENVIRONMENTAL TOPICS IN ENGLISH LANGUAGE CLASSES Snezana Todor Stavreva Veselinovska, Snezana Mihajlo Mirascieva, Emilija Todor Petrova Gorgeva, Snezana Aleksandar Kirova - L7_03

THEMATIC SESSION VIII

OTHER RELATED TOPICS

Chairmen: Prof. Spassimir Tonkov and Assoc. Prof. Galina Radeva

Oral presentations

16¹⁰-16²⁰ PALEOECOLOGICAL INVESTIGATION ON THE POSTGLACIAL VEGETATION AND CLIMATE CHANGES IN THE CENTRAL RILA MOUNTAINS, BULGARIA *Spassimir Tonkov, Elissaveta Bozilova, Gøran Possnert - L8_01*

16²⁰-16³⁰ INJURIES BY SCAB DISEASE TO APPLE FRUITS NON-TREATED WITH FUNGICIDES *Antony Stoev - L8_02*

16³⁰-17⁰⁰ Discussion

17⁰⁰-17³⁰ Coffee break and poster session

17³⁰ - 18⁴⁵ Poster Session II and discussion

Chairmen: Assoc. Prof. Marina Stanilova, Chief Assist. Svetla Bratanova and Chief Assist. Kalina Danova

POSTER SESSION II

BIODIVERSITY AND CONSERVATION BIOLOGY

P5_01 INVASIVE PLANT SPECIES OF UNIVERSITY BOTANIC GARDEN VARNA
Petya Boycheva

P5_02 ECOLOGY-ANATOMICAL CHARACTERISTICS AND VARIABILITY OF RANUNCULUS ACRIS (RANUNCULACEAE) *Georgi Dochev, Svetlana Bancheva*

P5_03 FIRST DATA ABOUT MACROINVERTEBRATE DIVERSITY ON THE BYAL KLADENETS LAKE – BULGARIA *Galia Georgieva, Yordan Uzunov*

P5_04 CONTRIBUTION TO THE KNOWLEDGE OF CARABID (COLEOPTERA: CARABIDAE) AND CERAMBYCID FAUNA (COLEOPTERA: CERAMBYCIDAE) OF BELASITSA MOUNTAIN IN R. MACEDONIA *Aleksandra Cvetkovska-Gjorgjievska, Slavčo Hristovski, Borislav Guéorguiev, Dana Prelić, Valentina Slavevska-Stamenković Milica Ristovska*

P5_05 A STUDY OF AQUATIC MACROPHYTES IN TWO BULGARIAN DANUBE WETLANDS *Borislava Gyosheva, Vladimir Valchev*

P5_06 DEVELOPMENT OF MACROZOOBENTHOS COMMUNITY IN THE EPHEMERAL ALDOMIROVSKO LAKE (NORTHWEST BULGARIA) *Pencho Ivanov, Mila Ihtimanska, Domenica Zaccagnino, Silvestre Marcato, Luchezar Pehlivanov*

P5_07 SEASONAL CHANGES IN TROPHIC STRUCTURE OF THE LOTIC MACROZOOBENTHOS COMMUNITIES *Emilia Varadinova, Maria Kerakova, Yordan Uzunov*

P5_08 DIVERSITY OF SOFT-BOTTOM MACROZOOBENTHIC COMMUNITIES IN THE SHALLOW COASTAL ZONE OF BURGAS BAY (SOUTH-WESTERN BLACK SEA) *Stefania Klayn, Ventzislav Karamfilov*

P5_09 IN VITRO MICROPROPAGATION OF DIANTHUS SP. (CARYOPHYLLACEAE) *Asya Kozhuharova, Mihail Perchekliyski, Boryanka Traykova, Marina Stanilova*

P5_10 ASSESSMENT OF TURBOT (*SCOPHTHALMUS MAXIMUS* L.) STOCK STATUS IN BULGARIAN BLACK SEA ACCORDING TO INDICATORS OF EU MARINE STRATEGY FRAMEWORK DIRECTIVE *Marina Panayotova*

P5_11 INITIATION OF IN VITRO CULTURE AND CAPACITY OF SEED SPROUTING IN TWO DIFFERENT MEDIUMS OF *ACHILLEA THRACICA* VELEN. PLANTS *Mariya Rogova, Daniela Dragolova, Zhenia Yordanova, Milena Dimitrova, Desislava Mantovska, Veneta Kapchina-Toteva*

P5_12 TRENDS OF MESOZOOPLANKTON COMMUNITY DYNAMICS IN THE BULGARIAN PART OF THE BLACK SEA *Elitsa Stefanova, Kremena Stefanova, Asen Konsulov*, *Lyudmila Kamburska*

P5_13 NEW RECORDS OF *DALDINIA VERNICOSA* IN BULGARIA *Dimitar Stoykov*

P5_14 NEW RECORDS OF ASCOMYCOTA IN BULGARIA *Dimitar Stoykov*

P5_15 CONSERVATION OF RARE AND ENDANGERED PLANT SPECIES OF THE BULGARIAN FLORA IN AN EX SITU COLLECTION *Boryanka Traykova, Valentina Goranova*

P5_16 *ELATOBIMUM ABIETINUM* (WALKER) - A LITTLE KNOWN PEST ON *PICEA* SPP. IN BULGARIA *Mariya Yovkova, Aneliya Pencheva*

P5_17 OCCURRENCE OF *TESTICULARIA AFRICANA* (SMUT FUNGI) IN TANZANIA AND MOZAMBIQUE *Teodor Denchev, Cvetomir Denchev*

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ABSTRACTS

THEMATIC SESSION I

MECHANISMS OF ADAPTATION OF LIVING SYSTEMS

PL1_01

MECHANISMS OF GENOTYPE RESISTANCE TO OXIDATIVE STRESS

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Recent understanding of the mechanisms involved in the formation of genotype resistance to oxidative stress comprises a set of integrated morphological, physiological, biochemical, metabolic and genetic characteristics that are interrelated and interdependent.

In this report, some features typical for radio- and chemiresistant genotypes of model organisms *Chlorella vulgaris* and *C. reinhardtii* will be discussed in a brief way.

The special contribution of higher constitutive levels of HSP70B, superoxide dismutase (SOD), SH-groups, pigments especially carotenoids and chlorophyll *a*, stability of ultrastructural cell components and/or the presence of cell wall is clarified. Our experiments show that genotype resistance to oxidative stress not always correlates with the quantity of initially induced BSBs, but rather with accelerated rejoining of DSBs, suggesting that unrepaired DSBs could at least partly account for different cell survival following environmentally induced stress.

To throw more light on the mechanisms involved in the formation of genotypic resistance to oxidative stress is of importance because several main reasons:

- of total biological point of view;
- from the perspective, to identify markers for rapid assessment of genotype resistance to various environmental stimuli;
- in terms of clarifying the relationship between genotype and induced resistance, which is a vital problem in the case of radio and chemo therapy;
- from an environmental point of view concerning the genetic elite of natural populations.

Acknowledgements: This work was supported by the following projects: “Environmental and genetic risk: methods for assessment and strategies to overcome”, Bulg. Acad. Sci; Antarctic algae - a model system for resistance to oxidative stress, NSF (DO 02-317); “Biochemical and molecular markers for resistance to oxidative stress”, BAS-RAS.

Keywords: oxidative stress, defense systems

L1_01

THE ACTIVITIES OF THE ASPARTATE AMINOTRANSFERASE, ALANINE AMINOTRANSFERASE AND ALKALINE PHOSPHATASE ENZYMES IN THE BLOOD SERUM OF RATS IN CONDITIONS OF CHRONIC LEAD POISONING

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Aim: The aim of this study was to analyze the activities of the AST (Aspartate Aminotransferase (AST), ALT (alanine aminotransferase) and ALP (alkaline phosphatase) enzymes in the blood serum of rats in conditions of chronic lead poisoning.

Material and methods: Research included: 40 female rats of the strain, weighing about 150-200 gr, and 4-5 months of age and 10 young offspring of the above females, 1.5 months old and about 80-100 gr of weight. Lead in the form of lead – acetate Pb (CH₃COO)₂ was given to female rats orally, by means of water.

Results: In conditions of chronic lead poisoning of female rats and their offspring a significant increase in the activities of AST, ALT and ALP enzymes in the blood sera of experimental groups in relation to the control ones was determined. A higher dose of lead resulted in a more significant increase of ALP activity in the blood sera of female rats.

Conclusion: The activities of AST, ALT and ALP enzymes in the blood serum of young rats were significantly increased in conditions of chronic lead poisoning of their mothers during periods of pregnancy and lactation, but dependence on the dose of lead being received by their mothers was not established.

Key words: Lead, AST (Aspartate Aminotransferase), ALT (alanine aminotransferase), ALP (alkaline phosphatase), chronic lead poisoning.

L1_02

DNA DOUBLE STRAND BREAKS REPAIR CAPACITY IN YEAST *SACCHAROMYCES CEREVISIAE* AFTER ZEOCIN TREATMENT

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Aim: to clarify some mechanisms involved in the development of adaptive response (AR) in *Saccharomyces cerevisiae* measured microbiologically and molecularly.

Materials and Methods: Test-system: *Saccharomyces cerevisiae* D7ts1 diploid strain.

Endpoints: Survival, gene conversion, reverse mutation, mitotic crossing-over; Double strand breaks (DSBs) induced and repair capacity measured by constant-field gel electrophoresis.

Experimental designs: Single treatment with 10µg/ml or 100µg/ml zeocin (based on preliminary results). Split treatment for induction of AR: microbiological tests - initial dose - 10µg/ml, test dose - 100µg/ml, inter-treatment time - 45, 60, 120, 180 or 240 min; for DSBs measurement - initial dose - 10µg/ml, test dose 100µg/ml, inter-treatment time - 45min and recovery time – 30, 60, 90, 120, 180 and 240 min.

Results: Based on the microbiological 45 min inter-treatment time is found as the most favorable - 2 fold higher cell survival compared to the one after single test dose treatment. The levels of gene conversion, reverse mutation and mitotic crossing-over are comparable with those measured in non-treated cells.

The adaptive response is measured as an acceleration of DSBs repair after split treatment. The magnitude of adaptive response was improved when 30 min recovery time was given (2 fold less DSBs).

Conclusion: Here for the first time from our point of knowledge data are presented about zeocin induced adaptive response in *Saccharomyces cerevisiae*. The optimal experimental conditions for the most pronounced adaptive response are: 45 min inter-treatment and 30 min recovery time. In these conditions cells can overcome the damaging activity of the radiomimetic zeocin.

Acknowledgements: This study was supported by project DNTS/ Slovakia/ 01/1

L1_03

DO ENDOGENOUS CYTOKININS REGULATE TERPENOID BIOGENESIS AND THYLAKOID MORPHOGENESIS IN ARTEMISIA ALBA IN VITRO MODEL SYSTEM?

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Aim: In our previous research it was established that terpenoid profile of the essential oils of *Artemisia alba* depends on plant growth regulators (PGR) supplementation and morphological development *in vitro*. These effects were further shown to be related to endogenous cytokinin levels. Here we study the morphology of thylakoid membranes (TM) in order to find possible relation between the obtained dependencies and the status of the photosynthetic apparatus of the plant *in vitro*.

Materials and methods: Shoot cultures of *A. alba* were initiated and maintained as previously described. Different treatments with indole-3-butyric acid (IBA) and benzyl adenine (BA) were applied. Isolated TM were examined by flow cytometry (FCM) and atomic force microscopy (AFM). Levels of endogenous cytokinins were determined by LC/MS chromatography. Terpenoid profile was studied by GS/MS analyses of the essential oils.

Results: FCM revealed co-existence of two TM fractions differing in size and internal structure in all PGR-treatments. AFM further demonstrated that IBA induced the formation of small TM subfraction and small granas (plants with predominant monoterpenoid content in the oils and slightly reduced cytokinin levels), while the combined action of IBA and BA resulted in the formation of large thylakoids and featureless granas (plants with predominant sesquiterpenoids in the oils and a drop of bioactive cytokinins levels).

Conclusion: We demonstrate that PGR influence the endogenous cytokinins level which in turn plays a crucial role in the thylakoid morphogenesis. The fraction of "swollen" thylakoids can be interpreted as indicative of early stage of senescence-like response.

Acknowledgements: PhytoBalk, SNF No. IZEBZ0_142989 and SD-MEYS No. DO2-1153

Keywords: *Artemisia alba in vitro* culture, terpenoid biogenesis, endogenous cytokinins, thylakoid membranes, flow cytometry, atomic force microscopy

DNA DAMAGING EFFECT OF UV-B IN DIFFERENT *CHLORELLA* GENOTYPES

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UV-B irradiation is considered as a powerful agent that can damage cell structures including DNA. The problem concerning genotype resistance to different environmental stimuli is of a great importance because it is related to the formation of genetic elite of the population. Our hypothesis is that algal species isolated from habitats with extreme environmental conditions would have similar or/and even more efficient cellular defense mechanisms.

The aim of this study was to compare the capacity of *Chlorella* species isolated from various habitats to repair DSBs induced by UV-B irradiation.

Material and Methods: *Chlorella vulgaris* (isolated from soil in island Livingston, Antarctic), *Chlorella vulgaris* 8/1 (isolated from thermal springs in the region of Rupite, Bulgaria) and *Chlorella kesslery* (Mesophilic from Trebon collection) were irradiated with UV-B ($\lambda = 312\text{nm}$) in BLX-254, Life Technology, UV crosslinker. The irradiation was in a dose range of 50, 100, 250, 500J/m². Recovery time of 4 and 24 hours was given after the irradiation. Cells were kept in continuous light at 23°C in the growth camera Phytotron GC 40 and in a dark on ice. Induction and repair efficiency of double-strand breaks (DSBs) was measured by CFGE.

Results: As a result of our study *Chlorella* species could be characterized as DNA proficient. An acceleration of DSBs rejoining was found when a recovery time in the range of 4-24 h (RT / light) was given. No statistically significant difference was obtained between repair capacities depending on the duration of recovery time. When cells were kept for 4-24h RT/dark on ice some partial repair of DSBs was obtained for *Chlorella vulgaris* and *Chlorella vulgaris* 8/1. Both species were found to express similar repair capacity. The same experimental conditions were shown to prevent in a full extent the repair of UV-B induced DSBs in *Chlorella kesslery*.

Conclusion: New evidence is provided that UV-B irradiation could induce DSBs. Our finding that *Chlorella vulgaris* (Antarctic) and *Chlorella vulgaris* 8/1 (Thermophilic) express similar capacity to repair UV-B induced DSBs could contribute for better understanding of mechanisms of genotype resistance. **Acknowledgements:** This study was funded by project: “Antarctic algae – a model-system for resistance to oxidative stress”. D-002-317

Keywords: *Chlorella*, DSBs, UV-B, repair efficiency, CFGE

BIOCHEMICAL AND MOLECULAR MARKERS FOR ASSESSMENT OF OXIDATIVE STRESS IN TWO GENOTYPES *PHASEOLUS VULGARIS* L.

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Aim: to identify reliable biochemical/molecular marker/s for the assessment of PEG-induced oxidative stress in two closely related genotypes *Phaseolus vulgaris* L.

Material and Methods: *Phaseolus vulgaris* L. mutant line 4 (L4) derived from cultivar Dobrudjanski 2 (D2) were studied. At the third leaf phase plants were split into three groups: untreated and treated with 8% and 16% polyethylene glycol (PEG - MW 10 000) for 24h. Four markers for oxidative stress - malondialdehyde (MDA), hydrogen peroxide (H₂O₂), proline (Pro) and heat shock protein content (HSP70B) were analyzed.

Results: No statistically significant differences in the constitutive levels of MDA, H₂O₂ and Pro were found for both genotypes. Around 3 fold higher constitutive HSP70B levels were measured for D2 comparing with those obtained for L4. The similar tendency was expressed analyzing induced HSP70B levels by PEG. No effect of the concentration and genotype was observed after PEG treatment, when MDA, H₂O₂ and HSP70B were measured. The levels of these parameters were around 1-2,4 fold higher comparing with those in a control.

Differences in a stress response measured as Pro accumulation were found for both genotypes. No dose-dependent relationship was obtained between PEG concentrations and Pro content in D2. Contrary, such relationship was demonstrated for L4. Interestingly, both genotypes respond in a similar pattern to 16% PEG induced drought.

Conclusions: Results presented here, that closely related genotypes reply to environmentally induced stress in a similar way confirmed our previous finding that species isolated from habitats with extreme environment have similar defense mechanisms. Based on our preliminary data Pro could be considered as a reliable marker to distinguish stress response to drought in genetically closely related genotypes.

Acknowledgements: This study was funded by the projects: DDVU_02/87 “Complex morphometric, physiological, biochemical and molecular assessment of drought tolerance in Bulgarian common bean genotypes (*Phaseolus vulgaris* L.)”, “Biochemical and molecular markers of drought tolerance in Bulgarian common bean genotypes” – scientific cooperation between RAS and BAS and „Ecological and genetic risk: methods and strategies for overcoming“– BAS.

Keywords: biochemical and molecular markers, drought stress, *Phaseolus vulgaris* L.

P1_01

PRO-OXIDATIVE/ANTIOXIDATIVE CAPACITY OF WATER EXTRACT OF POPPY (*PAPAVER RHOEAS* L.)

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Aim: to analyze pro-oxidative/antioxidative capacity of water leaf extract of *Papaver rhoeas* L. and to shed some light on its mode of the action.

Materials and Methods: *Chlamydomonas reinhardtii* strain 137 C+ was used as a model organism. Water leaf extract (A3) of poppy and several concentrations in the range of 1% to 5% were applied. Cells treated were for 1h. The amounts of MDA and H₂O₂ were determined spectrophotometrically using the methods of Dhindsa et al. 1981 and Heath & Packer, 1968. The values were compared with those measured in control sample - DMSO. The statistical assessment of the results was performed using t-test and one way ANOVA (GraphPad).

Results: For 2.5% and 5% concentration - peroxide oxidation was higher than that measured in the control DMSO. For 1% the values of the peroxide oxidation were significantly lower than that of the control, i.e. by treatment with this concentration of the extract A3 a protective effect was observed. Lipid oxidation of the membranes after treatment with 1%, 2.5% and 5% concentrations (values are approximately equal to or lower than that of the control DMSO) was not detectable.

Conclusions: For 1% concentration of the extract A3 the values of the peroxide oxidation were significantly lower than that of the control, i.e. this concentration had a protective effect. Lipid oxidation of the membranes was not detectable using water extract of *Papaver rhoeas* L.

Acknowledgements: This work is supported by the grant of the Bulgarian Ministry of Education, Youth and Science project: "Evaluation of DNA protective potential of bioactive natural compounds towards DNA damaging agents", BIONATPROT, BSTC/ Slovakia/01/1 and a project with budget subsidy "Environmental and genetic risk: methods for assessment and strategies to overcome".

Keywords: oxidative/antioxidative capacity, water leaf extract, *Papaver rhoeas* L.

P1_02

EVALUATION OF THE PHOTOSYNTHETIC CHARACTERISTICS OF TEN DIFFERENT FERN SPECIES AND THEIR CHANGES UNDER DROUGHT STRESS, HEAT STRESS AND APPLICATION OF EXOGENOUS ABSCISIC ACID

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Introduction: Fern species are among the least examined plants due to the common belief that their application is limited and of no significant interest. Despite the fact that ferns are often neglected, it is well known that some species exhibit interesting properties as medicinal pharmaceuticals, antidotes for

numerous poisons and protein rich nutrients. Their possible uses are not well developed yet because of the little information available about their characteristics and biodiversity.

Aim: The aim of the present study was to gather information about the physiological characteristics of ferns which can contribute to understanding their properties and promote their usage in many different fields.

Materials and methods: The photosynthetic apparatus is very sensitive to changes in the overall physiological state of plants, which makes it an excellent object for studying their properties, their reaction to changes in the environment and their behavior under stress. The Multifunctional Plant Efficiency Analyzer (MPEA) was used for evaluation of the photosynthetic characteristics of ten fern species by measuring the prompt and delayed chlorophyll fluorescence, and 820 nm light reflection. Data collected was used to build a photosynthetic profile of the species, showing the differences between their physiological characteristics. Their reaction to drought stress, heat stress and application of exogenous Abscisic acid was studied.

