Comparison and Interpretation of COTMAN™ Growth Curves Under Varying Irrigation Regimes in the Texas High Plains (Field 5F span 5-8 and Field 6A-F)

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Objective: To investigate irrigation management effects on crop development and to better understand the impact of irrigation management factors upon actual growth curves in the Texas High Plains versus the COTMAN™ Target Development Curve.

Methodology: The COTMAN™ crop information software system, developed at the University of Arkansas with support from Cotton Incorporated, has shown promise as a crop management tool for the Texas High Plains. However previous and current COTMAN™ projects in the region indicate that actual growth curves from some fields may deviate considerably from the COTMAN™ standard Target Development Curve. Studies were conducted at the Texas Agricultural Experiment Station Helms Farm near Halfway (Pullman clay loam) in Hale County, and at the AgCARES research farm located near Lamesa (Amarillo fine sandy loam), in Dawson County in 2004.

Fig. 1. Plant mapping for input into COTMAN, Helms Research Farm, June

Roundup Ready picker type cotton cultivars (FiberMax 989RR and 989BR) were used in this test, and soil fertility and other inputs were managed according to recommended agronomic practices. Beginning at first square, COTMAN™ observations were made in each trial at both locations on a weekly basis. Corresponding COTMAN™ software applications were used to generate and interpret growth curves. Low energy precision application (LEPA) irrigation method was used at both Halfway and Lamesa locations. Subsurface drip irrigation (SDI) was included at the Helms Farm location. Varying levels of irrigation, ranging from 60% to 120% times a target baseline evapotranspiration (ET) replacement rate, were used within each test to represent varying (and frequently limiting) levels of irrigation capacity available for commercial farms in the region.

Weekly square mapping and SQUAREMAN applications were conducted June 17 - July 8, 2004; weekly nodes above white flower counts and BOLLMAN applications were conducted July 8-August 12, 2004. COTMAN™ field reports indicated that in all treatments, the actual crop development curve peaked below the Target Development Curve. Mean cutout date was 77 days after planting (as compared to 80 DAP for the Target Development Curve.) Only one treatment (LEPA 120% base irrigation rate treatment at Helms Farm) reached cutout after 80 days. Additional analysis of environmental conditions and management factors is ongoing.