Result Demonstration/Applied Research Report

2004 Tom Green County
Cotton Harvest Aid Demonstration
Cooperator: Chris Bubenik

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Summary

Seventeen harvest aid treatments were applied to Stoneville 5599 BG/RR cotton on October 15, 2004 to prepare the crop for harvest. The plot was established on Chris Bubenik's Farm, seven miles north of Wall, Texas. The chemicals were applied to irrigated cotton that had 60 percent of its bolls open. Leaf shed was less than one percent and the cotton plant leaves were still green in color. All applied treatments resulted in a significant level of boll opening, leaf defoliation and leaf desiccation when compared to the untreated checks. New plant growth was minimal for the 21 days the plot was evaluated. The regrowth that was developing should not interfere with harvesting and ginning.

Objective

In the Southern Rolling Plains of Texas, cotton is usually planted starting in mid-May. Because of this late planting date, many producers do not use harvest aids to terminate the cotton. When growing conditions are favorable, most of the cotton in this area is ready for harvest thirty days before the first killing freeze. The delay in harvest reduces the income of farmers due to the loss of lint yield and fiber quality. Even though the cost of several of the harvest aid treatments are expensive, there is usually a product that is economically justified that can be used effectively for crop termination. The intent of this field test is to: 1) determine the effectiveness of harvest aids at defoliating, desiccating, and opening bolls on cotton, 2) provide producers the opportunity of observing how effectively the harvest aid materials work, and 3) determine the economic feasibility of using the harvest aid material.

Materials and Methods

Cooperating Producers: Chris Bubenik
Location: 7 miles north of Wall

Crop Production Information:

Planting Date: May 12, 2004 Planting Rate: 11.0 pounds per acre
Variety Planted: Stoneville 5599 BG/RR Planting Pattern: Solid on 40 inch rows
Herbicide Applied: Trifluralin was applied preplant incorporated in the Fall of 2003 at 2.6 pints per acre, followed by 16 ounces of Direx plus 16 ounces of Caparol applied broadcast at planting. During the season one application of Roundup was applied using a hooded sprayer.
Number of Irrigations: Pre + two applications during the growing season (12 acre inches)
Insecticides Applied: Sprayed twice with Trimax at a rate of 0.5 ounce per acre applied in a band to control fleahoppers and sprayed twice with Curacron at one pint per acre to control bollworms and spider mites.
Fertilizer Applied: August 2003, applied 15 tons of cattle manure per acre.
Growth Regulator: Made three applications (8 ounces plus 16 ounces plus 16 ounces) of Pentia during the season

Harvest Aid Application Information:

Date Applied: October 15, 2004 Row Pattern: 40 inch rows planted solid
Wind Speed: 9 to 11mph Irrigation: Yes
Wind Direction: Southwest Plot Design: 13.33 ft X 75 ft replicated 3 times
Water Applied: 16 Gallons Per Acre Boom Height: 40 inches
Air Temperature: 77 to 82^0 Fahrenheit Pressure: 32 pounds per square inch
Relative Humidity: 22 to 37% Ground Speed: 4 mph
Time of Day: Established from 12:30 p.m. to 5:30 p.m.
Test Design: Randomized complete block design
Nozzles: one 11002 Air Induction over the top of row, one 8002 flat fan nozzle on a 9 inch drop on each side of the row.

Harvest Aid Application Information (followup application):

Date Applied: October 23, 2004
Time of Day: 10:00 a.m. to 1:00 p.m.
Wind Speed: 3 to 4 miles per hour
Wind Direction: Southwest
Air Temperature: 76 to 78^0 Fahrenheit
Relative Humidity: 26 to 27%
Carrier: 16.0 gallons of water per acre
Pressure, Nozzle Arrangement, Boom Height was the same as shown on October 15.

Plant Information

Date information was collected: October 15, 2004
Average Height: 40 inches
Average number of bolls above top cracked boll: 5
Percent open bolls: 60
Number of plants per acre: 52,000
At the time of application, plant health was excellent. The upper most cotton bolls were cross-sectioned and the seed coats were dark and the cotyledons were well developed.

Weather Information

Rainfall and air temperature information was obtained from the weather station located 1 mile south of plot.