Results: Results clearly showed significant differences between the photosynthetic parameters of the ten species and in comparison to other plants both in their normal phenotype and their reaction towards environmental stress. Some ferns showed better adaptation and higher tolerance to abiotic stresses.

Conclusion: In conclusion, fern species showed interesting properties and better adaptation to changing environments which has the potential to make them an important agricultural object.

Key words: ferns, photosynthetic apparatus, chlorophyll a fluorescence, environmental stress

P1_03

HIGH LIGHT INDUCED PHOTBLEACHING OF PHOTOSYNTHETIC PIGMENTS IN *ARABIDOPSIS THALIANA* THYLAKOID MEMBRANES, WT AND LUTEIN DEFICIENT MUTANT LUT2

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Introduction: Illumination with high light intensity has a negative effect on photosynthetic processes. One of the detrimental effects is the degradation of photosynthetic pigments - photobleaching. Carotenoids are responsible for several important functions in photosynthetic processes - serve as accessory pigments in light absorption, facilitate photoprotection by dissipation of excess absorbed light energy, quench chlorophyll triplet states and scavenge reactive oxygen species. The most abundant carotenoid is lutein associated with the antenna of photosystem II.

Aim: The aim of this study was to investigate to what extent the lack of lutein influences the process of photobleaching.

Materials and methods: For this purpose the higher model plant *Arabidopsis thaliana*, wt and mutant lut2, deficient in lutein, were used. Illumination with $800 \mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ of isolated thylakoid membranes was performed at room temperature. Absorption spectra of non-illuminated and illuminated thylakoid membranes in buffer and the concentration of photosynthetic pigments were analyzed at different time points.

Results: The results indicated that photobleaching proceeds faster in thylakoid membranes of lutein-deficient mutant, lut2. The content of chlorophyll a and total carotenoids decreased in a time-dependent manner, both in the wt and lut2, faster in the carotenoid mutant than in wt. Degradation of chlorophyll b is observed only in lut2.

It can be concluded that thylakoid membranes of *lut2* are more susceptible to photobleaching than that of *wt* and that lutein performs an important role for protection of photosynthetic pigments against photodegradation.

Keywords: photosynthesis, photobleaching, lutein, *Arabidopsis thaliana*

P1_04

STUDY ON THE MICROSTRUCTURE OF LEAF SURFACE, LIPIDS COMPOSITION AND PIGMENTS SPECTRUM OF *ERYNGIUM MARITIMUM* L.

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Saline soils occupy 25% of the earth's surface. Halophyte plants are evolutionarily adapted to survive in such conditions.

The aim was to examine the microstructure of the leaf surface, lipids composition and pigment spectrum of halophyte *Eryngium maritimum* L.

Materials and methods: The plants were collected near the Pomorie Lake (Bulgaria). The leaf surface was studied with scanning electron microscope (JEOL JSM-6060 LA). The isolation of the main lipid classes and the analysis of their fatty acid composition were performed using thin-layer and gas chromatographic techniques. The spectra of photosynthetic pigments were recorded using a spectrophotometer Spekord M-40.

Results: The leaf surface of *E. maritimum* is flat, leathery and thorn-toothed. The abaxial surface is covered with stomata. The number of stomata per 1 mm² reaches 28±4.5. An average diameter of the stoma opening is 11.9±0.74 μm. Cuticle cells on leaf abaxial surface and epidermis of adaxial surface are covered with a layer of loose wax. Stomata are less embedded in the epidermis surface than it occurs on the abaxial side. The amount of the saturated fatty acid is high in comparison with other terrestrial plants. Triacylglycerol content is very high. The main glycolipid class is SQDG. The content of phospholipids is relatively low. The level of chlorophyll *b* and the content of carotenoids are lower as compared with the same in mesophytes.

Conclusion: The saline soils provided to *E. maritimum* specific microstructure of leaf, well-developed cuticle and stomata slit placed below the surface of the epidermis. The presence of a large amount of saturated fatty acids provides decrease of membrane permeability and better resistance against soil salinity. The key role in photosynthetic activity of *E. maritimum* L. plays chlorophyll *a*. The carotenoids transfer an additional energy to chlorophylls.

Acknowledgment: This work was completed in the frames of bilateral project between Ukrainian Academy of Sciences and Bulgarian Academy of Sciences (2014-2018).

Keywords: *Eryngium maritimum* L., microstructure, lipids composition, pigments

P1_05

VARIATIONS IN ANTIOXIDANT CAPACITY DURING PEA VEGETATIVE GROWTH AT HIGH AIR TEMPERATURE

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The purpose of the study was to compare the antioxidant capacities (AOC) of pea plants grown hydroponically at 22°C (normal) and 40°C (high) air temperature by means of AOC assays.

Methods: AOC was determined by HORAC (hydroxyl radical averting capacity), ORAC (oxygen radical absorbance capacity) and F-C (Folin-Ciocalteu) assays which assessed different functions of certain non-enzymatic antioxidants.

Results: Exposure to 40°C suppressed gradually pea growth and development; at the end of exposure pea plants did not expand the upper leaf stages, and did not develop reproductive organs. Changes of opposite pattern occurred in AOC during heat exposure. AOC in the whole plant increased about twofold after short exposure, however, prolonged one influenced negatively AOC of the green organs, particularly leaf and shoot apex AOC were reduced significantly. These responses were confirmed by the three assays though in different magnitude. The heat effect on the potential non-enzymatic antioxidants underlying the used assays will be discussed.

Conclusion: By means of three different *in vitro* assays we established that normally highest AOC was localized in green pea organs (leaves, shoot apex). The AOC values indicated the impacts of certain non-enzymatic antioxidants. The high air temperature affected mostly the AOC of upper leaf stages and shoot apex; pea growth and development were disturbed as well. The AOC is dynamic index; it varies depending on the developmental and environmental conditions, and the used assays are capable to detect the variations.

Key words: *Pisum sativum* L. cv. Ran, heat, growth, antioxidant capacity (AOC) assays.

P1_06

PROTEIN PROFILING AND ANTIOXIDANT ENZYME ACTIVITY OF *ARTEMISIA ALBA* CULTURES

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Aim: to assess the impact of exogenously applied plant growth regulators (PGR) on enzyme activities in *A. alba* shoot cultures.

Material and Methods: Protein content of fresh leaf and roots of *A. alba* was measured according to Bradford. Enzymes were estimated by SDS-PAGE, electrophoretic zymography and spectrophotometrically.

Results: The aerials were rich in protein content (~0.01g/g fresh leaf). Application of indole-3-butyric (IBA) acid alone was related to observance of bands in the aerials, corresponding to molecular mass of 24 and 26 kDa, which were absent when combination of IBA and benzyl adenine (BA) was applied.

Application of BA alone increased the protein content in the aerial parts. In roots and callus the protein content (~0.002 g/g fresh tissue) and the variety of protein fractions was lower. The latter samples displayed marked differences in their electrophoretic profile as compared to the aerials. The native PAGE enzyme activity staining, revealed presence of antioxidant enzymes (catalase, superoxide dismutase, ascorbate peroxidase, polyphenoloxidase, peroxidase). Data are in accordance with the activities of antioxidant enzymes obtained spectrophotometrically.

Conclusions: Application of PGR in *A. alba in vitro* leads to changes in the electrophoretic profile of samples of aerials and roots of the plant, which is confirmed by the results in determining the activities of antioxidant enzymes. Since relevant changes in polyphenol content and molecular markers of lipid peroxidation and oxidative stress have been obtained, it can be assumed that there is a correlation between enzymatic and non-enzymatic antioxidant protection of the plant *in vitro*.

Acknowledgment: Swiss National Science Foundation in the Framework in the Bulgarian-Swiss Research Programme (BSRP, grant No. IZEBZO_142989; DO2-1153)

Keywords: *Artemisia alba* shoot cultures, antioxidant enzyme activity, SDS-PAGE, native PAGE

P1_07

SCREENING OF THE ANTIMICROBIAL ACTIVITY OF MEDICINAL PLANT CULTURES COMMON TO THE FLORA OF BULGARIA AND TUNISA

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The aim of the present study was to screen the antimicrobial activity of *in vitro* cultivated medicinal plants originating from the flora of Bulgaria and Tunisia.

Material and Methods: *in vitro* cultures of *Hypericum perforatum*, *H. richeri*, *H. rumeliacum* and *Inula britannica* collected from the wild habitats in Bulgaria, as well as *Lavandula dentata*, originating from the experimental field of Biological Agriculture Technical Center in Chott-Mariem, Sousse, Tunisia were initiated by surface sterilization of the stem explants of the plants in benzyl adenine supplemented media. After *in vitro* growth induction stock shoots of the species were maintained in growth regulators free medium. Air dried plant material was subjected to successive ultrasonic extraction with chloroform and methanol. The different extracts were screened for their activity against six references strains pathogen bacteria, using the disc diffusion method.

Results: in this study we found antibacterial activity only in the chloroform extract. The highest activity was founded against *Listeria monocytogenes* by the chloroform extracts of *H. perforatum* and *H. richeri*, followed by the chloroform extracts of *L. dentata* and *Inula britannica*.

Conclusion: *In vitro* culture development of the studied medicinal plants could further be used as a constant and controllable source of raw material for the delivery of antimicrobial agent of the studied species. Further research is in progress to analyze the chemical composition of the various extracts as well as to broaden the study with enriched fractions obtained from these species.

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THE EFFECTS OF HEAVY METALS ON THE CHLOROPLASTS ULTRASTRUCTURE OF PEA LEAVES MESOPHYLL

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Current environmental pollution arouses a heightened interest in studying heavy metals (HM) as a stress factor and in searching for mechanisms to protect organisms from their toxic effects. Redundancy of heavy metals has a negative influence on organelle of cells by changing their structure and properties.

The aim of this work was to study the influence of ions Cu^{2+} and Zn^{2+} on the membrane system in the chloroplasts of cell of pea leaf mesophyll.

Materials and Methods: 14-day leaves of pea seedlings were used in our experiments. The leaf blades of *Pisum sativum* L. were soaked at 22°C and lighting of 15 μM quanta/($\text{m}^2 \times \text{s}$) for 2.5 days in Petri dishes in versions: in distillates, 250 μM CuSO_4 or 400 μM ZnCl_2 . From leaves exposed to CA inhibitor solutions there were cut out 2-3 cm long segments. The preliminary fixation was done in conditions of sample vacuum infiltration in 1% glutaraldehyde on 0,1 M phosphate buffer (pH 7,0) at the room temperature. Samples fixation was carried out with 2,5% glutaraldehyde on 0,1 M cacodylate buffer, pH 7.6 for 4 hours at 4°C. After washing in the same buffer (2 times for 20 min), the material post-fixation was conducted in solution of 1% OsO_4 on 0,1 M cacodylate buffer, pH 7,6, for one night at 4°C. Dehydration was done by sample washing in ethyl alcohol at increasing concentrations and in acetone. Then the material was soaked in epoxide resins and acetone mixture, poured in Epon-Araldite mix resin and transferred to thermostat for polymerization at 60°C.

Ultra-thin cell sections were obtained using ultramicrotome LKB-IV (LKB, Sweden). Sections were stained with uranyl acetate and potassium permanganate mixture (1:1) for 15 min in darkness. Ultra-thin sections were studied and filmed using transmission electron microscope JEM-1300 (JEOL, Japan). Preparation sections images were filmed by film for electron microscopy EB19H (AGFA, Belgium). After processing to analyze chloroplasts pictures and their segments morphometrically, the negatives were scanned. Pictures were made using the computer software Adobe Photoshop 7.0 and Corel Photo-Paint 11. 30-39 grana thylakoids enlarged $\times 10000$, or $\times 15000$, and $\times 100000$ were analyzed for each experiment version. The thylakoid dimensions on section pictures were measured using the free software UTHSCSA ImageTool 3.0.

Results: Under exposure to Cu^{2+} , with a preserved granum general structure and uniform thylakoid packing in grana, the thylakoid of grana thickness exceeded that of control by 11%, while interthylakoid gap thickness – by 10%.

Following the chloroplast treatment with Zn^{2+} there were observed some heterogeneity in grana thylakoid packing, granum structure changes that resulted in increase of thylakoid gaps by 14%, grana thylakoid thickness also increased by 18% as compared to control.

Conclusion: Thus, heavy metals can affect photosynthesis that causes a reduction in photosynthetic pigments content and in carbonic anhydrase activity, which breaks the ultrastructure. The results obtained are important for understanding the mechanisms of heavy metals toxic effects, estimation of plant potential to adapt to unfavorable factors of the environment and may be used in solving the problems of the theory of plant resistance to extreme factors action.

Key words: *Pisum sativum* L., acid rains, thylakoids, grana, chloroplast, photosynthetic apparatus.

P1_09

HIGH-LIGHT INDUCIBLE PROTEINS HLI A/HLI B ARE ESSENTIAL FOR LIGHT STRESS-ADAPTATION IN CYANOBACTERIUM *SYNECHOCYSTIS* PCC 6803

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Aims: HliP (high-light inducible proteins) are important in protection of the photosynthetic apparatus of cyanobacteria from light stress. However, the interaction of these proteins with chlorophyll-protein complexes of thylakoids remains unclear.

Material and methods: association of HliA/HliB stress proteins with photosystem 1 (PS1) complexes of the cyanobacterium *Synechocystis* PCC 6803 has been studied for understanding of their function. HliA/HliB are determined using gel-electrophoresis and Western blotting.

Main results: it has shown that stress-induced HliA/HliB proteins are associated with PS1 trimers in wild type cells grown at moderate light condition ($40 \mu\text{mol photons m}^{-2} \text{s}^{-1}$). The content of these proteins increased in 1.7-fold after light stress ($150 \mu\text{mol photons m}^{-2} \text{s}^{-1}$) for 1 h. In the absence of PS1 trimers (ΔpsaL mutant) the HliA/B proteins are associated with PS1 monomers and PS2 complex. HliA/HliB proteins are associated with PS1 monomers but not with PS1 trimers in *Synechocystis* PS2-less mutant grown at $5 \mu\text{mol photons m}^{-2} \text{s}^{-1}$; the Hli proteins content associated with PS1 monomers increased 1.2 times after light stress. The HliA/HliB proteins have not detected in wild type cells of cyanobacterium grown in glucose-supplemented medium at $5 \mu\text{mol photons m}^{-2} \text{s}^{-1}$, but light stress induces the synthesis of stress proteins associated with PS1 trimers.

Conclusion: thus, for the first time, the association of HliA/HliB proteins not only with PSI trimers, but also with PS1 monomers is shown, that presupposes the universal role of these proteins in protecting of the photosynthetic apparatus from excess light. The characterization of stress-responsive proteins will provide new insights into the understanding of adaptation mechanisms.

Acknowledgements: This work was supported by the Presidium of RAS (Program Molecular and Cellular Biology) and by Russian Foundation for Basic Research (project no. 13-04-00533).

Keywords: high-light inducible proteins HliA/HliB, light stress, cyanobacteria

P1_10

Assessing the impact of salt stress on the photosynthetic apparatus of *Paulownia* lines

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Aim: This study characterizes the effects of the salinity of the soil on the pigment composition and functional activity of the photosynthetic apparatus of two lines of *Paulownia* (*Paulownia tomentosa* x *fortunei*, TF and *Paulownia elongata* x *elongata*, EE).

Materials and methods: Pigment composition, pulse amplitude modulated (PAM) chlorophyll fluorescence and redox kinetics of P₇₀₀ were used for characterization of the studied lines of *Paulownia* grown on three soil types with different salt content.

Results: The experimental results showed that: (i) salinity does not affect the pigment composition of *EE* while some change in the pigment amounts, which are associated with a modification of LHCII and some changes in the structural organization of thylakoid membranes, are detected in *TF*; (ii) the quantum yields of the primary photochemistry of the photosystem II in the dark adapted state (F_v/F_m) are not influenced by salt stress; (iii) salinity affects in different way parameters of the PAM chlorophyll fluorescence in the light adapted state (F_v'/F_m' , q_p , q_N , ETR, V_s) in both lines of *Paulownia*; (iv) photosystem I photochemistry are influenced by the degree of salinity; (v) salinity in the soil influences Q_A^- reoxidation kinetics. All these changes under the salt stress influence in a different way the CO_2 assimilation rate.

Conclusion: Data in the present investigation revealed some of the reasons for salt tolerance of the plants.

Acknowledgements: The work was supported by the Bulgarian Academy of Sciences

Keywords: *Paulownia*, PAM chlorophyll fluorescence, P_{700} , pigments, soil salinity

P1_11

ENERGY FLOW AND BALANCE OF BIOGENIC ELEMENTS THROUGH TWO SYNTHOPIC POPULATIONS OF THE HOUSE MICE *MUS* *MUSCULUS MUSCULUS* AND *MUS SPICILEGUS*

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Aim: The purpose of the study is to investigate the energy needs of two house mice (*Mus musculus musculus* and *Mus spicilegus*), and to estimate the amount and the flow of the main biogen elements Nitrogen (N), Phosphorus (P), Potassium (K) and Calcium (Ca).

Material and methods: Food preferences have been provided by Drozd (1966). The measurements and calculations of the daily energy flow were by Ryszkowski and Petruszewicz (1967).

The biogen elements were determined using the following methods:

1. Nitrogen - according to Kiejdahl.
2. Phosphorus - colorimetrically with photoelectro-colorimeter "Specol" 1.
3. Potassium and calcium - by flame photometer "Flapho".

Results: On the base of laboratory experiments for food preferences of the two investigated species basic bioenergetic characteristics, so as the energy flow through mice body were established. Calculations on the balance of the main biogen elements N, P, K and Ca also were done. The results show that for both mice species about 19% from the total food intake (C) excreta as feces and urine (F+U) and therefor the assimilation (A) was around 80%. It incorporates also the metabolic energy (R), which spends mainly as costs for respiration to maintain the animals' base vital functions. From the total of 0.092 g of nitrogen in the consumed food. *Mus spicilegus* returned to nature 78.2% and *Mus m. musculus* 83.1% by excreta. The main nitrogen amount (69.4 %) in the total excretion belongs to urine. Therefore, the amount of nitrogen that's includes in body metabolic processes is within 26.9 to 31.8% for both rodent species. The assimilate quantities of the other three biogenic elements are significantly higher than those of the nitrogen. *Mus spicilegus* returns 34% of phosphorus, 15.8% of potassium and 10.5% of calcium.

Keywords: house mice, energy flow, biogen elements

THEMATIC SESSION II

ANTHROPOGENIC IMPACT ON LIVING NATURE

PL2_01

MICROBIAL PROCESSES AND BIODIVERSITY OF MICROORGANISMS IN HOST ROCKS FOR GEOLOGICAL DISPOSAL OF RADIOACTIVE WASTE

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Worldwide, geological stable formation (i.e. clay or organic host-rocks) is considered the key solution for the disposal of radioactive waste. Overall, the safety of geological disposal is based on a multi-barrier concept with various materials, such as vitrified and bituminized waste, metal container (carbon steel, stainless steel), or bentonite. Many countries are considering long –term disposal of nuclear waste in a deep geological formation, encapsulated in metal container, surrounded by a bitumen or bentonite-engineered barrier, and emplaced in the host rock. The assessment of the long term behaviour of the radioactive waste and disposal materials is required in order to demonstrate the safety of this strategy and to assure the future geological disposal. Microorganisms can potentially affect radionuclides migration by various processes including biosorption, biomineralization, intracellular accumulation, biotransformation, etc. In addition, microbial occurrence can influence the release of radionuclides by changing geochemical conditions (especially pH and Eh), by producing organic complexantes. The observation of an important microbiological diversity in these conditions lead to consider the impact of these microorganisms of the rate of processes implicated in the (i) metal corrosion, (ii) transformation of clay minerals, (iii) radionuclide migration. All these processes might affect the safety of geological repositories compromising its isolation and containment functions.

L2_01

ECOLOGICAL STATUS OF ATANASOVSKO LAKE (BULGARIA) BASED ON THE MACROZOOBENTHOS COMMUNITY

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Aim: The aim of this study is to present actual data on the ecological status of Atanasovsko Lake according to the taxonomic composition and quantity of the bottom macroinvertebrates.

