

BOOK OF ABSTRACTS

3rd International Conference on Plant Biology (22nd SPSS Meeting)



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Institute for Biological Research "Siniša Stanković", University of Belgrade

Faculty of Biology, University of Belgrade

**3rd International Conference
on Plant Biology
(22nd SPPS Meeting)**



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to the analysis of phenolic compounds in ethanol extracts of leaves, flowers, stems, rhizomes, and roots of *I. oculus-christi*. The content of total phenolics (TPC) and total flavonoids (TFC) in extracts of different plant parts of *I. oculus-christi* was determined. Significantly high TPC and TFC were observed in extract of flowers, while the extracts of stems and roots had the lowest content of phenolic compounds. UHPLC–LTQ/orbitrap/MS analysis was performed for separation, identification, and quantification of the major phenolic components in *I. oculus-christi* extracts. A total of 46 compounds detected belong to three structurally distinct groups: 1) hydroxycinnamic acid derivatives (14 compounds); 2) flavonoid glycosides (21 compounds); and 3) flavonoid aglycones (11 compounds). Dominant hydroxycinnamates were derivatives of caffeic acid, esterified with quinic or aldaric acids. The relative abundance of these compounds was higher in extracts of flowers, leaves and rhizomes. From the flavonoid glycoside group, flavone (nepetin, luteolin, apigenin, and chrysoeriol) and flavonol (quercetin, patuletin, kaempferol, isorhamnetin, and 3,3'-dimethylquercetin) derivatives were found in tested samples. Flavonoid aglycones were the most abundant compounds in extracts of flowers. Observed differences in phenolic content highlight the possibility of targeted collection and application of different *I. oculus-christi* extracts considering previously determined biological activities.

Keywords: *Inula oculus-christi*, UHPLC-Orbitrap MS, hydroxycinnamic acid derivatives, flavonoid glycosides, flavonoid aglycones

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Elicitation effects of methyl jasmonate on secoiridoid production in shoot culture of centaury (*Centaureum erythraea* Rafn)

PP4-16

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Centaureum erythraea (centaury), a plant with a long tradition of medicinal use, contains bioactive secoiridoid glucosides (SGs). The exogenous application of methyl jasmonate (MeJA) may elicit a response similar to stress, and is used in the present study to induce SG accumulation and expression of SGs' biosynthesis associated genes in centaury's aerial parts. UHPLC-MS/MS analyses have indicated that the addition of 250 μM MeJA to the medium has caused overproduction of almost all investigated secondary metabolites. The most notable change was detected for swertiamarin production, which was several fold-higher in MeJA-treated plants. For the purpose of determining the key genes of MeJA response, we performed a qPCR analysis of all genes potentially involved in the secoiridoid biosynthetic pathway. After five days of MeJA treatment, an increase of relative gene expression was detected for *G8O*, *8HGO7*, *IO*, *7DLGT*, *7DLH2*, *SLS* and *CPR1*. On the other hand, in centaury plants subjected to MeJA treatment for ten days, there was no significant increase in gene expression. For *GPPS* and *LAMT*, decreased expression levels were detected, when

compared to control plants. Patterns of SGs biosynthetic gene expression are highly correlated to SGs' profiles during MeJA-elicitation treatments, giving clear evidence that the identified genes are a part of SGs' biosynthetic routes. All the results indicate that MeJA is a suitable elicitor that leads, through gene expression changes, to increased flux through the pathway and production of swertiamarin, sweroside and gentiopicrin, which can be used for future production of secoiridoids with the aid of biotechnological processes.

Keywords: *Centaurium erythraea*, gene expression, methyl jasmonate, secoiridoid glucosides, UHPLC-MS/MS analysis

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Total phenolic content and peroxidase activity in Salanova lettuce

PP4-17

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Lettuce (*Lactuca sativa* L.) belongs to a group of leafy vegetables commonly used as a salad in human nutrition. As minimally processed food product, it is an important source of vitamins, minerals and various antioxidative compounds. In our greenhouse experiment, two Salanova lettuce cultivars ('Aquino' RZ- green and 'Gaugin' RZ- red multi-leaf butterhead) were grown in the fertile soil during three successive seasons (autumn, winter and spring). The aim of the study was to examine the effect of different microbiological fertilizers (EM Aktiv, Vital Tricho and combination of EM Aktiv and Vital Tricho), cultivars and growing seasons on the total phenolic content and peroxidase activity. Our results showed that in all seasons red cultivar 'Gaugin' had higher total phenolic content compared to green cultivar 'Aquino'. Their highest level was measured in autumn with fertilizer Vital Tricho (549.14 $\mu\text{g GAE g}^{-1}$ FW). The elevated phenolic status of red versus green cultivar was further strengthened by its higher level of peroxidase with the highest activity measured in spring with combination of fertilizers EM Aktiv and Vital Tricho (0.43 U mg^{-1} prot). The higher peroxidase activity and content of UV-absorbing phenolics, as plant-borne substrates of these enzymes, in the red cultivars indicate that the red leaves are better equipped to combat oxidative stress. Consequently, red cultivar 'Gaugin', with increased synthesis of health-promoting antioxidants, could be considered as functional food in human diet.

Keywords: lettuce, microbiological fertilizers, phenolics, peroxidase

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