

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>	

Associations between SSR markers and multiple important agronomic traits in maize

PP1-12

Sanja Mikić¹, Ankica Kondić Špika¹, Ljiljana Brbaklić¹, Dušan Stanisavljević¹, Dragana Trkulja¹, Marina Tomičić¹, Borislav Kobiljski², Slaven Prodanović³, Gordana Šurlan Momirović³

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Association analysis, a recent approach in studying genetic architecture of quantitative traits, provides higher resolution mapping, time efficient and direct application on breeding material in comparison to bi-parental QTL mapping. Assuming that markers near stable QTLs across different environments and genetic backgrounds can be useful for marker-assisted selection, we selected SSR markers previously associated with the QTLs for the traits of interest in various mapping studies. To confirm the marker trait associations and evaluate the stability of the QTLs, a set of diverse maize inbred lines developed at the Institute of Field and Vegetable Crops in Novi Sad was chosen. It was genotyped with microsatellite markers near already known QTLs and phenotyped for flowering time, yield and yield components. Association analysis indicated significant correlations between several agronomic traits and three microsatellites on chromosomes 3, 5 and 8, namely umc1025, bnlg1237 and bnlg162. According to different intermated B73 × Mo17 maize genetic maps, these markers coincide with the position of annotated genes within 1 cM to 4 cM. Gene *triose phosphate isomerase 4*, near umc1025, seems to be crucial for efficient energy production, genes *plasma membrane intrinsic protein 1* and *2*, close to bnlg1237, have a significant role in water transport through plasma membrane, whereas *dehydroascorbate reductase like1* gene, near bnlg162, is important for plant growth, as it is responsible for ascorbic acid recycling. Although the results implied possible pleiotropy, additional analyses should be conducted to rule out the linkage and further elucidate the nature of the multiple trait correlations.

Keywords: association mapping, microsatellites, maize, QTL

Molecular tools for NS pumpkin breeding - The beginning

PP1-13

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Since ancient times, pumpkin fruit have been essential in the diet of rural communities. Nowadays, pumpkins are cultivated both for fruit and seeds. Consumers appreciate cold pressed pumpkin seed oil, as it is rich in phytosterols and tocopherols, and fruit due to its sweet and mild taste as well as high nutritive value. The development of molecular tools for use in pumpkin breeding is still in the early stages and marker assisted selection is little-used, compared to other vegetables such as tomato and lettuce. Molecular genotyping and development of markers for marker-assisted selection could be an invaluable way to circumvent the disadvantages of classical pumpkin breeding in NS breeding program. Molecular characterization of existing genotype collection will be performed and the data used for creation of core collection. Making the most of the core collection will be done by exhaustive characterization and association mapping with phenotypic traits

important for cultivation, as well as nutrition. Obtained results will assist in breeding programs aiming to obtain new genotypes with enhanced agronomical, nutritive and health beneficial properties.

Keywords: *Cucurbita* spp., molecular tools, breeding

Nursery production of purple beech (*Fagus sylvatica* 'Purpurea') by grafting

PP1-14

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Fagus sylvatica 'Purpurea' is a purple leaf cultivar of European beech, planted as an ornamental tree in many parks and gardens, but very rare in Serbia. This cultivar changes leaf color during the vegetation period: from red to very dark blackish-purple, that becomes bronze-green and, during the summer, dark green. Five adult purple beech trees were selected from 2 different locations in Belgrade, as sources of scion woods for grafting. Grafting was done in the nursery of Faculty of Forestry in Belgrade. The analysis of survival and vitality was performed, including variability of grafts height and root collar diameter. The data were processed by the software package „Statistica“, and the following results are presented: descriptive statistics (min and max values, average value, standard deviation), LSD-test, analysis of variance and cluster analysis. Results of this research can be used to determine the tree that could be appropriate as scion's source for the future mass production of purple beech in Belgrade.

Keywords: purple beech, cultivars, grafting, nursery production

Possibility of SSR and ISSR marker transfer in *Vicia* species

PP1-15

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The genus vetch (*Vicia* L.) includes over 200 herbaceous annual and perennial species, containing food and forage legumes among them, with a prevailing Euro-Asiatic distribution. There are only few studies published considering the assessment of genetic diversity in *Vicia* using DNA markers, except for faba bean, where these were used extensively. The development of novel markers requires high costs and is time consuming. Instead of developing new markers, their transfer within genus is an alternative in less studied species. Having that in mind, the goal of this research was to investigate the possibility of transfer of SSR and ISSR markers within *Vicia* genus. Cross-species amplifications of the 6 SSR and 4 ISSR primers were carried out, using genomic DNA isolated from three accessions of eight *Vicia* species. Average transferability for SSR markers was 56.25%. Primers VfG14 and GAI1 displayed the highest, while VfG24 had the lowest rate of transfer. Primers VfG14 and GATA5 indicated polymorphism among *V. narbonensis* and *V. ervilia* accessions. Average percentage of transferability of ISSR primers was very high (96.87%), with three out of four tested primers being 100% transferable. Amplification with primer ISSR8 resulted in different amplification profiles for each investigated *Vicia* spe-