COTTON YIELD AND WATER USE REPONSE TO VARIABLE IRRIGATION RATE AND TIMING

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Abstract

Irrigated agriculture remains a primary user of fresh water both nationally and globally. Concerns about water scarcity, arising due to aridity, drought, desertification, and water shortage, have driven efforts to improve approaches for managing agricultural irrigation water. The objective of this study was to measure cotton yield and water use responses to variable irrigation rate and timing in Maricopa, Arizona. Four irrigation rates were used, including 60%, 80%, 100%, and 120% of recommended amounts from simulations of a cotton growth model. The rates were administered differentially during two time periods: 1) squaring to peak bloom and 2) peak bloom to 90% open boll. The experimental design incorporated 16 rate and timing treatments in a randomized complete block design with four replications. Irrigation rates were administered via an overhead lateral move irrigation system with commercial variable-rate irrigation equipment. The soil moisture profile in each experimental plot was measured weekly using neutron scattering probes to a depth of 200 cm in 20-cm increments. Seed cotton yield was measured from two cotton rows in three 10-m swaths per treatment plot. The study was designed to characterized yield and water use relationships for cotton in an arid environment.