

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 FA1 106 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 Georgi** 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 (<i>Hordeum vulgare L.</i>) development
12:45-13:00	(Selected talk) Milan Dragičević	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 <i>in vitro</i>
13:15-13:30	(Selected talk) Václav Motyka	New findings about the role of <i>cis</i> -zeatin-type cytokinins in plant physiology and evolution
14:00-15:00	<i>Lunch</i>	

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 <i>Allium</i> species (sect. <i>Codonoprasum</i>) 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	<i>Centaurium erythraea</i> 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- <i>O</i> -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	<i>Coffee break</i>	

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 <i>Gymnospermium maloi</i>
19:15-19:30	(Selected talk) Đura Nakarada	Thapsic acid, a rarely found natural product among bryophyte species
19:30-20:30	Poster sessions: <i>Plant Growth, Development, Metabolism and Nutrition; Plant and Fungal Natural Products in Human Nutrition and Medicine; Phytochemistry</i>	

20:30-21:00	<i>Dinner</i>
21:00-21:30	<i>Presentation of Petnica Science Center</i>
21:30-22:30	<i>Tour around Petnica Science Center</i>

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: ploidy, 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 <i>Populus nigra</i> in protected areas along the Danube River
10:40-10:55	(Selected talk) Marko Sabovljević	Conservation biology of European bryophytes
11:10-11:30	<i>Coffee break</i>	

Section VI: Evolutionary Plant Biology

11:30-12:00	(Invited talk) Petr Smýkal	Past legume crop domestication and agriculture of tomorrow
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 <i>Iris pumila</i> in Deliblato Sand: flowering phenology
12:55-13:10	(Selected talk) Vukica Vujić	Light induces variation in size and shape of <i>Iris pumila</i> flower parts in two natural habitats
13:10-13:25	(Selected talk) Sanja Manitašević Jovanović	How do <i>Iris pumila</i> plants respond to photo-oxidative stress in the wild: the variation of leaf functional traits?
13:30-13:45	<i>Group photo</i>	
14:00-15:00	<i>Lunch</i>	

Section VII: Molecular mechanisms underlying health compounds biosynthesis in fruits (COST ACTION FA1106)

11:50-15:40	(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	<i>Coffee break</i>	
18:30-19:30	Poster sessions: <i>Biodiversity and Conservation; Evolutionary Plant Biology</i>	
21:00-	<i>Gala dinner</i>	

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 ₂ S 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	<i>Alyssum markgrafii</i> as a model organism to study metal hyperaccumulation
10:30-10:45	<i>Coffee break</i>	
10:45-11:00	(Selected talk) Dejana Panković	The influence of <i>Trichoderma</i> 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 <i>Cryphonectria parasitica</i> populations on biological control of chestnut blight in Croatia
11:15-11:30	(Selected talk) Nevena Nagl	Effect of <i>in vitro</i> 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 <i>Pelargonium zonale</i> in relation to sugar, antioxidative and phenolic metabolism
12:00-13:00	Poster session: <i>Abiotic and Biotic Stress and Ecophysiology</i>	
13:00-13:30	<i>Closing Ceremony</i>	
13:30-14:30	<i>Meeting of the Serbian Plant Physiology Society/Cost Action FA1106</i>	
14:30-15:30	<i>Lunch</i>	
16:00-19:30	<i>Excursion (Gradac Canyon and "Ćelije" Monastery)</i>	
19:30	<i>Departure</i>	
21:00	<i>Arrival in Belgrade</i>	

Anatomical characteristics of seed coat of the field pea (*Pisum sativum* L.) genotypes in relation to seed cracks and damage

PP2-15

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In this paper we analysed morphological characteristics of seed and micro-morphological, anatomical and chemical characteristics of seed coat of the pea genotypes Jezero, Javor and NS Junior. The aim was to investigate whether these genotypes can be differentiated on the basis of seed coat morpho-anatomical characteristics, depending on the harvest of treatment. For the purpose of anatomical analysis, parts of the seed coats, laterally from the hilum, were separated. Cross-sections of those parts were obtained using a Leica CM 1850 cryostat. All observations and measurements were performed using an Image analyzing System Motic 2000. The surface of seed coat was observed using SEM. Tuberculate surface of seed coat characterized all examined pea genotypes, and the average diameter of tubercule was about 12 µm. Statistical analysis showed that NS Junior genotype had the smallest seeds, thinnest seed coat and the highest number of macrosclereids per mm². Also, genotype NS Junior stands out as a genotype with the highest percentage of crude fiber within seed coat. The lowest percentage of seed coat damage and cracks in the NS Junior genotype may be related to the characteristics of the above mentioned micro-morphological, anatomical and chemical characteristics. There is a marked difference between the genotypes with regard to morpho-anatomical characteristics of seed coat, which is confirmed by the results of Multivariate discriminant function analysis.

