



Changes in electrolyte leakage and lipid peroxidation in rosemary winter and summer cuts and concomitant antioxidants and oxidative enzymes, in response to soil type and irrigation water supply

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Abstract : The percentage of electrolyte leakage (EL) as a measure to cell membrane permeability and the concentration of malondialdehyde (MDA) as a product of lipid peroxidation damage of cell membranes by free radicals were determined in roots and shoots of rosemary (*Rosmarinus officinalis* L.) plants grown in sandy clay (SC) and sandy loam (SL) soils and irrigated once (I₁) or twice (I₂) per week, with each soil. The mentioned criteria were taken with two cuts at February and August (3, 9 months from transplanting, respectively). Higher values were recorded in leaves than in roots and at the second than the first cut. Planting in the SC soil combined with I₁ irrigation system induced higher EL and MDA values and H₂O₂ produced in leaves at the two cuts, as compared to the corresponding plants supplied with I₂ irrigation system at the 1st cut. Among the different treatments, a negative correlation was generally shown between the contents of total phenols (TPH), total flavonoides (TF), ascorbic acid (ASA) and consequently total antioxidant (TAC) capacity in addition to the antioxidant enzymes peroxidase (POX) and catalase (CAT) in leaves and soil moisture that was indirectly affected by the soil type (SC and SL). On the other hand, enhanced activities of the oxidative enzymes polyphenol oxidase (PPO), ascorbic acid oxidase (ASAO), and indoleacetic acid oxidase (IAAO) were recorded in leaves of the plants grown in the SC soil concomitant with I₁ and I₂ irrigation, at the two cuts, as compared to the plants grown in the SL soil. Thus, it might be assumed that rosemary plants as being affected by different soil types and irrigation levels, during the two cuts, could enhance their antioxidant metabolites and antioxidant enzyme activities in leaves in order to minimize EL and MDA rates in roots and leaves. Considering that soil water content within the different applied treatments was not stressful, our results might emphasize that the network of antioxidant system is also tuned to certain extents under variable favorable conditions with similar trends as those taking place under stress conditions.

Keywords: Rosemary (*Rosmarinus officinalis*), Soil type, Irrigation systems, Lipid peroxidation, Antioxidants, Oxidizing enzymes.