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Arbuscular Mycorrhizal Symbiosis Modulates Antioxidant Capacity of in vitro Propagated Hyssop, Hyssopus officinalis L.

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Abstract : Hyssopus officinalis L., Lamiaceae, commonly called hyssop, is an aromatic, semi-evergreen, woody-based, shrubby perennial plant. Hyssop is a good expectorant and antiviral herb commonly used to treat respiratory conditions such as influenza, sinus infections, colds, and bronchitis. Most of its medicinal properties are attributed to the essential oil of hyssop. The study was conducted to evaluate the influence of inoculation with arbuscular mycorrhizal fungi of in vitro propagated hyssop plants on the: activities of antioxidant enzymes superoxide dismutase, catalase, guaiacol peroxidase and ascorbate peroxidase; accumulation of non-enzymatic antioxidants total phenols and flavonoid, water-soluble soluble antioxidant metabolites expressed as ascorbic acid; the antioxidant potential of hyssop methanol extracts assessed by two common methods: free radical scavenging activity using free stable radical (2,2-diphenyl-1-picrylhydrazyl, DPPH• and ferric reducing antioxidant power FRAP in flowers and leaves. The successfully adapted to field conditions in vitro plants (survival rate 95%) were inoculated with arbuscular mycorrhizal fungi (Claroideoglomus claroideum, ref. EEZ 54). It was established that the activities of enzymes with antioxidant capacity (superoxide dismutase, catalase, guaiacol peroxidase and ascorbate peroxidase) were significantly higher in leaves than in flowers in both control and mycorrhized plants. In flowers and leaves of inoculated plants, the antioxidant enzymes activity were lower than in non-inoculated plants, only in SOD activity, there was no difference. The content of low molecular metabolites with antioxidant capacity as total phenols, total flavonoids, and water soluble antioxidants was higher in inoculated plants. There were no significant differences between control and inoculated plants both for FRAP and DPPH antioxidant activity. According to plant essential oil content, there was no difference between non-inoculated and inoculated plants. Based on our results we could suggest that antioxidant capacity of in vitro propagated hyssop plant under conditions of cultivation is determined by the phenolic compounds-total phenols and flavonoids as well as by the levels of water-soluble metabolites with antioxidant potential. Acknowledgments: This study was conducted with financial support from National Science Fund at the Bulgarian Ministry of Education and Science, Project DN06/7 17.12.16.

Keywords : antioxidant enzymes, antioxidant metabolites, arbuscular mycorrhizal fungi, Hyssopus officinalis L.
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