Material and Methods: Macrozoobenthic invertebrates were sampled in October and November 2014 from 16 sites located in different water bodies (i.e. freshwater swamps and surrounding canal, brackish and hyper-saline basins). A hand-held net (EN-ISO 10870:2012) was used for collecting the samples. The

ecological status was determined in accordance with Regulation N-4/2012. The Biotic Index (for freshwater bodies) and AMBI and M-AMBI biotic index (for salt water bodies) were used for the evaluation of the status.

Results: We recorded 46 macroinvertebrates taxa belonging to 18 different groups. Fifteen taxa were recorded for the first time from Atanasovsko Lake. They represent 33% from all species found from the lake. List of newly founded taxa and the conservation status of all macroinvertebrates will be presented in a separate publication. All freshwater bodies had “moderate” ecological status (Biotic index = 2.5 or 3). The brackish water bodies had “good” or “high” ecological status (M-AMBI = 0.62÷0.90), while the hyper-saline water body had “bad” ecological status (M-AMBI=0.31).

Conclusions: In general, we may conclude that the summarized ecological status of the lake is appropriate and acceptable with respect to the environmental conditions. The only case of deterioration is not due to anthropogenic pollution, but mainly to the high salinity of the water, which limits the occurrence even of saline invertebrates.

Acknowledgements: This study is supported by the Project “Actualization of Management plan for the maintained reserve Atanasovsko Lake” with PI prof. Tanyo Michev, IBER, BAS

Keywords: Atanasovsko Lake, invertebrate fauna, ecological quality

L2_02

SHORT-TERM AND LONG-TERM EXPERIMENTS IN ENVIRONMENTAL STUDIES

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The aim of this study was to compare genotoxic potential of polluted soil samples from KCM Plovdiv in short term and long term experiments using CFGE.

Material and Methods: The wild type *Chlamydomonas reinhardtii* 137C was used. Five soil samples from different plots were studied. Extraction was performed with 0.01M CaCl₂ solution. The strain 137C was cultivated on liquid TAP medium under standard conditions in the growth camera Phytotron GC 40. The cell suspension was treated for 2 and 72 hours with soils samples. DSBs induction was measured by constant field gel electrophoresis.

Results: The results revealed that soil samples/extracts did not show genotoxic effect after 2h treatment. DNA damaging effect of soil samples was obtained when cells were treated for 72h.

Conclusions: Our results demonstrated that long term treatment could be considered as more reliable approach for revealing genotoxicity of environmental samples.

Acknowledgements: This study was funded by project “Evaluation of soil monitoring indicators and environmental risk assessment for development of programs to sustainable land use in contaminated and anthropogenic impacted zones”, (DTK 01/105 05.01.2010).

Keywords: soil samples, DSBs, CFGE, test-system, *Chlamydomonas reinhardtii*

L2_03

DIFFERENTIAL SIGNIFICANCE OF AGE AND RADIATION EXPOSURE FACTOR IN THE HYPERMETHYLATION OF VARIOUS GENES IN HUMAN BLOOD LEUKOCYTES

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Aim: The study of long-term epigenetic consequence associated with hypermethylation promoter of genes of basic protective functions of cells in blood leukocytes in remote periods after irradiation of human body; the evaluation of age and radiation exposure factor in the hypermethylation of various genes.

Materials and Methods: Methylation-sensitive PCR assay was used to analyze promoter hypermethylation of *p16/CDKN2A*, *p14/ARF*, *RASSF1A* and *GSTP1* genes in blood leukocytes from 208 unirradiated volunteers and 124 irradiated subjects (83 Chernobyl Nuclear Power Plant liquidators, 21 nuclear specialists, 20 residents of territories with radioactive contamination, 4 persons evacuated in 1986 from the zone of Chernobyl NPP). The age of unirradiated and irradiated subjects at the time of examination was 19 to 77 years and 24 to 77 years, respectively. Besides, 74 non-exposed offsprings (2.5 – 49 years) born from irradiated parents were examined.

Results: As a whole, a frequency of individuals with promoter methylation of at least one of the analyzed genes in exposed group is significantly higher compared to the control group (OR = 5.44, 95% CI = 2.62 - 11.76, p-value = $3.9 \cdot 10^{-7}$). No significant differences were found in the frequency of children born to irradiated and unirradiated (control group) parents with the revealed promoter hypermethylation of studied genes (power of the test is about 90%). On this account, upon further analysis, the offsprings of irradiated individuals were assigned to the control group. Multiple regression analysis showed that the growth in the number of methylated loci of a set of *RASSF1A* and *p14* genes is due to the age factor ($\beta = 0.242$; p-value = $1.7 \cdot 10^{-5}$). In contrast, the growth in the number of methylated loci of a set of *p16* and *GSTP1* genes is exclusively due to the fact of radiation exposure ($\beta = 0.290$; p-value = $1.7 \cdot 10^{-7}$).

Conclusion: The reality of hypermethylation of CpG islands in promoters of genes of basic protective functions of cells is revealed in blood leukocytes in remote periods after irradiation of human body. Differential role of age and radiation exposure factor in the hypermethylation of various genes was identified.

Acknowledgments: This work was supported in part by the grant “Russian Foundation for Basic Research” (№ 13-04-00985) and programme “Dynamics of gene pool of plants, animals and human” of the Presidium of the Russian Academy of Sciences

L2_04

ANALYSIS OF SEDIMENTS IN THE MARITSA RIVER BASIN

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The study involved sampling and analysis of sediments at 6 sites in the Maritsa River basin in the period 2013-2014. The aim of the current research was to assess effects of the anthropogenic pressure caused by the metals and pesticides production and by the intensive agriculture. Sites were located in the middle part

of the Maritsa River basin (near Plovdiv city) and the watersheds of Chepelarska and Stryama rivers. New methods were applied in order to establish trends in the accumulation of certain priority substances in sediments, as required by the Directive 2008/105/EC.

Keywords: sediments, heavy metals, pesticides, Maritsa River basin

L2_05

PHYTOCHELATINS DYNAMIC IN *CLINOPODIUM VULGARE* AS A FUNCTION OF CD STRESS. GLUTATHIONE TO BE USED AS BIO INDICATOR FOR ELEVATED SOIL CD

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Introduction: Plants respond to heavy metal toxicity in a variety of ways. One of the detoxication mechanisms is chelation of metal ions by various plant synthesized ligands such as Phytochelatins (PCs). PCs are enzymatically synthesized Cys-rich peptides with general formula (g-Glu-Cys)_n-Gly.

Materials and Methods: Collection of soil-(non polluted soil with negligible anthropogenic impact) Diluvial meadow soils / Colluviosols according to the WRB classification system, 2006/ located in the area of Lozen village – the control soil variant. 12 equal 6kg portions of the control soil were contaminated in the laboratory with water solutions of Cd acetate. Three different concentration levels of Cd (2, 12 and 20 µg/g soil) were added to soils. Pots were sowed with 0.6 g seeds and were kept in a climate controlled greenhouse. Accela HPLC with Q-Exative detector (Thermo Fisher Scientific, Waltham, MA, USA) with H-ESI electrostray was used in PCs analysis. Quantitation of unbound phytochelatins was performed by RP separation of CV extracts on Kinetex C8 50 x 3 mm 2.6 µm core-shell column (Phenomenex Inc, Torrance, CA, USA) A Perkin Elmer SCIEX Elan DRC-e ICP-MS system was exploited Cd measurements in soil and plants according.

Results and Discussion: The content of PCs and the PCs dynamics in *Clinopodium vulgare L* plant organs (roots, shoots and leaves) were investigated as function of Cd concentration in the soil medium varying from background concentrations to upper permissible soil concentration of 2 ppm and up to 20 ppm. PC3 was the most abundant phytochelatin in plant roots reaching 225 µg/g, followed by PC4 (80 µg/g) and PC2 (23 µg/g). PC5 (0.3 µg/g) was detected in roots only at the highest Cd soil concentration. GSH was the most abundant in plant shoots and significantly higher than PC3 (7.3 µg/g), PC2 (6.6 µg/g) and PC4 (1.3 µg/g). PC5 was not detected in shoots. GSH was determined as 20 µg/g in leaves, 15-fold higher concentration than that in control plants leaves. PC2 and PC3 were detected in lower concentrations in leaves (up to 2.4 µg/g) but still higher than in control plants leaves. PC4 and PC5 were not detected in leaves of Cd stressed plants.

Conclusion: GSH could be proposed as a marker of heavy metal pollution in soil based on the pronounced correlation among d concentration in plants, soil and leaves' glutathione concentration.

P2_01

GENOTOXIC POTENTIAL OF HERBICIDE 2,4-D *IN VIVO* IN SOME COMMON IN THE AGROECOSYSTEMS SMALL MAMMAL SPECIES

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2,4-Dichlorophenoxyacetic acid (2,4-D) is commonly used herbicides worldwide as growth a regulator of broadleaf weeds in agriculture and forestry.

The aim of the present study was to evaluate the genotoxic potential of low doses 2,4-D in some typical small mammal species for the agroecosystems of Northern Bulgaria (*Apodemus sylvaticus*, *Microtus arvalis* and *Mus spicilegus*) and the laboratory mice (ICR strain).

Materials and Methods: The cytogenetic analysis have been done following a routine cytogenetic method for chromosomal aberrations. The herbicide was injected intraperitoneally (3.5 mg/kg b.w.) once (first group) and in three sequential exposures with an interval of 48 hours (second group). As positive control was applied Mitomycin C (3.5 mg/kg b.w.). The mitotic index was also calculated.

Results: In single treated experimental group the percentage of chromosomal aberrations were from $4.55 \pm 0.39\%$ in *M. spicilegus* to $5.0 \pm 0.52\%$ in *A. flavicollis*. Statistically significant differences between the control and the treated groups was found in ICR mice, *M. arvalis* and *A. flavicollis*.

All triplicate treated groups showed relatively more pronounced species-specific response. Statistically significant differences between ICR / *M. spicilegus*; ICR / *M. arvalis*, and between the *M. arvalis* / *A. sylvaticus* were established. A higher rate of injured cells compared to their respective untreated controls were also obtained.

Conclusion: Our results confirm the low to moderate clastogenic effect of the herbicide 2,4-D and an absence of a pronounced cytotoxic effect but his harmful effect on the hereditary structures is increased as a result of the triple introduction of herbicide.

Keywords: 2,4-D, chromosomal aberrations, small mammals

P2_02

ASSESSMENT OF GENOTOXICITY IN EXFOLIATED BUCCAL EPITHELIAL CELLS OF AGRICULTURAL WORKERS

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Aim: Agricultural workers are exposed to a mixture of pesticides, which is suspected to cause genetic damage. The aim of this study was to assess herbicide Randop 480 ec exposure by urinary excretion of 1-hydroxypyrene (1-OHP), a biological exposure marker. Moreover, we aimed to assess the level of genetic damage in Kosovo agricultural workers exposed to pesticides.

Methods: Fifty agricultural workers and a standardized control group were examined for frequencies of micronucleus (MN) in buccal epithelial cells.

Results: The genetic damage observed in the buccal cells of foundry workers was significantly higher than that in controls. Cigarette smoking was also related to genetic damage since the MN observed in herbicide exposed groups with smoking habits was significantly higher than non-smoking workers.

Conclusions: Occupational exposure of herbicide from agricultural workers has been associated with the increased genetic damage and smoking habit represents an additional risk factor. Exposure to herbicide may be aetiologically related to increased risk of cancer in agricultural workers.

Keywords: herbicide, agricultural, workers

P2_03

ECOLOGICAL STATUS OF THE MAIN RIVERS IN "BALGARKA" NATURAL PARK (BULGARIA)

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Aim: The aim of the study is to evaluate the ecological status of the rivers from Yantra River basin in Natural Park "Balgarka".

Material and Methods: Fieldwork was carried out in the summer and autumn of 2013. Twenty five main sites and 12 additional sites from 22 rivers were selected. Some physicochemical parameters of the water were measured. Benthic macroinvertebrate samples were collected by a hand net (ISO 10870:2012) according to the multihabitat method (EN 16150:2012). The taxonomic composition and abundance of macroinvertebrates were established. Data were analyzed by: dominant analysis, structural parameters of the communities, biotic indices for ecological assessment and autecological analysis.

Results: The total number of the macroinvertebrate individuals was 49643. We identified 127 different taxa. In the higher parts of the rivers ecological status was "high". Thirteen river sections with reduced ecological status were located. The hydrochemical parameters were typical for the mountain river type in Bulgaria. Rivers have very high species diversity and well-structured benthic communities. The most adequate assessment of ecological status is achieved by trophic index and biotic index.

Conclusions: The main impacts were the disturbance of the hydrological regime and pollution by sewage from the settlements, and also seasonal drying of smaller rivers in the eastern part of the Park. The autecological analysis showed disturbance in benthic communities from dewatered river sections.

Keywords: Yantra river, ecological status, benthic macroinvertebrates, Natural Park "Balgarka"

P2_04

ANTIBACTERIAL ACTIVITY OF NANOSTUCTURED MATERIAL FOR MEDICAL APPLICATION

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Aim: To assess the antibacterial activities of eighth collagen structures with nanoparticles against *Listeria monocitogenes*, *Pseudomonas putida*, *Bacillus cereus*, *Staphylococcus epidermidis*, *Salmonella enterica* and serotype *choleraesuis*, *Candida lusitaniae*74-4 and *Escherichia coli*.

Materials and Methods: All the samples contain collagen fibers and silver, zinc oxides and titanium oxides nanoparticles. The ratio between the collagen and antimicrobial substance is 2:1.

The samples were cross-linked with 0.25% glutaraldehyde and then lyophilized. After lyophilization all of them looks like sponge.

The bacterial strains are sub cultured from glycerol-frozen Eppendorf tubes in the most suitable for each bacterium media. 24 h fresh cultures were sub cultivated in agar medium and checked for purity after 24-48 h cultivation. Single colony was picked from each strain and sieved in liquid medium. Fresh 18 h cultures were sieved on a solid nutrient medium in petri dishes and sterile pieces of antibacterial samples are put in it. The petri was put in refrigerator for a night and cultivated at 37°C for 24-48 h.

Results: The antibacterial activity of tested materials was specific for each species as presented in mm sterile zone. The materials with code numbers 2 and 5 have the antibacterial activity against all tested microorganisms, material No1 against 5 of them, and 4 and 7 against 4 tested microbes.

Conclusion: Some materials show very strong antibacterial and antifungal activity and could be used as wound dressings in medicine, catheters and drainage hoses for surgery etc.

Acknowledgements: To Prof. Todorka Vladkova for the provided materials.

Keywords: antibacterial effect, antifungal effect, bacteria, fungi.

P2_05

ENVIRONMENT POLLUTION FROM A PACKAGING USED IN THE DAILY LIFE OF THE PEOPLE

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Aim: It is known that about 70% of the planet is covered by water. Waste falling in water sources and in particular plastics pose a threat not only to the health of marine ecosystems, but also for the global economy and population. The majority of the waste in the water systems are generated by the activities on land, namely as a result of human involvement. The aim of this study is to make a summary literature research on major sources of pollution and to pathway opportunities to attend to the problems associated with waste into the environment.

Materials and Methods: For the implementation of the task scientific information available in different European organizations such as the European Environment Agency, European Food Safety Authority, World Health Organization, Ministry of Environment and Waters in Bulgaria, etc. has been used.

Results: Following a study it has been found that about 10 million tons of waste fall into the world's seas and oceans each year. Plastics and especially plastic bags, bottles and bags for single use are the most common type of contaminants found in the marine environment.

Conclusions: Based on this study, it can be concluded that different countries search for sufficient options to address the problems related to environmental pollution from used packaging. These are: the production of biodegradable packaging; make a periodic collection of waste in the seas, oceans, rivers; cleaning of beaches and seaboard around them; protection of rivers and etc.

Keywords: pollution, plastics, bottles, biodegradable packaging.

P2_06

STUDY ON PRIORITY AND OTHER SUBSTANCES IN TOPOLNITSA RESERVOIR WATERS, BULGARIA

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Aim: The present study aimed to evaluate the contamination status of Topolnitsa Reservoir.

Materials and Methods: It is located in a region rich in copper ores and intensive mining activities. The reservoir also serves as the final sink for all other types of pollutants carried with Topolnitsa River and its tributaries, some of which are heavily contaminated. Surface water samples were collected monthly in 2013 and 2014 near the wall of the reservoir (Muhovo village), and analyzed for arsenic (As), cadmium (Cd), copper (Cu), nickel (Ni) and lead (Pb) with ICP-MS at the accredited Regional Laboratory-Plovdiv at Executive Environment Agency.

Results: The data were compared with the maximum permissible levels set by national regulations on standards for environmental quality for priority substances and other pollutants. It was determined that only the average annual concentrations of Cu were higher than the allowable limits. Thus, we linked this result with the anthropogenic sources of contamination such as the copper metallurgical plants and mine tailings which are left after the metal has been extracted.

Acknowledgements: We thank East Aegean River Basin Directorate and Regional Laboratory-Plovdiv at Executive Environment Agency.

Keywords: Topolnitsa Reservoir, heavy metals, water, contamination, ICP-MS

P2_07

SENSITIVITY OF GREEN ALGAE AND CYANOBACTERIA TO PHENYLUREA HERBICIDES

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Aim: The sensitivity of the green alga *Chlorella vulgaris* and cyanobacterium *Synechocystis salina* to isoproturon (3-(4-isopropylphenyl)-1,1-dimethylurea) and DCMU (3-(3,4-dichlorophenyl)-1,1-dimethylurea) was compared. These herbicides interact with photosystem II (PSII) and influence its activity.

Material and Methods: The effects of different concentrations of phenylurea herbicides on the functions of PSII were studied by pulse amplitude modulated (PAM) chlorophyll fluorescence measurements and determination of the oxygen evolution by polarographic oxygen electrodes (Joliot-type and Clark-type).

Results: Results showed: (i) stronger herbicide-induced changes on the donor side of PSII than on the acceptor side; (ii) significant differences in the inhibition of the oxygen evolution without exogenous electron acceptor (measured with a Joliot-type electrode) and in the presence of benzoquinone (measured

with a Clark-type electrode); (iii) higher sensitivity of *Synechocystis salina* in comparison to *Chlorella vulgaris*; (iv) stronger inhibition of the oxygen evolution from DCMU than isoproturon.

Conclusion: Data revealed that the effects of phenylurea herbicides on the photosynthetic oxygen evolution can be used for assessing the biological impact of these herbicides on aquatic ecosystems.

Acknowledgement: The work was supported by Bulgarian Academy of Science

Keywords: Isoproturon, DCMU, oxygen evolution, PAM chlorophyll fluorescence, algae, cyanobacteria

P2_08

LEAD IN SANDER LUCIOPERCA AND SILURUS GLANIS DANUBE FISH

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Aim: Lead is a heavy metal harmful for almost all human organs. Due to its continuous bones accumulation and blood release a chronic lead toxicity could be induced. The aim of our investigation was to determine the lead concentration in two muscle tissue samples of predatory Danube fish - European catfish (*Siluris glanis*, Linnaeus 1758) and pike perch (*Sander lucioperka*, Linnaeus 1758).

Materials and Methods: Catfish and pike perch were collected in November 2014 in Danube River (Vidin section, Bulgaria). Muscle samples were analyzed for Pb content *via* Atomic Absorption Spectrometry (AAS) at the Central Laboratory of Veterinary Sanitary Expertise and Control, Bulgarian Food Safety Agency.

Results: Lead concentration of the investigated samples did not exceed the Maximum Residual Limit of Pb for predatory fish. Our results showed that the Pb concentration in *S. glanis* was 0.025 mg kg⁻¹ (MRL - 0.3 mg kg⁻¹). Lower Pb content was registered in the muscles of *S. lucioperka* – 0.0082 (MPL 0.3 mg kg⁻¹). Results obtained demonstrated that the lead concentrations do not exceed the recommended by the EC values, described in the Regulation 1881.

Conclusions: Lead contamination in predatory catfish and pike perch Danube fish was not registered. The mentioned fishes are safety for consumption.

Acknowledgements: This study was funded by Grant № 972/2015 of the Central Fund for Strategic Development (CFSR), New Bulgarian University.

