

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

Organization Committee

Marijana Skorić, Jelena Savić, Danijela Mišić, Branislav Šiler, Ana Ćirić, Milana Trifunović, Bojana Banović, Nemanja Stanisavljević, Živko Jovanović, Jelena Dragišić Maksimović, Stevan Avramov, Aleksandra Dimitrijević, Dunja Karanović

Scientific Committee

Sokol Abazi (Tirana, Albania)
Jules Beekwilder (Wageningen, The Netherlands)
Harro Bouwmeester (Wageningen, The Netherlands)
Mondher Bouzayen (Castanet-Tolosan, France)
Christian Fankhauser (Lausanne, Switzerland)
Hrvoje Fulgosi (Zagreb, Croatia)
Milen Georgiev (Plovdiv, Bulgaria)
James Giovannoni (Ithaca, USA)
Giovanni Giuliano (Roma, Italy)
David Honys (Prague, Czech Republic)
Angelos Kanellis (Thessaloniki, Greece)
Miroslav Lisjak (Osijek, Croatia)
Autar Mattoo (Beltsville, USA)
Cathie Martin (Norwich, UK)
Roque Bru Martínez (Alicante, Spain)
Václav Motyka (Prague, Czech Republic)
Petr Smýkal (Olomouc, Czech Republic)
Mario Pezzotti (Verona, Italy)
Alain Tissier (Halle, Germany)
Julia Vrebalov (Ithaca, USA)
Jelena Aleksić (Belgrade, Serbia)
Goran Anačkov (Novi Sad, Serbia)
Milan Borišev (Novi Sad, Serbia)
Tijana Cvetić Antić (Belgrade, Serbia)
Bojan Duduk (Belgrade, Serbia)
Dragana Ignjatović-Mićić (Belgrade, Serbia)
Zorica Jovanović (Belgrade, Serbia)

Ivana Maksimović (Novi Sad, Serbia)
Vuk Maksimović (Belgrade, Serbia)
Vladimir Mihajlović (Kragujevac, Serbia)
Dragana Miladinović (Novi Sad, Serbia)
Jovanka Miljuš- Đukić (Belgrade, Serbia)
Danijela Miljković (Belgrade, Serbia)
Neda Mimica-Đukić (Novi Sad, Serbia)
Danijela Mišić (Belgrade, Serbia)
Miroslava Mitrović (Belgrade, Serbia)
Nevena Nagl (Novi Sad, Serbia)
Maja Natić (Belgrade, Serbia)
Miroslav Nikolić (Belgrade, Serbia)
Slavica Ninković (Belgrade, Serbia)
Dejan Orčić (Novi Sad, Serbia)
Pavle Pavlović (Belgrade, Serbia)
Ljiljana Prokić (Belgrade, Serbia)
Marina Putnik Delić (Novi Sad, Serbia)
Svetlana Radović (Belgrade, Serbia)
Tamara Rakić (Belgrade, Serbia)
Aneta Sabovljević (Belgrade, Serbia)
Marko Sabovljević (Belgrade, Serbia)
Jelena Samardžić (Belgrade, Serbia)
Ana Simonović (Belgrade, Serbia)
Marina Soković (Belgrade, Serbia)
Angelina Subotić (Belgrade, Serbia)
Sonja Veljović-Jovanović (Belgrade, Serbia)
Tanja Vujović (Čačak, Serbia)
Snežana Zdravković- Korać (Belgrade, Serbia)
Bojan Zlatković (Niš, Serbia)

Publishers

Serbian Plant Physiology Society
Institute for Biological Research „Siniša Stanković“, University of Belgrade,
Bulevar despota Stefana 142, 11060 Belgrade, Serbia

Editor

Branka Uzelac

Technical editor

Branislav Šiler

Photograph in front page

Danijela Mišić

Graphic design & prepress

Lidija Mačej

Printed by

Makarije, Belgrade

Number of copies

250

Belgrade, 2015

CIP - Каталогизација у публикацији
Народна библиотека Србије, Београд

581(048) I

INTERNATIONAL Conference on Plant Biology (2 ; 2015 ; Petnica)

[Book of Abstracts] / 2nd International Conference on Plant Biology [and] 21th Symposium of the Serbian Plant Physiology Society [and] COST Action FA1106 QualityFruit Workshop, Petnica, June 17-20, 2015 ; [organized by] Serbian Plant Physiology Society [and] Institute for Biological Research "Siniša Stanković", University of Belgrade ; [editor Branka Uzelac]. - Belgrade : Serbian Plant Physiology Society : Institute for Biological Research "Siniša Stanković", 2015 (Belgrade : "Makarije"). - 203 str. : ilustr. ; 24 cm

Tiraž 250. - Registar.

