Reliability of 1:1, 1:2 and 1:5 Weight Extracts for Expressing Salinity in Light-textured Soils of Saudi Arabia

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Abstract. Electrical conductivity (EC) and concentrations of Ca^{2+}, Mg^{2+}, Na^{+} and Cl^{-} were determined in saturation as well as in 1:1, 1:2 and 1:5 (soil:water) weight extracts of 122 Saudi soils. They were mainly of sandy loam and loamy sand classes of texture. Linear regression analysis showed that EC of the 1:1, 1:2 and 1:5 extracts correlated significantly well with that of saturation extracts (ECe) ($r^2 = 0.974$–0.896). It was possible to derive regression equations via which the ECe corresponding to each of the dilutions could be predicted.

Similar procedure was adopted and similar results were obtained for expressing concentrations of Ca^{2+} Mg^{2+}, Na^{+} and Cl^{-} in various soil extracts. However, whereas the effect on concentration of Na^{+} and particularly Cl^{-} were near to mere dilution (r^2=0.782–0.940), that of Ca^{2+} and Mg^{2+} showed wider deviations (r^2 =0.480–0.929) indicating that other physio-chemical processes had influence upon their concentrations as dilution was increased.

Introduction

Salinity is a major factor determining suitabilty of soils for crop production, particularly in arid and semiarid zones. The electrical conductivity of a saturated soil extract (ECe) was found to be a reliable index of soil salinity [1]. This method has wide international application because it takes into account the field water-holding capacity of the soil and can be related to plant response. For example, it was used by Mass and Hoffman [2] to express crop tolerance to salts. However, the procedure for determination of (ECe) is time consuming. The more dilute soil:water extracts appear to be more convenient for the purpose of screening large numbers of samples. In addition, ECe method is subject to some uncertainly in establishing the saturation end point. Furthermore, the quantity of a soil sample required for each salinity determination by the ECe method is greater than that required for more dilute extracts. This may restrict practicability of the former where the amount of the sample is limited.