

Causes of Square Shed - 1980

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Observations similar to those taken in 1978 and 1979 were taken at the Cotton Research Center in 1980. Insect populations were monitored and squares examined to determine causes of square shed.

Four categories were again observed which led to square shed: 1) Plant bug feeding, 2) Thrips feeding leading to soft rot, 3) Worm damage and 4) Physiological stress. The proportions of shedding due to these causes from 5/26 to 7/30 are shown in Table 1.

Shedding of squares was greater than in 1979, but was not a factor influencing yield. The shedding that did occur prior to 7/14 primarily due to plant bug feeding. Thereafter physiological stress became more prominent. These observations are very similar to those made in 1978 and 1979, with the exception that fewer squares were observed with soft rot symptoms in 1979 than in 1978 and 1980.

Table 1. Shedding of squares in 1980 caused by plant bugs, Thrips, worms or physiological stresses.

Date	Fraction of available positions shed	Bugs	Thrips	Worms	Physiology
5/26	16	80	30	-	-
6/9	20	65	29	-	6
6/16	15	80	15	-	5
6/30	18	57	17	27	6
7/7	20	50	14	10	26
7/14	30	43	6	47	3
7/21	47	28	-	8	64
7/28	60	60	4	8	28

Response of Cotton to Boll Removal

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The loss of developing bolls is a major problem in cotton and can result in reduced yields. Field plots were established to determine the effect of selective boll removal on yield of short staple cotton in Tucson, Arizona. Once active flowering began, all bolls and flowers were removed from fruiting branches to leave only the bolls at the first node, second node or both positions. All other fruiting nodes were picked free to eliminate their influence. Each treatment was replicated six times in 30 foot, four row plots. The center two rows were mechanically harvested for yield.

Seed cotton yields of the harvested plots are shown in Table 1. The presence of only bolls at the second node significantly reduced seed cotton yield. While the yield of only first position bolls was not significantly different than first and second position bolls; seed cotton yields were approximately 400 pounds per acre higher.

These data indicate that the first position boll is the most important sink for photosynthates and while the presence of additional bolls does not significantly reduce yields, they do serve to dilute the available photosynthetic material.

Table 1. The effect of selective boll removal on yield of short staple cotton. Tucson, 1980.

Treatment	Seed Cotton Yield	
	lb/plot	lb/acre
First position boll present	9.1 a*	2384 a
First and second position bolls present	7.6 a	1991 a
Second position boll present	5.1 b	1336 b

* Means followed by the same letter are not significantly different at the 5% level.

Changes in ABA Content and Abscission Rate of Bolls with Water Deficit

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Summary

The concentration of the hormone abscisic acid (ABA) and abscission of bolls both increased with water deficit and decreased when stress was relieved by irrigation. The correlations provide circumstantial evidence that ABA is one plant hormone that regulates boll shedding during drought.

Boll shedding is strongly affected by drought, and tends to increase during the season as boll load increases. Abscisic acid (ABA) is one of two plant hormones that is thought to stimulate boll abscission (shedding). (Ethylene is the other.) Several workers have shown that rapid drying causes a rapid increase in the ABA content of leaves. However, no one has investigated the effects of drought on the ABA content of bolls. We conducted a test during the summer to determine the possible effects of water deficit on ABA content of young bolls, and to correlate ABA content and shedding rate of bolls.

Blooms were tagged during the season for boll shedding determinations and so that bolls of known age could be harvested for ABA analysis. The effects of water deficit were estimated by comparing different irrigation treatments and by following changes in ABA content and boll shedding during irrigation cycles.

ABA content and boll abscission rates were both higher in stressed than in non-stressed plots, and both increased as stress developed during the interval between irrigations (Table 1). Even though one column in Table 1 is labelled "non-stressed," it did become stressed before irrigation on 15 July. Its leaf water potential decreased to -28.6 bars on 14 July compared to -29.7 bars for the "stressed" treatment. The "non-stressed" treatment was irrigated on 30 June and 15 July. Two stressed treatments are included in Table 1; the first three rows of data are for plants that were not