BOOK OF ABSTRACTS

3rd International Conference on Plant Biology

(22nd SPPS Meeting)

9-12 JUNE 2018
BELGRADE

Serbian Plant Physiology Society

Institute for Biological Research "Siniša Stanković", University of Belgrade

Faculty of Biology, University of Belgrade

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PROGRAMME

Saturday 9th June

09:00-14:00	*Registration*	
14:00-14:30	*Opening Ceremony*	

Section 2 • Plant Stress Physiology

Chairs: Sonja Veljović-Jovanović & Ivana Maksimović

14:30-15:00	(Plenary lecture) **Hrvoje Fulgosi**	Sifting the elements of FNR-TROL bifurcation
15:00-15:30	(Plenary lecture) **Autar Mattoo**	Tomato (*Solanum lycopersicum*) lipoxygenase (LOX) gene family: Delineating gene members associated with growth, development and abiotic stresses
15:30-15:50	(Invited talk) **Tamara Rakić**	Two-year study of ecophysiological parameters of *Miscanthus* × *giganteus* grown on tailing pond at the mine "Rudnik" (Serbia)
15:50-16:10	(Invited talk) **Vladimir Crnojević**	Data science in biosystems
16:10- 16:40	*Coffee break*	
16:40-17:00	(Invited talk) **Ingeborg Lang**	Tolerance to heavy metals – some examples in bryophyte species
17:00-17:15	(Selected talk) **Predrag Bosnić**	Silicon mediates sodium (Na+) transport in maize under moderate NaCl stress
17:15-17:30	(Selected talk) **Milan Borišev**	Dynamics of Cd accumulation and metabolic adaptation of *Salix alba* grown hydroponically
17:30- 17:45	(Selected talk) **Slavica Dmitrović**	Nepetalactone-rich essential oil mitigates BASTA-induced ammonium toxicity in *Arabidopsis thaliana* L. by maintaining glutamine synthetase activity
17:45-18:00	*Group Photo*	
18:00-19:00	*Poster session: Plant Stress Physiology (Section 2)*	
19:00-21:00	*Welcoming cocktail (Rectorate of the University of Belgrade)*	

Sunday 10th June

09:00-14:00 *Registration*

Section 1 • Plant Growth, Development, Metabolism and Nutrition

Chairs: Snežana Zdravković-Korać & Miroslav Nikolić

09:30-10:00	(Plenary lecture) **Guido Grossmann**	Cellular growth regulation in roots - how to adapt in a complex environment
10:00-10:20	(Invited talk) **Ondrej Novák**	Tissue- and cell-specific analysis of phytohormones
10:20-10:40	(Invited talk) **Ksenija Radotić**	Plant cell walls – mechanical and chemical modifications underpin growth and stress response
10:40-11:00	(Invited talk) **Herman Heilmeier**	Bioavailability of elements for effective phytoremediation and phytomining: the role of rhizosphere processes
11:00- 11:30	*Coffee break*	
11:30-11:50	(Invited talk) **Václav Motyka**	Comprehensive phytohormone profiling during Norway spruce (*Picea abies*) somatic embryogenesis
11:50-12:05	(Selected talk) **Danijela Paunović**	Are receptor tyrosine kinases chimeric AGP's?
12:05-12:20	(Selected talk) **Jelena Pavlović**	Silicon increases iron use efficiency in cucumber- a strategy 1 model plant
12:20-12:35	(Selected talk) **Katarina Ćuković**	Characterization of *Arabidopsis GLN1;5* knockout mutant
12:35- 14:00	*Lunch break*	

Sunday 10th June

Section 4 • Phytochemistry

Chairs: Vuk Maksimović & Vladimir Mihailović

14:00-14:30	(Plenary lecture) **Alain Tissier**	Engineering plant diterpenoid pathways in yeast: increasing yield and expanding product diversity
14:30-14:50	(Invited talk) **Roque Bru Martinez**	Metabolic engineering and elicitation strategies to produce stilbenoids in plant cell cultures
14:50-16:10	(Invited talk) **Sokol Abazi**	New fatty acids discovered for the first time in *Vitex agnus-castus*
16:10-16:30	(Invited talk) **Peđa Janaćković**	Do plant volatiles reflect taxonomy?
16:30- 17:00	*Coffee break*	
17:00-17:20	(Invited talk) **Angelos Kanellis**	The *Cistus creticus* terpene synthase gene family
17:20-17:40	(Invited talk) **Marina Soković**	Terpenes and terpenoids: linking bioactivity, opportunities and challenges
17:40-18:00	(Invited talk) **Jules Beekwilder**	Plant terpenes and bioplastics
18:00-18:15	(Selected talk) **Jelena Dragišić Maksimović**	Enzymatic behavior of edible berries – "Beroxidases"
18:15-18:30	(Selected talk) **Elma Vuko**	Inhibition of satellite RNA associated cucumber mosaic virus infection by essential oil of *Micromeria croatica* (Pers.) Schott
18:30-18:45	(Selected talk) **Dorisa Çela**	Structure elucidation of a new alkaloid and other 11 known compounds isolated from *Gymnospermium* species
18:45-19:45	***Poster sessions: Plant Growth, Development, Metabolism and Nutrition; Phytochemistry (Sections 1 and 4)***	

