

Modeling of water transfert of subsurface drip irrigation under oases conditions

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Abstract: Due to its high efficiency potential, subsurface drip irrigation (SDI) system was recently introduced in Morocco. It aims to use the available water more efficiently especially in arid regions. As the use of SDI is relatively recent, the distribution of water around the emitters must be precisely known in order to increase the water use efficiency through reducing water losses due to evaporation. The appropriate design and management of SDI requires optimizing the available parameters for farmers, such as irrigation frequency, discharge rates, duration of water application and the depth of drip lines. The objective of this paper is to assess how the variation of the depth of SDI system surrounding date palm can affect the distribution of soil moisture. To reach this objective, a numerical model simulating water, heat, and/or solute movement in two-dimensional, variably-saturated porous media, was used to evaluate the distribution of water around the dripper line in a silty soil under oases conditions. The simulation results using an axi-symmetrical two-dimensional model were compared to observations of field experiments carried out in a farmer's plot in the Tafilalet oasis (Southeastern Morocco) involving SDI with emitters installed at different depths. The study showed the suitability of the model to well simulate infiltration processes around a dripper line during irrigation. The results have shown that the soil moisture is relatively more stable for subsurface drip irrigation buried at 35cm than those buried at 15 and 25cm with a slight difference except of water's contributions. There was an increase in volumetric soil water content for 35 than for 25 and 15.

Keywords: subsurface drip irrigation, oases, axisymmetrical flow, infiltration, Morocco.