Keywords: lead, predatory Danube fish, toxicity

P2_09

CONTENT OF MERCURY IN HORSE MACKEREL FISH DETERMINED BY ATOMIC ABSORPTION SPECTROMETRY

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Aim: The consumption of fish is the most significant source of ingestion-related mercury exposure in human and animals, although plants and livestock also contain mercury due to bioaccumulation of mercury from seawater, freshwater, marine and lacustrine sediments, soils, and atmosphere, and due to biomagnification by ingesting other mercury-containing organisms. Mercury is a toxic heavy metal,

which injures the nervous system. Chronic exposure to inorganic mercury causes stomatitis and tremor. The horse mackerel (*Trachurus mediterraneus ponticus*) was assessed for Hg content.

Materials and Methods: The horse mackerel was collected in October 2014 near the towns Sozopol and Nessebar at Black sea coast and was stored at -20°C prior to analysis. Samples were prepared from muscles tissue. Muscle samples were analyzed for Hg content *via* CVAAS (Cold Vapor Atomic Absorbtion Spectrometry). Data obtained were compared with the Maximum residual limits (MRL) of fish contaminants described in the EC Regulation № 1881/2006.

Results: According the Hg concentrations our results demonstrated no contamination in the horse mackerel. No excess of this metal over the MRL was registered in the fish – 0.0054 mg kg⁻¹ (MRL=0.05 mg kg⁻¹)

Analyses were in accordance with the Regulation № 1881/2006 as well. All results obtained coincide the data of The National Monitoring Program. According to it no Hg contamination was registered for the period 2000-2015 in the investigated fish species.

Acknowledgements: This study was funded by Grant № 972 Grant № 972/2015 of the Central Fund for Strategic Development (CFSR), New Bulgarian University.

Conclusions: The Horse mackerel Black sea fish is not Hg polluted and meets the food safety standards.

THEMATIC SESSION III ECOSYSTEM RESEARCH AND SERVICES

PL3_01

THE ECONOMIC SIGNIFICANCE OF NATURAL ECOSYSTEMS

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Background and aims: The current overview aims to bring more light to the problem of ecosystem services on national level. As an EU member Bulgaria has to assess and report to the European commission the state of ecosystems and their services as a response to the Action 5 of EU Biodiversity Strategy to 2020. Few data has been collected so far in this respect. Consistent approach throughout the country is needed to integrate all information collected. The concepts of the presentation follow the MAES (2013) and CICES (2013).

At highest hierarchical level the ecosystems in Bulgaria are classifies in 9 classes. They correspond to the EUNIS classification. Grassland ecosystems are discussed in more detail. The contemporary ecosystems are result of long time human influence. Their functioning is closely related to the capacity to deliver services. People benefit from ecosystem (goods and) services.

Why we are doing this? The ecosystem services assessment is a process through which the findings of science and concerning the biodiversity and ecosystem functioning are evaluated. Their consequences for human well-being and the management and policy options are important part of this process. Ecosystem assessment is essential for decision-making processes. The best available information for guiding decisions is needed for the planning and implementation of sustainable use of natural resources and thus to preserve the economic potential of ecosystems. The focus on benefits implies that ecosystem services are open also to economic valuation.

L3_01

ECOSYSTEM SERVICES PROVIDED BY GREEN INFRASTRUCTURE IN URBAN ENVIRONMENTS – FOCUS ON CARBON STORAGE

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Aim: Our research addresses “why, when, where, and how” we can better manage and restore green infrastructure in urban ecosystems focusing on its potential to store carbon. These are crucial questions to promote alternative regimes combining conservation, sustainable use and restoration of green infrastructure. We aim to develop our understanding how human activities influence carbon sequestration in these specific ecosystems through assessment of different components – soil, aboveground biomass and forest floor in two pilot regions – Sofia and Sandanski.

Materials and methods: Our most recent data collected in contrasting urban environment in Sofia and Sandanski was analyzed following combination of specific sampling design, standard methods for laboratory analyses and social studies.

Results: The analyzed data reveals a clear linkage between the conditions of ecosystems and the storing of carbon in the components of green infrastructure in a variety of sub-types of urbanized ecosystems and their level of anthropogenic pressure.

Conclusions: Our findings support the statement that green infrastructure in urban environments has high potential to sequester carbon. Different aspects of management of urban forest parks have high importance for the population in these areas. The results confirmed that urban forest parks should be preserved for future generations as a good option as regards recreation and relaxation. This is related to the improvement of living conditions in urban areas, together with highly aesthetic views of forests. Based on data obtained and the results of social investigation performed, it is recommend that new zones of green infrastructure should be created and/or enlarged.

Acknowledgments: the study is funded by National Science Fund under DMU 02/15/2009 “Soil carbon pools and fluxes in soil-to-plant system of urban forest parks”.

Keywords: ecosystem services, green infrastructure, urban, carbon storage

L3_02

METHODOLOGY FOR ASSESSMENT AND MAPPING OF ECOSYSTEMS AND THEIR SERVICES – BULGARIAN APPROACH

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The national methodological framework on mapping and assessment of ecosystem services contains a total of nine methodologies by ecosystem type and aims at streamlining the national ecosystem mapping and biophysical assessment process in Bulgaria. The methodologies prepared as part of this framework are, at this stage, not aimed at completing the full cycle of ecosystem service valuation and reporting. They deliver a practical step-by-step guidance to the process of: (1) Assessing the ecosystems condition, and (2) Assessing the ecosystems’ potential to deliver ecosystem services (biophysical valuation).

Each methodology is relevant to ecosystems of the respective type on the entire territory of Bulgaria although its implementation may differ between NATURA 2000 zones and areas outside NATURA 2000

due to different data availability, land use and the spatial distribution of ecosystems. Apart from the methodologies, the national methodological framework (under development) also details the theoretical background behind the ecosystems approach practiced in Bulgaria, as well as the necessary steps to undertake towards fulfilling Action 5 of Target 2 - Maintain and restore ecosystems and their services of the EU Biodiversity strategy to 2020.

The present approach combines the guidelines of MAES Process with expert assessment of selected indicators and spatial distribution of ecosystem types and subtypes. The proposed typology of ecosystems (at level 2) corresponds with the ecosystem classification of MAES (2013), combined of CORINE Land Cover (CLC) classes and with the European Nature Information System (EUNIS) habitat classification types.

The assessment of ecosystem services is based on real parameters (measurable and available) and presents the Real (assessed) ESs Capacity for selected ecosystem type. Based on the index of performance, obtained in assessing the ecosystem state, the Ecosystem Services Potential capacity could be estimated. ESs Potential Capacity is the sum total of possible supply of ecosystem service for specific type of ecosystem if this ecosystem is managed by an appropriate way (trade-offs not included as they are outside the scope of biophysical valuation). The value of ESsPC is informative for the planners when preparing plans and scenarios for urban development. For the mapping the real ecosystem service capacity (RESsC) value will be applied.

Keywords: ecosystem, state, indicators, ecosystem services, assessment, mapping

Acknowledgements: This study is being prepared in the frame of the Predefined project “PDP2 Methodological assistance for ecosystem assessment and biophysical valuation” financed by the Financial Mechanism of the European Economic Area, Programme BG 03 Biodiversity and ecosystem services.

L3_03

ENHANCING ECOSYSTEM SERVICES MAPPING FOR POLICY AND DECISION MAKING - ESMERALDA

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The mapping and assessment of ecosystems and their services is one of the keystones of the EU Biodiversity Strategy and a necessary condition to make informed planning and development processes and decisions. Action 5 sets an EU-wide knowledge base, meant to be a primary data source for developing Europe’s green infrastructure, to identify areas for ecosystem restoration and to set a baseline against which the no net loss of biodiversity and ecosystem services (ES) can be evaluated.

ESMERALDA is aiming to deliver a flexible and generic methodology that can simultaneously provide building blocks for pan-European assessments, regional assessments which ensure a timely delivery of EU member states with Action 5 of the Biodiversity strategy and local assessments as required for spatial planning, agriculture, climate, water and nature policy. This methodology will build further on existing ES-related projects and databases (MAES, OpenNESS, OPERAs, national studies) and related studies such as the Millennium Ecosystem Assessment (MA) and the Economics of Ecosystems and Biodiversity (TEEB). Furthermore, ESMERALDA will identify the relevant stakeholders; take stock of their user requirements at EU, national and regional level. The objective is to transmit experience during an active

process of dialogue and co-creation of knowledge, empowering the participants towards the achievement of the Action 5 aims.

The flexible mapping approach will be integrating biophysical, social, and economic and valuation assessment techniques. Flexibility in methods will be achieved by offering a tiered mapping and assessment approach from rather simple (Tier 1) to complex (Tier 3), integrating (less complex) expert- and land cover-based approaches, existing ES indicator data and more complex biophysical ES modelling.

The strength of ES MERALDA is to make solutions for mapping and assessment immediately available from the start of the project to relevant stakeholders as we can build on existing mapping exercises in European and national research projects and a flexible online data sharing system.

Keywords: assessment, mapping, ecosystem, indicators, ecosystem services, stakeholders

Acknowledgements: Grant Agreement 642007 — ES MERALDA — Horizon 2020-SC5-2014-2015/H2020-SC5-2014.

P3_01

SIZE, GROWTH AND DIET OF BLUEFISH (*POMATOMUS SALTATRIX*) IN THE BLACK SEA, BULGARIA

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Introduction: In the last 3 decades the abundance of the Black Sea predatory species such as bonito (*Sarda sarda*) and bluefish (*Pomatomus saltatrix*) has been severely reduced not only by fishing but also as a result of pollution. Bluefish is not a substantial target for Bulgarian commercial fishery, but as a piscivore it is a significant component in the trophic interrelations between pelagic fishes.

Aim: In the Black Sea region *Pomatomus saltatrix* is poorly investigated; therefore, our aim was to explore the bluefish diet, size and growth data, perform comparisons between our survey (2013-2014) and data from historical studies conducted by Kolarov and Taranenko (1960s and 1970s).

Materials and methods: The samples were collected during the 2013-2014 autumn seasons, from landings in the Burgas Bay fishing area. The specimens were processed for determination of population parameters (body length, weight, age, condition factor), and for stomach content analyses.

Results: The results show that in the Black Sea, the diet of bluefish consists principally of pelagic fish species such as sprat and horse mackerel. Young and juvenile individuals (ages 0 and 1) were mainly represented in the landings in 2013-2014, while in the 60s and 70s, older than age-2, sexually mature specimens were dominant in the catches. Compared with the historical data, in the modern period, the older bluefish specimens showed a significantly slower growth rate (low average population parameters values). This phenomenon could be due to an insufficient food supply, since the highest percentages of empty stomachs were registered in the largest size classes.

Acknowledgements: The study was carried out within the KNOWSEAS project

Key words: Black Sea, bluefish, diet, population parameters

P3_02

LONG-TERMS TREND IN THE HYDROLOGICAL CONNECTIVITY BETWEEN THE LOWER DANUBE AND WATER BODIES FROM THE BULGARIAN FLOODPLAINS

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Introduction: The floodplains as part of the river valleys play an important role in regulation of the flood events. During floods permanent water bodies situated on the floodplain became connected to the river and other temporary ones occurs. They provide different type of ecosystem services, concentrate huge amount of biodiversity and support the good ecological potential of the main river. These contributions are highly dependent of the prolongation of the connectivity between the main arm of the river and the adjacent water bodies.

Materials and Methods: The trend and the duration of the surface hydrological connectivity between the main river arm and water bodies situated on the Bulgarian floodplains were examined.

Monitoring data on the Lower Danube water levels for the period from 1921 to 2014 were used. The duration of the connectivity was calculated. The edge of inundation of the investigated floodplains and water bodies was provided by authorities or obtained by in situ observations.

Results: The results showed a decrease of the duration of the average annual hydrological connection between the lateral water bodies and the main arm of the Danube. Severely affected by these changes turned out to be the lateral water bodies situated in the higher parts of the river terrace, while longest temporal reduction of the flood duration were established in those situated on the medium height.

Keywords: Lower Danube, water level, flood duration, water bodies, connectivity

P3_03

META ANALYSES OF SESSILE OAK DENDROCHRONOLOGICAL SERIES FOR ASSESSMENT OF TREE EUSTRESS

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Aim: The study deals with meta-analyses of the sessile oak dendrochronological series for eustress investigation. The broad-leaved tree species is very important from both an economic and socio-ecologic points of view.

Material and methods: 255 sessile oak chronologies from 13 locations in Europe were analyzed by SPPAM application for the period of 188 years in average. The tree ring width sequences are approximated with polynomials of mainly 7th degree and $R^2 > 0.45$. A growth index (I_t - ratio between measured and approximated value) is computed. Years, where I_t is lower than a threshold value, were categorized as stress ones. The four grade scale for assessment of frequency, duration and depth of eustress was proposed. The influence of climatic types of years on the eustress appearance was also investigated.

Results: Average 42 eustress periods were identified. The obtained average eustress characteristics were as follows: $A_{av}=0.244$, $D_{av}=2$ y and F_{av} for 100 years=23 y. The significant risk location, where the eustress frequently appears with very long duration and very deep depth was recognized. The predominance of warm/dry years in total number of adverse climatic years (with eustress) was established.

Conclusions: Proposed holistic approach for eustress identification is convenient for fast diagnose of present and future state of forest communities and recognition the stands under risk.

Keywords: dendrochronology, eustress, climatic type of year, SPPAM program, sessile oak

P3_04

HIGH RESOLUTION VEGETATION ANALYSES OF MANAGED ARRHENATHERION COMMUNITY

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Background and Aims: The maximum compositional variability in grasslands appears at very fine scales (0.05 m - 0.5 m). The high resolution methods are an effective detector for deviation from randomness in the formation of communities. We attend to demonstrate patterns in community structure, and hence the existence of assembly rules in a case study from Arrhenatherion vegetation.

Methods: We used 6 grid-frames. Each frame was 225 cm long and 40 cm wide, containing 408 microquadrads (sampling plots), each of them 25 cm² in size (5 by 5 cm). Species rooted in the sampling plots were recorded. Correlation analysis was applied to study species aggregation.

Results: Our results show trends in the spatial organization of the studied grassland, such as: (1) Number and diversity of species combinations (beta diversity); (2) The most and the less common species (spatial distribution); (3) The most co-occurring species (deviation from randomness).

Conclusion: Finding patterns in the co-occurrence of species is a step forward to revealing the fine mechanisms, driving the community assembly in Arrhenatherion vegetation under mowing management. The studied communities are not a random combination of species, but they have composition and structure which are determined by regional species pool and environmental and biotic filters.

Acknowledgements: This work was carried out within the project SIGNAL, mainly funded by the ERA-Net BiodivERsA.

Keywords: assembly rules, fine scale, patterns.

P3_05

ABIOTIC ENVIRONMENTAL FACTORS AND ITS RELATIONS TO PRIMARY PRODUCTIVITY OF CARP FISH PONDS

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Introduction: There are about 3000 ha fresh water fish farms for thermophilic fish species in Bulgaria in which common carps, big head carps and grass carps are grown by polyculture technology. The most

appropriate water bodies for rearing of carp fishes are the manmade reservoirs and earthen fish ponds where the polyculture technology guarantees the best utilization of available food basis.

Aim: The aim of the study was to investigate the effect of organic manure on plankton primary production of fish ponds

Materials and methods: The experiment was carried out on seven earthen fish ponds of the Institute for Fishery and Aquaculture in Plovdiv town in the period 2004-2006. The measuring of plankton primary production was carried out by light and dark bottle technique in its oxygen modification.

Results: The organic manureing caused better development of phytoplankton by increasing intensity of photosynthesis, which is reflected by light conditions suppressing the unfavorable for macrophyte development, by statistically significant higher permanganate oxidability, higher concentrations of phosphate ions and better N/P ratio (15/1) in manured then in control fish ponds. The size of primary production in fish breeding gives a good estimation of the result of applied ameliorative measures (i.e. manureing) as a first step for achieving the natural fish productivity.

Keywords: primary productivity, carp fish ponds, environmental factors

P3_06

PERSPECTIVES FOR ECONOMICAL VALUATION OF URBAN FORESTS – CASE-STUDY FOR SANDANSKI

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The aim of present study is to discuss the current trends for economical valuation of urban forests in the scope of Bulgarian national context with pilot region of Sandanski town.

Materials and Methods: The methods applied include analysis of the recently published articles and books with relevant information about ecosystem services and role of green infrastructure in urban areas. Further the data of the content analysis were compared with data from previous research in urban forests and other elements of green infrastructure in Sandanski area.

Results: Following the definition that green infrastructure is a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services the urban forests as well as single trees were studied as main elements of green infrastructure in urban settings, which play the major role in ecosystem services provisioning. The results present that although there is awareness about the urban environment, the value of the urban forests and green infrastructure is still neglected and intangible.

Conclusions: It was confirmed that green infrastructure and urban forestry play vital part of any large city in Europe, by providing a range of environmental, social, economic, cultural benefits. These benefits are still underestimated and neglected. Part of the results focuses on outlining economical valuation perspectives and practical recommendations for policy makers and other stakeholders.

Acknowledgments: The study is part of the COST action FP1204 GreenInUrbs.

Keywords: ecosystem services, urban forests, perspectives, valuation

THEMATIC SESSION IV

LANDSCAPE ECOLOGY

PL4_1

IMPACT OF CLIMATE CHANGE ON VULNERABILITY OF FORESTS AND ECOSYSTEM SERVICE SUPPLY IN TWO REPRESENTATIVE LANDSCAPES IN WESTERN RHODOPE

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Impact of a range of climate change scenarios on timber production, carbon storage, biodiversity and soil retention in Western Rhodopes in South Bulgaria was projected using climate sensitive forest models. Within the case study region two proximate representative landscapes were simulated; a lower elevation landscape (1000 to 1450 m a.s.l.) that is dominated by mixed species forests, and a higher elevation landscape (1550 to 2100 m a.s.l.) that is currently dominated by spruce. In both landscapes climate change is projected to induce a shift in forest composition. Within the lower elevation landscape all climate scenarios result in drought sensitive species, such as Norway spruce, being replaced by more drought tolerant species such as Scots pine and Black spruce. In the higher elevation landscape a reduction in spruce growth is projected, particularly under the more severe climate change scenarios. In three of the five climate scenarios a reduction in total growing stock is projected to occur in both landscapes and across all stand types. In the other 2 climate scenarios the impact of climate change on total growing stock was minimal, with a projected moderate increase in higher elevation stands (> 1500 m a.s.l.). In general, climate change is projected to negatively influence the forest carbon storage potential across landscapes and stand types with the magnitude of the impact depending on the severity of the climate change scenario. The impact of climate change on forest diversity and habitat availability is projected to differ considerably between the two landscapes, with diversity and habitat quality metrics generally increasing at higher elevations, and being reduced at lower elevations. Our results suggest that, if no change is introduced in currently implemented management practices, the sensitivity of forests and forest ecosystem services in the Western Rhodopes to climate change will differ between low and higher elevation sites, and will depend strongly on current forest composition.

Keywords: climate change, forest ecosystem services, ecosystem modelling, sustainable forest management

L4_01

Assessment of the status and potential of landscapes of Rila southeastern slopes' parts for achieving conservation and recreational activities

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Aim: To assess the current state and potential of the southeastern Rila slopes territory with a view to rational and sustainable natural development, resulting as a combination of conservation and recreational activities.

Materials and Methods: The preliminary landscape map is prepared on the basis of the material available at the preparatory stage. After an initial view of the territory the data from the preparatory stage are compared to the current state of the landscapes. The key area is selected during the field stage and the landscape mapping is prepared. During the cameral stage the information from fieldwork is processed and implemented in the processing of landscape maps. An inventory of contemporary landscapes in the studied area is made.

Results: Mapping of dominant landscapes was performed by using a standard form of cartographic representation. A detailed classification of the landscapes in the selected area was represented by using landscapes map M 1:25 000, assessed map of the area M 1:25 000, landscape map of the key area M 1:10 000 and recommended map of the key area M 1:10 000. The impact of anthropogenic factors on this key area within “the Dancing Bears Rehabilitation Park” in Belitsa was estimated. Some of the areas were classified as areas, where anthropogenic load was considered as possible. These areas were illustrated on the evaluation map. Possibilities of conservation and recreational activities were estimated by using the systematic analysis.

Conclusions: We proved that this territory is considered to be appropriate for conservation and recreation activities.

