Result Demonstration/Applied Research Report

2006 Nolan County
Cotton Harvest Aid Demonstration
Cooperator: Larry Williams

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Summary

Fifteen treatments were applied over the top of cotton on September 27 to prepare for harvest. The plot was established on Larry Williams' Farm located on the north edge of Roscoe, Texas. The chemicals were applied to FiberMax 989 BG2/RR cotton that had 80 percent of its bolls open. Leaf shed was less than one percent when the plot was established. Plots were evaluated on October 10 (14 days after the initial application treatment applications and on October 20 (23 days after initial treatments were applied and 15 days after a follow-up application by the producer). A single application of harvest aid chemicals would not have adequately prepared the cotton for harvest. Excluding the cost of Ethepon, the most cost effective applications for this test were Ginstar alone followed by a second application of Aim + Agridex.

Objective

In the Southern Rolling Plains, cotton is usually planted starting in mid-May. Because of this 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 County Producers:	Larry Williams
Location:	North edge of Roscoe, Texas

Crop Production Information:

Variety Planted:	FiberMax 989 BG2/RR
Planting Pattern:	Planted solid on 40 inch rows
Irrigation:	None

Harvest Aid Application Information for September 27, 2006:

Wind Speed:	9.0 to 10.0 miles per hour
Wind Direction:	Southeast
Air Temperature:	82 to 85^0 Fahrenheit
Relative Humidity:	28 to 42%
Carrier:	15.0 gallons of water per acre
Pressure:	34 pounds per square inch
Nozzle Size:	11002 extended range flat fan over the top of each row and one 8002 Extended Range nozzle on each side of the row.
Boom Height:	38 inches
Cotton Height:	28 inches
Ground Speed:	4.0 miles per hour
Application Device:	Self propelled rig with 13.33 foot boom
Plot Size:	13.33 feet X 50 feet
Test Design:	randomized block design replicated three times

Harvest Aid Application Information for October 5, 2006:

Wind Speed:	2.0 miles per hour
Wind Direction:	Southeast
Air Temperature:	87^0 Fahrenheit
Relative Humidity:	33%
Carrier:	12.0 gallons of water per acre
Pressure:	55 pounds per square inch
Nozzle Size:	11004 extended range flat fan over-the-top spaced 15 inches apart
Boom Height:	40 inches
Ground Speed:	10 miles per hour
Application Device:	Tractor mounted spray rig with 90 foot boom
Plot Size:	13.33 feet X 50 feet
Test Design:	randomized block design replicated three times
Harvest Aid Mixture:	1 oz. Aim + 1 pt. Ethephon + 1 qt. Agridex

Plant Information

At the time of the first application, the upper most cotton bolls were cross-sectioned, the seed coats were dark, and the cotyledons well developed. Cotton height averaged 28 inches and was a uniform height across the plot. The percent of open bolls averaged 80 percent. Overall the plants were healthy and unstressed and leaf defoliation was less than one percent.

Weather Information

Climatic Conditions for September 27- October 20, 2006

Date	Rainfall (inches)	Max Air (°F)	Min Air (°F)	Date	Rainfall (inches)	Max Air (°F)	Min Air (°F)
27-Sept	0.00	90.4	63.2	09-Oct	0.27	71.1	56.0
28-Sept	0.00	74.0	55.0	10-Oct	0.29	73.0	55.0
29-Sept	0.00	90.2	48.4	11-Oct	0.00	84.0	50.0
30-Sept	0.00	95.0	64.0	12-Oct	0.00	64.0	46.0
01-Oct	0.00	88.1	68.1	13-Oct	0.00	76.0	40.0
02-Oct	0.00	91.0	68.0	14-Oct	0.00	77.4	60.2
03-Oct	0.00	89.0	63.0	15-Oct	0.91	76.1	65.0
04-Oct	0.00	88.3	61.0	16-Oct	0.79	76.0	57.0
05-Oct	0.00	87.0	59.4	17-Oct	0.00	81.0	50.0
06-Oct	0.00	89.0	59.3	18-Oct	0.00	63.1	48.4
07-Oct	0.00	85.3	66.2	19-Oct	0.00	63.4	44.0
08-Oct	0.00	85.3	60.1	20-Oct	0.00	76.0	43.0

Results and Discussion

Initial Application on September 27

The boom height on the sprayer was set to clear the tallest plants by six inches. Penetration into the lower crop canopy was improved by using drop nozzles and by applying 15 gallons of water per acre. All harvest aids are contact materials and coverage is critical. The application of the harvest aids did impact percent defoliation and percent desiccation. Leaf defoliation was higher than the check in all treatments on October 10, 2006 (14 days after the treatments were applied). The data collected on October 10 is reported in Table 1.

