PLANT-BASED IRRIGATION SCHEDULING

J.L. Snider
University of Georgia
Tifton, GA
D.R. Chastain
University of Georgia
Athens, GA

Abstract

Despite experiencing high cumulative rainfall during the growing season and low evaporative demand in the southeastern United States, variability in the amount and timing of rainfall can lead to substantial yield losses under dryland conditions. The decision to irrigate can be complicated by variability in soil moisture, atmospheric demand, stage of plant development, rooting depth, etc. Because the cotton plant integrates its total environment, direct and indirect measures of plant water status should provide a valuable tool for scheduling irrigation according to crop need. Direct measures of plant water status that could be utilized for irrigation scheduling in cotton include maximum and minimum leaf water potential. Maximum leaf water potential (predawn water potential) has the advantage of being measured at a time of relative environmental stability. Indirect measures of crop water status (plant growth, canopy temperature, turgor pressure, etc.) have the potential for complete automation, but data from a well-watered reference crop is often essential to the interpretation of indirect measures of water status. Importantly, data on plant-based scheduling in the humid southeastern U.S. is scant to non-existent. To address this, irrigation was scheduled with predefined predawn water potential triggers, and canopy temperature, plant growth, and yield were characterized for field-grown cotton in southern Georgia during the 2013 growing season. Our findings indicate that plant-based methods can be used to obtain maximum yields while increasing water use efficiency.