Acknowledgments: This work was performed with the partnership of Department of “Landscaping and Environment Preservation” in Geology and Geography Faculty of Sofia University “St. Kliment Ohridski”; “Agrolesproject”; The municipality council Belitsa; The Dancing Bears Rehabilitation Park; The Village “Holy Mountain” Semkovo

Keywords: Sustainable use of nature; Landscape System analysis; anthropogenic load; Conservation and recreation activities

L4_02

Remote Sensing in Landscape Ecology

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Introduction: Landscape ecology is a highly interdisciplinary science, studying the interactions between organisms and their relationships with the environment conditions and processes. Landscape ecology findings are a core prerequisite for ecosystems conservation and biodiversity preservation.

Aim: The goal of our paper is to present key considerations on using remote sensing as a means of landscape ecology surveys and to acknowledge the importance of incorporating multisource and multitemporal remotely sensed data into ecological landscape analysis.

Materials and Methods: The fundamental physical principles of remote sensing techniques, types of sensors which vary according to the purposes for which they are used, main data types and data analysis techniques are presented from the view of different applications to landscape ecology. The basic concepts underlying the ecological applications of remote sensing are discussed emphasizing the ability of these technologies to measure, map, and understand ecological changes and interactions. The grounds for integrating remote sensing data into landscape inventories are pointed out.

Results: The demand for ecosystem analysis is growing rapidly as information gathering and analysis options are increasing. The paper presents a case study-based review of the predominant applications of remote sensing in the field of landscape ecology. The focus is on the identification of land covers, change detection and quantification, assessment of the degree of deforestation, invasive species distribution, and soil degradation (salinization, landslides), evaluation of the environmental impact of mining (water quality, biodiversity), study of coastal and marine-life habitat, monitoring of oil spills, and etc.

Conclusions: Using airborne and satellite data results in improved capabilities for landscape-scale ecosystem studies. Remote sensing technologies contribute to the main objective of landscape ecology to detect spatial and temporal changes and to quantify the ways in which ecosystems interact.

Keywords: landscape ecology, remote sensing, satellite images, geoecological monitoring

L4_03

Discussion over simulation with forest gap model PICUS in terms with Bulgarian case study

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Introduction: The changes in climate require using adaptive approaches in management of nature resources. This is especially valid for forests, which are systems with long lifespan and need long period to respond the change in environment conditions.

Aim: The purpose of the present work was to show how the forest simulation model PICUS could be used to predict the condition of forest states under different climate and management scenarios.

Materials and methods: There was taxation data collected for cerris stands in National Forest State “Seslav”. In addition there was data about soil and climate in the area of the case study. This data was used in Picus to make simulations for long term period (100 years prediction)

The increment was compared in order to evaluate the vitality and productivity of the stands under different climate and management scenarios.

Results: Results showed that even adaptive approaches in management the coppice oak forests lead to significant loss in surplus. This is why it is necessary to reconsider the conceptions of converting coppice forests into seed.

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Keywords: forest simulation model PICUS, coppice forest

L4_04

Submarine landscape diversity of Varna sublittoral zone: present-day conservation issues and recommendations for sustainable marine spatial planning

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Introduction: Despite having originated in the former USSR, the notion of the submarine landscape as a benthic geo-ecocomplex is a concept rapidly gaining popularity nowadays, especially in Nordic countries. Pursuant to these ideas, the landscape comprises a group of interlinked, hierarchically organized subsystems, implying for the taxonomic subordination of the underwater units.

Aim: Main goal of the study is identify, systemize hierarchically and represent graphically the benthic complexes found at Varna sublittoral zone, to evaluate their nature conservation significance, as well as to assess the environmental issues within the cited sector of the Bulgarian Black Sea. The analyses are followed by recommendations for sustainable marine use, envisioning the necessity for effective marine spatial planning and sound integrated coastal zone management in Varna Municipality.

Material and methods. Several data sources concerning the submarine landscape components (e.g. seabed substrates, seafloor geomorphology, bathymetric contours, dominant benthic biota etc.) were integrated and examined in GIS. These included archive GIS files, scanned maps, relevant publications etc. The analyses of the spatial extent and distribution of the underwater landscapes were accompanied with hierarchic systematization of the identified units by applying pertinent categorization criteria on every taxonomic level.

Results: The submarine landscape diversity of the study site comprises 43 kinds united in 7 genera, 5 types and 3 classes. Greatest impact upon the landscape pattern is observed in the shallow areas contiguous to the recreation and port zones of Varna Municipality.

Discussion and conclusions: The contemporary use of the submarine landscapes often runs counter to their conservation value, with Aladzha bank being the most alarming example. Recommendations for sustainable marine spatial planning are addressed and visualized as GIS maps of the suggested marine use types.

Keywords: marine landscape ecology, benthic landscape units, Bulgarian Black Sea, ICZM, GIS

P4_01

Wireless sensor networks for wildfires detection

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Aim: Geocological monitoring plays a key role in environment protection and sustainability. It has many aspects but one of the most important recently have become wildfires because they are increasing in frequency, duration and intensity worldwide. Wildfires fires are not only dangerous for human life, property and industrial infrastructure, but may strongly damage the environment. Aside from deforestation and the increased release of carbon dioxide into the air they can also affect habitats, species population and distribution after the incident. In the light of the ecological problems that the devastating impact of wildfires arises, the objective of our paper is to present a monitoring strategy and service design for wildfire early detection.

Materials and Methods: The emerging of Wireless Sensor Network (WSN) technology has brought new opportunities for intensive data implementation in ecological research and environment monitoring. The paper discusses the characteristics of different fire-detection sensors, and compares their abilities and disadvantages. Finally, the study summarizes existing problems and experiences of wireless sensor network in ecomonitoring applications.

Results: The design of a wireless sensor network for early detection of forest fires is presented. The framework of a fire-detection and monitoring system that provides critical, real-time data is shown as well as the deployment of sensor nodes and the network topology is shown. Evaluation of the efficiency of different sensors is attempted emphasizing on ultraviolet radiation detectors. Data aggregation scheme is proposed which significantly prolongs the network lifetime, because it only delivers the data that is of interest.

Conclusions: The analysis of the preconditions, reasons and factors has led to the conclusion that Bulgaria joins the Mediterranean region with traditionally high risk of forest fires on its territory. The consequences of the fires in the Sakar Mountain, for instance, had the dimensions of a local ecological catastrophe. For this reason we consider the subject of the paper very useful and facilitating further research.

Keywords: geoecological monitoring, wildfires, fire detectors, UV radiation

THEMATIC SESSION V BIODIVERSITY AND CONSERVATION BIOLOGY

PL5_01

IBER – NATIONAL CENTER FOR SCIENTIFIC INVESTIGATION IN THE FIELD OF BIODIVERSITY AND ECOSYSTEM RESEARCH

Anna Ganeva

PL5_02

PLANT DIVERSITY OF BULGARIA

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Bulgaria is one of the richest countries in Europe in terms of its plant diversity, although its territory is relatively small - about 110000 km². The country is situated at the crossroad of three bio-geographic regions – Continental, Black Sea and Alpine. To date in Bulgaria are established around 4100 species of plants (excluding mosses). The richest plant families are Asteraceae, Poaceae, Fabaceae, Caryophyllaceae, Brassicaceae, whereas the richest genera are *Hieracium* s.l., *Carex*, *Centaurea* s.l., *Trifolium*, *Silene*. Among the country's 20 floristic regions richest in plant species are Rhodopi Mts, Balkan Range, Pirin Mts, Rila Mts and Black Sea Region. An important feature of the specificity and uniqueness of a particular flora is the endemism. The Bulgarian flora comprises 444 endemic species (11.8% of the Bulgarian flora excluding the neophytes). Of these species 270 are Balkan endemics (7.2% of the Bulgarian flora), and 174 are Bulgarian endemics (4.6% of the Bulgarian flora). Altogether 722

species (*ca.* 19% of the total flora) have a national IUCN category of threat, and additionally 79 are Near Threatened. A significant part of the bioresources of Bulgaria is represented by the medicinal plants which have great ethnobotanical, social and economic importance. In the national Law on Medicinal Plants are listed 768 species of medicinal plants, some of which are exported from the country in a significant amount. The study of plant diversity in Bulgaria is of primary importance for its conservation and sustainable use of the plant resources.

PL5_03

BIODIVERSITY OF VERTEBRATES IN ANTARCTICA

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The existence conditions of organisms and vertebrate fauna and their position in the food chain and how they relate the Antarctic marine ecosystem are examined. One of the features of the living environment is the combination of low temperatures, high light intensity during the summer and minimal in winter.

Antarctic animals - fish, penguins and other birds, seals and whales - mostly endemic species have evolved specific adaptations, unusual for other regions of the world. Coldwater Antarctic fish are active in a very narrow temperature range, often just below freezing. Birds are considered seabirds, some of them are nesting, others are migratory, nesting-migratory and birds occasional visitors. Most numerous are penguins - about 87% of the ornitofauna. Seals represent a large group of predatory animals getting through to amphibious lifestyle. In comparison with terrestrial mammals, they have over 75% more blood. From a total of 100 species of whales that inhabit the ocean, about 20 species occur permanently or temporarily in Antarctica.

All species found in the Southern Ocean and adjacent areas are under strict protection. Protection of sensitive Antarctic marine ecosystem is extremely important, because the consequences of its violation could not be recovered, even for decades.

PL5_04

CATALOG OF THE PLANT SPECIES IN NEW BULGARIAN UNIVERSITY CAMPUS. BIOLOGICALLY ACTIVE SUBSTANCES.

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Aim: The aim of the study was to determine and describe the diversity of plant species in the New Bulgarian University Campus.

Materials and Methods: Tree and bush species in the NBU campus.

Results: In the NBU campus were described over 170 plants - trees and bushes which belong to 52 taxa, 35 genera and 20 families. Plant biodiversity consists of 12 European species, 10 Asian species, 16 Eurasian species, 12 from North America and 2 from Africa. 13 of the species possess conservation status according the International Union for Conservation of Nature (IUCN), 3 of them were described as endangered species (EN). Among the 52 taxa, two of the species - *Aesculum hippocastanum* and *Taxus baccata* are Bulgarian endangered species and are included in the Bulgarian Red Book. Most of the

species are source of valuable biologically active substances as alkaloids, saponins, flavonoids, glucosides, tannins and vitamins which play essential role for the human health.

Conclusions: The tree and bush diversity in the New Bulgarian University campus cover 52 taxa. Most of the plants are valuable source for biologically active substances. All species are map localized and labeled in front of each tree or bush in the University campus.

Acknowledgements: The project was supported by the NBU Infrastructure Fund.

Keywords: tree, bush, taxon, university campus, biologically active substances

L5_01

CONDITION AND THREATS TO THE POPULATIONS OF FIVE BALKAN ENDEMIC PLANTS ON MT FALAKRO, NORTHERN GREECE

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Introduction: The calcareous terrain and transitional Mediterranean climate are the reasons for a rich flora, despite of the strong anthropogenic activities – pasture, marble quarries, felling, tourism and herbs picking.

The aim of this study is to investigate population of 5 Balkan endemic plants: 1. *Achillea ageratifolia* (Sm.) Boiss.; 2. *Fritillaria drenovskyi* Degen & Stoj.; 3. *Haberlea rhodopensis* Friv; 4. *Petkovia orphanidea* (Boiss.) Stef.; 5. *Viola delphinantha* Boiss.

Material and Methods: Field trips were performed from 2012 to 2014.

Results:

1. Form fragmented population, structured by single individuals and tufts. Maximum density of individuals, observed by the author (*), is 60/m².
2. Form fragmented branch-population, structured by 2 basic fragments, *: 7/m².
3. Form fragmented population, in the canyon of the rivulet floating through Pirgi village, *: 60/m².
4. Form mosaic population, *: 20/m².
5. Form mosaic population, structured by single individuals and tufts, on the North slope of Profitis Elias, *: 20/m².

Conclusions: Most vulnerable are the populations of *Viola delphinantha* and *Fritillaria drenovskyi*, because of the small size and anthropogenic activities. In case of enlarging of the marble quarry on the North slope of Profitis Elias (2232), the population of *Viola delphinantha* will be in danger. More investigations are necessary.

Key words: Greece, Mt Falakro, endemic plants, populations.

L5_02

BACTERIOPLANKTON DIVERSITY AND COMMUNITY COMPOSITION IN OKOTO LAKE, SEVEN RILA LAKES

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Okoto Lake is the deepest glacial lake on the territory of the Balkan Peninsula.

The aim of the study was to determine the bacterioplankton temporal diversity, and the key environmental factors influencing on it.

Materials and Methods: Water samples for microbial and physicochemical analyses were collected from the surface layer of the lake in July and September 2006 and 2007. The 16S rRNA gene library construction approach was used to assess the bacterial diversity and communities' composition. Four clone libraries were constructed and 323 clones were analyzed using RFLP determining 49 16S rDNA profiles, in total.

Results: In general, the bacterioplankton's composition varied in time and it was comprised of five to seven dominant 16S rDNA profiles constituting 75-88% of the respective clone libraries. Bacterioplankton was much less diverse in September 2007, when the community clone library was consisted only by one dominant profile representing 90% of the bacterial clone library. A unique dominant profile (14%) was detected in the clone library from September 2006.

The highest numbers of rare 16S rDNA profiles were recorded in the communities from September 2006 and July 2007. Each rare profile represented maximum of 1-2% of the total bacterial clone library from the respective sampling occasion.

Conclusion: Results showed that bacterioplankton diversity increased from July to September 2006, in contrast to 2007, when a decreasing trend was recorded. There was not found a certain trend in the bacterioplankton diversity composition between the relevant months of the two years under investigation.

Key words: high mountain lakes, bacterioplankton diversity, 16S rRNA gene, RFLP.

L5_03

ECOLOGICAL CONDITIONS OF THE RIVERS IN "CENTRAL BALKAN" NATIONAL PARK (BULGARIA) BASED ON THE BOTTOM MACROINVERTEBRATES

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Aim: The aim of this study is to present preliminary data about the ecological conditions of some rivers in "Central Balkan" National Park in Bulgaria.

Material and Methods: The composition and structure of bottom invertebrates were used to determine the ecological conditions of 16 selected rivers according to the Water legislation in Bulgaria (Regulation N-4/2012). The "hand net" (EN-ISO 10870:2012) with 500 µm mesh size was used for sampling. Ten

subsamples from each sampling site were taken according to the “multihabitat sampling” method (EN 16150:2012). Biotic index and index TTN (total taxa number) were used for evaluation of the ecological conditions.

Results: The studied rivers have shown “good” and “very good” ecological status according to the calculated indices. Macrozoobentic invertebrates from more sensitive “A” and “B” taxa groups (according to the Biotic index) were predominated in the samples. These are *Ecdyonurus* sp., *Rhithrogena* sp., *Ephemera danica* (Muller 1764), *Epeorus* sp., *Serratella ignita* (Poda 1761), *Habroleptoides* sp. (from Order Ephemeroptera); *Taeniopteryx* sp., *Perlodes intricatus* (Pictet 1841), *Perla marginata* (Panzer 1799), *Nemoura* sp., *Protonemura* sp. (from Order Plecoptera); *Crenobia alpina* (Dana 1766), *Dugesia* sp. (from Subphylum Turbellaria).

Conclusions: It can be concluded that the studied rivers have shown conditions, which are close to the reference ones for those river types. This is an evidence for the existence of undisturbed macroinvertebrate communities with high biodiversity.

Acknowledgements: Part of this study is supported by “Bulgarian Biodiversity Foundation” NGO.

Keywords: macrozoobenthos, ecological conditions, Biotic index

L5_04

DIVERSITY OF CESTODES PARASITISING BIRDS FROM ETHIOPIA

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Aim of the study is to add new data of the diversity of cestodes parasitising African birds.

Materials and Methods: New materials of cestodes were collected from birds at Wondo Genet and Ziway Lake, Ethiopia, in November – December 2012. Totally, 73 individuals of 43 species and 24 families of birds were examined for the presence of helminth parasites.

Results: Ten cyclophyllidean cestode species were collected from intestines of 13 species of birds belonging to 10 families. These were 4 species of the family Hymenolepididae (genera *Passerilepis*, *Echinocotyle* and a new genus), 3 species of the Paruterinidae (genera *Anonchotaenia*, *Biuterina* and *Neyraia*), 2 species of the Dilepididae (genera *Dilepis* and *Sobolevitaenia*) and 1 species of the Anoplocephalidae (genus *Paronia*). Three new species were discovered; these belonged to *Sobolevitaenia* and *Passerilepis* as well as to a new hymenolepidid genus. In addition, a cestode larva of *Mesocestoides* (Mesocestoididae) was found.

Conclusions: New data on the diversity, distribution and host range of avian cestodes were provided.

Acknowledgements: This study was funded by the project “Planetary Biodiversity Inventory: Cestodes from bowels of vertebrates in the World” (funded by National Science Foundation, USA).

Keywords: taxonomy, cestodes, birds.

L5_05

HABITAT DIVERSITY IN MALA PLANINA

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Aim: The main aim of the current research is to identify and analyse the habitat types and the habitat diversity of Mala planina.

Materials and Methods: Habitat types reflect the diverse array of organisms adapted to life in Mala planina. Some typical mountainous habitats are found on this territory. Their investigation has theoretical and practical importance. Cameral and preparatory terrain research of the habitat types is done. Remote methods are used to accomplish the aim of the current work. The preliminary study is based on maps of the vegetation of Mala planina, provided by Sofia Forestry and Svoge Forestry.

Results: The classical approach for classification helps for achieving better results in this study. All possible factors for differentiation of habitats are considered.

Conclusion: This research proves that the habitat diversity of Mala planina is great. The area is not far away from the Bulgarian capital. The anthropogenic influence is indisputable and by revealing the preliminary habitat diversity authors aim to prove that conservation of habitats is necessary.

Acknowledgements: This research is sponsored by the "National, European, and Civilizational Dimensions of the Culture – Language – Media Dialogue" Program of the "Alma Mater" University Complex for the Humanities at Sofia University "St. Kliment Ohridski", funded by the Bulgarian Ministry of Education, Youth and Science Scientific Research Fund.

Keywords: habitat types, diversity, Mala planina, maps

L5_06

BRYOPHYTE FLORA OF SUB-MEDITERRANEAN RIVERS IN BULGARIA

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Aim. This work presents a contribution to the knowledge of aquatic bryophytes in sub-Mediterranean Rivers in Bulgaria.

Materials and methods. Bryophytes were studied at nine rivers in South Bulgaria during 2014 together with abiotic factors (flow velocity, shading, mean depth, substrate type), and altitude. In total 14 taxa were identified, among them 11 mosses and 3 liverworts. The recorded species refer to 7 families and 12 genera. **Results.** The most frequently distributed species was *Leptodictum riparium* (Hedw.) Warnst. (registered at 7 sites, relative abundance 78%), followed by *Cratoneuron filicinum* (Hedw.) Spruce and *Platyhypnidium riparioides* (Hedw.) Dixon (registered at 4 sites; relative abundance 44%), *Brachythecium rivulare* Schimp. and *Hygroamblystegium tenax* (Hedw.) Jenn. (registered at 3 sites; relative abundance 33%). The majority of studied rivers sites were sunny, with moderate velocity and stony bottom.

Acknowledgments. The study was carried out under the Contract "Intercalibration of the methods for analysis of biological quality elements (BQE) for the types of surface waters on the territory of Bulgaria,

corresponding to common European types in the Geographical intercalibration groups” led by DICON-UBA (Dicon Group Ltd and the Austrian Environmental Agency - Umweltbundesamt Austria); Team leader: Dr. Robert Konecny.

Keywords: bryophytes, sub-Mediterranean rivers, Bulgaria

L5_07

THE RIVERS TROPHIC RESOURCES - LEADING FACTOR IN FORMATION OF FUNCTIONAL FEEDING GROUPS OF THE MACROZOOBENTHOS

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Aim: The aim of this study is to analyze the role of trophic basis for structuring of functional groups (FFG-s) of the macrozoobenthos along the river continuum and to evaluate the significance of anthropogenic impacts on the formation of trophic resource available.

Materials and methods: Benthic samples were collected from four river ecosystems – Mesta, Vit, Tundzha and Veleka, belonging to three catchment areas and two EU-ecoregions. Three type-specific sites along each river were chosen. Benthic materials were sampled during three seasons within two-year observation period (2011–2012). An adapted version of multi-habitat sampling method was used. Macroinvertebrate taxa were determined and referenced to six FFG-s.

