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Determination of Evapotranspiration and Optimum Irrigation Schedule For Cotton in Çukurova Region Using CROPWAT Model

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Abstract

The agriculture sector is actively looking for the most effective ways to manage water resources. Proper water management is crucial for increasing agricultural productivity and optimizing the region's water usage efficiency. The aim of this study was to estimate the irrigation water requirement, reference and crop evapotranspiration and irrigation schedule for cotton in Çukurova region over a 31-year period (1990-2020) using the CROPWAT model. To ensure appropriate water utilization and planning, information regarding the climate data was obtained from the Adana station of Turkish State Meteorology Service. The soil and crop data were sourced from Turkey's Ministry of Food, Agriculture, and Livestock. The CROPWAT 8.0 model was used to determine the irrigation dates, irrigation amount, effective rainfall, net irrigation requirement (NIR), and yield reduction for rainfed and various irrigated circumstances. The findings indicated that the average reference evapotranspiration (ET_o), crop evapotranspiration (ET_c) for cotton and effective rainfall were 804 mm, 731 mm, and 27 mm respectively. It was also estimated that the dates of irrigation after planting (DAP) were 72 days, 101 days, 131 days and 170 days. The total amount of irrigation water used during the growing period at critical depletion and user defined were 700 mm and 545 mm respectively, thus 155 mm of water was saved (22%). Data of maximum crop yield obtained at critical depletion by CROPWAT was associated with data from Turkish Statistical Institute (TUIK) (2014-2020) and TUIK data is compared with CROPWAT data which was estimated under rainfed condition. According to the result 51% of yield reduction was simulated when irrigation was not applied.

Key Words: CROPWAT, Evapotranspiration (ET_o), Net Irrigation (NIR), Effective rainfall, Crop yield

