

# Defoliation Tests with Ginstar at the Maricopa Agricultural Center in 1998

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## ***Abstract***

Defoliation tests were conducted on upland and Pima cotton at the Maricopa Agricultural Center to evaluate the use of low rates of Ginstar for preconditioning cotton, several rates of Ginstar and tank mixes of Ginstar and Def. The upland cotton used in this test was generally difficult to defoliate, probably because of cool night temperatures. One application of Ginstar + Def gave acceptable defoliation of upland cotton 14 days after treatment (DAT) and this treatment was as good as using Ginstar as a preconditioner followed by Ginstar (2 applications of defoliant). For Pima cotton, most Ginstar treatments gave acceptable defoliation 7 DAT. Although defoliation treatments caused some leaf desiccation, it was not a serious problem in these tests. All defoliation treatments resulted in excellent control of terminal regrowth for both upland and Pima cotton.

## ***Introduction***

Research conducted in past seasons has indicated that the defoliant Ginstar is more effective than most other defoliation treatments for defoliating cotton in a single application in central Arizona (Nelson and Hart, 1993; Nelson and Hart, 1994; Nelson and Hart, 1995; Nelson and Hart, 1996; Nelson and Hart, 1997; Nelson, 1998).

However, information is still needed on the rates of Ginstar to use under different crop conditions and environmental conditions. In addition, research is necessary to determine if other defoliants will enhance the activity of Ginstar. Tank mixes of Def and Ginstar have generally improved defoliation of hard to defoliate cotton and defoliation during cold weather (Nelson and Hart, 1997; Nelson, 1998).

Preliminary tests have indicated that acceptable defoliation of cotton may be obtained under adverse conditions using Ginstar as a preconditioning treatment (Nelson and Hart, 1997; Nelson, 1998). In the tests reported here we evaluated the use of Ginstar at several rates as a preconditioner under cool weather conditions.

## ***Materials and Methods***

Defoliation tests were conducted in October 1998 using DPL 33B and Pima S-7 cotton. The cotton for these tests was planted in dry soil and irrigated up on 17 April 1998. Standard practices for irrigation, cultivation and pest control were followed. The cotton received a total of 105 lbs of N per acre during the growing season and seven irrigations with the final irrigation on 14 September.

On 14 October 1998 Ginstar preconditioning treatments were applied to treatments No. 1-4 (Table 1). At that time upland cotton had 0-2 NAWB and 50-60% open bolls while Pima cotton had 0-1 NAWB and 60-70% open bolls. On 20 October the main treatments (Ginstar and other defoliants) were applied. On 3 November, Chlorate + Starfire was applied to treatments No. 10 and 11 in the upland test. This Chlorate + Starfire treatment was not applied to the Pima test because the cotton in that test was already 85-95% defoliated on 3 November.

In all tests, defoliation treatments were applied with J.D. HiBoy sprayer with a 7 nozzles per row spray boom. A 25

GPA application rate was achieved using 40 psi pressure, disc-core type spray tips (Disc No. 1.5 and Core No. 13) and a ground speed of 3 MPH.

Plots were 4, 40-inch rows wide by 40 ft. long. Each test utilized a randomized complete block experimental design with four replications. Plots were rated for leaf drop and desiccation by two persons 7 and 14 days after application of main treatments (20 October). Counts of open and unopened bolls were made on 3 November. These counts were made for one meter of row per plot. Cotton in upland and Pima tests was rated for terminal regrowth 14 days after treatment (DAT) and the upland test was rated for terminal regrowth 22 DAT. Weather conditions and heat units (HU) for upland and Pima cotton tests in 1998 are shown in the following table.

Date defoliant applied	Day of Treatment		14 day period after defoliant was applied						
	Air temp. (°F)		Ave. temp. (°F)		Ave. Rel. Hum. (%)		Rain (Inches)	Ave. wind speed (MPH)	HU <sup>1</sup>
	Max.	Min.	Max.	Min.	Max.	Min.			
20 Oct.	90	43	80	50	91	31	0.28	3.9	162

<sup>1</sup> Heat units based on 86/55°F thresholds.

