

## Biochemical changes in terpenoids, essential oil content and yield in peppermint (*Mentha piperita* L.) under bacterial and fungal treatments under greenhouse conditions

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### Abstract

This experiment was carried out to study the effect of plant growth promoting rhizobacteria (PGPR) and arbuscular mycorrhizal fungi (AMF) on essential oil content, yield and composition of shoots in peppermint (*Mentha piperita* L.), based on completely randomized design with three replications, in the Research Greenhouse of Faculty of Agriculture, Urmia University, in 2010. Inoculation with three species of PGPR (*Azotobacter*, *Bacillus* and *Pseudomonas*) and three species of AMF (*Glomus mosseae*, *Glomus intraradices* and *Glomus fasciculatum*) and control (no bacterial or mycorrhizal inoculation) were the experimental treatments. Results revealed that the highest essential oil content (2.77%) and yield (0.259 ml per pot) was obtained in *Glomus fasciculatum* and *Pseudomonas* treatment, respectively. Chemical analysis of the essential oil showed that in all the treatments, the main components of the oil were menthol, menthone, isomenthone, 1,8- cineole, pulegone and menthofuran. The highest values of menthol (42.27%), menthone (19.33%), isomenthone (16.77%), 1,8- cineole (10.16%), pulegone (7.34%) and menthofuran (6.61%) were obtained in control, *Glomus mosseae*, *Bacillus*, *Azotobacter*, *Glomus intraradices* and *Pseudomonas*, respectively. Comparison of terpenoids content indicated that the amount of oxygenate monoterpene increased with application of *Glomus mosseae*, *Glomus fasciculatum*, *Bacillus* and *Pseudomonas* and hydrocarbonate monoterpene with *Glomus fasciculatum*, *Glomus intraradices* and *Azotobacter*. Total amount of monoterpene and hydrocarbonate sesquiterpene increased in all the treatments. In general, the results showed that different bacterial and fungal treatments have different effects on chemical composition of the essential oil of peppermint. Therefore, to achieve the needs of different industries for specific chemical profile of peppermint essential oil, it can be suggested that this plant be inoculated with bacterial and fungal treatments to get the desired chemical components.

**Keywords:** Essential oil, PGPR, AMF, Terpenoids, Peppermint.

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