

EVALUATION OF COTTON2K FOR ARIZONA CONDITIONS**K. R. Thorp****USDA-ARS Arid-Land Agricultural Research Center****Maricopa, AZ****E. M. Barnes****Cotton Incorporated****Cary, NC****B. A. Kimball****D. J. Hunsaker****USDA-ARS Arid-Land Agricultural Research Center****Maricopa, AZ****Abstract**

Cotton2K is a crop growth simulation model that descended from the GOSSYM and CALGOS cotton models. It is a highly comprehensive simulation model of cotton physiology with detailed simulations of soil water and nutrient balances. After thorough evaluation, Cotton2K can be useful for a variety of applications requiring integrated assessment of cotton production systems, including water and nutrient management decisions, breeding selection, policy decisions, and lifecycle analysis. The objective of this study was to evaluate Cotton2K using detailed cotton physiological data collected during the free-air carbon dioxide enrichment (FACE) studies conducted at Maricopa, Arizona in 1990 and 1991. Well-watered and water-limited treatments were imposed via drip irrigation, and carbon dioxide was maintained at ambient (370 ppm) and elevated (550 ppm) levels using free-air carbon dioxide enrichment stations. The measured data set included weekly counts of nodes, fruiting sites, squares, flowers, abscised sites, green bolls, and mature bolls. Dry weights of stems, leaves, and reproductive structures were also measured weekly. Soil water content was measured regularly using neutron moisture meters and used to estimate evapotranspiration. Preliminary results indicated that Cotton2K underestimated crop water uptake and transpiration in Arizona. Efforts focused on updating the evapotranspiration routines of the model, including 1) permitting input of hourly weather data and 2) incorporating the ASCE Standardized Reference Evapotranspiration algorithm with dual crop coefficient procedures as an option for crop water use calculations. Thorough comparisons of Cotton2K simulation results with measured data will follow these model improvement efforts.