Serbian Plant Physiology Society

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

2nd International Conference on Plant Biology

21th Symposium of the Serbian Plant Physiology Society

COST ACTION FA1106 QUALITYFRUIT Workshop

Petnica Science Center, June 17-20, 2015

2st International Conference on Plant Biology • 21th Symposium of the Serbian Plant Physiology Society • COST ACTION FA1106 QUALITYFRUIT Workshop

PETNICA SCIENCE CENTER 17-20 JUNE, 2015

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PROGRAMME

2st International Conference on Plant Biology • 21th Symposium of the Serbian Plant Physiology Society • COST ACTION FA1106 QUALITYFRUIT Workshop

PETNICA SCIENCE CENTER 17-20 JUNE, 2015

Wednesday 17th June, 2015

09:00-14:00	*Registration*	
14:00-15:00	*Lunch*	

Section I: Plant Biotechnology

15:00-15:30	*Opening Ceremony*	
15:30-16:00	(Invited talk) **Alain Tissier**	Systems biology of a plant cell factory, the tomato glandular trichomes
16:00-16:20	(Invited talk) **Jules Beekwilder**	Biotechnological production of plant compounds
16:20-16:40	(Invited talk) **Milen Georgiev**	Metabolomics, lead, discovery and plant biotechnology: perfect holistic match?
16:40-17:00	(Invited talk) **Dragana Božić**	Exploring the secondary metabolism in trichomes of *Salvia fruticosa* and *Rosmarinus officinalis:* the case of carnosic acid
17:00-17:30	*Coffee break*	
17:30-17:45	(Selected talk) **Milica Bogdanović**	Problems in detecting activity of fluorescent reporter genes – case of DsRED and GFP
17:45-18:00	(Selected talk) **Stevan Jeknić**	Alteration of flower color in *Solanum lycopersicum* through ectopic expression of a gene for capsanthin--capsorubin synthase from *Lilium lancifolium*
18:00-18:15	(Selected talk) **Miloš Prokopijević**	Characterization of soybean hull peroxidase immobilized on glycidyl methacrylate copolymers
18:30-19:30	Poster session: *Plant Biotechnology*	
20:00-21:00	*Dinner*	
21:00-	Wine tasting	

Wednesday 17th June, 2015

08:00-09:00	*Breakfast*

Section II: Plant Growth, Development, Metabolism and Nutrition

09:00-09:30	(Invited talk) **James Giovannoni**	Harnessing genetic diversity to better understand regulation of tomato fruit ripening and nutritional quality
09:30-09:50	(Invited talk) **Christian Fankhasuer**	Photosensory receptor-mediated growth responses in Arabidopsis
09:50-10:10	(Invited talk) **David Honys**	Male germline development: lesson from the -omics
10:10-10:30	(Invited talk) **Dragan Vinterhalter**	Acid growth theory, auxin and potato phototropism
10:30-10:50	(Invited talk) **Bojana Banović**	How to avoid self-fertilization in plants- a buckwheat story
10:50-11:20	*Coffee break*	

11:20-11:50	(Invited talk) **Hrvoje Fulgosi**	Revisiting alternative electron partitioning pathways in photosynthesis
11:50-12:10	(Invited talk) **Miroslav Nikolić**	The rhizosphere: perspective and challenges for plant nutrition
12:10-12:30	(Invited talk) **Jelena Samardžić**	Silicon alleviates oxidative stress in cucumber plants grown under copper excess
12:30-12:45	(Selected talk) **Lidija Begović**	Lignin deposition and synthesis in the internodes during barley (*Hordeum vulgare L.*) development
12:45-13:00	(Selected talk) **Milan Dragićević**	DUF1070 is a conserved signature domain of some arabinogalactan peptides
13:00-13:15	(Selected talk) **Jan Fíla**	Phosphoproteomics profiling of tobacco mature pollen and pollen activated *in vitro*
13:15-13:30	(Selected talk) **Václav Motyka**	New findings about the role of *cis*-zeatin-type cytokinins in plant physiology and evolution
14:00-15:00	*Lunch*	

