

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

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-Mičić (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 - Каталогизacija 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 - Апстрактни

COBISS.SR-ID 215711500

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

and GR showed no statistically significant activities compared to control plants, while SOSA, CAT and LUPO activities were lower than in control plants. Subsequent analysis of total non-protein thiol content of LMWA revealed that this class of compounds possessed the strongest impact on overall antioxidant activity, at least in the case of 0.5 mM nickel treatment.

Keywords: *Alyssum markgrafii*, hyperaccumulator, antioxidant response

This work was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (O1173005 and O1173015).

Effects of different nitrogen and phosphorus concentrations on antioxidative response of *Lemna gibba* plants to silver toxicity

PP8-49

Martina Varga¹, Ivana Štolfa¹, Janja Horvatić¹
(martina.varga@biologija.unios.hr)

¹ Department of Biology, Josip Juraj Strossmayer University in Osijek, Cara Hadrijana 8/A, 31000 Osijek, Croatia

Silver is non-essential heavy metal for plants known to cause oxidative stress. Several factors, such as the presence of nutrients, can affect the ability of plants to adequately respond to abiotic stress. The objective of This study was to investigate the effect of different nitrogen (N) and phosphorus (P) concentrations on antioxidative response of plants to ionic colloidal silver (Ag). To provide insight, *Lemna gibba* plants were exposed to three N and P levels (100%, 50% and 25%) for seven days and then to nominal 100 µg L⁻¹ and 1000 µg L⁻¹ Ag for 48h. Plants grown at lower N and P concentrations had significantly higher initial enzyme activities such as ascorbate peroxidase (APX), guaiacol peroxidase (GPOX) and superoxide dismutase (SOD) as well as elevated concentrations of ascorbic acid and total phenols. Increased antioxidative enzymes activities indicate oxidative stress-tolerance. Silver caused oxidative injury to *L. gibba* cells, evident from decreased protein and chlorophyll concentrations and increased concentrations of hydrogen peroxide (H₂O₂) and products of lipid peroxidation (TBARS). However, the production of H₂O₂ and TBARS as well as the degradation of proteins and pigments caused by Ag treatment was less pronounced in plants grown at lower N and P concentrations when compared to full strength medium. This could be explained by higher degree of protection from oxidative stress caused by Ag in plants grown at lower N and P supply. These results indicate that N and P supply, by modifying antioxidant activity in plants, can affect their tolerance to various kinds of stresses.

Keywords: *Lemna gibba*, silver, nutrients, oxidative stress, antioxidative response

Influence of UV radiation on the content of secondary metabolites in tomato grown in different environmental conditions

PP8-50

Bojana Živanović, Ana Sedlarević, Sonja Milić, Marija Vidović, Filis Morina, Sonja Veljović Jovanović
(bojana.zivanovic@imsi.rs)

Institute for Multidisciplinary Research, University of Belgrade, Belgrade, Serbia

In this study we investigated the effects of ambient ultraviolet (UV, 280- 400 nm) radiation on the composition of secondary metabolites of high nutritional value (pigments and flavonoids) in *Lycopersicon esculen-*

tum (tomato) fruits. Tomato plants were grown during summer in the open field and two types of polytunnels, PT1 (UV-A 1.45 mV cm⁻², UV-B 3.84 μV cm⁻², PAR 750 μmol m⁻² s⁻¹) and PT2 (UV-A 0.37 mV cm⁻², UV-B 0.03 μV cm⁻², PAR 760 μmol m⁻² s⁻¹) and fruits were taken in august. The contents of lycopene, β-carotene and flavonoids (quercetin and kaempferol) were determined by HPLC in the tomato exocarp and pulp. Regardless of UV radiation exposure, higher amounts of lycopene, flavonoids and β-carotene were measured in exocarp compared to the pulp. Accumulation of phenolics, in both exocarp and pulp was the highest in fruits collected in the field. Similarly, the concentration of epidermal flavonoids was the highest in the leaves of plants from the open field. These results support the protective functions of flavonoids as UV-screens and antioxidants from high PAR. Moreover, the content of lycopene was the highest in exocarp and β-carotene in the pulp of fruits exposed to full ambiental UV radiation doses, compared to fruits collected in the polytunnels. The results implicate that the controlled exposure to solar UV radiation during crop growth may be used as a stimulator of biosynthesis of compounds with high antioxidative capacity thus improving the fruit quality and nutritional value.

Keywords: UV radiation, *Lycopersicon esculentum*, pigments, flavonoids

This work was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (III43010).

Volatile compounds of golden fern (*Asplenium ceterach* L.) detected during the process of rehydration

PP8-51

Suzana Živković¹, Marijana Skorić¹, Mihailo Ristić², Mirjana Perišić³, Nevena Puač³, Gordana Malović³, Zoran Lj. Petrović³

(suzy@ibiss.bg.ac.rs)

¹ Institute for Biological Research "Siniša Stanković", University of Belgrade, Bulevar despota Stefana 142, 11060 Belgrade, Serbia

² Institute for Medicinal Plants Research "Dr Josif Pančić", Tadeuša Koščuška 1, 11000 Belgrade, Serbia

³ Institute of Physics, University of Belgrade, Pregrevica 118, 11080 Belgrade, Serbia

Volatile organic compounds (VOC) emitted by fronds of desiccation tolerant fern *Asplenium ceterach* L. during the rehydration process were investigated. Head-space GC-MS analysis was used in order to determine the volatile compounds in dry and rehydrated sample of golden fern. It was found that the VOC profile of golden fern is based mainly on isomeric heptadienals (over 25%) and decadienals (over 20%), other linear aldehydes, alcohols and related compounds. Aerial parts of fresh and dry fronds do not contain monoterpene-, sesquiterpene- and diterpene-type hydrocarbons or corresponding terpenoids. In order to determine the composition of the VOC during the process of rehydration, we have applied proton-transfer reaction mass spectrometry (PTR-MS). PTR-MS is a sensitive technique that allows real-time detection of VOCs emitted from plants. We have used dry plants to establish a base line and then distilled water was added to induce hydration process of the golden fern plant. Masses in the range from m/z 21 to m/z 300 were measured with dwell time of 200 ms and for the time period of 24 hours. The experiment was repeated for five plants. PTR-MS measurements revealed that the amounts of compounds, determined by head-space GC-MS, generally exhibit a significant increase after addition of water. After about 20 hours the values measured by PTR-MS for these masses are reduced to a new base line that corresponds to the rehydrated plant.

Keywords: golden fern, rehydration, PTR-MS, headspace GC-MS

This study was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (III41011 and ON173024).