## *Results*

The defoliation tests reported here were conducted under cool weather conditions. There were only 162 HU accumulated during the 14 day period after defoliant was applied on 20 October. It is generally thought that 200 or more HU are needed in the 14 day period after application of defoliant to achieve acceptable defoliation (70 to 75% leaf drop).

### Upland test

In the upland test, no defoliation treatment gave acceptable defoliation by 7 DAT (Table 1). Considerable patience is required when defoliating upland cotton under cool weather conditions, since very little leaf drop generally occurs in the first week after defoliant is applied. However, 14 days after defoliant was applied, treatments that included using 4 oz/A of Ginstar as a preconditioner, Ginstar + Def and Ginstar followed by Chlorate + Starfire all gave over 70% defoliation. Ginstar used alone in a single application at rates of 8, 10 and 12 oz/A did not give acceptable defoliation 14 DAT. In this test, one application of Ginstar + Def was as good a defoliation treatment as using Ginstar as a preconditioner followed by Ginstar.

All defoliant treatments resulted in good defoliation 22 DAT. Desiccation was not a problem in the upland test with all treatments having less than 5% desiccated leaves 14 DAT (Table 2). All Ginstar treatments gave good terminal regrowth control (Table 3). No defoliation treatment resulted in a lower percentage of unopened bolls than the untreated check 14 DAT (Table 3).

### Pima test

Pima cotton was rapidly defoliated by treatments used in this test (Table 4). Only the lower rates of Ginstar and the treatment using Dropp failed to provide acceptable defoliation 7 DAT. All defoliation treatments provided excellent leaf drop 14 DAT. Defoliation treatments caused 7 to 14% leaf desiccation 7 DAT, but many of the desiccated leaves had fallen from the plants by 14 DAT (Table 5). All defoliation treatments gave excellent control of terminal regrowth compared to the untreated check (Table 6). The percentage of unopened bolls was reduced when Ginstar was used as a preconditioner at the 4 oz/A rate (Table 6). These treatments averaged only 10.6% unopened bolls compared to 23.8% unopened bolls for the untreated check.

## *References*

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**Table 1. Defoliation treatments and percent defoliation for the upland test.**

Treatment	Rate (Prod./A)	Defoliation (%)		
		7 DAT	14 DAT	22 DAT
1. Ginstar followed <sup>1</sup> by Ginstar	4 oz 8 oz	51 a <sup>3</sup>	72 abc	87 abc
2. Ginstar followed <sup>1</sup> by Ginstar	4 oz 10 oz	55 a	74 ab	89 ab
3. Ginstar followed <sup>1</sup> by Ginstar	6 oz 8 oz	56 a	69 bcd	86 abc
4. Ginstar followed <sup>1</sup> by Ginstar	6 oz 10 oz	54 a	66 bcde	84 bcd
5. Ginstar	8 oz	33 cd	50 f	72 e
6. Ginstar	10 oz	29 d	58 def	80 cde
7. Ginstar	12 oz	32 cd	56 ef	78 de
8. Ginstar + Def	8 oz + 1 pint	48 ab	76 ab	91 ab
9. Ginstar + Def	10 oz + 1 pint	53 a	82 a	92 a
10. Ginstar followed by Chlorate + Starfire <sup>2</sup>	10 oz 2 gal + 16 oz	45 abc	76 ab	94 a
11. Dropp + Def + Oil followed by Chlorate + Starfire <sup>2</sup>	0.2 lb + 1 pint + 1 pint 2 gal + 16 oz	35 bcd	63 cde	88 ab
12. Untreated Check	-----	13 e	27 g	32 f

<sup>1</sup> Applied 6 days before main treatments were applied.

<sup>2</sup> Applied 13 days after main treatments were applied.

