

COTYLEDONS IN COTTON: WHO NEEDS 'EM?**Laval M. Verhalen****Melanie B. Bayles****Bruce E. Greenhagen****Oklahoma State University****Stillwater, OK****Introduction**

Upland cotton (*Gossypium hirsutum* L.) has two cotyledons. How necessary are they for crop performance? Many plant species function quite well with only one (Porter, 1967). In cotton, biotic (e.g., insects, diseases) and abiotic (e.g., blowing sand, hail) factors can cause up to 100% damage to those leaves. To date, cotton studies found in the literature most similar to this one were conducted by Kerby and Keeley (1987) studying plant height, main stem node number, leaf area, leaf dry weight, and total aboveground plant dry weight and by Longer and Oosterhuis (1999) studying root and shoot growth, plant height, leaf area, and boll number. The purpose of these experiments was to determine what effect partial or complete loss of cotyledons in upland cotton has on lint yield, selected yield components, and fiber traits.

Materials and Methods

Irrigated experiments (randomized complete block designs, four replications) were conducted in 2000 through 2003 in the field near Perkins, OK, on a Teller loam soil (a fine-loamy, mixed, active, thermic Udic Argiustoll) planted to 'PM 330'. Plots consisted of three rows 11.0 m long with rows spaced 1.0 m apart. Plants within rows were hand thinned from 7 to 10 cm apart. At the end of the season, the center row in each plot was sampled for the estimation of selected yield components and fiber traits and harvested for the determination of lint yield.

Shortly after emergence in 2000 at the VC growth stage (Elsner et al., 1979), cotyledons were partially or completely removed with scissors. Treatments included 0, 25, 50, (a different) 50, 75, and 100% cotyledon (C) removal. The 2001 experiment was clipped slightly later than in the previous year (i.e., when the first true-leaf was about the size of a dime). Based on our observations of the "-2C" treatment in that year, a "-2C (later)" treatment was added to the experiments in 2002 and 2003. Its application was delayed until the first true-leaf was the size of a dime.

Results and Discussion

The 2001 experiment (where C-removal was slightly delayed) showed no significant differences among treatments for any trait. In the other experiments (except for fiber strength in 2002), C-removal of 50% or less had no effect on any of the traits studied. Removal of 75% caused a 32 to 33% lint yield loss in 2 of 3 yr; and 100% removal caused an 81 to 100% yield loss in all 3 yr. Complete removal of the cotyledons caused losses in 2 of 3 yr for picked lint percentage, pulled lint percentage, boll size, and micronaire and in 1 of 3 yr for fiber strength and elongation. Fiber length and length uniformity ratio were not influenced by cotyledon removal. Apparently, cotyledon losses greater than 50% up to and including 75% trigger reductions in lint yield; and losses greater than 75% do likewise for a number of other traits. One cotyledon (or its equivalent) was sufficient to prevent losses for all characters studied, except fiber strength in 1 yr. More than one cotyledon can be viewed as a form of insurance.

References

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