

Effect of Drip Tape Irrigation with Saline Water on Some Chemical Properties of Soil

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Abstract

In order to study the effect of irrigation water salinity on some chemical parameters and distribution of salt in soil profiles under drip irrigation system (T-tape), a factorial experiment with Randomized Complete Block Design (RCBD) was carried out in the research farm of the department of irrigation and reclamation engineering, University of Tehran, Karaj, Iran, during June to October 2017. The treatments consisted of three maize hybrids SC 260, SC 400, and SC 704 (V_1 , V_2 and V_3) and three levels of irrigation water salinity of 0.7, 3, and 5 dS/m (S_1 , S_2 and S_3). To study the salinity profile in the soil during the plant growth period, EC_e , pH, Na^+ , K^+ and ($Ca^{2+}+Mg^{2+}$) cations were determined in 0-20, 20-40 and 40-60 cm soil layers and at a distance of 10 and 20 cm from irrigation lines. The result of variance and comparison of the mean measured properties at 0-20 and 20-40 cm soil layers, (EC_e and Na^+) showed that there was a significant difference between soil salinity (EC_e) and sodium (Na^+) under different levels of water salinity and depth of soil. The soil salinity and sodium content were directly correlated with irrigation water salinity and growth period of maize hybrids, and had an inverse relationship with soil depth. Indeed, the highest amount of soil salinity (13.4 dS/m) and soil sodium (95.6 meq/L) in the 0-20 cm layer was in V_3S_3 and the lowest (2.4 dS/m and 5 meq/L) was observed in the 20-40 cm layer of V_2S_1 . Also, regardless of salinity treatments, there was no significant difference between the three hybrids and the salt absorption potential was the same for all tree hybrids. In saline irrigation treatments (i.e. 3 and 5 dS/m), the wetting front moved less away from the irrigation line, and most salt accumulation was observed at a distance of 10 cm from irrigation line and soil surface due to plant consumption and evapotranspiration. According to the results of this study, in the conditions of using saline water for irrigation of crops using a drip irrigation system, at the end of the growing season or in the next winter, leaching is needed to remove salts in the soil surface layer from the root zone of the next crop.

Keywords: Leaching, Salt distributions profile, Soil-Water-Plant Relationships, Irrigation water salinity

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