There was no rainfall to affect harvest aid chemical activity during the first 12 days following the application of treatments and maximum air temperatures were above 85° F for 11 of these 12 days. With these conditions the harvest aids should have worked well, but new growth following rains in the first week of September made conditions more difficult for some harvest aid combinations to effectively prepare the cotton for harvest. This was evident in the fact that the percentage of desiccated leaves or green leaves still on plants was high in many of the treatments.

In the Aim, Blizzard, ET, Ginstar, and Resource plots, an abscission layer between the petiole and the main stem had formed but the leaves were still loosely attached after 14 days.

In this test, the Ginstar alone or in combination with other harvest aids provided a high level of defoliation with a minimum amount of desiccation. These applications came closet to preparing the cotton crop for harvest following a single application. Still, the percentage of green or desiccated leaves still on plants in plots would have made harvesting at this time questionable. An application of a PPO inhibitor plus a crop oil concentrate or the application of paraquat plus a non-ionic surfactant should finish preparing the cotton crop for harvest.

All of the plots had regrowth in the top and bottom portion of the plant but the average size was about the size of a dime. This should not pose a problem in harvesting the crop. If there is a regrowth problem some of the materials applied are known to be better at desiccating or removing juvenile growth; these include Aim, Blizzard, ET, Ginstar, and Resource. Please note

that a crop oil concentrate was used in tank mixes that contained Aim, Blizzard, ET, and Resource. For maximum performance with these products C.O.C. is an important part of the tank mix.

Second Application on October 5, 2006

The producer over sprayed the experimental test plots with a harvest aid mixture of 1 oz. Aim + 1 pt. Ethephon + 1 qt. Agridex. This mixture was applied at a spray rate of 12 gpa using a 60 ft. boom with nozzles spaced 20 inches apart. Climatic conditions following the application until the date plots were rated were overall cooler and wetter than conditions following the first application. Maximum air temperatures ranged from 63 to 89 degrees Fahrenheit with nighttime air temperatures ranging from 40 to 66 degrees Fahrenheit. There were two rain events (Oct. 9-10 and Oct. 15-16) that brought 0.56 and 1.70 inches of moisture, respectively. These cloudy and wet conditions cooled the soil temperature and slowed the physiological processes of the cotton plant.

The added effect of this second application to further condition cotton for harvest is reported in Table 2. The application to the previously untreated plots resulted in 41.7% leaf defoliation with 10% of the leaves desiccated, but there still was a significant amount of green leaves (48.3%) compared to the other treated plots (0.6 to 33.3%). This shows that a single application of this harvest aid mixture would not have adequately prepared the cotton for harvest. All previously treated plots had additional leaf defoliation by the October 20 sample date. The defoliation percentages among all previously treated plots were significantly higher than the check treatment with the single application. Leaf desiccation ranged from one to 20 percent in all of the treatments. Desiccation percentages below 10% should not adversely effect leaf grade.

After the second application the Ginstar alone and in combination with other harvest aid treatments had 94 to 97.7 percent of the cotton leaves defoliated. There was $\leq$ 3.0% of green leaves from regrowth.

Economic Analysis

This test can be used to document the results obtained from the use of harvest aids. If the same treatments are consistently at the top of the list for several years, then producers may want to incorporate those treatments into their cotton production program. 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.

A single application of harvest aid chemicals would not have adequately prepared the cotton for harvest this year. Therefore, a follow-up application would have been needed. In this test the addition of Ethephon in the followup application mixture may not have been needed because of the high percentage of open bolls (80%) at the time treatments were initiated. This would have reduced the cost of the follow-up application by $4.38 per acre. So, the cost of Aim + Agidex would have been $7.48. For this particular test, the most cost effective applications for the maximum level of performance would have been Ginstar (5.0 oz/ac) followed by Aim (1 oz.) + Agidex. (1 qt.). The total cost of this treatment combination would have been $14.88 per acre.

Table 1. Nolan County Cotton Harvest Aid Test (Larry Williams Farm, 2006) ratings on October 10, 2006 (14 days after treatments were applied)

