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APPLICATION OF SWAP TO ASSESS PERFORMANCE OF SUBSURFACE DRAINAGE SYSTEM UNDER SEMI-ARID MONSOON CLIMATE

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ABSTRACT SWAP (Soil-Water-Atmosphere-Plant) was evaluated for its capability to predict groundwater table behaviour under drained condition with a semi-arid monsoon climate in Haryana (India). The performance of the model was tested using data for water table, drainage discharge rate and cumulative discharge. A close agreement was observed between the measured data and simulated value. SWAP simulated values ranged within absolute deviations of 0.17-0.18 m for water table, 0.87-1.07 mm day⁻¹ for discharge rate and 7.8-39.4 mm for cumulative drain discharge rate when compared to observed values. The calibrated and validated model was used to predict excess water stress utilizing SEW₃₀ index for different spacing under three rainfall situations. The results revealed that SEW₃₀ exceeding 100 cm day⁻¹ could be encountered with drains spaced at 75 m while it would remain within 50 cm day⁻¹ with drains spaced at 50 m during normal and/ or above normal rainfall years. No excess water stress problems occurred with drains spaced at 25 m or in years with below normal rainfall in any of the test spacing. Long-term simulations revealed that residual effect of one year do not affect the water table during the next year under drained condition.

Keywords: Subsurface drainage, Simulation, modeling, SWAP, Waterlogging, SEW₃₀.