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Soil water dynamics under drip irrigation : potential water losses through deep drainage

Due to water resources scarcity, reasonable water available management has become essential in arid and semi arid regions. Drip irrigation is increasingly used in irrigated agriculture because of its productivity and water savings. However, water may still be lost through deep percolation. In this work, HYDRUS software is used to simulate water movement coupled with heat transport in a sandy-textured soil column under four (04) low-pressure drip irrigation water treatments (two deficit 50%ETc, 75%ETc, one normal 100%ETc, and one surplus 150%ETc), in order to assess potential water losses through deep drainage over the 110-day cycle of an intermediate maize variety. The soil column is subject to atmospheric boundary conditions (minimum and maximum air temperatures, relative humidity, global radiation, sunshine duration, and wind speed) and variable flux (representing the drip emitter) at its surface, zero flux of water and heat on its lateral side and free drainage at its bottom boundary. The results show that the deficit treatments of water, in particular 50%ETc, although causing losses, make it possible to reduce water losses by drainage. For a sandy soil, with a daily irrigation frequency, applying water at 50%ETc and 75%ETc considerably reduces water loss through deep drainage.
Keywords: Drip irrigation, Water dynamics, Free drainage

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