PREDICTING IRRIGATION WATER USE IN GEORGIA WITH CROP GROWTH SIMULATION MODELS AND REGRESSION ANALYSIS: A COMPARATIVE ANALYSIS

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AFFILIATION: UGA
REFERENCE: *Proceedings of the 2017 Georgia Water Resources Conference*, held April 19-20, 2007, at the University of Georgia

Regression analysis is the predominate method used by economists to estimate the effects of weather, agronomic and economic variables on water withdrawals for crop irrigation. Weather variables typically include measures of precipitation and a proxy for temperature, e.g., growing degree days. Precipitation is often included either at the seasonal or monthly scale. In contrast, crop growth simulation models can investigate the effects of daily precipitation and weather events. Using the data set compiled for the Georgia Agricultural Water Pumping study, we estimate three regression models of total irrigated water applied for three crops: corn, cotton, and peanuts. The models differ based on the time scale of the precipitation variable (bi-weekly, monthly, seasonal). We then use DSSAT to simulate irrigation applications under a series of irrigation management strategies based on soil moisture conditions. Finally, we compare the out-of-sample prediction errors across the regression models and the DSSAT models. Our results show that the DSSAT models based on daily soil moisture conditions are better predictors of total irrigated water use than any of the regression models we estimated.

Program reference: 3.1.3