Effect of salinity and phosphorus on growth and chemical composition of two varieties of spinach

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Abstract

Soil salinity may cause nutrients imbalance in plants. Addition of some nutrients to saline soils may alleviate negative effects of salinity on plant growth and yield. In order to evaluate the effect of salinity and phosphorus on growth and chemical composition of two varieties of spinach (Khardar and Virofly Duch) a greenhouse experiment was carried out in a factorial arrangement 2×3×2 in a completely randomized design with three replications. Treatments consisted of three levels of salinity (0.6, 3.8 and 8 dS/m as NaCl) and two levels of phosphorus (40 and 80 mg per kg soil as mono-calcium phosphate). Results indicated that concentration and total uptake of sodium (Na), chloride (Cl) and magnesium (Mg) were higher in Khardar than in Virofly; however, concentration and total uptake of nitrogen (N), potassium (K), iron (Fe), manganese (Mn), zinc (Zn) and copper (Cu) were lower than in Virofly. Concentration and total uptake of calcium (Ca) and phosphorus (P) were similar in two varieties of spinach. Application of 80 mg P increased dry weight of Khardar but had no significant effect on dry weight of Virofly. Addition of P, significantly increased total uptake of N, P, Ca, Mg, Zn, Cu, Na and Cl in Khardar, and total uptake of P and Cu in Virofly. Phosphorus decreased uptake of N, Ca, Mg, Na and Cl in Virofly. Application of NaCl significantly increased fresh weight of both varieties of spinach and dry weight of Virofly. Salinity decreased uptake of N in Khardar but increased it in Virofly. In both spinach varieties, salinity decreased uptake of Ca and Mg, but increased uptake of Zn, Na and Cl. Both spinach varieties are considered relatively salt-tolerant plants, due to the fact that NaCl improved their growth.

Keywords: Total uptake, Yield, Macronutrients, Micronutrients, Sodium chloride.

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