Monday 11th June

Section 5 • Applications in Agriculture, Pharmacy and Food Industry

Chairs: Jasmina Glamočlija & Slavica Ninković

09:00-9:30	(Plenary lecture) **Mondger Bouzayen**	New factors controlling fruit development: epigenetic modifications associated with the fruit set transition in tomato
09:30-10:00	(Plenary Lecture) **Andrew Allan**	New breeding technologies for fruit trees
10:00-10:20	(Invited talk) **Slađana Žilić**	Food and pharmacy application of anthocyanins originating from colored grains
10:20-10:40	(Invited talk) **Eligio Malusa**	Microbial-based inputs: opportunities and challenges for sustainable and resilient agricultural productions
10:40-11:10	*Coffee break*	
11:10-11:30	(Invited talk) **Dragana Miladinović**	Old problems, new tools - Integrated approach to oil crop breeding
11:30-11:45	(Selected talk) **Brankica Tanović**	Prospects of cabbage leaf debris use in the control of *Fusarium* wilt of pepper
11:45-12:00	(Selected talk) **Nina Devrnja**	Effects of tansy essential oil on fitness and digestion process of gypsy moth larvae
12:00-12:15	(Selected talk) **Zora Dajić-Stevanović**	Advantages and limitations of phytogenic feed additives
12:15-14:00	*Lunch break*	

Monday 11th June

Section 3 • Biodiversity, Conservation and Evolution of Plants

Chairs: Jelena Aleksić & Aleksej Tarasjev

14:00-14:30	(Plenary lecture) **Hendrik Poorter**	Meta-Phenomics: Converting data into knowledge
14:30-15:00	(Plenary lecture) **Antonio Granell Richart**	The biodiversity present in European tomato, phenotypes galore and a first insight in the underlying genetics
15:00-15:20	(Invited talk) **Zlatko Šatović**	Origin and genetic diversity of Croatian common bean landraces
15:20-15:50	*Coffee break*	
15:50-16:10	(Invited talk) **Aneta Sabovljević**	Conservation physiology of bryophytes
16:10-16:30	(Invited talk) **Nataša Barišić Klisarić**	Biomonitoring: Plants' (in) perspective
16:30-16:50	(Selected talk) **Sanja Budečević**	Morphological diversity of functionally distinctive floral organs in *Iris pumila*: Does the flower color matter?
16:50-17:05	(Selected talk) **Žaklina Marjanović**	First data on arbuscular mycorrhizal communities from selected climatic borderline forest ecosystems of the Balkan Peninsula
17:05-17:20	(Selected talk) **Tijana Banjanac**	Verification of interspecies hybridization within the genus *Centaurium* Hill using *EST-SSR* molecular markers
17:20-18:20	*Poster sessions: Applications in Agriculture, Pharmacy and Food Industry; Biodiversity and Conservation, Evolutionary Plant Biology (Sections 5 and 3)*	
18:20-18:30	*Closing Ceremony*	
18:30-19:00	*SPPS General Assembly Meeting*	
21:00-01:00	*Gala dinner: Restaurant "Vizantija"*	

Tuesday 12th June

10:00-16:00	*Excursion: Special Nature Reserve "Carska bara"*

The screening of selected *Lamiaceae* species for antioxidant activity in relation to phenolic content of plant extracts

PP5-26

Milan Stanković, Nenad Zlatić, Biljana Bojović, Dragana Jakovljević, Marina Topuzović (nzlatic@gmx.com)

