

Defoliation Research on Pima and Upland Cotton at the Marana Agricultural Center in 1991

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Abstract

A field study was conducted at the Marana Agricultural Center to evaluate the effectiveness of ground rig applied defoliant treatments on Pima and Upland cotton under cool weather conditions. Defoliant treatments were slow acting at this location, however, all chemical treatments tested resulted in good defoliation 14 days after application.

Introduction

There is a lack of information on chemical defoliation of Pima and Upland cotton for the Marana area. The main strategies for preparing cotton for harvest have been to defoliate with chlorate or wait until frost kills the leaves. Chlorate has given variable defoliation results and has at times, resulted in a high percentage of desiccation when used on Pima cotton at this location. Relying on frost as a defoliation method has several disadvantages. One is that the date of the first frost at this location varies tremendously and can be quite late. Another is that the leaves killed by freezing may not fall from the plant and can contribute to gin trash at harvest.

There has been widespread public sentiment against aerial application of pesticides, including defoliants, in the Marana area. In a 1990 test, several defoliants were effective in defoliating Pima cotton when applied with a HiBoy sprayer (Nelson and Silvertooth, 1991). This past season it was again our objective to evaluate chemical defoliation treatments at Marana using ground rig application.

Materials and Methods

Pima S-6 and DPL 90 cotton was planted at the Marana Agricultural Center on 24 April, 1991 in moist soil. The planting received a total of 63 lbs. of N/A preplant and during the season. The final irrigation was on 18 September. Defoliation treatments were applied with a HiBoy sprayer using 7 nozzles/row on 31 October. The total volume of spray was 22 GPA. Treatments are described in Tables 1 and 2. Plots were 4 rows wide by 30 feet long. These tests utilized randomized complete block designs with 4 replications. Plots were visually rated for leaf drop by 2 individuals 8 and 14 days after application of treatments.

Maximum and minimum temperatures averaged 77 and 45⁰F, respectively, for the 14 day evaluation period. Although night temperatures were low, no frost occurred at this location prior to or 14 days after application of defoliants. Rainfall totaling 0.83 inches was recorded on 27 October. Consequently the field was very wet when the defoliants were applied. Petiole NO₃-N content was below 1000ppm at the time of defoliation for both Pima and DPL 90 cotton.

Results and Discussion

The results of the Marana tests was shown in Tables 1 and 2. Natural defoliation for the Pima and Upland cottons at the time treatments were applied was estimated to be 50 and 55%, respectively. Defoliant were slow acting at this location, probably because of low temperatures.

Defoliant showed very little activity on Pima cotton 8 days after application, but by 14 days, all chemical treatments had given acceptable defoliation (Table 1). There were no significant differences in estimated defoliation among the chemical defoliation treatments at 8 or 14 days after application.

In the test with Upland cotton, several treatments produced significant leaf drop 8 days after application of treatments (Table 2). As with Pima, all chemical treatments resulted in good defoliation after 14 days. Treatments containing the experimental SN597 formulations were as effective as the combination treatments of Dropp + Def or Dropp + Def + Accelerate.

Based on tests conducted at Marana the past several years, it appears that combinations of presently available defoliant are needed to provide good defoliation in a single ground rig application (Nelson and Silvertooth, 1991 and Silvertooth et al., 1991).

References

- Nelson, J.M. and J.C. Silvertooth. 1991. Defoliation research on Pima cotton at the Marana Agricultural Center in 1990. Cotton, A College of Agriculture Report. University of Arizona, Series P-87:36-38.
- Silvertooth, J.C., S.H. Husman, G.W. Thacker, D.R. Howell and S.S. Winans. 1991. Defoliation of Pima Cotton, 1990. A College of Agriculture Report. University of Arizona, Series P-87:18-32.

Table 1. Defoliation Test on Pima S-6 Cotton - Marana Agricultural Center.¹

Treatments	Rate (lbs a.i./A)	% Defoliation	
		8 days	14 days
01 Dropp+Accelerate ²	0.15 + 0.033	59 a ⁶	74 a
02 Dropp+Accelerate	0.15 + 0.050	59 a	75 a
03 Dropp+Accelerate	0.15 + 0.065	60 a	78 a
04 Dropp+Def+ Na ₂ CO ₃ ³	0.15+0.75+0.1725	59 a	80 a
05 Dropp+Def+Accelerate	0.15+0.75+0.050	61 a	79 a
06 Dropp SP40+Def	0.15+0.75	57 a	79 a
07 Dropp+Def+Sylgard ⁴	0.15+0.75	61 a	76 a
08 SN597 NA 243 ⁵	0.15	58 a	77 a
09 SN597 NA 296-1	0.15	60 a	79 a
10 SN597 NA 297-1	0.15	59 a	81 a
11 SN597 NA 298-1	0.15	59 a	78 a
12 Check	--	56 a	63 b

¹Treatments were applied Oct. 31, 1991 using a J.D. HiBoy sprayer with a 7 nozzle/row boom. Treatments were applied at a rate of 22 GPA on plots 4 rows wide and 30 ft. long.

²Treatments 01-06 were applied with 1 pt/A Agri-dex.

³Na₂CO₃ (Sodium Carbonate)

⁴Sylgard 309 applied at 1.0% V/V.

⁵SN597 treatments are experimental Nor-Am formulation.

⁶ Means followed by the same letter are not significantly different at the 0.05 probability level.

Table 2. Defoliation Test on Upland Cotton - Marana Agricultural Center.¹

Treatments	Rate (lbs a.i./A)	% Defoliation	
		8 days	14 days
01 Dropp+Accelerate ²	0.15 + 0.033	66 ab ⁶	84 ab
02 Dropp+Accelerate	0.15 + 0.050	66 ab	79 b
03 Dropp+Accelerate	0.15 + 0.065	66 ab	80 b
04 Dropp+Def+Na ₂ CO ₃ ³	0.15+0.75+0.1725	69 ab	87 ab
05 Dropp+Def+Accelerate	0.15+0.75+0.050	71 a	88 ab
06 Dropp SP40 +Def	0.15+0.75	68 ab	87 ab
07 Dropp+Def+Sylgard ⁴	0.15+0.75	71 a	89 ab
08 SN597 NA 243 ⁵	0.15	64 ab	88 ab
09 SN597 NA 296-1	0.15	65 ab	90 a
10 SN597 NA 297-1	0.15	64 ab	88 ab
11 SN597 NA 298-1	0.15	68 ab	92 a
12 Check	--	63 b	68 c

¹Treatments were applied Oct. 31, 1991, using a J.D. HiBoy sprayer with a 7 nozzle/row boom. Treatments were applied at a rate of 22 GPA on plots 4 rows wide and 30 ft. long.

²Treatments 01-06 were applied with 1 pt/A Agri-dex.

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