Salt Accumulation, Water use Efficiency and Corn Yield in Different Micro and Furrow Irrigation Systems in an Arid Zone

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Abstract: A field experiment with four replications was conducted in an arid area to evaluate the effects of different micro and furrow irrigation systems on corn yield, water use efficiency and salt accumulation in the soil. Corn yields obtained were 8733, 3242, 4573 and 8212 kg ha^{-1} for subsurface irrigation, adjustable drip, tape drip and furrow irrigations respectively. While the amounts of water used were 7230, 7386, 7500 and 9590 m3ha-1 respectively. Analysis of variance showed that the effect of four irrigation methods on the corn yield was very significant at the 1% probability level while their effect on the 1000-seed weight of corn was significant at the 5% level. WUE in the subsurface irrigation was the highest 1.21 kg m-3. While in the adjustable drip, tape drip and furrow irrigations it was 0.44, 0.61 and 0.86 kg m-3 respectively. In the absence of salt leaching, accumulation of salts in the soil surface layer (0-25 cm) was more than the subsurface layer (25-50cm) in both micro-irrigation systems. The subsurface irrigation with porous pipes showed a better result in the yield and WUE.

Keywords: Salt accumulation, Micro irrigation, Subsurface irrigation, Furrow irrigation, Water use efficiency, Corn yield,.

Introduction

Selection of proper irrigation methods in arid and semi arid regions are very important. In these regions the available water, type of soils and crops, land topography, capital costs and farmer knowledge are the main parameters for selection of the proper irrigation methods. Micro-irrigation is spreading rapidly, and offering advantages including: high efficiency, low labor requirement, precise placement of water, high degree of control and adjustment of water particularly in the arid and semi arid regions (Camp, et al. 1989). The results of a 3-year