Rainfall Information (Date and Amount)

October 1 & 2	0.08 inch	November 1	0.07 inch
October 3	0.05 inch	November 2	0.07 inch
October 4	0.14 inch		
October 5	0.36 inch		
October 6	0.91 inch		
October 7	0.62 inch		
October 10 & 11	0.02 inch		
October 13	0.25 inch		
October 14	0.01 inch		
October 22	0.52 inch		
October 25	1.26 inches		
October 26	0.47 inch		
October 27	0.04 inch		
October 30	0.01 inch		
October 31	0.23 inch		
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Total October Rainfall	4.97 inches	November Rainfall	0.14 inch

Maximum and Minimum Air Temperatures for October 15 - November 4, 2004

Date	Max Air	Min Air	Date	Max Air	Min Air	Date	Max Air	Min Air
15	84	47	22	78	64	29	85	59
16	73	50	23	76	55	30	75	55
17	89	48	24	81	52	31	66	56
18	88	57	25	79	58	1	74	47
19	90	57	26	73	64	2	48	42
20	89	53	27	78	61	3	58	38
21	93	57	28	82	64	4	72	33

Data Collection:

An area in each treatment was marked to make ratings on the percent open bolls, percent defoliation, percent desiccation, and regrowth in the top and bottom portion of the plants. A rating system was used to reflect the growth of new leaves in the top and bottom portion of the plants within each marked area. A copy of the regrowth rating system used is attached. The information collected on October 27, November 3 and November 10 are reported in Tables 1, 2 and 3, respectively.

Results and Discussion

The First Seven Days

During the first two weeks of October, 2.44 inches of rain was received on the plot. No rain was received seven days after the test plot was established.

On the previous page is a table that indicates the maximum and minimum air temperature during the 21 days these products were evaluated. From October 15 to October 21, daytime air temperatures ranged from 73 to 93 degrees Fahrenheit and the night temperatures ranged from 47 to 57 degrees. On October 22, 0.52 inch of rain fell on the plot. When the plots were evaluated on October 23, there was a significant difference in the percent of boll opened, percent defoliation and percent desiccation. The data collected is summarized in Table 1.

The percent of open bolls increased by 3 to 18 percent in the first week with seven of the treatments being better than the check.

The percent of leaf defoliation increased by 14 to 66 percent. All treatments had significantly more leaf defoliation than the check except for Ginstar at 4 ounces per acre.

The percent of leaf desiccation increased by 0 to 48 percent. All treatments that were tank mixed with Gramoxone Max had significantly more desiccation than most of the treatments in the test. No regrowth was noted in the top and bottom portion of the cotton plant.

The Second Week (October 22 - October 28, 2004)

Hourly daytime air temperature ranged from 73 to 82 degrees Fahrenheit. The nighttime temperatures ranged from 52 to 64 degrees. During the week rainfall occurred four days with a total accumulation of 2.29 inches. The amount of cloud cover during the week slowed the response of the cotton to the harvest aids applied. The followup applications were applied on September 23. On October 29 the plots were evaluated, and there was a significant difference in the percent open bolls, percent defoliation, and percent desiccation. The data collected is summarized in Table 2.

The amount of boll opening ranged from 75 to 92 percent, which is an increase of 6 to 22 percent from the previous evaluation. All treatments had significantly more boll opening than the check except for two treatments (Ginstar at 4 ounces per acre and Aim at 1 ounce plus Ginstar at 3 ounces plus Crop Oil Concentrate at 1 percent by volume).

The amount of leaf defoliation ranged from 28 to 94 percent, an increase of 19 to 42 percent. The amount of desiccation ranged from 0 to 17 percent which should keep the leaf rating of ginned cotton in the acceptable range of 1 to 3. However, there is still a high percent of green leaves remaining in some plots and additional defoliation is needed before harvest.

Regrowth in the top and bottom portion of the plant was minimal and no plot treatment had the lowest rating of one at the time of the 14 day after treatment evaluation.

