

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-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	<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/Coast 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>	

POSTER PRESENTATIONS

Germacrene A synthase and oxidase promoter analysis in chicory

PP1-1

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Chicory (*Cichorium intybus* L.) is rich in sesquiterpene lactones, bitter compounds whose biosynthesis involves several recently characterized genes, namely germacrene A synthase (GAS), in chicory present as long and short form, and germacrene A oxidase (GAO, CYP71AV8). Promoters of these genes have been studied by cloning promoter regions to drive the expression of eGFP, and obtaining stable chicory transformants carrying promoter constructs. Due to incompatibility of eGFP with another fluorescent marker – DsRED, which was used for selection of transformed clones, promoter activity was detected in transgenic plants by RT-PCR and qRT-PCR techniques. Most of the obtained chicory clones were expressing GFP, in roots, leaves, stems and flowers, suggesting that cloned promoters were functional in different chicory organs. The promoters were characterized by different strengths – GAO and GAS long promoters were stronger than both GAS short promoters, judging by eGFP expression level. The promoters also showed partial tissue specificity – GAS long was active in roots, leaves, stems and flowers, while GAS short promoters were mainly active in chicory roots.

Keywords: germacrene A synthase, germacrene A oxidase, promoter analysis, eGFP

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Efficiency of different molecular markers in detection of Ogu-INRA *cms* and *Rfo* genes in NS rapeseed

PP1-2

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Development of rapeseed hybrids was enabled by the discovery and introduction of *cms* and *Rf* genes. Several *cms* genes have been discovered so far: *Pol*, *Nap*, *Cam*, *Ogu*, *Nsa*, *Shan 2A* and *Kos*. Ogu-INRA *cms*, derived from *Raphanus sativus*, is one of the most widely analyzed and used gene in rapeseed breeding. This gene, together with compatible *Rfo* gene (derived from line R2000), is currently being introduced in NS breeding material. During the process of development of *cms* and *Rf* lines, some deviations from expected segregation ratio were observed. In order to analyze NS breeding material, the efficiency of four markers, two for de-

tection of Ogu-INRA *cms* gene and two for detection of *Rfo* gene, was tested. Both markers used for detection of Ogu-INRA *cms* gene produced similar and comparable results, as was the case with two markers, Bn-RFO-AS2 and BolJon, used for detection of *Rfo* gene.

Keywords: *Brassica napus* L., marker, Ogu-INRA *cms* system

This work is a part of the project TR31025, supported by Ministry of Education, Science and Technological Development of the Republic of Serbia.

Study of chicory germacrene A synthase function in guaianolide biosynthesis through amiRNA-induced gene silencing

PP1-3

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Germacrene A synthase (GAS) catalyzes an important step in guaianolide biosynthesis converting farnesyl pyrophosphate to germacrene A – universal sesquiterpene precursor in chicory. The function of two genes coding for GAS – *CiGASlo* and *CiGASsh*, was studied by gene silencing. Chicory was transformed with amiRNA constructs designed to specifically silence either of the two genes, and regenerated transgenic plants were tested for changes in gene expression and sesquiterpene lactones content. Silencing was successful in most of the clones, which had reduced gene expression. However, the amiRNA constructs were not specific for *CiGASlo* or *CiGASsh*, so that both genes were silenced in most transgenic plants. To verify that the gene silencing had impact on sesquiterpene lactone levels, three representative guaianolide oxalates (lactucin-15-oxalate, 8-deoxilactucin-15-oxalate and lactucopicrin-15-oxalate) were identified and quantified by UPLC-MS/MS in roots and shoots of transgenic and control plants. Data analyses showed unequal segregation of targeted compounds in the plant tissues, and implied that the synthesis of these compounds highly depends on the expression of GAS genes in the shoots and that these metabolites are pooled in the shoots, while the root guaianolide oxalates content is regulated on a level different from GAS expression. Nevertheless gene silencing reduced the targeted metabolites levels significantly. It was concluded that both genes are involved in guaianolide biosynthesis, and that their complex pattern of expression in different parts of the plant determines the amount of guaianolides and their derivatives.

Keywords: germacrene A synthase, silencing, amiRNA, chicory, guaianolides

This work was funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia (OI 173024) and EU FP7 Project acronym: TERPMED, grant agreement no. 227448.