Simulation of furrow irrigation practices (SOFIP): a field scale modelling of water management and crop yield for furrow irrigation

Because of the spatial and temporal variability of the advance-infiltration process, furrow irrigation investigations should not be limited to a single furrow irrigation event when using a modelling approach. The paper deals with the development and application of SOFIP, a model used to analyse furrow irrigation practices that take into account spatial and temporal variability of the advance-infiltration process. SOFIP can be used to compare alternative furrow irrigation management strategies and find options that mitigate local deep percolation risks while insuring a crop yield level that is acceptable to the farmer. The model is comprised of 3 distinct modelling elements. The first element is RAIEOPT, a hydraulic model that predicts the advance-infiltration process. Infiltration prediction in RAIEOTPT depends on a soil moisture deficit parameter. PILOTE, a crop model, which is designed to simulate soil water balance and to predict yield values, updates the soil moisture parameter. This parameter is an input of a parameter generator (PG), the third model component, which in turn provides RAIEOPT with the data required to simulate irrigation at the scale of a N-furrow set. The study of sources of variability and their impact on irrigation advance, based on field observations, allowed us to build a robust PG. Model applications show that irrigation practices must account for inter-furrow advance variability when optimising furrow irrigation systems. The impact of advance variability on deep percolation and crop yield losses depends on both climatic conditions and irrigation practices.

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