Section III: Plant and Fungal Natural Products in Human Nutrition and Medicine

15:00-15:30	(Invited talk) **Autar Mattoo**	Functional Foods & Nutrition: Facts, Fiction, and Needs
15:30-15:50	(Invited talk) **Nataša Simin**	Wild-growing *Allium* species (sect. *Codonoprasum*) as promising sources of novel herbal drugs
15:50-16:10	(Invited talk) **Marina Soković**	Alternative sources of natural products: mystery of mushrooms and beyond
16:10-16:25	(Selected talk) **Miloš Đorđević**	*Centaurium erythraea* extract improves redox-status and antioxidant enzyme activity of STZ-treated pancreatic β-cells and diabetic rat liver and kidney
16:25-16:40	(Selected talk) **Bojan Jevtić**	Effects of cucumber extracts on cytokine production in encephalitogenic cells
16:40-16:55	(Selected talk) **Filis Morina**	Quercetin 7-*O*-glucoside inhibits the formation of dinitrosocatechins and their quinones in catechin/ nitrite systems under stomach simulating conditions
16:55-17:10	(Selected talk) **Milica Pešić**	Development of natural product drugs in a sustainable manner
17:10-17:30	*Coffee break*	

Section IV: Phytochemistry

17:30-18:00	(Invited talk) **Roque Bru Martínez**	Early and late molecular mechanisms involved in the biosynthesis and accumulation of stilbenoids in elicited grapevine cell cultures established from berries
18:00-18:20	(Invited talk) **Sokol Abazi**	Chemical analysis of secondary metabolites isolated from endemic Albanian plants with subcritical CO_2
18:20-18:40	(Invited talk) **Vuk Maksimović**	Composition and therapeutic values of berry wines - bitter truth about sweet product
18:40-19:00	(Invited talk) **Maja Natić**	Phenolic profiles of wild fruits grown in Serbia
19:00-19:15	(Selected talk) **Dorisa Cela**	NMR structure elucidation of a new alkaloid isolated from *Gymnospermium maloi*
19:15-19:30	(Selected talk) **Đura Nakarada**	Thapsic acid, a rarely found natural product among bryophyte species
19:30-20:30	Poster sessions: *Plant Growth, Development, Metabolism and Nutrition; Plant and Fungal Natural Products in Human Nutrition and Medicine; Phytochemistry*	

20:30-21:00	*Dinner*	
21:00-21:30	*Presentation of Petnica Science Center*	
21:30-22:30	*Tour around Petnica Science Center*	

Friday 19th June, 2015

08:00-09:00	*Breakfast*	
Section V:	**Biodiversity and Conservation**	
09:00-09:30	(Invited talk) **Goran Anačkov**	Phenotypic plasticity or new taxa?
09:30-09:50	(Invited talk) **Jelena Aleksić**	What does Balkan Peninsula has to offer to conservation biologists?
09:50-10:10	(Invited talk) **Maja Lazarević**	Plant diversity drivers in the Balkans: ploidization, hybridization and cryptic speciation
10:10-10:25	(Selected talk) **Zora Dajić Stevanović**	Conservation of floristic and vegetation diversity in Southeast Europe: sustainable use and ecosystem services approach
10:25-10:40	(Selected talk) **Mihailo Jelić**	Assessment of genetic integrity and diversity of *Populus nigra* in protected areas along the Danube River
10:40-10:55	(Selected talk) **Marko Sabovljević**	Conservation biology of European bryophytes
11:10-11:30	*Coffee break*	
Section VI:	**Evolutionary Plant Biology**	
11:30-12:00	(Invited talk) **Petr Smýkal**	Past legume crop domestication and agriculture of tommorow
12:00-12:20	(Invited talk) **Stevan Avramov**	Comparative approach in evolutionary ecology of plants
12:20-12:40	(Invited talk) **Yuval Sapir**	Population divergence and speciation within a species: ecology and the Royal Irises
12:40-12:55	(Selected talk) **Aleksej Tarasjev**	Population scale multi-year monitoring of *Iris pumila* in Deliblato Sand: flowering phenology
12:55-13:10	(Selected talk) **Vukica Vujić**	Light induces variation in size and shape of *Iris pumila* flower parts in two natural habitats
13:10-13:25	(Selected talk) **Sanja Manitašević Jovanović**	How do *Iris pumila* plants respond to photo-oxidative stress in the wild: the variation of leaf functional traits?
13:30-13:45	*Group photo*	
14:00-15:00	*Lunch*	
Section VII:	**Molecular mechanisms underlaying health compounds biosynthesis in fruits (COST ACTION FA1106)**	
115:00-15:40	(Invited talk) **Angelos Kanellis**	Introduction to Session Genetic improvement of fruits and vegetables for health
15:40-16:10	(Invited talk) **Mondher Bouzayen**	Cross-talk between multiple hormone signaling pathways associated with the ripening of tomato fruit
16:10-16:40	(Invited talk) **Julia T Vrebalov**	The role of transcription factors in regulation of tomato fruit ripening and quality