Table 1. Chris Bubenik's 2004 Bayer and FMC Cotton Harvest Aid Tests (Tom Green County) October 23, 2004 (8 days after initial treatments were applied)

Harvest Aids Applied	Rate Applied Per Acre	% Open Bolls (8 DAT)	% Defoliation (8 DAT)	% Desiccation (8 DAT)	Regrowth Rating Top (8 DAT)	Regrowth Rating Bottom (8 DAT)
Ginstar	4.0 oz	65 cde	35 bc	3 d	0	0
Ginstar	6.0 oz	65 cde	45 ab	3 d	0	0
Ginstar	8.0 oz	65 cde	52 ab	6 d	0	0
Ginstar + Finish 6 Pro	6.0 oz. + 16.0 oz	67 bcde	57 ab	12 bcd	0	0
Check	--	60 e	15 c	0 d	0	0
Ginstar + Finish 6 Pro	6.0 oz. + 21.0 oz	75 abc	67 a	9 cd	0	0
Def + Finish 6 Pro	16.0 oz. + 16.0 oz	77 ab	65 a	17 bcd	0	0
Def + Finish 6 Pro	16.0 oz + 21.0 oz	75 abc	65 a	13 bcd	0	0
Ginstar + Herbimax (COC)	5 oz + 16 oz	65 cde	47 ab	9 cd	0	0
Def + Prep	16.0 oz. + 16.0 oz	73 abcd	62 a	8 cd	0	0
Aim + Herbimax (COC) followed by Aim + Herbimax (COC)	1.0 oz + 1% v/v followed by 1.0 oz + 1% v/v	67 bcde	53 ab	13 bcd	0	0
Aim + Prep + Herbimax (COC) followed by Gramoxone Max + Herbimax (COC)	1.0 oz + 16.0 oz + 1% v/v followed by 12.0 oz + 1% v/v	70 abcde	52 ab	18 bcd	0	0
Aim + Gramoxone Max + Herbimax (COC)	1.0 oz + 6.0 oz + 1% v/v	68 abcde	65 a	29 abc	0	0
Aim + Gramoxone Max + Herbimax (COC)	1.0 oz + 12.0 oz + 1% v/v	72 abcd	51 ab	43 a	0	0
Aim + Herbimax (COC) followed by Gramoxone Max + Herbimax (COC)	1.0 oz + 1% v/v followed by 12.0 oz + 1% v/v	67 bcde	60 a	12 bcd	0	0
Gramoxone Max + Herbimax (COC) followed by Gramoxone Max + Herbimax (COC)	12.0 oz + 1% v/v followed by 12.0 oz + 1% v/v	72 abcd	49 ab	48 a	0	0
Aim + CottonQuik + Prep + Herbimax (COC)	1.0 oz + 64.0 oz + 16.0 oz + 1% v/v	78 a	58 a	32 ab	0	0
Check	--	63 de	20 c	0 d	0	0
Aim + Ginstar + Herbimax (COC)	1.0 oz. + 3.0 oz. + 1% v/v	63 de	60 a	22 bcd	0	0

NOTE: In Table 1 the individual or combination of letter a, b, c, d, or e shown below the number are to indicate statistical significance. There is no statistical difference between numbers that have the same letter (even when there appears to be a large difference in results between the materials applied).

Table 2. Chris Bubenik's 2004 Bayer and FMC Cotton Harvest Aid Tests (Tom Green County)
October 29, 2004 (14 days after initial treatments were applied / 6 days after followup treatments)

