

Simulation of rice yield under water and salinity stress in Rasht area using AquaCrop model

ABSTRACT

Guilan is a north province of Iran in which plays an important role in rice production. Since 78.8% of Guilan farmlands are under cultivation of rice, it is the second province ranking as rice producer in Iran. On the other hand, because of dam construction and neighborhood to the Caspian Sea, the volume of fresh water is declining, and is transformed to saline water. In this study, AquaCrop model version 4.0 with additional salinity module was used for calibration and validation in two successive years at Rasht rice Research Institute that is located nearby Rasht city. Five irrigation levels: full irrigation, alternate wetting and drying (AWD), irrigation at 100, 90 and 80% of field capacity (FC) and Four water salinity treatments: fresh water = S0 (EC = 1 dSm⁻¹) while S1, S2, and S3 are saline water with 2, 4, and 6 dSm⁻¹, respectively, were applied for evaluation of rice yield. Statistical analysis, including root mean square error normalized, coefficient of determination (R²), and paired t-tests showed that simulated and observed values are the same at 95% confidence level. Moreover, the FAO AquaCrop model predicted rice yield with more accuracy in less salinity values (EC = 2 dSm⁻¹ and less). Overall, AquaCrop model represented acceptability in simulation of rice yield under simultaneously water and salinity stress.

Keyword: AquaCrop model; Yield; Salinity; Irrigation