Keywords: anatomy, seed micromorphology, seed coat

Genetic variability of fatty acid content in rapeseed (*Brassica napus* L.) as basis of breeding for oil quality

PP2-16

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Rapeseed is not only the third largest source of vegetable oil in the world, but is also considered as a source of high quality oil used for various purposes. Since 1991, rapeseed production has shifted to "00" rapeseed cultivars with low content of erucic acid and glucosinolates, achieved through intensive selection which resulted in quite a narrow genetic basis of modern lines and cultivars. The variability of seed tocopherol and fatty acid content in rapeseed cultivars and their F1 generation were the objectives of this study. The material consisted of five distinct rapeseed cultivars, including Orkan, which is not a "00" cultivar. Cultivars were grown in the field together with ten F1 hybrid combinations in three repetitions. The seed tocopherol content was quite variable. Alpha tocopherol content ranged from 176 mg kg⁻¹ to 334 mg kg⁻¹ in cultivars and 200 mg kg⁻¹ to 384 mg kg⁻¹ in hybrids, while gamma tocopherol content also had wider range in F1 (316-440 mg kg⁻¹) than

in parents (334-444 mg kg⁻¹). Beta and delta tocopherol content ranged from 0 to 1.4 mg kg⁻¹ and 1.3 mg kg⁻¹ respectively, but with lower content in F1. Presence of strong antioxidants, such as beta and delta tocopherol, is significant not only for oil stability from the analysed genotypes, but also as a valuable source of variability for breeding. Further efforts should include a wider assessment of variability in the available gene pool for quality-affecting parameters. Similarly to the presented results on oil quality, such assessments should help breeders to use genetic resources more efficiently and produce cultivars of desired quality.

Keywords: rapeseed, breeding, oil quality, fatty acids, tocopherols

Uptake, translocation and accumulation of zinc and copper in strawberries

PP2-17

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The term heavy metal, when related to its impact on the life of the plant and human health, almost always implies negative connotations. However, certain heavy metals are essential for physiological processes in the plant, and without them the plant would not be able to successfully complete its life cycle. Cu and Zn are particularly significant for the life of the plant since the plant needs them in a slightly higher quantity than other heavy metals. The aim of this study was to determine the contents of Zn and Cu in the examined soils, to determine their accumulation in the leaves and fruits of strawberries, and to get a fuller insight into the dynamics of Zn and Cu in the system 'soil - leaf - fruit' on the examined site. The content of Zn and Cu in the soil, leaves and fruits of strawberries was determined by atomic absorption spectrophotometry. The average Zn and Cu contents were 42.06 mg kg⁻¹ and 8.45 mg kg⁻¹ dry matter of soil; 100.34 mg kg⁻¹ and 0.11 mg kg⁻¹ dry matter of leaves, and 91.72 mg kg⁻¹ and 0.42 mg kg⁻¹ dry matter of fruits. The degree of uptake and accumulation of Zn in the leaves and fruits of strawberries was at a satisfactory level in accordance with the plant's needs for this element, which was not the case when Cu was studied. The reasons are: a low copper content in the examined soil, low mobility of copper in the plant, and the antagonistic relationship between zinc and copper in the soil.

Keywords: soil, leaf, fruit

The influence of seed size on sunflower protein content

PP2-18

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Seed quality is a collection of seed attributes which are considered to be of significance for the value of the seeds used for sowing purposes. Seed size is one of the seed quality components which affect the performance of the crop. A commercial seed lot is rarely uniform in seed size, and seeds of various sizes within a seed lot can have different quality properties. In this research, the influence of seed size on seed protein content was investigated. Sunflower hybrid seeds were classified into two categories by seed size: large (seeds retained on a > 4.5 mm screen) and small (seeds that passed through a 3.5-4.5 mm screen), and then each category was separated in the gravity desk by specific mass. Field experiments with six seed samples of sun-