EVALUATION OF GINSTAR AS A COTTON DEFOLIANT FOR CENTRAL ARIZONA

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Abstract

Field studies were conducted at Maricopa, Arizona to evaluate the effectiveness of Ginstar defoliant on pima (Gossypium barbadense L.) and upland (G. Hirsutum L.)cotton under warm and cool weather conditions. Single applications of Ginstar gave good defoliation in September tests. In October tests, under cool weather conditions, Ginstar was effective in defoliating pima cotton, but upland cotton was not defoliated in a single application by any of the defoliants tested. Ginstar defoliant was as effective as the combination treatments, Dropp + Def or Dropp + Def + Accelerate for defoliating cotton.

Introduction

Defoliation treatments often give inconsistent results in the desert regions of Arizona. In many instances, two or more applications of defoliants are required to properly prepare the crop for harvest. What is desired, both for upland and pima cottons, is a treatment that consistently defoliates cotton in a single application. The effectiveness of the defoliation treatment can depend on many factors including the condition of the cotton crop, weather conditions and the kind of defoliants used. Recently, the new defoliant Ginstar has shown promise for defoliating cotton in central Arizona. The objective of this research was to determine the effectiveness of Ginstar used alone or in combination with other defoliants as a treatment for defoliating cotton in a single application.

Materials and Methods

Field experiments were conducted in 1993 and 1994 at the University of Arizona, Maricopa Agricultural Center using DP5415 and Pima S-7 cotton planted each year in April. In all tests, the cotton was furrow irrigated and received 90-100 lbs. of N/A. In 1993, the final irrigation was on 16 August for defoliation tests conducted in September and 14 September for tests conducted in October. In 1994, the final irrigation for all tests was 18 August. In all tests, defoliation treatments were applied with Hi Boy sprayer using a 7 nozzle/row boom and a 20-25 GPA application rate. Individual plots were 4 rows wide by 40 feet long. All tests utilized randomized complete block designs with 3 or 4 replications. Plots were rated for percent defoliation and desiccation by 2-3 individuals 7-8 and 14-15 days after application of treatments.

Defoliation tests were conducted in September and October each year to evaluate treatments under both warm and cool weather conditions. Descriptions of the defoliation treatments compared in the various tests are shown Tables 1-8. In these tests, Dropp + Def and Dropp + Def + Accelerate treatments were applied with 1 pt./acre Agri-Dex. In tests conducted on 23 September and 21 October 1993, 307 and 175 HU (86/55°F thresholds), respectively, were accumulated in the 14 day period after application of defoliants. In tests conducted on 22 September and 14 October 1994, 244 and 164 HU, respectively, were accumulated in the 14 day period after application of defoliants

Results and Discussion

1993 Defoliation Tests

Results of defoliation tests conducted on 23 September are shown in Tables 1-2. Defoliation treatments resulted in a high percentage of leaf desiccation in the pima test (Table 1) at day 7 after treatment, but a high percentage of leaves were defoliated after 14 days. Air temperatures were near 100°F and over 300 HU were accumulated in the 14 day period after application of defoliants in the September tests. Ginstar and Dropp + Def treatments were generally very effective in defoliating both pima and upland cotton (Table 2) in a single application in September.

Results of defoliation tests conducted on 21 October are shown in Tables 3-4. Excellent defoliation was obtained in the pima test (Table 3) using either Ginstar or Dropp + Def, but none of the treatments was effective in a single application in the upland test (Table 4). We consider 75% defoliation to be necessary for harvesting to proceed. In addition to cool weather, several other factors made the upland cotton difficult to defoliate in October. First, the 14 September termination irrigation resulted in cotton with a very dense, green canopy at the time of defoliation. Second, whitefly populations increased late in the season and many leaves had a coating of honeydew when defoliants were applied.

1994 Defoliation Tests

Results of defoliation tests conducted on 22 September are shown in Tables 5-6. In the upland test (Table 5), all of the Ginstar treatments resulted in good defoliation 14 days after application of defoliants. In the pima test (Table 6), a high percentage of leaves were initially desiccated by the defoliants. The desiccated leaves eventually fell from the plants and at 14 days after application, high defoliation percentages were obtained for all defoliant treatments.

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Results of defoliation tests conducted on 14 October are shown in Tables 7-8. Temperatures were cool when these tests were conducted and less than 200 HU were accumulated during the 14 day period after application of treatments. In the upland test (Table 7), none of the defoliant treatments provided acceptable defoliation with a single application. In the pima test (Table 8), which was already partially defoliated before chemicals were applied, all treatments gave excellent defoliation 14 days after application.

