EFFECT OF EXOGENOUS SALICYLIC ACID ON ACCUMULATION OF NI IN THE ROOTS AND LEAVES 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]. The present investigation was carried out to in order to evaluate the effects of salicylic acid (SA) on content of Ni in leaves and roots of *M. officinalis* plants exposed to nickel (Ni) stress. Sterilized healthy and mature seeds were transferred into pots and irrigated with Hoagland nutrient solution, under glasshouse conditions. Mean day temperature was 28±5 °C, night temperature 22±3 °C, with photon flux density 400-600 µmol m^{-2} s^{-1} (PAR), 16/8 light/dark photoperiod and average relative humidity (RH) 35.9±6.5 during the entire growth period. Plant lets at 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, leaves and roots of the plants were collected by hand and dried for further analyses. Samples were wet digested as described by Stoltz and Greger, (2002). The Ni content (µg g^{-1} DW) determined using atomic absorption spectrometry (ICP-OES). Our results showed that with increasing the Ni concentration, accumulation of Ni increased in the root samples more than in the leaves. These results suggest that protective barriers exist to prevent the penetration of Ni from the roots into leaves. Also the results indicated that SA decreased root-to-shoot translocation of Ni and hence improved Ni toxicity in the leaves. The lowest level of Ni accumulation (25.6 µg/g DW) was observed in the leaves of plants which were treated with 25 µM of Ni and 1000 µM of SA. In addition, roots more than leaves are affected to the damages caused by heavy metals, therefore these organs are more responsive to Ni stress. Higher accumulation of Ni in the roots and substantially lower content (<1000 µg g^{-1} DW) of Ni in the leaves, supports *M. officinalis* classification as a Ni excluder and not a hyperaccumulator medicinal plant to Ni stress.

References

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