Determination of optimum water requirement under drip irrigation by various water production functionsin *rabi*Maize (*Zea mays* L.) at southern peninsular region of India

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Abstract

The functional relationship between the crop yield and water use is needed to make decisions on resource development and effective management of the available resources.Crop water production functions describe the relationship of crop yield response to varying levels of water input and can be useful for various water management applications. Water input can be either on a seasonal basis or on critical growth period basis and the corresponding functions are named seasonal or dated water production functions.In the present study, *rabi*maize was grown with five drip irrigation levels and a control (surface furrow irrigation) in four replications under sandy clay loam soil at WALAMTARI R& D Farm, Hyderabad, India during *rabi* 2012-13 and 2013-14 andseven water production functions *viz.*, linear, quadratic, cubic, power, Stewart's S_1, Stewart's S_2 and Singh *et al*. were tested to find out the optimum water requirement.Among all the models tested, the seasonal crop water production functions as expressed by quadratic or second order polynomial function performed well for both the grain and total dry matter yield as evident from the significant regression coefficients, coefficient of determination (R^2) and F-value in both the years and on poled basis.The explained total variation in crop yield as indicated by values of the coefficient of determination (R^2) varied from 0.968 to 0.998 in 2012-13, 2013-14 and on pooled basis for grain yield and from 0.925 to 0.980 in 2012-13, 2013-14 and on pooled basis for total dry matter yield.The predicted maximum grain yield was 8565 kg ha^{-1} in the year 2012-13 with crop ET of 388.11 mm, 8092 kg ha^{-1} in the year 2013-14 with crop ET of 317.09 mm and 8303 kg ha^{-1} on pooled basis with crop ET of 352.35 mm, respectively beyond which with further increase in ET level decreased the yield.

Key Words: Maize, Drip irrigation, Water production functions, Optimum yield and water requirement