

Numerical Evaluation on Subsurface water distribution from Ring Emitter Irrigation

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Water scarcity causes the utilization of arid land not maximal in supporting agricultural production in Indonesia. It requires an effort to use water as efficiently as possible to improve and maintain the stability of land productivity. One option to improve the water use efficiency is to use subsurface irrigation systems. Ring irrigation is one of subsurface irrigation techniques based on indigenous materials and skills, in which a ring-shaped emitter covered by textile is placed in the root zone. Investigating soil water dynamic in the root zone under such irrigation is essential in order to understand the combined effects of practices and management. The laboratory experiments were conducted to evaluate soil water content at different irrigation water pressure values (10 and 1 cmH₂O) in coarse sand and finer-texture silt. The experimental data were used to calibrate the HYDRUS 2D/3D. Simulation results were in good agreement with the observed data. This study demonstrated that HYDRUS 2D/3D is an effective tool to predict soil water dynamics under the ring emitter irrigation for coarse and fine soils, therefore HYDRUS 2D/3D can be further used to optimize emitter design and operation.