16:40-17:10	(Invited talk) **Cathie Martin**	Engineering the production of health-promoting metabolites in tomato for studies of comparative nutrition
17:10-17:40	(Invited talk) **Giovanni Giuliano**	Tomato fruit carotenoid biosynthesis: regulation and evolutionary aspects
17:40-18:10	(Invited talk) **Panagiotis Kalaitzis**	Suppression of a tomato prolyl 4 hydroxylase results in multiple alterations on fruit development, ripening and health components
18:10-18:30	*Coffee break*	
18:30-19:30	Poster sessions: *Biodiversity and Conservation; Evolutionary Plant Biology*	
21:00-	*Gala dinner*	

Saturday 20th June

08:00-09:00	*Breakfast*	
Section VIII:	**Abiotic and Biotic Stress and Ecophysiology**	
09:00-09:30	(Invited talk) **Harro Bouwmeester**	Strigolactones. Key players in the adaptation of plants to the abiotic environment
09:30-09:50	(Invited talk) **Miroslav Lisjak**	H_2S and NO signalling in plants
09:50-10:10	(Invited talk) **Jelena Savić**	Essential oils elicit defense genes in potato: Can volatiles released from damaged plants prime defense in their undamaged neighbours?
10:10-10:30	(Invited talk) **Živko Jovanović**	*Alyssum markgrafii* as a model organism to study metal hyperaccumulation
10:30-10:45	*Coffee break*	
10:45-11:00	(Selected talk) **Dejana Panković**	The influence of *Trichoderma* spp. treatment on water regime, ABA content and gene expression in leaves and roots of tomato in drought conditions
11:00-11:15	(Selected talk) **Zorana Katanić**	Effect of dynamic changes of vegetative compatibility types in *Cryphonectria parasitica* populations on biological control of chestnut blight in Croatia
11:15-11:30	(Selected talk) **Nevena Nagl**	Effect of *in vitro* induced water deficit on lipid peroxidation intensity and antioxidant capacity of sugar beet
11:30-11:45	(Selected talk) **Marija Vidović**	High PAR and UV-B radiation-induced differential responses in green and white leaf sectors of *Pelargonium zonale* in relation to sugar, antioxidative and phenolic metabolism
12:00-13:00	Poster session: *Abiotic and Biotic Stress and Ecophysiology*	
13:00-13:30	*Closing Ceremony*	
13:30-14:30	*Meeting of the Serbian Plant Physiology Society/Cost Action FA1106*	
14:30-15:30	*Lunch*	
16:00-19:30	*Excursion (Gradac Canyon and "Ćelije" Monastery)*	
19:30	*Departure*	
21:00	*Arrival in Belgrade*	

Activity of nitrogen assimilation enzymes in soybean seedlings infected with hemibiotrophic fungi

