

Reducing Chloride Toxicity in Avocado by Nitrate

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Abstract. The quantitative relationships between chloride and nitrate and their effect on two rootstocks of avocado: West Indian (relatively resistant to salinity) and Mexican (very sensitive to salinity) was studied. Seedlings were grown for 126 days in 10 liter containers filled with sand. The basal solution contained KH_2PO_4 (0.6 mmol), CaSO_4 (0.5 mmol), MgSO_4 (0.1 mmol), and the micronutrients were applied in an EDTA complex solution containing Fe (5.4 μmol), Mn (0.9 μmol), Zn (1.6 μmol), Cu (0.3 μmol), and Mo (0.15 μmol). The experimental treatments were: four concentrations of chloride (2, 4, 8, and 16 mmol); each level of chloride was combined with 2, 8, or 16 mmol of nitrate on top of the basal nutrient solution. The mineral composition of the various parts of the plants was analyzed at 57 and 126 days from the start of the treatments. An increase in the concentration of nitrate led to a decrease of chloride in all parts of the plant in both rootstocks. Plants treated with a concentration as high as 16 mmol chloride showed signs of severe damage at a concentration of 2 mmol nitrate, but no damage was observed in solution containing 16 mmol nitrate. The plants preferentially took up nitrate as opposed to chloride. When the chloride level in the solution was low and the nitrate concentration was high, chlorosis developed in the young leaves of the two rootstocks. An increase in the concentration of chloride prevented the development of chlorosis and led to increased transport of iron from the roots to the leaves. Increased fertilization with nitrate led to a decrease in the concentration of phosphorus in all plant parts in both rootstocks. The sodium was accumulated in the roots and in the lower part of the wood.

Potassium nitrate fertilization may be a practical and simple way to reduce salinity damages to avocado trees. There is need for further research on avocado nutrition under conditions of increased salinity.