

**COTTON LINT YIELD AND FIBER QUALITY  
AS A FUNCTION OF IRRIGATION LEVEL  
AND TERMINATION DATES  
IN THE TEXAS HIGH PLAINS: 1996 — 1998**

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**Abstract**

Irrigation management for cotton production in the Texas High Plains has to consider the amount and frequency of rain, and the amount of water available for irrigation. In many cases, irrigation wells have a low pumping capacity resulting in deficit irrigation, i.e., the water applied is less than the water requirements of the crop. Cotton, a perennial and indeterminate plant, in the short growing season that characterizes the Texas High Plains is sensitive to late season irrigations that often increase vegetative growth but do not increase lint yield. Our objective was to determine the effect of three irrigation levels (0.1, 0.2 and 0.3 inches/day) on alternate (AFI) and every furrow irrigation (EFI) and three termination dates on lint yield and fiber quality. The termination dates were based on cumulative heat units (HU, base temperature 60 °F) from emergence and we selected 1600, 1800 and 2000 heat units.

Field experiments were conducted in Lubbock, TX on a 4-acre field at the Texas A&M Univ. Res. and Ext. Center using Paymaster HS-26 planted on 40-inch bedded rows from 1996 to 1998. All treatments were replicated 4 times and irrigation was applied on a 3-day frequency matching daily rain and evapotranspiration. Annual rain in 1996 was 14.9 inches, 19.8 inches in 1997 and 10.5 inches in 1998. The spring of 1997 was wet with ~ 5 inches of rain in April delaying planting. Both 1996 and 1998 were extremely hot and dry, except August 1996 with an excess of 6 inches of rain. Conversely, the cumulative heat units from emergence to first freeze were 2522 in 1996, 2090 in 1997 and 2845 in 1998. Both 1996 and 1998 had similar patterns of cumulative HU's during the May — August period; however, September — October, 1998 was much warmer than in 1996. During 1997 the period, May — July, had 20% less HU's compared to 1996 and 1998 and was above average during August — October. Termination dates for the 1600 HU were 26 July 1996, 2 September 1997 and 29 July 1998; for the 1800 HU were 5 August 1996, 15 September 1997 and 9 August 1998; and for the 2000 HU were 16 August 1996, 4 October 1997 and 21 August 1998.

Our results indicated that AFI versus EFI only affected lint yield in 1998 when the EFI reduced lint yield by 8%. Irrigation level, in each of the three years, reduced lint yield at the low (0.1 inch/day) level and there was no difference in lint yield for the medium and high levels. There were no differences in lint yield when irrigation was terminated at the 1800 and 2000 HU level and the 1600 HU level reduced lint yield significantly by 10% each of the three years. Alternate versus EFI, as expected, had no effect on fiber quality. Micronaire increased with termination date. As irrigation level increases micronaire decreases and fiber length increases. In hot and dry years fiber length is reduced by early termination and fiber length decreases after the 1800 HU termination date. Our results clearly indicate the interaction between weather, irrigation level and irrigation termination date and their effect on lint yield and fiber quality. The proper water management has to consider the rain, availability of irrigation water and the development of the cotton crop.