DEFICIT IRRIGATION OF COTTON ON HIGH WATER HOLDING CAPACITY SOILS IN TENNESSEE B.G. Leib University of Tennessee Knoxville, TN C.O. Gwathmey University of Tennessee Jackson, TN C.L. Main Phytogen

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<u>Abstract</u>

The goal of this research was to determine the level of deficit irrigation that produced the highest cotton yield and quality. In 2006 thru 2009, drip tape was used to create nine deficit irrigation treatments compared to a rainfed control in a RCB Design. Irrigation was initiated at square, bloom, and post-bloom by opening manual valves on the drip lines while irrigation levels were created by different drip tapes that supplied 1.5, 1.0, and 0.5 inches per week. Irrigation amounts were reduced if rainfall supplied the required water. Delta Pine 143 and Phytogen 375 were used on a Memphis soil (high water holding capacity) at the West Tennessee Research and Education Center, Jackson, TN.

During the growing season, soil water tension, nodes above white flower and cracked bowl were monitored. At harvest, seed cotton was weighed, fiber samples were collected, plant height was measured, and bowl location was mapped. After harvest, gin out was determined and cotton samples were classed.

Deficit irrigation was the best means to irrigate cotton in a high water holding – silt loam soil. Irrigating early at a high rate caused irrigated yield reduction while requiring the highest amount of irrigation. The optimum timing and amount of deficit irrigation was dependent on the yearly rainfall patterns but the greatest response to irrigation was observed when irrigating two weeks post bloom. This approach to cotton irrigation needs to be tested in lower water holding capacity soils where the need to water earlier and at high rates may not match the optimum deficit irrigation strategy for high water holding capacity soils.