ISBN 978-86-912591-3-6 (SPPS)

1. Društvo za fiziologiju biljaka Srbije. Simpozijum (21 ; 2015 ; Petnica)

2. COST Action FA1106 QualityFruit. Workshop (2015 ; Petnica)

a) Ботаника - Апстракти

COBISS.SR-ID 215711500

Supported by the Ministry of Education, Science, and Technological Development of the Republic of Serbia

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> | |

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

Senad Murtić, Hamdija Čivić, Fikreta Behmen, Agan Kojić, Tarik Bilajac
(murticsenad@hotmail.com)

Faculty of Agricultural and Food Sciences, University of Sarajevo, Zmaja od Bosne 8, 71000 Sarajevo

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

Jelena Ovuka, Velimir Radić, Vladimir Miklič
(jelena.mrdja@nsseme.com)

Institute of Field and Vegetable Crops, Maksima Gorkog 30, 21000 Novi Sad

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-

flower hybrid were conducted in 2010 and 2011 in Rimski šančevi and Zrenjanin, Serbia. Data were analyzed using three-way ANOVA for a split-split-plot design. Based on obtained results it can be concluded that the influence of locality and year on seed protein content was statistically highly significant, while the influence of seed size was not statistically significant. On average, the highest protein content was observed on the locality Zrenjanin (19.31%), and during the first year of examination (18.77%).

Keywords: seed size, protein content, sunflower

This work was supported by Ministry of Education, Science and Technological Development of the Republic of Serbia (TR31025).

Morphological characteristics and variability of sycamore maple (*Acer pseudoplatanus* L.) seedlings

PP2-19

Vladan Popović, Tatjana Ćirković-Mitrović, Ljiljana Brašanac-Bosanac, Ljubinko Rakonjac, Aleksandar Lučić
(vladanpop79@gmail.com)

Institute of Forestry, Kneza Višeslava 3, 11030 Belgrade, Serbia

The comparative morphological analysis of 11 half-sib lines of sycamore maple showed main characteristics and individual, inter and intra-line variability of the seedlings. Seeds for analysis of seedlings' characteristics and variability were collected from micro-populations in the area of Belgrade. The trial was set up in the nursery of the Institute of forestry in Belgrade. When 30 seedlings per each half-sib line (that were taken as a sample) were 30 days old, the following characteristics were measured: root, epicotyl, hypocotyl and cotyledon length, cotyledon width, mass of the seedlings, root collar diameter and the number of cotyledons. The obtained results contribute to the understanding of analyzed characteristics, the preliminary assessment of the genetic variability of the studied half-sib lines and they represent a good basis for the adequate use of genetic potential of the species.

Keywords: sycamore maple, seedling, half-sib line, variability

Effect of fertilizers on concentration of photosynthetic pigments in leaves of one-year-old seedlings of walnut (*Juglans regia* L.)

PP2-20

Vladan Popović, Tatjana Ćirković-Mitrović, Aleksandar Lučić, Ljubinko Rakonjac
(vladanpop79@gmail.com)

Institute of Forestry, Kneza Višeslava 3, 11030 Belgrade, Serbia

The effect of three different fertilizers on concentration of photosynthetic pigments in leaves of one-year-old seedlings of walnut (*Juglans regia* L.) has been studied in the nursery conditions. Three types of pigments have been examined: chlorophyll a, chlorophyll b and carotenoids as well as the total concentration of chlorophyll a and b. The trial was set up in a random block system with three types of fertilizers and the control in three replications in the nursery of Institute of forestry in Belgrade in 2013. The leaf sampling was carried out in the middle of the growing season. The highest concentration of photosynthetic pigments was found in the leaves of seedlings treated with the preparation Bactofil B 10 and the lowest in the seedlings treated