Table 1. Defoliation test using Pima S-7 cotton on 23 September 1993.

		Defoliation (%)	Defoliation (%)
Treatments	Rate (lbs.a.i./acre)	7 days	14 days
Ginstar	0.075	22a[1]	80a
Ginstar	0.10	27a	84a
Ginstar	0.15	23a	86a
Dropp + Def	0.10 + 0.56	25a	87a
Check	-----	23a	31b

[1] Means in columns followed by the same letter are not significantly different at the 0.05 probability level.

Table 2. Defoliation test using DP5415 cotton on 23 September 1993.

		Defoliation (%)	
Treatments	Rate (lbs. a.i./acre)	7 days	14 days
Ginstar	0.075	41a[1]	65b
Ginstar	0.10	43a	89a
Ginstar	0.15	43a	85a
Dropp + Def	0.10 + 0.56	46a	82a
Check	-----	17b	20c

[1] Means in columns followed by the same letter are not significantly different at the 0.05 probability level.

Table 3. Defoliation test using Pima S-7 cotton on 21 October 1993.

		Defoliation (%)	
Treatments	Rate (lbs. a.i./acre)	8 days	15 days
Ginstar	0.10	82ab[1]	89a
Ginstar	0.15	87a	90a
Ginstar	0.188	85a	89a
Dropp + Def	0.10 + 0.75	76ab	85a
Check	-----	40c	48b

[1] Means in columns followed by the same letter are not significantly different at the 0.05 probability level.

Table 4. Defoliation test using DP5415 cotton on 21 October 1993.

		Defoliation (%)	
Treatments	Rate (lbs. a.i./acre)	8 days	15 days
Ginstar	0.10	43a[1]	60a
Ginstar	0.15	47a	72a
Ginstar	0.188	46a	71a
Dropp + Def	0.10 + 0.75	46a	58a
Check	-----	16b	29b

[1] Means in columns followed by the same letter are not significantly different at the 0.05 probability level.

Table 5. Defoliation test using DP5415 cotton on 22 September 1994.

		Defoliation (%)	
Treatments	Rate (lbs. a.i./acre)	8 days	14 days
Ginstar	0.075	59ab[1]	84ab
Ginstar	0.094	66ab	83ab
Ginstar	0.100	69a	88a
Ginstar	0.150	62ab	90a
Ginstar + Prep	0.075 + 1.0	69a	89a
Dropp + Def	0.075 + 0.375	53b	73b
Check	-----	20c	22c

[1] Means in columns followed by the same letter are not significantly different at the 0.05 probability level.

Table 6. Defoliation test using Pima S-7 cotton on 22 September 1994.

	Defoliation (%)	Defoliation (%)	
Treatments	Rate (lbs. a.i./acre)	8 days	14 days
Ginstar	0.075	23b[1]	92a
Ginstar	0.094	21b	92a
Ginstar	0.100	21b	95a
Ginstar	0.150	21b	92a
Ginstar + Prep	0.075 + 1.0	22b	91a
Dropp + Def	0.075 + 0.375	22b	92a
Check	-----	41a	42b[1]

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

Table 7. Defoliation test using DP5415 cotton on 14 October 1994.

		Defoliation (%)	
Treatments	Rate (lbs. a.i./acre)	7 days	14 days
Ginstar	0.094	30a[1]	54a
Ginstar	0.117	31a	57a
Ginstar	0.141	31a	60a
Ginstar	0.188	29a	56a
Ginstar + Def	0.094 + 0.375	32a	54a
Dropp + Def	0.20 + 0.75	32a	58a
Dropp + Def + Accelerate	0.20 + 0.75 + 0.065	34a	60a

[1] Means in columns followed by the same letter are not significantly different at the 0.05 probability level.

Table 8. Defoliation test using Pima S-7 cotton on 14 October 1994.

		Defoliation (%)	
Treatments	Rate (lbs. a.i./acre)	7 days	14 days
Ginstar	0.094	76a[1]	86ab
Ginstar	0.117	77a	87ab
Ginstar	0.141	77a	85ab
Ginstar	0.188	77a	93a
Ginstar + Def	0.094 + 0.375	77a	90ab
Dropp + Def	0.20 + 0.75	79a	87ab
Dropp + Def + Accelerate	0.20 + 0.75 + 0.065	77a	86ab

[1] Means in columns followed by the same letter are not significantly different at the 0.05 probability level.