PP8-19

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The purpose of this research was to compare how soybean seedlings (*Glycine max* L., cultivar Bečejka) cope with different nutrition acquisition strategies of hemibiotrophic fungi: *Rhizoctonia solani* Kühn and *Sclerotinia sclerotiorum* (Lib.) de Bary. Severe changes at morphological and histological level after inoculation with both fungi were accompanied by significant changes in nitrogen assimilation enzymes activities in leaves and roots of 21-day-old soybean plants. Infected seedlings had decreased nitrate reductase (NR) (2-fold the amount of control, on average) and glutamate synthase (GS) activity (40-60%), except in leaves infected with *S. sclerotiorum*. Glutamate dehydrogenase (GDH) activity increased 46-75% after the pathogen infection, being highest during *R. solani* infection. High GDH values in infected organs (0.26-0.47 μmol NADH mg^{-1} protein) point to enhanced nitrogen remobilization process from infected tissue, possibly to restrict available nutrients to pathogens, among other things beneficial to plant. Differences in GS and GDH activities in the same organs depending on pathogen infection showed that plants cope differently with these fungi at this stage of development, or that time of switching from bio- to necrotrophic lifestyle differs between investigated pathogens. Due to adaptable lifestyle of hemibiotrophic fungi, mechanistic details that allow pathogen to control host metabolic pathways are unknown, and for this reason the understanding of plant nutrient acquisition could be of great importance in the development of novel disease control strategies.

Keywords: biotic stress, hemibiotrophic fungi, nitrogen metabolism

This work was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (TR31022).

Effect of nitrogen nutrition on water use efficiency of wheat cultivars under well-watered and drought conditions

PP8-20

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Optimal nitrogen (N) nutrition has been shown to alleviate the negative effects of drought stress (DS) on plants. In this study, the effects of different ratios of N nutrition on the water use efficiency (WUE) of ten wheat cultivars were investigated under DS and non-DS conditions. The experiment was conducted in a greenhouse with four growth conditions:

1. Well watered (60% field capacity) in the presence of sufficient N (60 mg N kg^{-1} soil)
2. Well watered (60% field capacity) in the presence of low N (3-4 mg N kg^{-1} soil)
3. Water limited (20% field capacity) in the presence of sufficient N (60 mg N kg^{-1} soil)
4. Water limited (20% field capacity) in the presence of low N (3-4 mg N kg^{-1} soil).

Water use profiles of individual plants were recorded during the whole cultivation period from which the efficiency of water usage, as well as the effect of N availability on water utilization was determined. WUE was significantly decreased by N limitation in well watered conditions, as well as in drought stressed plants. This shows that under N-limitation wheat plants have decreased capacity to use soil water. The WUE at the level of seed production was not affected by N limitation under drought stress in two wheat cultivars (NS Avangarda and Siete Cerros). These cultivars could be used as potential parents for development of new wheat cultivars with enhanced production under drought and N-limited conditions.

Keywords: wheat, nitrogen nutrition, water use efficiency, drought

Black locust and white poplar ecophysiological adaptations to pollution stress at the fly ash deposits of the 'Nikola Tesla – A' thermoelectric plant (Obrenovac, Serbia)

PP8-21

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The ecophysiological traits of two woody species, *Robinia pseudoacacia* L. (planted) and *Populus alba* L. (naturally colonized), were assessed in terms of trace element (As, B) accumulation, photosynthetic efficiency (Fv/Fm), total chlorophyll (Chla+b) and carotenoid (Tot Carot) content, and MDA levels in populations growing at the 'Nikola Tesla – A' thermoelectric power plant's fly ash ponds, weathered for 3 (L1) and 11 years (L2), compared to their natural habitat. Research showed that the trace element content in leaves of both species at the ash deposits was higher compared to plants from the reference site ($p<0.001$). Despite decreasing as ash aged, the B content in leaves of both species at both ponds was at toxic levels for plants. As ash age increased, so did As concentrations in both species, with levels in white poplar leaves at L2 and black locust leaves at L1 and L2 being in the toxic range. In such conditions, white poplar exhibited stable photosynthetic efficiency at both ponds due to the stable photosynthetic pigment content and the functional integrity of cell membranes. At L2, symptoms of oxidative stress in black locust manifested in the form of reduced Fv/Fm ($p<0.001$), elevated levels of lipid peroxidation ($p<0.05$), and lower levels of chlorophyll and total carotenoids ($p<0.001$) compared to plants at the reference site. The results show that white poplar exhibited higher adaptive potential at L1 and L2, while black locust had reduced adaptive potential to the stressful conditions on the weathered ash at L2 of the 'TENT-A' ash deposit site.

Keywords: fly ash, *Robinia pseudoacacia* L., *Populus alba* L., pollutants, adaptations

This work was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (OI173018).