SIMULATING WATER USE OF IRRIGATED CORN ON THE TEXAS HIGH PLAINS

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Background

Crop simulation models rely on the calculation of potential evaporation of water (PET) to predict the crop water balance. Several PET equations have been developed, but which equation works best within the framework of a crop model is unknown. We compared the measured yield and seasonal crop water use (e.g., from planting to harvest) of irrigated corn (Zea mays L.) grown in large weighing lysimeters (4 x 4 x 2 m) at Bushland, TX over 3-years (1989, 1990, and 1994) to the yields and seasonal crop water use predicted with the Environmental Policy Integrated Climate model (EPIC) using the Penman, Penman-Monteith, Priestly Taylor, and Hargreaves PET equations.

ET Method

ET Method	
Penman Monteith	P-M
Penman	P
Priestly-Taylor	P-T
Hargreaves	H

Exp. Year	Planting Date	Harvest Date	Heat Units to Maturity
'89	Apr 26 (116)	Oct 26 (299)	1938
'90	May 9 (129)	Oct 17 (290)	1938
'94 NE	Apr 14 (104)	Sep 14 (257)	1938
'94 SE	Apr 14 (104)	Sep 28 (271)	1938

Findings

The measured yield and crop water use were 9.7 Mg and 785 mm with a SE of 0.9 Mg and 53 mm, respectively. Simulated yield and seasonal crop water use with the EPIC model and the four PET equations did not statistically differ from the measured values. These findings indicate that the choice of the PET equation in crop simulation models may not be critically important in crop simulation.
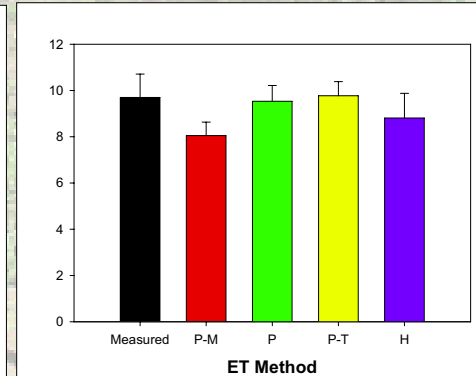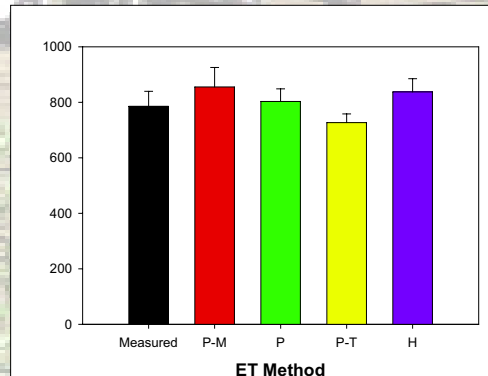
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