Results: At referent sites, located in the upper river sections, which are characterized with abundance of coarse particulate organic matter, the trophic group of Shredders was dominated. Deposit feeders prevailed in the middle and especially in the lower river stretches, predominantly by the soft ground and deposition of organic matter in sediment layer. Scrapers were the most numerous in the stretches with active development of periphyton. The Filterers encountered favorable conditions for development in deeper river pools whose bottom substrate are richly supplied with fine particulate organic matter. Collectors inhabited mainly areas in river with strong current, from which they provide nutrients. Percentage share of Predators was relatively consistent along the river continuum.

Conclusion: The trophic structure of macrozoobenthos directly related to the available and accessible food, formed as a result of the complementary action of natural environmental factors in the aquatic ecosystems. Under the influence of external human impacts, changes occurred in the quantity and quality of the food resources and redistribution along the river was observed, which reflects on the proportion of the FFG-s.

Keywords: macrozoobenthos, river ecosystems, functional feeding groups, trophic resources

USING BENTHIC MACROINVERTEBRATES TO ASSESS THE ENVIRONMENTAL AND TROPHIC CONDITIONS IN A DONOR AND RECIPIENT RIVERS FOR REINTRODUCTION OF BULLHEAD (*COTTUS GOBIO* LINNAEUS, 1758)

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Aim: The aim of the study is to determine the suitability of one small mountain river for reintroduction of Bullhead (*Cottus gobio*). We have compared the ecological status and trophic availability of recipient Palakaria River with conditions in Cherni Iskar River. The Bullhead used to inhabit Palakaria River, but it was extinct in the first half of 20-th century till in Cherni Iskar River it still has numerous population. For this assessment, we compare the composition, structure and autecological features of macroinvertebrate communities in both rivers.

Material and Methods: The study was carried out during April – November 2013. Eighteen qualitative (using Hand net) and quantitative (using Hess sampler) macrozoobenthic samples were collected (EN-ISO 10870:2012). Taxonomic composition, abundance and biomass were determined. Ecological conditions were evaluated using Biotic index and TTN index. Autecological characteristics of the bottom macroinvertebrates were also analyzed.

Results: The taxonomic composition of Cherni Iskar River consists of 50 taxa, till in Palakaria River we found a total of 58 taxa. The most abundant are the orders Ephemeroptera, Diptera, Plecoptera and Trichoptera, with over 90% of the total density in both rivers. Ecological status showed that the conditions in both rivers are mostly "high" according to the criteria of WFD. Most invertebrates, which inhabit the epirhithral zone, are also preferred as a food source by bullhead. Most of them are sprawling and swimming types, which makes them a good prey for a visual predator like the bullhead. The larval stages of most benthic invertebrates occur continuously throughout the year, which provide year-round trophic resources for bullhead.

Conclusions: We assume that the conditions in the two rivers were similar; recipient River had a good trophic base and future reintroduction of bullhead will be successful.

Acknowledgements: The study was funded by Project № 5103020-C-001, National Museum of Natural History - BAS and "Vitosha" Nature Park

Keywords: macrozoobenthos, bullhead, reintroduction

L5_09

DIVERSITY OF HYMENOLEPIDID CESTODES (CYCLOPHYLLIDEA, HYMENOLEPIDIDAE) FROM RAILS (GRUIFORMES, RALLIDAE) IN BULGARIA

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Aim of the study: to present new data on the species diversity of cestodes of the family Hymenolepididae Ariola, 1899 (Cestoda, Cyclophyllidea) parasitising birds of the family Rallidae in Bulgaria.

Materials and methods: The present study is based on both newly collected specimens and materials from three parasitological collections. In total, cestodes from 28 birds were studied from various localities in Bulgaria, e.g. 22 *Fulica atra* and 6 *Gallinula chloropus*. Type-specimens from the parasitological collection of the Natural History Museum in Geneva and the U.S. National Parasite Collection were used for comparison.

Results: In total, 5 hymenolepidid species have been found, i.e. *D. brevis*, *D. acuminata*, *D. americana*, *D. visayana* and *D. inflata*. The detailed redescriptions of these species contributed to the knowledge of their morphology and variability. High level of host-specificity of all recorded species was confirmed. On the basis of the re-examination of museum specimens, previous records of hymenolepidid cestodes from Rallidae in Bulgaria were analysed and new synonymies were proposed.

Conclusion: The study presented a recent review on poorly known group of cestodes of birds in Bulgaria. The following new host-records for four cestode species in Bulgaria were reported: *Fulica atra* for *D. inflata*, *F. atra* and *Gallinula chloropus* for *D. brevis* and *D. acuminata*, and *G. chloropus* for *D. visayana*.

Acknowledgements: The work was supported by the projects 2E/2011 and 6E/2013 of the Thracian University funded by the National Science Fund.

L5_10

HABITAT PREFERENCES AND IMPACTS OF THE INVASIVE ALIEN SPECIES OF *FALLOPIA* (POLYGONACEAE) IN BULGARIA

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Aim: To reveal the taxonomic diversity, habitat preferences and impacts of the invasive alien *Fallopia* species in the Bulgarian flora.

Materials and methods: Field work was carried out in the growing season of 2014. Naturalised occurrences of *Fallopia* species were localised by GPS-coordinates and mapped. Taxonomic identity of the species was determined. Notes were taken about the size of and floristic diversity in the occupied areas, and about the visible impacts.

Main results: Two invasive alien species of *Fallopia* were recorded – *F. ×bohemica* and *F. japonica*. Both species were used for ornamental purposes in urban environments. Naturalised occurrences of the

former species were published in 2002. *Fallopia japonica* is reported now for the first time for the Bulgarian flora. The main distinguishing characters between the two species are discussed. UTM-distribution maps of both taxa are provided. The two species have similar habitat requirements – they invade mostly urban areas, large parks, riparian and gallery woodland, transport networks, waste deposits. The observed impacts of the species are presented and discussed, e.g. change of the composition and structure of plant communities, reduction of the floristic diversity in the invaded areas, reduction of the capacity of water channels due to overgrowing, etc.

Conclusions: The genus *Fallopia* is represented by two invasive alien species in the Bulgarian flora. *Fallopia ×bohemica* seems to be more widespread and aggressive. Most vulnerable for invasions are urban and riparian ecosystems. Both species have strong negative impact on the native biodiversity and may increase the risk of flooding in settlements.

Keywords: Bulgarian flora, *Fallopia ×bohemica*, *Fallopia japonica*, invasive species, vascular plants

L5_11

FLORA AND HABITATS OF KONGURA RESERVE IN BELASITSA MTS

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Aims: The main aim of the study is to establish the floristic and habitat diversity in the study area as well as assessment of threats for their long term protection. Additionally, another objective is mapping of habitat types, medicinal plants and plant species of conservation concern on the territory of the reserve.

Materials and methods: The study was conducted in Kongura reserve, situated above the town of Petrich, covering 1310 ha. The reserve was declared for protection of most typical Belasitsa's primary ecosystems of sweet chestnut and beech, and the habitats of rare and endangered plant and animal species. Oak and alder are also forming communities mainly in the lower parts of slopes. The flora was studied using the transect method during field trips in August and September 2014. All available literature sources were critically analyzed before the final species list preparation. Vegetation was sampled applying the Braun-Blanquet approach and EUNIS habitat classification.

Results: On the territory of Kongura reserve 267 vascular plants belonging to 44 families were established. About 40% of them (107 species) were referred as medicinal plants and 8 were of conservation concern. Vegetation diversity was classified into 16 habitat types, 8 of which were protected by Habitat Directive (92/43/EEC).

Conclusions: Kongura reserve is characterized by great floristic and habitat diversity, largely with primary origin. Most of the territory is very steep and covered by deep forests which are difficult to walk through. Despite its status of strict reserve, hunting seems to be the main threat for biodiversity in the area.

Acknowledgements: The data was collected with the financial support of the project №DR-5113325-5-94 "Activities on sustainable management of reserve "Sokolata", reserve "Kongura", reserve "Ali Botush", reserve "Orelyak" and managed reserve "Tamnata Gora".

Keywords: biodiversity, Bulgaria, mapping, medicinal plants, protected area, protected species.

L5_12

FLORA, VEGETATION AND NATURAL HABITAT TYPES IN KUTELKA RESERVE (EAST STARA PLANINA (BALKAN) MTS.)

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Aim: To reveal the plant diversity – flora, medicinal plant, vegetation, as well as natural habitats on the territory of Kutelka Reserve.

Material and Methods: The study has been done during the vegetation period of 2014. The route method has been used to describe the plant biodiversity. Identification of taxa and nomenclature for vascular plants and bryophytes were according the main taxonomic sources for Bulgaria. The list of medicinal plants followed Appendix 1 of Medicinal Plants Act. Special attention has been paid to taxa of high conservation value. The study of vegetation (relevé sampling and syntaxonomy) follows the methodological school of Braun-Blanquet. Habitats are defined according to the Habitat Directive (Council Directive 92/43/EEC) and Bulgarian Act of Biodiversity.

Main results: Bryophyte flora in the reserve comprises 28 species, referred to 2 divisions (liverworts and mosses), 3 classes and 18 families. A total list of 483 species of vascular plants has been established. Ferns are represented by 7 species, 3 species are conifers and others (474 species) are flowering plants, including 104 monocots and 369 dicots. Twenty seven plant taxa have conservation importance. Medicinal plants are 167 species. Vegetation is classified to 5 phytosociological classes. Ten types of natural habitats are presented in the reserve territory.

Conclusion: The study represents a pilot scientific research in Kutelka Reserve. Established results show high plant diversity and confirm reserve's importance for conservation of biodiversity and nature of Bulgaria.

Acknowledgments. Authors are grateful to Prizma-Nishava Consortium for the funding and positive collaboration.

Keywords: bryophytes, plant communities, vascular plants.

L5_13

HELMINTHS OF CAUCASIAN DWARF GOBY *KNIPOWITSCHIA CAUCASICA* (BERG) FROM ATANASOVSKO LAKE, BULGARIA

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Aim: To reveal the species composition of helminth parasites in Caucasian dwarf goby *Knipowitschia caucasica* (Berg) from Atanasovsko Lake, Bulgarian Black Sea coast.

Material and Methods: In spring and summer of 2012–2013, 186 specimens of *K. caucasica* were sampled by using fishing nets and subsequently examined for the presence of helminths. Infections were assessed by their prevalence (P%), intensity (I), mean intensity (MI) and mean abundance (MA).

Main results: Four helminth species were recorded. These were two trematode species, *Aphalloides coelomicola* Dollfus, Chabaud & Golvan, 1957 (in body cavity, P% 59.1, I 1-54, MI 8.6, MA 5.1) and *Paratimonia gobii* Prevot & Bartoli, 1967 (in intestine, P% 58.6, I 1-226, MI 35.8, MA 20.9); one

monogenean parasite, *Gyrodactylus bubyri* Osmanov, 1965 (on gills, skin and fins, P% 50.5, I 1-89, MI 13.4, MA 6.8); third-stage larvae of a nematode species identified to the generic level as a member of *Contracecum* Railliet & Henry, 1912 (body cavity, P% 1.6, I 1, MI 1, MA 0.02).

Conclusions: *A. coelomicola*, *P. gobii* and *G. bubyri* are new records for the fauna of Bulgaria. This is the first record of *G. bubyri* for the Black Sea fauna. These three species exhibit high rates of infection.

Acknowledgments: We acknowledge the facilities developed by the projects WETLANET (FP7 CAPACITIES, 229802), CEBDER (National Science Fund, DO 02-15/2009) and "Phylogenetic ultrastructure markers for parasitic worms" (National Science Fund, YS DO 02-271/18.12.2008).

Keywords: *Knipowitschia caucasica*, helminths, Black Sea, Bulgaria

L5_14

FLORA AND HABITATS OF ORELYAK RESERVE IN PIRIN MTS

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Aims: The main aim of the study is to establish the floristic and habitat diversity in the study area as well as assessment of threats for their long term protection. Another objective is to map the habitat types, medicinal plants and plant species of conservation concern on the territory of the reserve.

Materials and methods: The study was conducted in Orelyak reserve, situated in the south central part of Pirin Mts covering 757 ha. Over 90% of its territory is occupied by ancient beech forests, which is the reason for its establishment, whereas scrublands and grasslands are only sparsely represented. The flora was studied using the transect method during field trips in August and September 2014. All available literature sources were critically analyzed before the final species list preparation. Vegetation was sampled applying the Braun-Blanquet approach and EUNIS habitat classification.

Results: On the territory of Orelyak reserve 339 vascular plants belonging to 64 families and 203 genera were established. About 40% of them (137 species) are medicinal plants and 9 species are of conservation concern. Vegetation diversity was classified into 11 habitat types, 5 of which are protected by Habitat Directive (92/43/EEC).

Conclusions: Orelyak reserve is characterized by great floristic and habitat diversity, largely with primary origin. Despite its status of strict reserve the human impact is notable all over the area. Protection of the reserve should be optimized in a way that activities such as grazing and transportation of products from nearby dairies outside official footpaths should be terminated.

Acknowledgements: The data was collected with the financial support of the project №DR-5113325-5-94 "Activities on sustainable management of reserve "Sokolata", reserve "Kongura", reserve "Ali Botush", reserve "Orelyak" and managed reserve "Tamnata Gora".

Keywords: biodiversity, Bulgaria, mapping, medicinal plants, protected area, protected species

CONTRIBUTION TO THE KNOWLEDGE OF EPHEMEROPTERA, PLECOPTERA AND TRICHOPTERA (EPT) SPECIES FROM REPUBLIC OF MACEDONIA

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Aim: The goal of this work is to document the first record of a new, endemic and rare EPT species for the Republic of Macedonia.

Material and Methods: The samples were collected between October 2008-July 2014, from the hydrographic basins of 7 rivers (18 stations) that cross the territory of R. Macedonia: Bregalnica (11 stations), Mala Reka (1 station), Tresonechka Reka (1 station), Rosochka Reka (1 station), Portica (Lazaropolska) Reka (1 station), Orevechka Reka (2 stations) and Lenishka Reka (1 station). EPT specimens were collected with Surber sampler, hand-net (mesh of the size 500 µm) and with an Ekman grab, following standard methodology for collection of bottom fauna (EN 28265:1994, EN 27828:1994, EN 9391:1995).

Results: The mayfly (Ephemeroptera) *Caenis pseudorivulorum* Keffermüller 1960 is newly reported for the fauna of the R. Macedonia. Furthermore, one endemic - *Serratella ikonovski* (Puthz, 1971) and tree rare mayfly species - *Ephemerella mucronata* (Bengtsson, 1909), *Rhithrogena gratianopolitana* Sowa, Degrange & Sartori, 1986 and *Heptagenia longicauda* (Stephens, 1835) - with detail area of distribution are reported. Among stoneflies (Plecoptera) the Balkan endemic taxa *Brachyptera beali beali* (Navás, 1924) and the rare species *Taeniopteryx hubaulti* Aubert, 1946, with its zoogeographical distribution are given. Concerning caddisflies (Trichoptera) the endangered *Thremma anomalum* McLACHLAN, 1876 from five localities of the territory of R. Macedonia is reported.

Keywords: Ephemeroptera, Plecoptera, Trichoptera, R. Macedonia.

INVASIVE PLANT SPECIES OF UNIVERSITY BOTANICAL GARDEN VARNA

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Aim: The aim of this study is to identify invasive alien species on the territory of University Botanical Garden Varna, to describe the species composition, the degree of invasiveness and their impact on native vegetation.

Materials and Methods: An evaluation of the extent of invasive and potentially invasive plants was carried out on the territory of University Botanical Garden Varna. The places with the densest populations of invasive plants were mapped. An extensive photographic material was collected.

Results: The studies found that the territory of UBG Varna has 28 invasive alien plant species, of which 7 species are included in Halting the loss of biodiversity by 2010: proposal for a first set of indicators to monitor progress in Europe – European Environment Agency Technical Report, 11: 104-109. The most dangerous invasive alien species on the territory of UBG Varna were *Ailanthus altissima*, *Robinia pseudoacacia* and *Sorghum halepense*. Most numerous invasive plant species belonged to the family Asteraceae - represented by 6 species, followed by family Fabaceae – 5 species. The remaining families were represented by only one species. These observations showed that they do not represent a threat to the changes in natural vegetation of the area and were marked as potentially invasive.

Conclusions: A Plan has been developed to limit the propagation and spread of invasive plant species. The possibilities for biological, chemical and mechanical control of invasive plant species were explored, as well as the possibility of replacing them with species of native flora, which could displace or limit the spread of invasive plant species.

Key words: invasive alien plant species, University Botanical Garden

P5_02

ECOLOGY-ANATOMICAL CHARACTERISTICS AND VARIABILITY OF *RANUNCULUS ACRIS* (RANUNCULACEAE)

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Aims: The aim of the study was to carry out ecological and anatomical investigation of different populations of *Ranunculus acris* in order to establish their variability.

Materials and methods: Four populations of *Ranunculus acris* from three floristic regions of Bulgaria were studied: Rhodopes, Central (Asenovgrad and Chepelare), Danubian Plain (Pavlikeni) and the Balkan Mountains, Central (Trojan). Ten individuals from each population were collected. Fresh material fixed in 75% ethanol was used. The studies were conducted using a light microscope Amplival. The results were statistically analyzed on the basis of 20 measurements for each feature in each individual.

Main results: The main characteristics of the leaf epiderma (upper and lower) and stem were analyzed including size of basic epidermal cells and stomata number. Analyses of the anatomical characteristics of leaves and stems from different populations of *R. acris* showed that the most variable is the length of the main epidermal cells. The least variable were size and number of the stoma.

Conclusions: The population of *R. acris* from Chepelare has large amounts of epidermal cells and a greater number of stomata in comparison with the populations of Pavlikeni and Trojan. These differences are related to environmental conditions and in particular to the greater humidity.

Acknowledgements: Financial support under project №10-12 NIC, AU-Plovdiv, Bulgaria is acknowledged.

Keywords: *Ranunculaceae*, *Ranunculus acris*, anatomy, variability

P5_03

FIRST DATA ABOUT MACROINVERTEBRATE DIVERSITY ON THE BYAL KLADENETS LAKE - BULGARIA

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Aim: The research presents the first qualitative and quantitative data about the inventory of the sublittoral macroinvertebrate fauna of the Byal kladenets (Ovchi kladenets).

Materials and methods: The survey was based on samples from the winter, spring and summer of 2013 near the dam wall. Qualitative samples of benthic macroinvertebrates were taken according to the standard methods ISO 9391:1995 and EN 27828:1994. Field and cameral work was done in accordance with the standard method ISO 5667-3:2012. The species composition, seasonal distribution pattern and abundance of the macrozoobenthos were measured.

Results: A total of 23 bottom invertebrates systematic groups were established, 14 of them identified to a species level. The following benthic taxa were presented: Oligochaeta, Chironomidae (Diptera), Insecta. The class Oligochaeta was the most represented with 29% of the number of taxa, followed by Gastropoda – 25%.

Conclusion: The studied area is characterized by an average diversity of benthic macroinvertebrate taxa, dominated by Chironomidae (Diptera), followed by Oligochaeta.

A significant seasonal decrease of both the total number of the benthic group and the total abundance of macroinvertebrates was observed.

Acknowledgements: This study is part of the project “Preparation of management plans of protected area “Ovcharitsa Lake” BG0002023 and Protected area “Jrebchevo Lake” BG0002052”.

Keywords: benthic macroinvertebrate communities, protected area

P5_04

CONTRIBUTION TO THE KNOWLEDGE OF CARABID (COLEOPTERA: CARABIDAE) AND CERAMBYCID FAUNA (COLEOPTERA: CERAMBYCIDAE) OF BELASITSA MOUNTAIN IN R. MACEDONIA

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Aim: This paper provides data concerning endemism and status of threat of carabid and cerambycid fauna on Belasitsa Mountain in Macedonia.

Material and Methods: The material was collected monthly in the period April 2010- November 2010, with pitfall traps from 14 different localities (from the base - 240 m above s.l. to the top -1500 m above s.l. of the mountain) on the north parts of Belasitsa Mountain.

