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Influence of Fertiliser Treatment on Antioxidant Activities and Essential Oil Constituents of Peppermint under Drought Stress Condition

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Abstract

A two year field experiment was conducted to determine the effect of drought stress and foliar application of zinc and salicylic acid on physiological traits, essential oil percentage, yield and yield components of peppermint (*Mentha piperita* L). Drought stress (no stress, moderate drought stress, and severe drought stress), zinc foliar fertilisation (0, 2 and 4 g L⁻¹), and foliar application of salicylic acid (0 and 1 mM) were included in the treatment group. Drought stress reduced the chlorophyll content and oil percentage of peppermint, but moderate stress increased oil percentage. Application of zinc increased total phenolic and flavonoids content. Salicylic acid treatment increased chlorophyll content, superoxidase dismutase and catalase activities. The interaction between drought stress and zinc application showed that the highest SOD, CAT, and DPPH was achieved in drought stress, while zinc application reduced the activities of those traits. The interaction effect of drought stress with application of salicylic acid showed that the highest oil yield was observed in well watered plants with application of salicylic acid. However, total phenolic and flavonoids content increased with increasing stress levels. Application of zinc + salicylic acid resulted in higher oil percentage and oil yield compared with non-treated control. Menthol and menthone increased considerably in response to moderate drought, while severe drought reduced these two oil components. Moderate drought can increase the synthesis of oil compounds, while foliar application of zinc and salicylic acid can alleviate the impact of drought through an antioxidant mechanism that reduces the harmful effect of drought stress.

Keywords: Antioxidant activity, Drought, *Mentha piperita* L., Phenolic contents, Pigments