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This study presents the results of total phenolic and flavonoid content, as well as antioxidant activity of the ethanolic extracts of seven species from *Lamiaceae* family (*Leonurus cardiaca* L., *Lamium album* L., *Marrubium vulgare* L., *Micromeria juliana* (L.) Benth. ex Rchb., *Stachys recta* L., *Vitex agnus-castus* L. and *Melissa officinalis* L.). Total phenolic content is expressed in terms of gallic acid equivalents, GAE (mg GA g^{-1} extract). Its values are the following: *Leonurus cardiac*a – 60.50, *Lamium album* – 71.19, *Marrubium vulgare* – 74.64, *Micromeria juliana* – 104.28, *Stachys recta* – 128.39, *Vitex agnus-castus* – 133.06 and *Melissa officinalis* – 199.12 mg GA g^{-1} extract. The concentration of flavonoids is expressed in terms of rutin equivalent, RuE (mg Ru g^{-1} extract) and its values are: *Leonurus cardiaca* – 41.51, *Lamium album* – 49.14, *Marrubium vulgare* – 64.07, *Micromeria juliana* – 43.30, *Stachys recta* – 78.12, *Vitex agnus-castus* – 101.39 and *Melissa officinalis* – 168.83 mg Ru g^{-1} extract. Obtained results of the antioxidant activity of the extracts, expressed as IC_{50} values, ranged from 131.15 μg mL^{-1} (minimal value) for *Leonurus cardiaca* to 21.56 μg mL^{-1} (maximal value) for *Melissa officinalis*. A significant relation was observed between the investigated parameters of phenolic content and antioxidant activity. According to our research, the species *Melissa officinalis, Vitex agnus-castus, Stachys recta* and *Micromeria juliana* showed significant antioxidant activity and can therefore be regarded as promising candidates for natural plant sources with high levels of biologically active compounds.

Keywords: *Lamiaceae species*, secondary metabolites, antioxidant activity

This investigation was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Grant No. III41010).

Identification and differentiation of *Ascochyta* complex fungi from field pea (*Pisum sativum* L.)

PP5-27

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Ascochyta pisi, *Dydimella pinodes* and *Dydimella pinodella* are three worldwide-distributed fungal pathogens of pea that occur singly or in combination and are sometimes referred to as the *Ascochyta* complex. They are among the most prevalent and damaging pathogens of legumes worldwide and their identification is currently based on symptoms and morphology. Since the identification based on these criteria remains difficult and uncertain, the aims of this study were to identify the pea-associated *Ascochyta* species and estimate their molecular phylogenies, through

two main approaches: (i) using sequence data from the ribosomal internal transcribed spacer regions (ITS) and elongation factor 1-alpha (EF); and (ii) using specific PCR-based marker (IGS1). Eighty nine isolates assumed to be *A. pisi, D. pinodes* and *D. pinodella* of diverse geographical origins were used. Following DNA extraction, ITS and EF were amplified in all tested isolates. The partial sequences were used for identification and clarification of intra- and inter-species relationships. The phylogenetic analysis using ITS sequences revealed that the most *A. pisi* isolates formed clusters with high bootstrap values, but differentiation between *D. pinodes* and *D. pinodella* isolates was not possible. Phylogeny based on EF sequences enabled differentiation of *D. pinodella* isolates, but *A. pisi* and *D. pinodes* could not be separated. Amplification with primers specific for IGS1 marker resulted in different amplification profiles in all three fungi, enabling their identification and differentiation.

Keywords: ascochyta, differentiation, sequence, IGS1

Optimization of reaction conditions for phenol removal in batch reactor with horseradish peroxidase immobilized within tyramine-alginate micro-beads

PP5-28

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Removal of phenolic compounds from wastewaters was previously studied using different enzymatic approaches. In the presence of hydrogen peroxide, peroxidases are able to oxidize phenol-like compounds and form non-soluble polymers that could be easily removed from aqueous phase. Horseradish peroxidase (HRP) is the most investigated peroxidase used for phenol removal from waste effluents, but it can be easily inactivated during this process by excess of hydrogen peroxide. In order to increase operational stability of the enzyme, immobilization on different materials and various peroxide delivery systems were tested. In our previous work, we studied bioinspired hydrogels based on natural cell wall polymers and enzymes, for efficient removal of phenols from water. In this work, tyramine-alginate hydrogels that we have previously developed were used for horseradish peroxidase encapsulation within micro-beads obtained in a coupled emulsion polymerization reaction. The aim of this research was to study the influence of tyramine- alginate concentration and hydrogen peroxide delivery system on operational stability and efficiency of phenol removal by immobilized peroxidase. The best result of 96% phenol removal from water solution was achieved by peroxidase immobilized within 20% (w/v) tyramine-alginate micro-beads using delivery system for hydrogen peroxide composed of 0.187 U mL^{-1} of glucose oxidase and 4 mmol L^{-1} of glucose. The reusability studies showed that these biocatalysts can be used up to five cycles with slight decrease in their catalytic performance.

Keywords: immobilization, horseradish peroxidase, phenol removal, tyramine, alginate

This work was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Grant No. 173017).