



The effect of humic acid and ascorbic acid on amount and composition of essential oils in Dragonhead medicinal plant (*Dracocephalum moldavica* L.) under salinity stress

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Abstract

Salinity is one of the most important abiotic stresses that reduces the production ability. In order to improve the performance of plants under salt stress conditions, humic acid as an organic acid and ascorbate as a powerful antioxidant can be effective. A factorial experiment was conducted in a completely randomized design with three replications in order to study the effect of ascorbic acid and humic acid on essential oil amount and components in dragonhead under salinity stress. Experimental treatments included salinity at four levels (0, 50, 100 and 150 mM), humic acid and ascorbic acid in three levels (0, 100 and 200 mg/l). Plant essential oil was extracted using Clevenger apparatus and its components were separated and identified by using gas chromatography and gas chromatography connected to the mass spectrometer. By increasing salinity, the essential oil decreased strongly, and application of mitigations was improved this trait. So that it reached to the lowest level (0.2 percent) in 150 mM salinity stress, and 200 mg/l of humic acid application caused 51.61 percent increase in essential oil compared to the control. Geranial, Neral, Geraniol and Geranyl acetate were identified as the main composition at different levels of stress and extenuates. The highest essential oil constituents of dragonhead in control treatment (non-application of extenuating circumstances and without salt) contains Geranial, Neral, Geraniol, Geranyl cetate, Trans- 4,2- heptadienal, Linalool, Pulegone and Verbenol which included 99.5% of the essential oil components respectively by 36.65, 31.94, 15.56, 11.66, 1.25, 1.09, 0.95 and 0.4 percent. Large number combination was observed compared to control treatment and usage of other extenuates (100 and 200 mg/l ascorbic acid and 200 mg/l of humic acid) in different levels of salinity stress with 100 mg/l of humic acid treatment. Among these combinations can be noted to Alpha-pinene, Beta-pinene, Camphene, Camphor, Alpha-thujone, Nerol and Thymol.

Keywords: Salinity, Essential oils, Humic acid, Geranial, Neral