<sup>3</sup> Means in columns followed by the same letter are not significantly different at the 0.05 probability level.

**Table 2. Defoliation treatments and percent desiccated leaves for the upland test.**

Treatment	Rate (Prod./A)	Desiccation (%)	
		7 DAT	14 DAT
1. Ginstar followed <sup>1</sup> by Ginstar	4 oz 8 oz	0.8 c <sup>3</sup>	0 c
2. Ginstar followed <sup>1</sup> by Ginstar	4 oz 10 oz	0.8 c	0.8 bc
3. Ginstar followed <sup>1</sup> by Ginstar	6 oz 8 oz	1.0 c	0.8 bc
4. Ginstar followed <sup>1</sup> by Ginstar	6 oz 10 oz	1.3 c	0 c
5. Ginstar	8 oz	1.0 c	2.5 ab
6. Ginstar	10 oz	1.5 bc	3.3 a
7. Ginstar	12 oz	1.0 c	1.3 abc
8. Ginstar + Def	8 oz + 1 pint	3.8 b	1.5 abc
9. Ginstar + Def	10 oz + 1 pint	8.3 a	3.3 a
10. Ginstar followed by Chlorate + Starfire <sup>2</sup>	10 oz 2 gal + 16 oz	2.5 bc	2.5 ab
11. Dropp + Def + Oil followed by Chlorate + Starfire <sup>2</sup>	0.2 lb + 1 pint + 1 pint 2 gal + 16 oz	2.3 bc	1.8 abc
12. Untreated Check	-----	0 c	0 c

<sup>1</sup> Applied 6 days before main treatments were applied.

<sup>2</sup> Applied 13 days after main treatments were applied.

<sup>3</sup> Means in columns followed by the same letter are not significantly different at the 0.05 probability level.

**Table 3. Defoliation treatments and percent terminal regrowth and percent unopened bolls 14 DAT for the upland test.**

Treatment	Rate (Prod./A)	Terminal regrowth (%)	Unopened bolls (%)
1. Ginstar followed <sup>1</sup> by Ginstar	4 oz 8 oz	1.0 c <sup>3</sup>	22.9 ab
2. Ginstar followed <sup>1</sup> by Ginstar	4 oz 10 oz	0.5 c	21.5 ab
3. Ginstar followed <sup>1</sup> by Ginstar	6 oz 8 oz	1.0 c	18.8 b
4. Ginstar followed <sup>1</sup> by Ginstar	6 oz 10 oz	0.5 c	31.1 a
5. Ginstar	8 oz	4.3 bc	29.0 ab
6. Ginstar	10 oz	1.8 c	29.8 ab
7. Ginstar	12 oz	3.8 bc	20.9 ab
8. Ginstar + Def	8 oz + 1 pint	1.5 c	27.4 ab
9. Ginstar + Def	10 oz + 1 pint	0.5 c	26.1 ab
10. Ginstar followed by Chlorate + Starfire <sup>2</sup>	10 oz 2 gal + 16 oz	1.0 c	28.8 ab
11. Dropp + Def + Oil followed by Chlorate + Starfire <sup>2</sup>	0.2 lb + 1 pint + 1 pint 2 gal + 16 oz	6.0 b	25.5 ab
12. Untreated Check	-----	80.0 a	29.6 ab

<sup>1</sup> Applied 6 days before main treatments were applied.

<sup>2</sup> Applied 13 days after main treatments were applied.

<sup>3</sup> Means in columns followed by the same letter are not significantly different at the 0.05 probability level.

