

**WATER INPUT AND FIBER PROPERTY VARIABILITY  
FROM A FLOWERING DATE AND BOLL  
LOCATION PERSPECTIVE**

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**Abstract**

High water input accompanied by moderate temperatures during the boll development period has been implicated in the production of cotton with long fibers and low micronaire values. This suggests that early season bolls would manifest longer fibers and lower micronaire values than later season bolls. The historical rainfall pattern (1993-1999) in the Coastal Bend (TX) has been characterized by less than 20 mm of rain in July (1999 was the exception with 92 mm). The objectives of this study were to compare fiber properties in first position bolls under rainfed and irrigated conditions, to compare fiber properties in first position bolls in early, normal and late planted cotton and to correlate water and heat unit inputs pre and post anthesis to fiber property values. Cotton (*Gossypium hirsutum* L.) DPL 50 was planted in March (1993-1995) and DPL 5409 was planted in March (1996). A drip irrigation system was used (1993-1996). Planting dates in 1997 and 1999 for DPL 5409 were early March, mid March and early April. Plants were grown in fields at the Texas A&M University Agricultural Research and Extension Center. First position flowers were tagged beginning the second week of flowering. Fiber properties were analyzed using the Advanced Fiber Information System (AFIS) after boll opening.

Under rainfed conditions when fiber from DPL 50 bolls tagged the second week of flowering was compared to fiber from bolls tagged the fourth week of flowering, fiber length decreased (1994,1995) while theta and micronafis (micronaire) did not change (1993,1994). Under irrigated conditions when fiber from DPL 50 bolls tagged the second week of flowering was compared to fiber from bolls tagged the fourth week of flowering, theta and micronafis values increased (1993, 1994) while fiber length fluctuated. If the percentage of bolls at high micronaire locations increased with irrigation then it could be expected that irrigation would increase both yield and bulk micronaire values. A comparison of fiber from rainfed and irrigated cotton tagged on the same day and having the same pre and post anthesis heat unit accumulations revealed no differences in fiber length, theta or micronafis values for bolls tagged the second week of flowering (1993-1995). Micronafis values were the same for fiber from rainfed and irrigated cotton tagged during the fourth week of flowering (1993-1995). By the fifth week of flowering more bolls were set under irrigated conditions than dryland conditions. Micronafis values for fiber from fifth week of flowering were greater than values for fiber from the fourth week of flowering in both rainfed and irrigated cotton, but no differences were found when rainfed cotton was compared to irrigated cotton (1994, 1995).

In 1997 bolls from different node locations in normal and late planted cotton were tagged on the same day. The lower the node location the longer the fiber and the higher the micronafis value. In the atypical year 1999 when normal to late planted cotton was compared, the lower the node location the longer the fiber but no differences in micronafis values were related to node location. When bolls tagged at similar node locations in early planted cotton in 1997 and 1999 were compared fiber lengths differed

but no differences were found between theta and micronafis values. A comparison of bolls tagged at similar node locations in late planted cotton in 1997 and 1999 revealed only differences in fiber length. In 1997 rainfall amounts during the boll development period of June and July were 45 mm while in the same period in 1999 rainfall was 154 mm. Heat units (DD 15.5C) from 35 days pre anthesis to 35 days post anthesis were 737 for the early planting date in 1997 and 741 in 1999. Heat units from 35 days pre anthesis to 35 days post anthesis were 822 for the late planting date in 1997 and 828 in 1999.

Significant negative correlations were found for early season bolls (1993-1997, 1999) between theta, micronafis, water input 35 days pre anthesis to anthesis and water input from anthesis to 10 days post anthesis. Significant correlations were found between theta, micronafis, heat units from 14 days pre anthesis to 20 days post anthesis and from anthesis to 10 days post anthesis.

In both the irrigation and planting date studies, the impact of heat unit accumulation overshadowed the impact of water input on fiber micronafis values. Water input may determine the number of bolls at specific boll locations and the ability of the plant to supply photosynthate while heat unit accumulation may determine the rate and duration of secondary wall deposition.