# BOOK OF ABSTRACTS

# 3rd International Conference on Plant Biology

## (22nd SPPS Meeting)

**9-12 JUNE 2018**
**BELGRADE**

**Serbian Plant Physiology Society**

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

**Faculty of Biology, University of Belgrade**

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provide a valuable knowledge about the mechanism of antioxidative response. In accordance with our aim, we investigated *in vivo* plants collected in Bulgaria at mountain Vitosha (2200 m) during the period of flowering, as well as fully developed plants grown *in vitro* under controlled environment. Extracts from *in vivo* and *in vitro P. atrata* leaves were fractioned by sequential solubilization in non-polar (chloroform) and polar (methanol) solvents and then methanol extracts were subjected to Gas Chromatography–Mass Spectrometry analysis of the polar metabolite content (aminoacids, sugars, organic, phenolic acids). The methanol extracts were also evaluated regarding the total quantity of phenolics, flavonoids, antioxidant activity and reducing sugars. In accordance with the growth conditions, the data showed specific composition of identified primary and secondary metabolites. In both variants of plant cultivation, significant correlation was observed between the content of phenolics and sugars and the antioxidant activity; however, a strong reduction in all parameters was observed during *in vitro* cultivation. Our work provides information about antioxidative compounds with role in the adaptation of high-altitude mountain plant species.

***Keywords:*** *Plantago atrata, in vivo, in vitro,* GC-MS, antioxidants

## Physiological drought alters nepetalactone metabolisam in *Nepeta rtanjensis* leaves

PP4-20

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Major constituents of *Nepeta rtanjensis* Diklić & Milojević: *trans*,*cis*-nepetalactone and its dehydrogenation product dehydronepetalactone, are synthetized and accumulated in glandular trichomes. Interestingly, dehydronepetalactone is the major monoterpenoid in fresh leaves of *N. rtanjensis*, while the amount of this compound dramatically decreases in dry leaves. Furthermore, dehydronepetalactone has been previously identified in *Nepeta* species mainly in the cases when essential oils and extracts prepared from fresh plant material were analysed. All this lead us to presume that nepetalactone metabolism is reprogrammed during the process of leaf dehydration. Here we present for the first time an insight into the molecular background of constitutive nepetalactone biosynthesis in leaves of *N. rtanjensis* and its alterations under physiological drought stress, which was experimentally induced *in vitro* by exposing plants to PEG 8000 (3 MPa) for 1, 3 and 6 days. Leaves of PEG-treated and of non-treated plants were collected and subjected to gene expression analysis and to metabolic profiling. Putative genes encoding enzymes for intermediate steps of nepetalactone biosynthetic pathway (*GPPS*, *GES*, *G8O*, *8HGO*, *IS1* and *IS2*) were mined from *N. rtanjensis* leaf transcriptome. Although majority of analysed genes were significantly down-regulated during the process of leaf dehydration, PEG-induced physiological drought induced no significant changes in nepetalactone content, while dehydronepetalactone content was slightly decreased. The possible key enzymes controlling the nepetalactone biosynthetic-flux could be *GPPS*, *G8O*, and *IS1*, which showed stable expression levels during dehydration. Stressed plants

most likely maintain nepetalactone content stable by lowering both its biosynthesis and degradation, which results in decreased dehydronepetalactone content in leaves, and thus in altered nepetalactone/dehydronepetalactone ratio.

***Keywords:*** nepetalactone, dehydronepetalactone, nepetalactone biosynthetic pathway genes, physiological drought

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## *Salvia sclarea* L. essential oil as possible natural antimicrobial and antigenotoxic agent

PP4-21

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Clary sage (*Salvia sclarea* L.) belongs to genus *Salvia* (family *Lamiaceae*). This cultivar is also known as a "clear-eye" since its seeds are traditionally used to easily remove foreign objects from the eye. The essential oil obtained from the plant aerial part is widely used as an antiseptic, antidepressant, antispasmodic, carminative, and aphrodisiac. The aim of this study was to determine the pharmacological potential of selected essential oil, obtained by means of steam distillation, according to screened antimicrobial and antigenotoxic activity. The antimicrobial activity was assessed using the microdilution method against ten ATCC standardized microorganisms, nine bacterial strains (of which six G+ and three G-) and one fungi. The *in vitro* protective effect of the essential oil from *S. sclarea* against hydroxyl radical-induced DNA damage was also evaluated. The obtained MIC values pointed out good antimicrobial potency of tested essential oil against *Bacillus subtilis* (0.3125 μg $\mu L^{-1}$), *Bacillus cereus* (0.3125 μg $\mu L^{-1}$), *Enterococcus faecalis* (10 μg $\mu L^{-1}$), *Staphylococcus aureus* (25 μg $\mu L^{-1}$), *Staphylococcus epidermidis* (1.56 μg $\mu L^{-1}$), *Micrococcus lysodeikticus* (50 μg $\mu L^{-1}$), *Escherichia coli* (50 μg $\mu L^{-1}$), *Pseudomonas aeruginosa* (10 μg $\mu L^{-1}$), *Salmonella enteritidis* (10 μg $\mu L^{-1}$), *Candida albicans* (6.25 μg $\mu L^{-1}$). Antigenotoxic activity was dose-dependent, decreasing with higher dosages in a concentration range from 25 to 400 μg $mL^{-1}$. Conclusively, examined oil may be characterized as a potential therapy against infections caused by *Bacillus* strain as well as a supplement in cancer treatments as healthy cells protector.

***Keywords:*** essential oil, *Salvia sclarea*, antimicrobial activity, antigenotoxic potential

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