Performance of AquaCrop Model for Simulating Maize Growth and Yield Under Varying Sowing Dates in Shire Area, North Ethiopia

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Abstract : Adjusting the proper sowing date of a crop at a particular location with a changing climate is an essential management option to maximize crop yield. However, determining the optimum sowing date for rainfed maize production through field experimentation requires repeated trials for many years in different weather conditions and crop management. To avoid such long-term experimentation to determine the optimum sowing date, crop models such as AquaCrop are useful. Therefore, the overall objective of this study was to evaluate the performance of AquaCrop model in simulating maize productivity under varying sowing dates. A field experiment was conducted for two consecutive cropping seasons by deploying four maize seed sowing dates in a randomized complete block design with three replications. Input data required to run this model are stored as climate, crop, soil, and management files in the AquaCrop database and adjusted through the user interface. Observed data from separate field experiments was used to calibrate and validate the model. AquaCrop model was validated for its performance in simulating the green canopy and aboveground biomass of maize for the varying sowing dates based on the calibrated parameters. Results of the present study showed that there was a good agreement (an overall $R^2 =$, $Ef=$ $d=$ $RMSE =$) between measured and simulated values of the canopy cover and biomass yields. Considering the overall values of the statistical test indicators, the performance of the model to predict maize growth and biomass yield was successful, and so this is a valuable tool help for decision-making. Hence, this calibrated and validated model is suggested to use for determining optimum maize crop sowing date for similar climate and soil conditions to the study area, instead of conducting long-term experimentation.

Keywords : AquaCrop model, calibration, validation, simulation
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