



USDA-CSREES 2007 National Water Quality Conference

Influence of Risk Aversion on Optimal Irrigation Management Strategies

Water resources in Georgia are under increasing pressure from human activity. As in many regions of the United States, irrigation constitutes the largest consumptive use in Georgia, highlighting the value of efficient management of irrigation water. This study uses a bio-economic engineering simulation model to assess irrigation choices for peanut production in two sites (Mitchell, Georgia and Gainesville, Florida) under stochastic weather conditions. The agronomic crop growth model, Decision Support System for Agro-Technology Transfer (DSSAT) model is used to simulate long-term (20 years) peanuts yields and irrigation applications under different irrigation thresholds, in addition to rainfed production. Outputs from the plant simulation model are incorporated into an economic model for the determination of optimal irrigation scheduling under two systems of historical product prices: quota and additional peanut prices. Two mean-variance utility functions are employed to examine solutions across a range of risk aversion coefficients – one represents constant relative risk aversion (CRRA), the other represents the conventional constant absolute risk aversion (CARA) model. Preliminary results suggest the optimal irrigation strategy for risk neutral farmers is 50% and 40% soil moisture for quota peanut price and additional peanut price, respectively. (Final results will be compiled prior to the conference.) Under both the CRRA and the CARA models, as risk aversion increases the optimal strategy is to reduce irrigation water use. With the CRRA model the divergence from the risk neutral strategy occurs at a lower level of risk aversion for quota peanut prices than for additional peanut prices. The converse occurs for CARA model. There is, however, a substantial range of risk aversion over which the optimal strategy in both models is the same for both price levels. This result suggests that recent changes in peanut price support policy will likely have a limited impact on the amount of water used to produce peanuts in this region.

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