

Defoliation Research on Pima Cotton at the Maricopa Agricultural Center in 1988

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ABSTRACT

A field study was conducted at the Maricopa Agricultural Center to evaluate the effectiveness of selected defoliation treatments on pima cotton. Defoliant treatments were applied in October under relatively warm conditions. Treatments containing Dropp generally resulted in the highest leaf drop percentages (over 90%). Def 6 treatments were ineffective in defoliating pima cotton.

INTRODUCTION

A defoliation strategy for pima cotton that gives consistently satisfactory results is not presently available. In many instances, pima cotton has been more difficult to defoliate than upland cotton. That difference may be due to the strong vegetative tendencies of pima cotton at the end of the season and possible differences between the two cottons in physiological processes associated with abscission and defoliation.

Research on pima cotton defoliation has been limited. Silvertooth (1988) reported on past and present research work at the 1988 Western Cotton Production Conference at Las Cruces, New Mexico. The objective of our research was to evaluate the effectiveness of selected harvest-aid chemicals on pima cotton.

MATERIALS AND METHODS

Pima S-6 cotton was planted on the Maricopa Agricultural Center on 31 March 1988 in moist soil. The planting received a total of 200 lbs. of N/A preplant and during the season. The final irrigation was made on 21 September. Two tests were established in that planting: one in which defoliant treatments were applied on 19 October, the other on 25 October.

Test No. 1 - Twelve treatments as shown in Table 1 were applied from 1 to 2 P.M. on 19 October. The maximum and minimum temperatures for that date were 90 and 66° F, respectively. A light rain began falling about 3 hours after defoliant treatments were applied and 0.3 inches of rain were recorded during the next 12 hours.

Test No. 2 - Ten defoliation treatments, as shown in Table 2, were applied from 9 to 10 A.M. on 25 October. Maximum and minimum temperatures for that date were 91 and 57° F, respectively. Prep treatments were made on 13 October by a ground rig sprayer using 25 gallons of water per acre as carrier. The test was located in the same field just adjacent to test No. 1.

Harvest-aid chemicals were applied with a Hi-Boy sprayer using 5 nozzles per row traveling at 1.5 mph. The total volume of spray was 25 GPA. Plots were 4 rows wide and 30 feet long. The tests utilized a randomized complete block design with 4 replications. Plots were visually evaluated for leaf drop by 3 individuals 7 and 14 days after application of chemicals. Means of the readings were used for statistical analysis.

At the time treatments were made, the plants were already practically defoliated, but new growth was present at the tips of the main stem and branches, and near the base of the main stem.

RESULTS AND DISCUSSION

The results of test No. 1 are shown in Table 3. Dropp was the most effective of the chemicals tested giving over 90% leaf drop in 14 days. The treatments containing Dropp also did an excellent job of terminating new growth at the stem tips and base of the main stem. Ginstar was not as effective a defoliant as Dropp at the rates tested, but did give some control of new growth. The Def 6 treatments were the least effective for defoliation and were not significantly different than the control. Some treatments may have been adversely affected by the rain that fell after application of the defoliant.

The results of test No. 2 were similar to those of test No. 1 (Table 4). Dropp treatments again gave high percentages of leaf drop, but they were not significantly higher than those of the Ginstar treatments. Prep had no significant effect on leaf drop either alone or in combination with defoliant.

Dropp was consistently effective in defoliating pima cotton. Although the tests were conducted in mid and late October, the warm weather occurring when the defoliant was applied could be expected to contribute to a good response from Dropp. Silvertooth and Howell (1988) reported that Dropp was a promising defoliant for pima cotton in Yuma county.

REFERENCES

Silvertooth, J. C. 1988. Preparing the Pima Crop for Harvest. Proc. Western Cotton Production Conf., Las Cruces, NM; 61-63.

Silvertooth, J. and D. R. Howell. 1988. Defoliation of Pima Cotton. Cotton. A College of Agriculture Report. Univ. of Arizona, Series P-72; 117-120.

Table 1. Defoliation treatments used in Test No. 1.

Treatment	Chemical	Rate(lbs a.i./A)
1	Control	----
2	Ginstar ¹	0.11
3	Ginstar	0.15
4	Ginstar	0.19
5	Dropp ²	0.40
6	Dropp + Accelerate	0.40 + 0.10
7	Def 6	1.88
8	Def 6 + Accelerate	1.88 + 0.10
9	Gramoxone + Def 6	0.08 + 0.75
10	Gramoxone + Def 6	0.08 + 1.50
11	Gramoxone + Sodium Chlorate	0.08 + 4.00
12	Sodium Chlorate	4.00

¹ Ginstar is a new harvest-aid product of the Nor-Am Chemical Company.

² Treatments 5 and 6 were applied with 0.7 pints Agri-Dex/acre and treatments 7-11 were applied with 0.5 pints X-77/acre.

Table 2. Defoliation treatments used in Test No. 2.

Treatment	Chemical	Rate (lbs a.i./A)
1	Control	---
2	Def 6 ¹	1.88
3	Dropp	0.20
4	Ginstar ²	0.15
5	Gramoxone + Def 6	0.08 + 1.50
6	Prep ³	1.00
7	Prep + Def 6	1.00 + 1.88
8	Prep + Dropp	1.00 + 0.20
9	Prep + Ginstar	1.00 + 0.15
10	Prep + Gramoxone + Def 6	1.00 + 0.08 + 1.50

¹ Prep and defoliant in treatments 2, 5, 7 and 10 were applied with 0.5 pints X-77/A. Defoliant in treatments 3 and 8 were applied with 0.7 pints Agri-Dex/A.

² Ginstar is a new harvest-aid product of the Nor-Am Chemical Company.

³ Prep was applied on 13 October and defoliant on 25 October

Table 3. Effect of defoliation treatments on leaf drop of Pima S-6 cotton, Test No. 1.

Treatment	Days after application	
	7	14
Control	56d ¹	61d
Ginstar(0.11 lbs a.i./acre)	65cd	74bc
Ginstar(0.15 lbs a.i./acre)	68cd	75bc
Ginstar(0.19 lbs a.i./acre)	77bc	82b
Dropp	86ab	93a
Dropp + Accelerate	91a	94a
Def 6	61cd	65cd
Def 6 + Accelerate	65cd	67cd
Gramoxone + Def 6(0.75 lbs a.i./acre)	77bc	78bc
Gramoxone + Def 6(1.5 lbs a.i./acre)	75bc	75bc
Gramoxone + Sodium Chlorate	74bc	74bc
Sodium Chlorate	74bc	75bc

¹ Means followed by the same letter are not significantly different at the 0.05 probability level according to Student-Newman-Kuels' test.

Table 4. Effect of defoliant treatments on leaf drop of Pima S-6 cotton, Test No. 2.

Treatment	Leaf drop ¹
	%
Control	64d ²
Def 6	66d
Dropp	91a
Ginstar	82abc
Gramoxone + Def 6	74bcd
Prep	65d
Prep + Def 6	65d
Prep + Dropp	92a
Prep + Ginstar	84ab
Prep + Gramoxone + Def	73cd

¹ Treatments were evaluated for leaf drop 14 days after defoliants were applied.

² Means followed by the same letter are not significantly different at the 0.05 probability level according to Student-Newman-Kuels' test.