Harvest Aids Applied	Rate Applied Per Acre	% Open Bolls (14 DAT)	% Defoliation (14 DAT)	% Desiccation (14 DAT)	Regrowth Rating Top (14 DAT)	Regrowth Rating Bottom (14 DAT)
Ginstar	4.0 oz	77 def	68 d	3 de	0	0
Ginstar	6.0 oz	77 def	70 cd	3 de	0	0
Ginstar	8.0 oz	78 cde	71 cd	8 bcd	0	0
Ginstar + Finish 6 Pro	6.0 oz. + 16.0 oz	85 abcde	79 bcd	4 bcde	0	0
Check	--	67 f	28 f	0 e	0	0
Ginstar + Finish 6 Pro	6.0 oz. + 21.0 oz	88 abc	80 bcd	4 bcde	0	0
Def + Finish 6 Pro	16.0 oz. + 16.0 oz	83 abcde	78 bcd	3 de	0	0
Def + Finish 6 Pro	16.0 oz + 21.0 oz	88 abc	86 ab	3 de	0	0
Ginstar + Herbimax (COC)	5 oz + 16 oz	80 bcde	80 abcd	6 bcde	0	0
Def + Prep	16.0 oz. + 16.0 oz	85 abcde	82 abcd	3 de	0	0
Aim + Herbimax (COC) followed by Aim + Herbimax (COC)	1.0 oz + 1% v/v followed by 1.0 oz + 1% v/v	80 bcde	86 ab	3 de	0	0
Aim + Prep + Herbimax (COC) followed by Gramoxone Max + Herbimax (COC)	1.0 oz + 16.0 oz + 1% v/v followed by 12.0 oz + 1% v/v	90 ab	94 a	5 bcde	0	0
Aim + Gramoxone Max + Herbimax (COC)	1.0 oz + 6.0 oz + 1% v/v	83 abcde	92 ab	4 cde	0	0
Aim + Gramoxone Max + Herbimax (COC)	1.0 oz + 12.0 oz + 1% v/v	85 abcde	90 ab	10 bc	0	0
Aim + Herbimax (COC) followed by Gramoxone Max + Herbimax (COC)	1.0 oz + 1% v/v followed by 12.0 oz + 1% v/v	87 abcd	89 ab	11 b	0	0
Gramoxone Max + Herbimax (COC) followed by Gramoxone Max + Herbimax (COC)	12.0 oz + 1% v/v followed by 12.0 oz + 1% v/v	90 ab	83 abc	17 a	0	0
Aim + CottonQuik + Prep + Herbimax (COC)	1.0 oz + 64.0 oz + 16.0 oz + 1% v/v	92 a	92 ab	5 bcde	0	0
Check	--	75 f	50 e	1 de	0	0
Aim + Ginstar + Herbimax (COC)	1.0 oz. + 3.0 oz. + 1% v/v	77 def	79 bcd	6 bcde	0	0

NOTE: In Table 2 the individual or combination of letter a, b, c, d, or e shown below the number are to indicate statistical significance. There is no statistical difference between numbers that have the same letter (even when there appears to be a large difference in results between the materials applied).

The Third Week (October 29 - November 4, 2004)

Hourly daytime air temperature ranged from 48 to 85 degrees Fahrenheit. The nighttime temperatures ranged from 33 to 59 degrees. The cooler temperatures through most the week slowed the plants response to harvest aids. During the week, 0.38 inch of rain was received. Total cloud cover occurred for four of the seven days. The followup applications had been applied for 13 days. On November 5 when the plots were evaluated, there was a significant difference in the percent open bolls, percent defoliation, and percent desiccation. The data collected is summarized in Table 3.

The amount of boll opening ranged from 78 to 96 percent, which is an increase of 2 to 11 percent from the 14 day evaluation. Nine treatments had significantly more boll opening than the check. The Aim at 1.0 ounce plus Prep at 16 ounces + Crop Oil Concentrate at 1% by volume followed by Gramoxone Max at 12 ounces plus Crop Oil Concentrate at 1% by volume treatment had significantly more boll opening than seven of the treatments in this test.

Leaf defoliation increased from 1 to 25 percent and all treatments had significantly more leaf defoliation than the check. The Aim at 1.0 ounce plus Prep at 16 ounces + Crop Oil Concentrate at 1% by volume followed by Gramoxone Max at 12 ounces plus Crop Oil Concentrate at 1% by volume treatment had significantly more leaf defoliation than six of the treatments in this test.

Leaf desiccation decreased from 0 to 9 percent. The leaf grade in cotton should remain at three or less in all of the treated plots.

There was no significant differences between treatments in the amount of regrowth developing in the top and bottom portion of the cotton plants. Regrowth at the top and bottom portion of the plants was smaller than a nickle in all noted plots. None of the treatments had enough regrowth to cause a problem during the ginning process.

The remaining area of the field that had not had harvest aids applied was ready to be sprayed. Several of the treatments used in this test could be selected and used successfully to prepare the crop for harvest. It was impressive to see the level of defoliation and regrowth suppression provided by many of the harvest aids in this test. I look forward to having these products available in the future for use as harvest aids in our region.

Economics

For 2004, we had a wet September and October and less than 50,000 acres of cotton has been harvested by the second week of November. Producers are currently applying harvest aids preparing the cotton crop for harvest. During October many areas of the region received over 5 inches of rain and it has kept producers from harvesting cotton in a timely manner. A loss of lint yield at this time ranges from 10 to 40 pounds per acre on cotton planted in May and lint quality has been effected. A loss of 4 to 7 cents per pound could occur because of the weather related delay. It is important to remember that a higher lint yield is not the only way of increasing profit from the use of a harvest aid. Other factors include: timely harvest, improved fiber quality, improved harvesting efficiency, and higher percent lint turnout at the gin.

