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The Effect of Alternative Organic Fertilizer and Chemical Fertilizer on Nitrogen and Yield of Peppermint (Mentha peperita)

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Abstract : One of the biggest challenges for the current and future generations is to produce sufficient food for the world population with the existing limited available water resources. Peppermint is a specialty crop used for food and medicinal purposes. Its main component is menthol. It is used predominantly for oral hygiene, pharmaceuticals, and foods. Although drought stress is considered as a negative factor in agriculture, being responsible for severe yield losses; medicinal plants grown under semi-arid conditions usually produce higher concentrations of active substances than same species grown under moderate climates. Nitrogen (N) fertilizer management is central to the profitability and sustainability of forage crop production. Sub-optimal N supply will result in poor yields, and excess N application can lead to nitrate leaching and environmental pollution. In order to determine the response of peppermint to drought stress and different fertilizer treatments, a field experiment with peppermint was conducted in a sandy loam soil at a site of the Tarbiat Modares University, Agriculture Faculty, Tehran, Iran. The experiment used a complete randomized block design, with six rates of fertilizer strategies (F1: control, F2: Urea, F3: 75% urea + 25% vermicompost, F4: 50% urea + 50% vermicompost, F5: 25% urea + 75% vermicompost and F6: vermicompost) and three irrigation regime (S1: 45%, S2: 60% and S3: 75% FC) with three replication. The traits such as nitrogen, chlorophyll, carotenoids, anthocyanin, flavonoid and fresh biomass were studied. The results showed that the treatments had a significant effect on the studied traits as drought stress reduced photosynthetic pigment concentration. Also, drought stress reduced fresh yield of peppermint. Non stress condition had the greater amount of chlorophyll and fresh yield more than other irrigation treatments. The highest concentration of chlorophyll and the fresh biomass was obtained in F2 fertilizing treatments. Sever water stress (S1) produced decreased photosynthetic pigment content fresh yield of peppermint. Supply of N could improve photosynthetic capacity by enhancing photosynthetic pigment content. Perhaps application of vermicompost significantly improved the organic carbon, available N, P and K content in soil over urea fertilization alone. To get sustainable production of peppermint, application of vermicompost along with N through synthetic fertilizer is recommended for light textured sandy loam soils.

Keywords : fresh yield, peppermint, synthetic nitrogen, vermicompost, water stress
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