

## Effect of plant growth promoting rhizobacteria and arbuscular mycorrhizal fungi on growth characteristics and concentration of macronutrients in peppermint (*Mentha piperita* L.) under greenhouse conditions

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### Abstract

In order to investigate the effect of plant growth promoting rhizobacteria (PGPR) and arbuscular mycorrhizal fungi (AMF) on morphological traits and concentration of macronutrients (nitrogen, phosphorus, potassium, calcium and magnesium) on peppermint medicinal plant, a pot experiment was conducted as complete randomized design with three replications, under greenhouse conditions. Treatments consisted of three bacterial species as PGPR (*Azotobacter*, *Pseudomonas* and *Bacillus*) and three species of arbuscular mycorrhizal fungi (*Glomus fasciculatum*, *Glomus intraradices* and *Glomus mosseae*) and control (no inoculation of bacteria and fungi). Results showed that application of PGPR and AMF had significant effect ( $p < 0.05$ ) on morphological traits, root colonization and concentration of macronutrients as compared to the control treatment. The highest value for shoot height (79.42 cm), stem diameter (3.04 mm), number of leaves (654), total length of lateral branches (641.33 cm), fresh and dry weight of shoots (109.75 and 21.94 g/pot, respectively) and concentration of phosphorus, potassium and magnesium in shoots (4.9, 66.3 and 19.3 g/kg, respectively) were observed in *Pseudomonas*-inoculated treatment. The highest values for root dry weight and calcium concentration were achieved in *Glomus fasciculatum* treatment and nitrogen concentration in *Azotobacter*-inoculated treatment. Overall, it could be stated that application of PGPR and AMF had an effective role in improving the growth characteristics and nutrients concentration of peppermint medicinal plant.

**Keywords:** Inoculation, Growth characteristics, Macronutrients, Soil quality.

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