Table 3. Chris Bubenik's 2004 Bayer and FMC Cotton Harvest Aid Tests (Tom Green County)
November 5, 2004 (21 days after initial treatments were applied / 13 days after followup treatments)

Harvest Aids Applied	Rate Applied Per Acre	% Open Bolls (21 DAT)	% Defoliation (21 DAT)	% Desiccation (21 DAT)	Regrowth Rating Top (21 DAT)	Regrowth Rating Bottom (21 DAT)
Ginstar	4.0 oz	85 cd	78 d	4 abcde	1	1
Ginstar	6.0 oz	85 cd	84 bcd	3 cde	1	1
Ginstar	8.0 oz	85 cd	84 bcd	6 abcd	0	1
Ginstar + Finish 6 Pro	6.0 oz. + 16.0 oz	87 bcd	84 bcd	4 abcde	0	1
Check	--	78 d	53 e	0 e	0	0
Ginstar + Finish 6 Pro	6.0 oz. + 21.0 oz	90 abc	82 cd	4 abcde	0	1
Def + Finish 6 Pro	16.0 oz. + 16.0 oz	85 cd	83 bcd	4 abcde	0	1
Def + Finish 6 Pro	16.0 oz + 21.0 oz	90 abc	89 abcd	3 cde	1	1
Ginstar + Herbimax (COC)	5 oz + 16 oz	85 cd	88 abcd	5 abcde	0	1
Def + Prep	16.0 oz. + 16.0 oz	87 bcd	87 abcd	3 cde	1	1
Aim + Herbimax (COC) followed by Aim + Herbimax (COC)	1.0 oz + 1% v/v followed by 1.0 oz + 1% v/v	85 cd	93 abc	3 bcde	0	0
Aim + Prep + Herbimax (COC) followed by Gramoxone Max + Herbimax (COC)	1.0 oz + 16.0 oz + 1% v/v followed by 12.0 oz + 1% v/v	96 a	96 a	4 abcde	0	1
Aim + Gramoxone Max + Herbimax (COC)	1.0 oz + 6.0 oz + 1% v/v	88 abc	93 abc	3 cde	0	1
Aim + Gramoxone Max + Herbimax (COC)	1.0 oz + 12.0 oz + 1% v/v	90 abc	92 abc	8 ab	0	1
Aim + Herbimax (COC) followed by Gramoxone Max + Herbimax (COC)	1.0 oz + 1% v/v followed by 12.0 oz + 1% v/v	93 abc	94 ab	6 abc	0	1
Gramoxone Max + Herbimax (COC) followed by Gramoxone Max + Herbimax (COC)	12.0 oz + 1% v/v followed by 12.0 oz + 1% v/v	92 abc	92 abc	8 a	0	1
Aim + CottonQuik + Prep + Herbimax (COC)	1.0 oz + 64.0 oz + 16.0 oz + 1% v/v	95 ab	94 ab	3 bcde	0	1
Check	--	78 d	53 e	1 de	0	1
Aim + Ginstar + Herbimax (COC)	1.0 oz. + 3.0 oz. + 1% v/v	88 abc	86 abcd	4 abcde	0	1

NOTE: In Table 3 the individual or combination of letter a, b, c, d, or e shown below the number are to indicate statistical significance. There is no statistical difference between numbers that have the same letter (even when there appears to be a large difference in results between the materials applied).

Acknowledgments

I want to take this opportunity to thank:

- Chris Bubenik for his help in plot establishment and management.
- Bayer CropScience for supporting harvest aid research conducted in the Trans-Pecos and Southern Rolling Plains areas of Texas.
- FMC Corporation for supporting harvest aid research conducted in the Trans-Pecos and Southern Rolling Plains areas of Texas.

I would also like to thank the companies that provided the chemicals for this harvest aid test, these included:

- Bayer CropScience who provided the Def, Finish 6 Pro, Ginstar, and Prep
- DuPont who provided the CottonQuik
- FMC Corporation who provided the Aim
- Syngenta Crop Protection, Inc. who provided the Gramoxone Max
- UAP Southwest who provided the Activator 90 (non-ionic surfactant) and Herbimax (crop oil concentrate)