EFFECT OF SALICYLIC ACID ON ESSENTIAL OIL COMPOSITION OF *MELISSA OFFICINALIS* L. PLANTS UNDER NI STRESS

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Melissa officinalis L., commonly named as lemon balm is one of the important medicinal plant species belongs to Lamiaceae family [1]. The potent therapeutic properties of lemon balm are sedative, carminative, antispasmodic, antibacterial, antiviral, anti-inflammatory and antioxidative [2]. It is well known that two group of compounds are mainly responsible for the pharmacological activities of this plant, the essential oil and phenolic compounds [3]. Essential oils of lemon balm are used as an anti-tumoral agent for prevention or remedy of cancers [5]. In the present study, we evaluated the effects of exogenous application of salicylic acid (SA) on essential oil components of *M. officinalis* L. in the absence or presence of different concentrations of nickel (Ni). Sterilized healthy and mature seeds were transferred into pots and irrigated with Hoagland nutrient solution, under glasshouse conditions. Plantlets at the 6-8 leaf stage were treated with different concentrations of Ni (0, 25, 50, 75, 100, 250, 500 μM) every alternate day and SA (0 and 1000 μM) mixed with tween-20 was sprayed in the evening of the same day. After 60 days of treatment, areal parts of the plants were harvested and further analyses. The essential oils were obtained from the samples by hydrodistillation for 5h, using a Clevenger-type apparatus and analysed by GC-MS. Results showed that application of Ni affected on the content of three main components of the essential oils. So, the contents of geraniol and geranial were decreased as a result of heavy metals pollution, while neral content was significantly increased in the essential oils. The observed decrease in the levels of geraniol and geranial in the treated plants under Ni treatment indicated a decline of the essential oils quality. The results also showed that SA application influenced quality and quantity of the essential oils components and consequently altered the tolerance of the plants against Ni stress. The useful component such as geranial, geraniol and neral were increased under Ni and SA treatments, which in turn enhanced the plants antioxidant properties. These results clearly provide evidences that metal pollutions can change the chemical composition of *M. officinalis* L.

References

[1] Toth. J.; Mrlianova, M.; Tekelova, D.; Korenova, M.; *Acta Facultatis Pharmaceuticae Universitatis Comenianae Tomus L.* 2003.
[2] Weitzel, C.; Petersen. M.; *Phytochemistry*, **2011**, *72*, 572–578.
[3] Kováčik, J.; Bačkor, M; *Water Air Soil Pollut*. **2007**, *185*, 185– 193.
[4] Silva, S.D.; Sato, A.; Luiz Salgueiro Lage, C.; San Gil, R. A. D.; Almeida Azevedo, D. D.; Esquibel M. A. *J. Braz. Chem. Soc,* **2005**, *16*, 1387-1390.
[5] Saeb, K.; Gholamrezaei, S; *Asian Pac J Trop Biomed*, **2005**, *1*, 1-3.