

**NEAR-CONTINUOUS SEASONAL CANOPY TEMPERATURE AS A PROXY FOR WATER USE IN
FIELD GROWN COTTON****James R. Mahan****USDA-ARS****Lubbock, TX****Andrew Young****Plant and Soil Science****Lubbock, TX****Paxton Payton****USDA/ARS****Lubbock, TX****Abstract**

Cotton, as an indeterminate crop, responds to variation in irrigation water supply in a relatively complex manner. Both the amount of water and the pattern of its application over the season influence the growth and development of the crop with potentially important interactions between yield and quality. The determination of water use by cotton is potentially complex in terms of both spatial and temporal variability. Inference of crop water use based on measurements of soil moisture is common. Measurements of canopy temperature provide insight into crop water use. Canopy temperature measurements provide a direct measurement of the plant that is related to its water use. In this study, canopy temperature of cotton was collected on a 15-minute interval over a 60-day period. Canopy temperature was measured in cotton grown under a variety of irrigation regimes during 2009 and 2010 at Lubbock TX. A total of 11 irrigation regimes were established in each year. The relationship between yield and water on the crop for each year was linear with similar slopes but different intercepts for each year. The utility of continuous canopy temperature as an indicator of crop water use on a seasonal timescale was investigated in terms of three canopy temperature-based indicators: mean Canopy Temperature, cumulative Leaf-to-Air Vapor Pressure Deficit, and cumulative Canopy Temperature. All three indicators accounted for variation at least as well as water provided to the crop. Limiting the analysis to daytime canopy temperatures improved the relationships between canopy temperature and yield. These results suggest that canopy temperature, collected near-continuously over seasonal timescales, may provide a useful indicator of crop water use.