TEMPERATURE RELATIONSHIPS OF COTTON YIELD Toby R. FitzSimons Derrick M. Oosterhuis University of Arkansas Favetteville, AR

<u>Abstract</u>

Cotton (Gossypium hirsutum) yields have been shown to be adversely effected by high temperatures, but establishing when a crop may be most affected is lacking. Research has demonstrated the optimum temperature for cotton at between 68°F and 86°F during the day and below 75°F at night. The objectives of this study were to use available long-term yield and weather data to determine periods when cotton yield would be most affected by high temperatures, examine differences between irrigated and non-irrigated cotton, and also identify differences between modern Bt (post-2000) and older conventional (pre-2000) cultivars. The sensitivity of specific growth periods was determined using weather and county yield survey data. Temperature data was collected for Lee County, Arkansas, USA from 1985 to 2010. Cotton yield data was acquired from the National Agricultural Statistics Service (NASS) for both irrigated and non-irrigated fields. There was no significant effect of high temperatures upon cotton vield found for conventional cultivars in both irrigated and non-irrigated fields. Modern irrigated Bt cultivars showed significance for decreased yields during periods of higher night temperatures at the pinhead stage (P = 0.025) and for the week prior to full flower, greater than 11 blooms per 25 feet of row (P=0.0016). Non-irrigated Bt cotton was significantly affected by higher night temperatures the week prior to first flower (P=0.0011) and by high day temperatures the week during (P=0.0168) and after first flower (P=0.0394). Cotton fields demonstrated an increased potential for yield loss during warmer July day and night temperatures when flowering occurs due to the sensitivity of the flowering stage, and least effected during August temperatures after flowering has occurred and boll filling occurs.