Results: In total 38 species of Carabid family and 9 species of Cerambycid family are presented. Three subspecies are endemic wherein *Cychnus semigranosus balcanicus* Hopffgarten, 1881 is Balkan and

subspecies *Molops rufipes belasicensis* Mlynář, 1977 and *Tapinopterus balcanicus belasicensis* Mařan, 1933 are locally endemic and subendemic species, respectively. Among the endemic species the presence of tertiary relict species *Myas chalybaeus* (Palliard, 1825) is registered. Four species of Coleoptera are included in the International Lists of biodiversity protection. Species *Carabus intricatus* Linnaeus, 1761, *Morimus asper funereus* Mulsant, 1862 and *Rosalia alpina* (Linnaeus, 1758) are listed in IUCN red list of threatened species under the categories LR / nt VU A1c + 2c and VU A1c, respectively. Species *Carabus intricatus* Linnaeus, 1761 and *Carabus convexus dilatatus* Dejean, 1826 are cited in CORINE list, while the species *Morimus asper funereus* Mulsant, 1862 is listed in Annex IV of the DCE 92/43 Natura 2000.

Conclusion: Despite the relatively low level of endemism and the presence of few taxa under protection, their presence clearly highlights the conservational importance of Belasitsa Mountain in Macedonia.

Keywords: carabid, cerambycid fauna, Belasitsa

P5_05

A STUDY OF AQUATIC MACROPHYTES IN TWO BULGARIAN DANUBE WETLANDS

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Aim: A study of two Danube wetlands was conducted in 2014.

Materials and methods: The species composition of aquatic vascular plants was studied using the transect method. Braun-Blanquet cover abundance method was applied. Several environmental variables were measured. The resulting dataset was analyzed and transects were compared.

Results: Thirty two vascular plant species were identified in the Maluk Preslavec lake and twenty four in the Garvan swamp. *Nuphar lutea* was the most numerous species in the Maluk Preslavec lake, while the Garvan swamp was dominated by *Typha angustifolia*. The invasive *Elodea nuttallii* was found in the Maluk Preslavec lake. The rare *Typha laxmannii* was found only on one location in the Maluk Preslavec lake. The environmental conditions and parameters were similar across the two study areas. However, there were differences between some of the hydrophysical parameters, such as the oxygen saturation and the electrical conductivity.

Conclusion: This study represents a contribution to environmental monitoring and biodiversity conservation programmes.

Acknowledgments: This work was funded by the project: Development of Srebarna Nature Reserve Management plan. We would like to thank to assoc. prof. Luchezar Pehlivanov for giving us the opportunity to work on this project.

Keywords: freshwater aquatic vascular plants, Danube wetlands, biodiversity, environmental monitoring

P5_06

DEVELOPMENT OF MACROZOOBENTHOS COMMUNITY IN THE EPHEMERAL ALDOMIROVSKO LAKE (NORTHWEST BULGARIA)

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Aim: The aim of the study was to investigate the development of the macrozoobenthos community in the ephemeral Aldomirovsko lake with respect to its specific hydrological regime and the environmental factors.

Material and Methods: The samples were taken from 4 sampling points in July in the year 2013 and one of them was sampled 5 times during the year 2014 from May to August. Main physical and Chemical parameters were measured along with nutrients in the water. Macrozoobenthos samples were collected according the multihabitat approach (Cheshmedjiev & Varadinova, 2013). The statistical analysis of the data was performed in SPSS v 20.0.0.

Results: The analysis of the samples from 2013 showed no statistically significant correlations between the abundance of the macrozoobenthos community and the environmental factors such as depth, temperature of water and transparency. The abundance had significant correlations with conductivity and nitrogen forms. On the other hand the analysis showed that during 2014 the most significant for the abundance was depth of lake and temperature of the water.

Conclusions: The results lead to the conclusion that environmental conditions at different sampling points of one ephemeral lake are very similar to each other and did not have any significance for the abundance of macrozoobenthos community. More significant was the temporary character of the lake, i.e. its hydrological regime and life conditions that it forms.

Keywords: abundance, macrozoobenthos, ephemeral lake

Acknowledgements: Part of the study was conducted under project with the Municipality of the town of Slivnitsa and Balkani Wildlife Society

P5_07

SEASONAL CHANGES IN TROPHIC STRUCTURE OF THE LOTHIC MACROZOOBENTHOS COMMUNITIES

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Aim: The study is aiming to analyze seasonal variability of the functional feeding groups (FFG-s) and its effect on the trophic structure of the macroinvertebrates in the river ecosystems.

Materials and methods: Totally sixty-three samples collected on four representative river ecosystems – Mesta, Vit, Tundzha and Veleka, belonging to three catchment areas and two EU-ecoregions, were collected. Three type-specific sites along each river were chosen. Benthic materials were sampled during three seasons within two-years observation period (2011–2012). An adapted version of multi-habitat sampling method was used. Macroinvertebrate taxa were determined and referenced to six FFG-s.

Results: Our results presented pronounced seasonal changes in the trophic structure of the macrozoobenthos. The group of Shredders showed the highest relative abundance in spring. Scrapers and Collectors gradually increased its share to autumn. The dynamic of Deposit feeders and Filterers indicated the opposite trend. The group of Predators demonstrated relatively constant presence in the composition of trophic structure of the macrozoobenthos during all seasons.

Conclusion: Distribution of FFG-s of the macrozoobenthos was determined by the available trophic resources. The type and the accessibility of food base had a leading role in the formation of the benthic trophic structure. Anthropogenic impact, which directly affected the ecological status influenced on the redistribution of FFG-s during different seasons.

Key words: river ecosystems, macrozoobenthos, functional feeding groups, trophic structure, seasonality

P5_08

DIVERSITY OF SOFT-BOTTOM MACROZOOBENTHIC COMMUNITIES IN THE SHALLOW COASTAL ZONE OF BURGAS BAY (SOUTH-WESTERN BLACK SEA)

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This study aims to examine the current state of macroinvertebrate biodiversity in soft-bottom habitats from the shallow infralittoral (less than 10 m depth) of the Southern Bulgarian Black Sea.

Materials and methods: The macrozoobenthic communities at 6 standard stations in Burgas Bay were sampled in June 2013. A total of 18 samples were collected and 7498 individuals identified, representing 108 taxa belonging to the faunal groups Mollusca, Polychaeta, Oligochaeta, Crustacea, and Varia. Polychaetes were the most abundant group (42.4% of the total number of individuals), followed by molluscs (21.3%), oligochaetes (19.9%), crustaceans (13.2%) and others (3.2%). The polychaetes were represented by the highest number of taxa (49), followed by the molluscs (27) and the crustaceans (24). Shannon-Wiener diversity (H') varied between 1.01 and 4.17, and evenness (J') - between 0.23 and 0.79.

Results: The differences observed in the macrozoobenthic community composition and structure were mainly determined by the type of substrate, which varied from coarse to fine-grained sand and contained different amounts of organic matter. The biodiversity was relatively low, with high dominance, which is characteristic of the shallow infralittoral zone. Stations in the inner part of the bay, close to the city of Burgas, had a higher proportion of opportunistic and tolerant taxa, which is indicative of disturbance, while stations in the outer part of the bay showed higher proportions of sensitive taxa.

Conclusion: Macorinvertebrate communities are an important component of coastal marine ecosystems. Their conservation is crucial for maintaining the biodiversity and ecosystem functioning in the coastal zone.

Keywords: soft-bottom macrozoobenthic communities, biodiversity, coastal zone, Bulgarian Black Sea
This study was carried out within the framework of the PERSEUS project.

P5_09

***IN VITRO* MICROPROPAGATION OF *DIANTHUS* SP. (CARYOPHYLLACEAE)**

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Aim: *Dianthus* species are perennial plants with high ornamental value, some of them are rare, and others are used in the traditional medicine. *In vitro* rapid multiplication of wild pinks could afford these nice small plants for the garden market.

Material and methods: Seeds were gathered in august 2013 from *Dianthus* plants near the Lake of Durankulak, Bulgaria. They were surface sterilized and germinated on half-strength MS medium, at $23\pm 1^\circ\text{C}$ and 16 hours light daily. Shoots were sub-cultured every eight weeks on media containing plant growth regulators (PGRs) BAP or Kin combined with NAA or IBA, in different concentrations. Multiplication efficiency was evaluated by propagation coefficient representing the average number of shoots obtained per explant. *In vitro* rooted plantlets were potted in soil mixture and *ex vitro* adapted in phytotron, then acclimated to greenhouse conditions.

Main results: Seeds germinated in only a week. After removal of seedling roots, adventitious shoots raised on the stem base while callus formed under the explants, on media containing 1 mg/l cytokinin and 0.5 mg/l auxin. Multiplication efficiency increased on media with less concentration of PGRs, reaching 9.9 ± 3.2 shoots per explant on medium with 0.2 mg/l BAP and 0.1 mg/l NAA. *In vitro* rooting occurred on basal MS medium but was embarrassed by endophytic bacteria rising after the last sub-cultivation and should be further improved. Plants acclimated in the greenhouse will be transferred to open field in spring.

Conclusion: *In vitro* micropropagation of wild pinks could be an opportunity for their mass propagation.

Keywords: wild pink, *in vitro* multiplication, ornamental, greenhouse

P5_10

ASSESSMENT OF TURBOT (*SCOPHTHALMUS MAXIMUS* L.) STOCK STATUS IN BULGARIAN BLACK SEA ACCORDING TO INDICATORS OF EU MARINE STRATEGY FRAMEWORK DIRECTIVE

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Aim: The Marine Strategy Framework Directive (MSFD) formulates Good Environmental Status (GES) of exploited fish stocks under Descriptor 3 (D3), which have to be achieved by 2020. Current study performed assessment of turbot stock by set of indicators under the three criteria of D3 using data from regional analytical stock assessments and research surveys along Bulgarian Black Sea coast.

Material and methods: Six indicators were calculated and applied to assess the turbot stock status in Bulgarian Black Sea area. Data was collected within 12 research surveys during 2006 – 2012. Reference levels for spawning stock biomass and fishing mortality were extracted from analytical stock assessments and for the rest of indicators were calculated at national level.

Results: Indicators under Criterion 3.1 demonstrate high level of fishing pressure and unsustainable exploitation of turbot stock. Estimates of fishing mortality and catch/biomass ratios are above the reference levels and currently turbot stock do not achieved GES. Reproductive capacity of species

according to Criterion 3.2 is likely to be at very low levels. Stock spawning biomass and biomass indices are below the precautionary limits and GES is not achieved. Population length distribution under Criterion 3.3 do not met GES requirements, because of low abundant older fish, although the indicator of 95% percentile of length distribution is in good status.

Conclusions: Indicator-based assessment according to the criteria under D3 demonstrate that the turbot stock along Bulgarian coast do not achieved GES due to high fishing pressure, reduced reproductive capacity and alterations in size structure.

Keywords: turbot, Bulgarian Black Sea, Marine Strategy Framework Directive, Descriptor 3, indicators

P5_11

INITIATION OF *IN VITRO* CULTURE AND CAPACITY OF SEED SPROUTING IN TWO DIFFERENT MEDIUMS OF *ACHILLEA THRACICA* VELEN. PLANTS

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Aim: The purpose of this study is to obtain *in vitro* culture of different lines of *A. thracica* by seeds from the plant and to be tested their ability of germination in these conditions.

Material and methods: Intact plant material of *A. thracica* was collected at its natural habitat near Manole village, Plovdiv, Bulgaria. The voucher specimen SO107385 has been deposited in the Herbarium of the Department of Botany, Faculty of Biology, Sofia University. *In vitro* shoot cultures were induced from ripe dry seeds, collected from *in situ* growing wild plant and sterilized with 70 % ethanol. The seeds were successfully sprouted and grown on half strength Murashige and Skoog medium (1/2 MS) with 15 g/l sucrose and 8 g/l agar and water agar.

Results: Ethanol (70%) was applied in sterilization of seeds from *A. thracica* and 18 of all 35 set seeds grown into 1/2 MS were sprouted and 13 of all 35 set seeds grown into water agar were sprouted. Successful micropropagation was achieved on hormone-free basal MS-B5 medium with 30 g/L sucrose and 8 g/L agar.

Conclusion: The conducted experiment showed higher germination of seeds placed on 1/2 MS medium compared than those on water agar.

Keywords: *Achillea thracica*, *in vitro* cultivation, seed sprout

P5_12

TRENDS OF MESOZOOPLANKTON COMMUNITY DYNAMICS IN THE BULGARIAN PART OF THE BLACK SEA

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The aim of the present study was to analyze the long-term quantitative fluctuations and structural modifications of the mesozooplankton community in the Bulgarian part of the Black Sea.

Material and methods: A long-term spring data set (1967-2009) of the mesozooplankton abundance and biomass along transect c. Galata was analysed.

Results: The three main periods of the Black Sea ecosystem evolution were distinguished: referent one (to the mid 1970s), period of intensive eutrophication (1980s and 1990s) and post-eutrophication period. The analysis shows some trends of recovery of the mesozooplankton community: occurrence of some sensitive species (*Centropages ponticus*, *Penilia avirostris*, *Evadne spinifera*, *Evadne nordmanni*, *Pseudoevadne tergestina*); increase of rarely observed copepods during the period of intensive eutrophication like *Paracalanus parvus* (constant in recent period); decline in the quantitative development of opportunistic species (*Acartia clausi*); reduced impact of *Noctiluca scintillans*, *Aurelia aurita* and *Mnemiopsis leidy*; abrupt increase (regime shift) in spring values of biodiversity indexes (Shannon-Weaver, Pielou and Margalef).

Conclusions: The positive trends are still unstable due to the observed large inter-annual deviations of the parameters studied and significant dynamics in the quantitative values of *Noctiluca* population.

Keywords: zooplankton, Western Black Sea, eutrophication, fluctuations

P5_13

NEW RECORDS OF *DALDINIA VERNICOSA* IN BULGARIA

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Aim: Contribution to the known diversity of *Daldinia* (Xylariales).

Material and methods: The studied specimens were housed at the Mycological Collection, Institute of Biodiversity and Ecosystem Research (SOMF); cross sections of the stromata were made with a help of a razor blade; all microscopic features were studied in water and KOH. Measurements under LM were always taken in water with the help of software *Carnoy* 2.0 (© Peter Schols, 2001). The spores are illustrated with colour photos, shot under LM with the help of *Canon* PS A460 and PS A1400 HD under Boeco microscope. Spores for SEM observations were obtained from pieces of stromata, mounted on metal stubs with double-sided adhesive tape and sputter-coated with gold. Scanning electronic microphotographs (SEM) were taken under a JEOL JSM-6390 at 10 kV.

Main results: Newly records of *Daldinia vernicosa* in Forebalkan and in Stara Planina Mts are reported. The fungus is identified on the basis of its morphological features. Brief description, based on the materials studied is applied.

Conclusion: As a result of field studies, arranged in Forebalkan and Eastern Stara Planina Mts, newly finds of *Daldinia vernicosa* are reported. Bulgarian collections were found on dead or dying, but not burnt large branches of *Carpinus orientalis* and on trunk of *Tilia*, which seems to be new substrates of *D. vernicosa*.

Acknowledgements: This work is held within the frame of the project 'Taxonomy, conservation and sustainable use of fungi'. Thanks go to Dr. B. Assyov (IBER, Sofia) for his photograph of stromata in situ, Dr. P. Alvarado (Alvalab, Spain) for providing the ITS tree of the specimen.

Keywords: Ascomycota, Bulgarian mycota, *Xylariaceae*

P5_14

NEW RECORDS OF ASCOMYCOTA IN BULGARIA

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Aim: Further studies aimed at contributing to the known diversity of sac fungi in Bulgaria.

Material and methods: All of the materials, recently collected by the author along the field trips during 2006-2014 years, are deposited in SOMF. The fungi are examined micromorphologically under Boeco BM 180/T/SP and Olympus BX-41 LM, following well-known standard methods, accepted in mycology. Photographs are taken with the help of Canon Powershot A1400 HD digital camera.

Main results: One new genus for Bulgaria from the family *Nectriaceae* – *Dialonectria* is briefly described and illustrated, based on fresh material of *D. episphaeria*. Seven very rarely recorded fungi from *Ascomycota* (including economic important parasites on bark, twigs and leaves of vascular plants), are illustrated and reported in new localities (*Biscogniauxia mediterranea*, *Colpoma quercinum*, *Hysterium angustatum*, *H. pulicare*, *Mamiania fimbriata*, *Trochila laurocerasi* and *Patellaria atrata*). *B. mediterranea* is recorded on bark of *Quercus dalechampii*. Brief morphological descriptions and colour illustrations are also included. Comments on their ecology and the known distribution of the cited fungi are mentioned.

Conclusion: One new and 7 rare or economic important ascomycetous fungi from Bulgaria are revealed as a result of intensive field and laboratory studies held. *Q. dalechampii* is found as a host of *B. mediterranea* from our country.

Acknowledgements. This work is held within the frame of the project ‘Taxonomy, conservation and sustainable use of fungi’.

Keywords: Bulgarian mycota, *Dialonectria*, *Hysterium*, *Mamiania*, *Patellaria*

P5_15

CONSERVATION OF RARE AND ENDANGERED PLANT SPECIES OF THE BULGARIAN FLORA IN AN EX SITU COLLECTION

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Aim: Conservation in *ex situ* collection of rare vascular plant species which have populations with limited area and critically low numbers, threatened by damage or extinction.

Material and methods: The collection includes sixteen plant species with authentic origin, ten of them being transferred alive from their natural habitats and six of them being germinated from seeds, cuttings and shoots.

Results: A good adaptive capacity was observed with the perennial species and those with vegetative propagation. 80 percent of them reached the generative phase. An increase of the number of individuals was achieved through division of rhizomes and through spontaneously germinating seeds of the individuals transferred from the wild. The best results in seed propagation were observed with the species having a high germination rate, most notably the woody species *Eriolobus trilobata* which has only two individuals growing in the wild in Bulgaria. Some of the plants were successfully brought back to the natural populations.

Conclusion The individuals of rare plants preserved in the collection may serve as a source of material for research and/or may be brought back to natural populations to stabilize them. A part of the plants will be transferred to botanical gardens to enrich their living collections of rare species.

Acknowledgments: The *ex situ* collection was created within the project “A pilot network of small protected sites for plant species in Bulgaria using the plant micro-reserve model” is co-funded by the EU’s Life+ Programme and the Ministry of Environment and Water of Bulgaria.

Keywords: *ex situ* collection, rare and endangered plants

P5_16

***ELATOBIMUM ABIETINUM* (WALKER) - A LITTLE KNOWN PEST ON *PICEA* SPP. IN BULGARIA**

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Elatobium abietinum (Hemiptera: Aphididae) is a pest infesting mainly *Picea* spp. This species was found for the first time in Bulgaria in April 2014 in three private properties near Sofia – in Bistritsa, Pancharevo, and Dragalevci on *P. abies* and *P. pungens*. The damage caused by the aphid leads to the full loss of the needles of infested branches.

The aim of this paper is to present biological and ecological characteristics of *E. abietinum*.

Materials and methods: They are based on generalization of the data from up to date studies carried out abroad.

The results show that the newly established *E. abietinum* in Bulgaria could represent a serious problem for landscaping, nursery production, and forestry.

In conclusion could be said that there is a high potential risk of a rapid spread of *E. abietinum* in Bulgaria.

Key words: aphid, Aphididae, Bulgaria, *Elatobium abietinum*, *Picea*, pest

P5_17

OCCURRENCE OF *TESTICULARIA AFRICANA* (SMUT FUNGI) IN TANZANIA AND MOZAMBIQUE

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Aim: a contribution to the taxonomy and distribution of the smut fungi in Africa.

Materials and Methods: Dried specimens from the herbarium of the Botanic Garden and Botanical Museum Berlin-Dahlem were examined under light microscope (LM) and scanning electron microscope (SEM). For LM observations and measurements, spores were mounted in lactoglycerol solution on glass slides, gently heated to boiling point to rehydrate the spores, and then cooled. For SEM, spores were attached to specimen holders by double-sided adhesive tape and coated with gold with an ion sputter. The surface structure of spores was observed at 10 kV and photographed with a JEOL SM-6390 scanning electron microscope.

Results: *Testicularia africana* (a smut fungus, known only from single collections from Sierra Leone, Guinea, and Cameroon) is reported for the first time from Tanzania and Mozambique. The new records extend its geographical range from Western Africa to Eastern Africa.

