Drought Stress Modulates Polyphenols Accumulation in *Melissa officinalis* L.

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Melissa officinalis L., commonly known as lemon balm is a famous medicinal plant in the Lamiaceae family that grows in Africa, Europe and Western Asia [1]. It has now been confirmed that the most medicinal properties of this plant are due to the presence of polyphenolic compounds, the most important of which is rosmarinic acid (RA). Drought is a major abiotic stress which affects morphological, physiological and biochemical aspects of plant growth. Also, drought stress can affect metabolic pathways and subsequent production of valuable secondary metabolites like phenolic compounds The purpose of this study was to examine the effects of drought stress on growth and content of some nutritional/pharmaceutical phenolic compounds in lemon balm. Experiments were carried out using a randomized complete block design in three replications. Drought stress was applied to 130-day-old plants with four water regimes: 90% pot capacity (PC), control; 75% PC, mild stress; 50% PC, moderate stress and 25% PC, severe stress. Plants were harvested 20 days after drought treatment and fresh and dry weight of their shoots were measured. Extraction of phenolic compounds was performed by methanol (80%) in an ultrasonic bath. Total contents of phenols (TP), flavonoids (TF), anthocyanins (TAC) and phenolic acids (TPA) in the extracts were measured using a spectrophotometric method. Concentration of RA in the extracts was determined by HPLC method. Fresh and dry weights of shoot were decreased under moderate and severe drought stress (50% and 25% PC, respectively). The minimum values of shoot fresh weight (7.264 g/plant) and shoot dry weight (1.453 g/plant) were observed in 25% PC treatment. The levels of all examined phenolic compounds were increased under 75% and 50% PC treatments. The highest amount of TP (42.311 mg GAE/g Dw), TF (12.107 mg QE/g Dw), TAC (17.283 µM/g Fw) and TPA (0.04407 mg RAE/g Dw) as well as RA (4.493 mg RA/g Dw) were found in 75% PC treatment. In conclusion, enhancement of polyphenols in mild drought stress could improve the nutritional and pharmaceutical properties of *M. officinalis* with no negative impact on plant growth.

Keywords: Drought stress, Lemon balm, Polyphenols, Rosmarinic acid

References

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