HYDROLOGICAL, CROP MODELS , IMPROVED AGRICULTURAL, WATER MANAGEMENT

ABSTRACT

 Understanding the relationships among plant, soil, and water is important in agricultural water management practices. Simulation of the soil water balance is central to improving crop water productivity. Individual crop or hydrological models have shortcomings due to the simplification of the surface or subsurface processes. Coupling of crop and hydrological models helps in understanding the complex processes involved in crop production. This review highlights the application of coupled crop and hydrological models in simulation of crop response to water availability. The hydrological models considered are CHAIN-2D, HYDRUS-1D, HYDRUS 2D/3D, and MODFLOW. The crop growth models considered are the water-driven model (AquaCrop), solar-radiation driven model (EPIC), and the carbon-driven models (WOFOST and DSSAT). HYDRUS-2D is the successor to CHAIN-2D. MODFLOW is a popular model especially in simulating groundwater flow while HYDRUS is satisfactory in the simulation of water dynamics in the vadose zone. From the review, it can be deduced that HYDRUS-1D has been coupled with all the crop models considered except DSSAT. EPIC - CHAIN-2D and MODFLOW-DSSAT were the other applications. Further research needs to consider linking 2D soil water models with any of the crop growth models for a better representation of the soil water dynamics and therefore accurate simulation of the soil water balance.

AUTHORS
Kanda, Edwin K.; Mabhaudhi, Tafadzwanashe; Senzanje, Aidan