**Table 4. Defoliation treatments and percent defoliation for the Pima test.**

Treatment	Rate (Prod./A)	Defoliation (%)	
		7 DAT	14 DAT
1. Ginstar followed <sup>1</sup> by Ginstar	4 oz 8 oz	83 a <sup>2</sup>	95 ab
2. Ginstar followed <sup>1</sup> by Ginstar	4 oz 10 oz	75 ab	94 abc
3. Ginstar followed <sup>1</sup> by Ginstar	6 oz 8 oz	81 a	96 a
4. Ginstar followed <sup>1</sup> by Ginstar	6 oz 10 oz	81 a	94 abc
5. Ginstar	8 oz	67 bc	93 abc
6. Ginstar	10 oz	68 bc	91 abc
7. Ginstar	12 oz	73 abc	93 abc
8. Ginstar + Def	8 oz + 1 pint	76 ab	94 abc
9. Ginstar + Def	10 oz + 1 pint	76 ab	93 abc
10. Ginstar	10 oz	65 bc	90 c
11. Dropp + Def + Oil	0.2 lb + 1 pint + 1 pint	62 c	90 c
12. Untreated Check	-----	43 d	49 d

<sup>1</sup> Applied 6 days before main treatments were applied.

<sup>2</sup> Means in columns followed by the same letter are not significantly different at the 0.05 probability level.

**Table 5. Defoliation treatments and percent desiccated leaves for the Pima test.**

Treatment	Rate (Prod./A)	Desiccation (%)	
		7 DAT	14 DAT
1. Ginstar followed <sup>1</sup> by Ginstar	4 oz 8 oz	7.5 b <sup>2</sup>	5.3 ab
2. Ginstar followed <sup>1</sup> by Ginstar	4 oz 10 oz	13.8 a	6.0 ab
3. Ginstar followed <sup>1</sup> by Ginstar	6 oz 8 oz	10.0 ab	4.5 b
4. Ginstar followed <sup>1</sup> by Ginstar	6 oz 10 oz	9.5 ab	6.3 ab
5. Ginstar	8 oz	11.3 ab	7.0 ab
6. Ginstar	10 oz	11.3 ab	6.8 ab
7. Ginstar	12 oz	12.5 ab	6.8 ab
8. Ginstar + Def	8 oz + 1 pint	12.5 ab	6.0 ab
9. Ginstar + Def	10 oz + 1 pint	10.0 ab	6.8 ab
10. Ginstar	10 oz	13.8 a	7.8 a
11. Dropp + Def + Oil	0.2 lb + 1 pint + 1 pint	10.3 ab	6.3 ab
12. Untreated Check	-----	0.0 c	0.0 c

<sup>1</sup> Applied 6 days before main treatments were applied.

<sup>2</sup> Means in columns followed by the same letter are not significantly different at the 0.05 probability level.



**Table 6. Defoliation treatments and percent terminal regrowth and percent unopened bolls 14 DAT for the Pima test.**

Treatment	Rate (Prod./A)	Terminal regrowth (%)	Unopened bolls (%)
1. Ginstar followed <sup>1</sup> by Ginstar	4 oz 8 oz	0.3 b <sup>2</sup>	9.9 e
2. Ginstar followed <sup>1</sup> by Ginstar	4 oz 10 oz	0.3 b	11.3 de
3. Ginstar followed <sup>1</sup> by Ginstar	6 oz 8 oz	0.3 b	17.6 bcde
4. Ginstar followed <sup>1</sup> by Ginstar	6 oz 10 oz	0.0 b	12.2 cde
5. Ginstar	8 oz	0.3 b	30.9 a
6. Ginstar	10 oz	0.0 b	22.1 abcd
7. Ginstar	12 oz	0.0 b	18.3 bcde
8. Ginstar + Def	8 oz + 1 pint	0.0 b	21.0 abcde
9. Ginstar + Def	10 oz + 1 pint	0.0 b	17.7 bcde
10. Ginstar	10 oz	0.0 b	21.3 abcde
11. Dropp + Def + Oil	0.2 lb + 1 pint + 1 pint	0.3 b	27.5 ab
12. Untreated Check	-----	45.0 a	23.8 abc

<sup>1</sup> Applied 6 days before main treatments were applied.

<sup>2</sup> Means in columns followed by the same letter are not significantly different at the 0.05 probability level.