

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

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POSTER PRESENTATIONS

Seasonal variation of flavonoid content and antioxidant activity of *Salvia officinalis* of different origin

PP3-1

Ana Alimpić, Danica Pavlović, D Mitar Lakušić, Petar D. Marin, Sonja Duletić-Laušević
(alimpic.ana@bio.bg.ac.rs)

University of Belgrade, Faculty of Biology, Institute of Botany and Botanical Garden "Jevremovac",
Takovska 43, Belgrade, Serbia

Sage (*Salvia officinalis* L., Lamiaceae) is widely known as an important culinary and medicinal plant. This study was aimed to investigate the antioxidant activity and flavonoid content in ethanol extracts of four samples of this species. Plants from Pleš (Eastern Serbia) and Luštica (Montenegro), were transplanted in Belgrade, and cultivated under the same conditions. Aerial parts were harvested during summer and winter season, grounded and extracted by ethanol to obtain crude extracts. Antioxidant activity was evaluated using DPPH assay and results were expressed as IC₅₀ values ($\mu\text{g mL}^{-1}$). Flavonoid contents (FC) were measured spectrophotometrically and data were presented as mg of quercetin equivalents per gram of dry extract (mg QE g⁻¹). All of the extracts performed DPPH activity ranged from 13.12-20.05 $\mu\text{g mL}^{-1}$, which was evaluated as good comparing to values obtained for standards BHA (13.37 $\mu\text{g mL}^{-1}$) and BHT (17.94 $\mu\text{g mL}^{-1}$). Flavonoid content ranged from 20.08 to 40.72 mg QE g⁻¹. Extracts of plants originated from Pleš showed stronger activity and higher FC than plants from Luštica. As expected, extracts of summer samples exhibited stronger DPPH activity and higher FC than the winter ones. Taking into account that uniform procedures have been applied for all of the plant samples, it could be concluded that flavonoid content and DPPH activity of the extracts depended on the locality of origin and season of the plant material collection.

Keywords: *Salvia officinalis*, ethanol extract, DPPH activity, flavonoid content

Hydrolysis of secoiridoid glycosides from *Centaurium erythraea* Rafn increases their antioxidative potential

PP3-2

Jelena Boljević, Suzana Živković, Jasmina Glamočlija, Dragana Božić, Neda Aničić,
Branislav Šiler, Marina Soković, Danijela Mišić
(jelena.boljevic@ibiss.bg.ac.rs)

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

Dominant secondary metabolites of common centaury (*Centaurium erythraea* Rafn) are bitter taste secoiridoid glycosides: swertiamarin, gentiopicrin and sweroside, and their function is proposed to be in plant responses against pathogens and herbivores. It can be assumed that secoiridoid glycosides and hydrolytic enzymes (β -glucosidases) form a dual defense system in common centaury, where β -glucosidase plays an essential role in removing non-reducing terminal glucosyl residues from glycosylated compounds, leading to highly active but unstable aglycones. The present study was designed to evaluate antioxidative and antimicrobial activity of hydrolyzed and non-hydrolyzed methanol extracts of *Centaurium erythraea* above-ground parts and its main components sweroside, swertiamarin and gentiopicrin. To examine the concentrations of secoiridoid glycosides and their aglycones in methanol extracts, before and after hydrolysis, UH-

PLC/DAD/+HESI-MS/MS method was developed and evaluated. Hydrolysis was performed enzymatically using commercial β -glucosidase isolated from almond. Results of FRAP, ABTS and DPPH assays showed higher antioxidative activity of hydrolyzed *C. erythraea* methanol extract and pure compounds than non-hydrolyzed ones. Conversely, hydrolysis of *C. erythraea* methanol extracts led to lower antifungal activity and had weak or no influence on antibacterial activity. Based on this study it can be presumed that biosynthesis of secoiridoid glycosides, and their degradation mediated by β -glucosidases are regulated by various biotic factors, and are involved in defense system against herbivores and pathogens.

Keywords: secoiridoid glycosides, β -glucosidase, *Centaurium erythraea*

This study was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (O1173024).

Antibacterial activity of Lady's Mantle

PP3-3

Tatjana Boroja¹, Vladimir Mihailović¹, Jelena Katanić¹, Milan Stanković²,
Nevena Stanković¹, Milan Mladenović¹
(tatjanaboroja@gmail.com)

¹ Department of Chemistry, Faculty of Science, University of Kragujevac, Radoja Domanovića 12, 34000 Kragujevac

² Department of Biology and Ecology, Faculty of Science, University of Kragujevac, Radoja Domanovića 12, 34000 Kragujevac

Lady's Mantle (*Alchemilla vulgaris* L.) belongs to the Rosaceae family. In traditional medicine, it was used as herbal treatment for menstrual disorders. Due to the high content of phenolic compounds, *Alchemilla* species were also shown to possess anti-inflammatory, antioxidant, antiinfluenza and anticarcinogenic activity. The purpose of this work was to evaluate the antibacterial properties of *A. vulgaris*. The methanolic extract of aerial parts of *A. vulgaris* prepared by maceration has been used to estimate the antibacterial activity against nine bacterial strains. The *in vitro* antibacterial activity was performed by microdilution method. Minimal inhibitory concentrations (MIC) were evaluated based on the color change of resazurin. The most sensitive bacterial strain was *Micrococcus lysodeikticus* (MIC 0.156 mg mL⁻¹). The methanolic extract of *A. vulgaris* also showed remarkable antibacterial potential against both ATCC and clinically isolated strains of *Enterococcus faecalis* (0.312 mg mL⁻¹ and 0.156 mg mL⁻¹, respectively). *Pseudomonas aeruginosa* was the most resistant species with MIC values 20 mg mL⁻¹. MIC values for chloramphenicol, used as standard, were in the range of 2.5-10 mg mL⁻¹. The results of the present investigation suggest that *A. vulgaris* possesses strong antibacterial activity against tested bacterial species, with MIC values ranging from 0.156 mg mL⁻¹ to 20 mg mL⁻¹. Based on these results, further chemical and pharmacological investigation, as well as isolation of bioactive compounds may be recommended.

Keywords: *Alchemilla vulgaris*, antibacterial activity, phenolic compounds

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