Keywords: *Anthracoideaceae*, *Rhynchospora*, smut fungi, taxonomy, *Testicularia*

P5_18

CERCOSPOROID FUNGI (*ASCOMYCOTA*, *MYCOSPHAERELLACEAE*) ON AGRICULTURAL CROPS IN BULGARIA

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Aim: Presentation of the systematic position of cercosporoid fungi on agricultural crops in Bulgaria according to modern conceptions.

Materials and Methods: Systematic position of the cercosporoid fungi (*Ascomycota*, *Mycosphaerellaceae*) included in the following text and their current names are presented after Hyde et al. (2011), and the databases consisting fungal names of various taxa such as Index Fungorum, MycoBank and Species Fungorum. The description of the new genus *Ramulispora* is conformed to Braun (1995). All names of the plant diseases mentioned are given according to Bulgarian literature sources: Stancheva (2002a, 2002b, 2004, 2006, 2010a, 2010b) and Kolev (2011).

Main results: Most common cercosporoid fungi (21 species) of genera *Cercospora* Fresen., *Passalora* Fresen., *Pseudocercospora* Speg., *Ramularia* Unger and *Ramulispora* Miura (*Mycosphaerellaceae*, *Capnodiales*) are pointed as causative agents of economically important plant diseases. All taxa of cercosporoid fungi, included in the present work, are listed alphabetically following the most recently adopted system of Phylum *Ascomycota* (Hyde et al., 2011).

Conclusion: The accurate identification of the parasitic fungi is very important for an adequate control. Before January, 1st 2013 the former group, previously known as ‘cercosporoid fungi’ was studied as ‘anamorphic fungi’ – a formal taxonomic group. After the publication of ICN (McNeill et al., 2012) their systematic position has changed, see also Hyde et al. (2011).

Acknowledgements. This work falls within the frame of the project ‘Taxonomy, conservation and sustainable use of fungi’.

Keywords: cercosporoid fungi, plant diseases, *Ramulispora*, systematic position

THEMATIC SESSION VI

ECOLOGICAL AGRICULTURE

PL6_01

DISEASE RESISTANT CROPS AND ECOLOGICAL (ORGANIC) AGRICULTURE

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Organic agricultural production is carried out in accordance with the laws of the Nature. Agricultural production is grown in ecologically clean regions without the use of synthetic chemicals (fertilizers, pesticides, etc.) and genetically modified plants. The only effective approach is to use varieties with complex resistance to economically important diseases.

Different forms and mechanisms of plant resistance are discussed in this review. The difference between innate and acquired resistance is explained. Within innate resistance, various forms of non-specific (immunity) as well as specific resistance (extreme resistance, gene-for-gene resistance with the hypersensitive response and gene silencing) are discussed.

To date, hundreds of naturally occurring genes for resistance to phytopathogens have been reported from studies of crops and their wild relatives. The isolation and characterization of some of these genes have resulted in detailed knowledge of some of the molecules that are critical in determining the outcome of plant disease resistance. We have summarized current knowledge regarding their identity and inheritance. Insofar as information is available, genomic organization, mechanisms of resistance and agricultural deployment of plant resistance genes are also discussed.

P6_01

Organic agriculture – features, benefits and negative effects

/A Review/

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The benefits of conventional agriculture, which is based on the application of chemical methods of pest management and the use of synthetic fertilizers to improve soil fertility, are obvious. Their application has led to getting more and better crop production. But, from an ecological point of view, the introduction of large amounts of chemicals into the soil, where they fall in the water and plants, brings detrimental environmental outcomes. So that, the organic farming appears as an alternative method, which is based on the use of natural and environmentally friendly methods to control pests in crops. Organic farming integrates biological, mechanical, physical and chemical methods of farm management, without usage of synthetic pesticides and fertilizers, as well as GMOs. This helps protect the soil characteristics and biodiversity of the ecosystems as a whole. Although the question in terms of yield quantity of the two methods and the costs, associated with them is controversial, the modern environmental science believes, that organic farming is a better agricultural alternative. Last but not least in importance is the production

of agricultural commodities, free of residual chemicals, which is significant for the protection of human health.

Keywords: organic agriculture/farming, pesticides, environment, ecosystem

P6_02

FORMS AND MINERAL PHOSPHORUS CONTENT IN THE LEACHED SMOLNITCHA AT TWO MINERAL FERTILIZATION LEVELS AND THREE CROP ROTATIONS TYPES

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Materials and Methods: The changes of the mineral phosphorus content in 0-60 cm soil horizon under the influence of two level of fertilization and three types of crops rotations has been investigated. The experiment has been done on the leached smolnitcha {Haplic Vertisols (Eutric) /FAO 2006/} with 23 years barley (*Hordeum vulgare* L.) monoculture. The advantages and the disadvantages of the rotation of “barley-sunflower (*Helianthus annuus*)”, ”barley-barley”, “barley-alfalfa (*Medicago sativa*)” on the content of mineral phosphorus elements in soil has been investigated.

Results: It was found that with increasing levels of phosphorus fertilization increased easily and moderately soluble phosphate in layers 0-20 and 20-40 cm. Hardly soluble aluminum and iron phosphates in all variants of fertilization and crop rotation units reduce the depth of the profile, under which iron predominate over aluminum phosphates.

Keywords: phosphorus, fertilization, rotations, “barley-sunflower”, ”barley-barley”, “barley-alfalfa”

THEMATIC SESSION VII ECOLOGY AND EDUCATION

PL7_01

ECOLOGICAL EDUCATION IN SECONDARY SCHOOL – REGULATIVE FRAMEWORK AND CURRICULUM ASPECTS

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Recently the term ecological education went beyond area of subject-specific and institutional use. This kind of significant evolution of the term is a result not only of the rapid development of sciences. It is affected by insensibly realizing (more or less) dependencies between our own health and quality parameters of nature, realizing the importance of environment not only as a food and shelter resources, but as conditions of human living in planetary significance.

The school as an institution is a natural surrounding to build pattern of behavior to ourselves and our mutual “home”. This is a rationale for state policy in ecological education, for defining curriculum accents with specific persistence in different regulatory documents.

In the report theoretical analysis is presented about ecological education as a state policy strategy and practices in the cross-field of institutional interactions (secondary school and university – formal and informal education), NGO and media. The report is based on following key points:

- new concepts and topics, result of natural and social sciences integration, to be included in the field of ecological education - as a practice now and strategy in future regulative documents for secondary school;
- ecological education on the level of institutional interactions with key topic – professional teacher training;
- ecological education as a noninstitutional event - NGO and media.

Keywords: ecological education, regulative determination pedagogical technology

L7_01

Project-based learning on the subject of “Advertising campaign: Separate waste collection”

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One of the goals in the field of scientific subjects in high school education is the development of scientific literacy. It is concerned with the comprehension of fundamental scientific terms and hypotheses, as well as with the understanding of the way of interaction between science, mathematics and technology.

Modern teaching practice offers different models of quality teaching and learning. One of them is bound with elaboration of student’s projects.

The aim of the following paper is to present a theoretically validated and approbated method of project-based learning in the field of biology and health education in 9th grade on the subject of “Advertising campaign: Separate waste collection”. The order of steps which are followed for the realization of the method, as well as the criteria for evaluation of the final product presented by the students is described in the paper. The method is carried out at Sofia Professional High-school of Electronics “John Atanassov” with 9th grade students.

In the course of project-based learning teachers and students switch their roles. The students take on the role of people who actively solve problems in the field of environmental studies and demonstrate personal opinion when they conduct activities which raise the level of public awareness and culture.

Keywords: project-based learning, waste collection, school education

L7_02

Framework to ensure and maintain the quality of non-formal education for sustainable development

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The issues of the question for evaluation of non-formal education for sustainable development varying in the different European countries are directly related to the question of the object of evaluation or "What we do evaluate?".

In the article the main criteria for assessing the quality of a training unit for non-formal education for sustainable development is suggested, as well as relevant indicators.

During the development process of the framework the following methods are implemented: theoretical analysis and synthesis and pedagogical modeling.

To ensure completeness and objectivity for evaluation of non-formal education quality for sustainable development, the following inter-related areas should be monitored: the expected results upon completion of the training unit, whether the content of the training unit for sustainable development through informal education and evaluation system of learners are effective and relevant to the defined goals; what the achievements of students in the course for non-formal education for sustainable development are; the resources provided for effective non-formal learning support and teaching quality and how the system works to ensure and maintain the quality of each training program for non-formal education for sustainable development.

Keywords: quality criteria, non-formal education, sustainable development, framework

L7_03

MACEDONIAN STUDENTS' PERCEPTION OF POLLUTION AND THE ENVIRONMENT THROUGH TEACHING ENVIRONMENTAL TOPICS IN ENGLISH LANGUAGE CLASSES

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Aims: Environmental education, considered to be a "blueprint for the future" emerged in the 1970s in recognition of the rapidly escalating deterioration of the environment. In the Macedonian education system, from primary to secondary levels, students are introduced to environmental issues through a range of core subjects.

Purpose of this study is to investigate students' perception of environmental topics in the English language syllabus. This paper aims to find out if students feel that these topics help in the improvement of their language skills.

Material and methods: The sample for this study comprised 200 students from a Macedonian secondary school. A two-part questionnaire is designed as instrument. Mean Score Ranking and ANOVA were the two main methods used to analyze the data. A structured interview was used to substantiate the quantitative data.

Results: The findings reveal that gender seems to have limited bearing on students' perceptions of the environment. In addition, students seem to be of the opinion that they gain more content knowledge than English language skills from studying environmental topics.

Conclusion: Many students want to be able to choose the environmental topics to study in their English classes. Teachers should consider giving students the freedom of choice as advocated by the learner-centered approach in CLT.

Key words: Environmental education, environmental topics, students, English language.

THEMATIC SESSION VIII

OTHER RELATED TOPICS

L8_01

PALEOECOLOGICAL INVESTIGATION ON THE POSTGLACIAL VEGETATION AND CLIMATE CHANGES IN THE CENTRAL RILA MOUNTAINS, BULGARIA

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The vegetation history and climate changes in the Central Rila Mountains for the last 14000 years were studied by means of pollen analysis, stomata identification and radiocarbon chronology of a sediment core from the subalpine Lake Manastirsko-2 located at 2326 m a.s.l. The landscape during the Lateglacial (14700-11700 years ago) was dominated by open herb vegetation composed of *Artemisia*, *Chenopodiaceae*, *Poaceae*, and other cold-resistant herbs. The stands of *Pinus* and *Betula*, and the shrubland of *Juniperus* and *Ephedra* partly enlarged during the Lateglacial interstadial (14700-12800 years ago) when the climate slightly improved. Pioneer forests of *Betula*, with groups of *Pinus* and *Juniperus* occupied barren soils at high/mid altitudes in the early Holocene (11700-7900 years ago). Below this vegetation zone spread mixed oak forests with *Tilia*, *Ulmus*, *Acer*, and later on *Corylus*. A coniferous belt composed of *Pinus sylvestris*, *Pinus peuce* and *Abies* began to develop 7900 years ago when the climate changed to milder winters, cooler summers with increase in air and soil humidity. The last dynamic changes in the vegetation cover were associated with the invasion of *Picea abies* in the coniferous belt 3400 years ago, while *Fagus sylvatica* slightly expanded at lower altitudes. Indications of human activities are noticed in the pollen diagram since the Late Bronze Age (3400-3200 years ago). The postglacial vegetation development in the Central Rila Mountains followed a similar pattern when compared with palynological and macrofossil records from other parts of the mountain and the Northern Pirin Mountains.

Keywords: pollen analysis, radiocarbon chronology, Lateglacial, Holocene, Rila Mountains

L8_02

INJURIES BY SCAB DISEASE TO APPLE FRUITS NON-TREATED WITH FUNGICIDES

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Aim: The research was aimed at the differences of apple scab symptoms developed in the lack of fungicide treatment against the pathogen *Venturia inaequalis* (Cooke) Winter (anamorph *Spilopcea pomi* Fr. ex Fr.).

Material and Methods: The research was carried out in two non-market orchards in the vicinity of Kostinbrod municipality (Sofia district). The choice of orchards was made after an inquiry about

agrotechnical activities planned to be implemented by the owners. Some factors with influence on the microclimatic conditions in both locations were also taken into account.

The development of apple scab was observed on the trees of cultivars Golden delicious, Granny Smith and Red delicious grown in two non-market orchards in the lack of fungicide treatment against the pathogen.

An evaluation of scab injuries was made during the picking period for every cultivar in the same growing season.

Results: The rate of injuries caused by scab diseases was different for one and the same cultivar grown in the observed orchards. The fruit quality in one of the two orchards significantly surpassed the fruit quality recorded in the other orchard. It could be explained with different physical conditions during the initial-infection period and later development of the disease.

Conclusion: The choice of location for planting of a new orchard is one of the important decisions for fruit growing with minimized pesticide treatment.

Keywords: apple scab, *Venturia inaequalis*

P8_01

HEAVY METALS (CD AND PB) EXPOSITION THROUGH WATER INFUSIONS FROM *CLINOPODIUM VULGARE L.*

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Introduction: Medicinal plants are significantly useful and economically vital as sources for modern “green biotechnology” medical products. Nevertheless natural products could turn harmful due to many reasons one of which could be high levels of toxic elements like As, Cd, Pb, Hg. Based on this better knowledge on how specific plant species manage higher concentrations of toxic metals from the environment is required. This would give prerequisite to risk assessors and quality control authorities to better understand risk of the use of plants in food chain or phytopharmacy.

Materials and Methods: To assess bioaccumulation ability of the plant *Clinopodium vulgare L.* to Cd and Pb a pot experiment was conducted introducing the elements in defined concentrations in the growing medium as well as in industrially contaminated soils collected from KCM, Plovdiv area:

Soil used in pot greenhouse experiment was collected at a depth of 0.25 m of the following soil variety: (nonpolluted soil with negligible anthropogenic impact) Diluvial meadow soils / Colluviosols according to the WRB classification system, 2006/ located in the area of Lozen village – the control soil variant; three (Diluvial meadow soils) soils from the region of KCM Plovdiv were collected as industrially contaminated soils for the experiment. Control soils were contaminated in the laboratory with water solutions of Cd acetate. Three Cd concentrations (2, 12 and 20 µg/g) were added to soils. Pots were sowed with 0.6 g seeds and were kept in a climate controlled greenhouse. Electrothermal AAS (Zeeman Perkin Elmer 3030/HGA-600) was applied for determination of Cd and Pb using standard addition calibration mode. A fraction analysis of water infusions from separate organs of the plant was performed before and after simulation of gastrointestinal digestion to assess bioaccessible forms of Pb and Cd and to measure expositional risk when consuming the plant in form of water extracts.

Results: Results from pot experiments show that at 1.7 mg/kg soil concentration of Cd, 0.98 mg/kg is available in aerial plant tissue. WHO recommends maximal concentrations for medicinal plants of 0.3 mg/kg. Cd has highest (90%) extractability from leaves in water infusions, 50÷60% of which in cationic form before gastrointestinal digestion and 20÷30% remain cationic, low molecular after gastrointestinal digestion, which prompt for potential risk of exposition for consumers.

Nearly 99% of the Pb in water infusions remains macromolecularly bound even after gastrointestinal digestion, which makes Pb of inconsiderable risk when being in plant at concentrations below 10 mg/kg, recommended by WHO.

P8_02

ENVIRONMENTAL HEALTH INVESTIGATION OF SANDPITS AT PUBLIC PLAYGROUNDS IN SOFIA CITY

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Aim: Based on EU Standards EN 1176 and EN 1177, the introduced in 2009 “Regulation 1 for the structure and safety of children playgrounds” (State Gazette 10/2009) set the new requirements for public safety of children playgrounds in Bulgaria. The purpose of this investigation is to evaluate the environmental contamination and the hygiene of natural sand from sandpits at public playgrounds of Sofia city, followed by relevant environmental health conclusions.

Materials and Methods: 20 representative samples of sand were collected from 20 public playgrounds in Sofia city, distributed randomly throughout the city center. Selected were sandpits from different municipalities, mostly from intensively exploited playgrounds. The samples were analyzed for chemical, microbial and parasitic contamination, followed by statistical generalization and environmental health conclusions.

Results: The sand appeared to be clean from harmful chemicals and parasites, though the microbes presented in the samples give clear indications for the potential risk of pathogenic contamination. The indicative quantifications of total coliforms and *E. coli*, *Enterococcus* and *Cl. Perfringens* prove their persistence in different proportions in most of the samples, thus indicating external fecal contamination and potential risk for presence of enteric pathogens in the sand.

Conclusion: The results of this study indicate the need for introduction of more regular and efficient sand disinfection procedures for the public sandpits of Sofia city.

Keywords: sandpits, playgrounds, environmental health, contamination

P8_03

A classification system for evaluation of ecological status of coastal marine waters in respect of zooplankton biological element of quality

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Aim: The aim of the study was to implement the Water Framework Directive approach for zooplankton and to develop a classification system for the ecological state assessment of coastal marine waters.

Material and Methods: An ecological classification system was defined on the base of candidate indicators such as mesozooplankton biomass, *Noctiluca scintillans* biomass, *Mnemiopsis ledyi* biomass

and Shannon diversity index. Thresholds and ecological quality ratios based on long-term zooplankton data (1967-2006) available for c. Galata transect and Varna Bay were identified.

Results: High mesozooplankton biomass suggests higher trophic environment and the increasing concentrations of the planktonic fauna indicates the food availability in the water column. On the other hand mesozooplankton biomass reduction indicates enhanced predator pressure in the food chain. Therefore, neither high nor low values of biomass would affect the good quality.

For detection of classification limits of *N. scintillans* biomass indicator, the period of intensive eutrophication (1980-1993) was selected as “low” ecological state. According to our results biomass of *N. scintillans* lower than 50 mg.m⁻³ reflects on “high” ecological status of coastal waters.

The definition of categories of Shannon-Weaver index was made on the basis of a maximum number of species found in the reference period. More than 3.5 bit.ind⁻¹ reveals high ecosystem state while less than 1 bit.ind⁻¹ – bad.

Conclusions: Varna Bay ecosystem state was mainly among moderate and good status in respect of tested zooplankton indicators. Further development is needed with focus on i) validation of recent indicators and ii) suggestion for new indicators.

Acknowledgments: The study is partly supported by the FP 7 Projects PERSEUS (Contract 287600) MISIS (Contract 07.020400/2012/616044/SUB/D2), DEVOTES and National monitoring programme (Contract D-33-4/08.05.2012 with Ministry of Environment and Waters of Bulgaria).

Keywords: zooplankton, indicators, Water Framework Directive, Varna Bay, Black Sea

P8_04

Acquisition of English Writing Skill as a Foreign Language

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Aim: The aim of this study is to analyze the acquisition level of the English writing skill of students of Journalism Department at the public University of Prishtina.

Material and Methods: The research included an evaluation test within 50 students in their first year in the department of Journalism in the public university of Prishtina. The course tests questions were drawn from the course content to assess the overall achievements out of a four month teaching period.

Results: Results of the test revealed that students face problems in attaining right English writing skill particularly concerning syntax structure pertaining right use of the word order in English. Out of 50 students, 30 showed to have different syntactical and morphological problems, especially related to proper use of word order in the targeted language.

Conclusion: Based on the research, we can conclude that students face problems in acquisition of English language as a foreign language. It is due mainly to the differences between Albanian language as a first language and English as a foreign language.

Keywords: writing, English, students, applied linguistics, process

Opinion of parents about the deviant behavior in elementary schools

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Aim: Aim of this research is to investigate the opinion of parents about the deviant behavior in elementary schools of Gjilani city, Kosovo.

Material and Methods: This investigation included the parents of pupils of four elementary schools: S. Hallaqi, A. Ajeti, Th. Mitko and Skenderbeu. In total the investigation was done within 123 parents. This investigation was done by questionnaire with question: do pupils express a deviant behavior.

Results: Obtain results showed that from 123 parents, 79 (64.22%) think that pupils express deviant behavior in schools. While 11 (8.94%) parents think that pupils do not express the deviant behavior. In the end 33(26.83 %) parents said that they do not know if the pupils express deviant behavior.

Conclusion: According to this investigation we can conclude that deviant behavior is present in our elementary schools.

Keywords: reducing, misbehavior, school, Kosovo

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Idakieva, Krassimira	P1_06		21
Ihtimanska, Mila	P5_06	mila.ihtimanska@gmail.com	62
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