Harvest Aid Chemicals Applied (4 rows of each)	Rate Applied Per Acre	Cost of Harvest Aid Per Acre	% Open Bolls	% Defoliation	% Desiccation
Gramoxone Inteon + Induce	5.0 oz. + 9.6 oz.	$1.10 + $1.50	100	50.0 cd	5.0 cd
Gramoxone Inteon + Induce	10.0 oz. + 9.6 oz.	$2.20 + $1.50	100	59.7 cd	16.7 b
Gramoxone Inteon + Induce	20.0 oz. + 9.6 oz.	$4.40 + $1.50	100	49.7 cd	43.7 a
Firestorm + Induce	13.3 oz. + 9.6 oz.	$4.00 + $1.50	100	46.7 cd	45.0 a
Aim + Prep + Herbimax (C.O.C.)	0.75 oz. + 16 oz. + 19.2 oz.	$3.17 + $4.75 + $1.39	100	49.7 cd	34.3 a
ET + Prep + Herbimax (C.O.C.)	1.5 oz. + 16 oz. + 19.2 oz.	$3.75 + $4.75 + $1.39	100	47.3 cd	43.3 a
Blizzard + Prep + Herbimax (C.O.C.)	0.6 oz. + 16 oz. + 19.2 oz.	$6.00 + $4.75 + $1.39	100	46.3 d	44.0 a
Resource + Prep + Herbimax (C.O.C.)	8.0 oz. + 16 oz. + 19.2 oz.	$9.50 + $4.75 + $1.39	100	48.3 cd	41.7 a
Check	-	-	100	10.7 e	0.0 d
FirstPick + Aim + Induce	48.0 oz. + 0.75 oz. + 9.6 oz.	$9.00 + $3.17 + $1.50	100	49.7 cd	44.7 a
FirstPick + Ginstar + Induce	48.0 oz. + 3.0 oz. + 9.6 oz.	$9.00 + $4.44 + $1.50	100	86.7 a	9.0 bcd
FirstPick + Ginstar + Induce	32.0 oz. + 3.0 oz. + 9.6 oz.	$6.00 + $4.44 + $1.50	100	81.0 ab	11.3 bc
Ginstar	5.0 oz.	$7.40	100	88.7 a	9.7 bcd
Finish 6 Pro + Ginstar + Induce	24.0 oz. + 3.0 oz. + 9.6 oz.	$12.94 + $4.44 + $1.50	100	87.3 a	8.3 bcd
Def + Prep + Induce	16.0 oz. + 16.0 oz. + 9.6 oz.	$6.25 + $4.75 + $1.50	100	65.3 bc	2.0 cd
Gramoxone Inteon + Prep + Induce	5.0 oz. + 21 oz. + 9.6 oz.	$1.10 + $6.23 + $1.50	100	52.7 cd	1.3 cd

NOTE: In Table 1 the individual or combination of letter a, b, c, d or e shown beside 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). Also, to account for 100 percent of the leaves you would add the percent defoliation plus the percent dessication and subtract from 100. The difference represents the percentage of original green leaves still remaining on the plant.

Table 2. Nolan County Cotton Harvest Aid Test (Larry Williams Farm, 2006) ratings on October 20, 2006 (23 days after initial treatments were applied; 15 days after follow-up application by producer)

Harvest Aid Chemicals Test Plot (4 rows of each)	Rate Applied Per Acre	Cost of Harvest Aid Per Acre	% Open Bolls	% Defoliation	% Desiccation
Gramoxone Inteon + Induce followed by -------> Aim + Ethephon + Agridex	5.0 oz. + 9.6 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$1.10 + $1.50 followed by ----> $4.23 + $4.38 + $3.25	100	69.3 cd	4.0 cde
Gramoxone Inteon + Induce followed by -------> Aim + Ethephon + Agridex	10.0 oz. + 9.6 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$2.20 + $1.50 followed by ----> $4.23 + $4.38 + $3.25	100	74.3 cd	4.3 cde
Gramoxone Inteon + Induce followed by -------> Aim + Ethephon + Agridex	20.0 oz. + 9.6 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$4.40 + $1.50 followed by ----> $4.23 + $4.38 + $3.25	100	80.7 c	15.3 ab
Firestorm + Induce followed by -------> Aim + Ethephon + Agridex	13.3 oz. + 9.6 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$4.00 + $1.50 followed by ----> $4.23 + $4.38 + $3.25	100	81.7 bc	11.0 bc
Aim + Prep + Herbimax (C.O.C.) followed by -------> Aim + Ethephon + Agridex	0.75 oz. + 16 oz. + 19.2 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$3.17 + $4.75 + $1.39 followed by ----> $4.23 + $4.38 + $3.25	100	71.3 cd	15.3 ab
ET + Prep + Herbimax (C.O.C.) followed by -------> Aim + Ethephon + Agridex	1.5 oz. + 16 oz. + 19.2 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$3.75 + $4.75 + $1.39 followed by ----> $4.23 + $4.38 + $3.25	100	81.3 bc	9.3 bcde
Blizzard + Prep + Herbimax (C.O.C.) followed by -------> Aim + Ethephon + Agridex	0.6 oz. + 16 oz. + 19.2 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$6.00 + $4.75 + $1.39 followed by ----> $4.23 + $4.38 + $3.25	100	67.7 cd	20.0 a
Resource + Prep + Herbimax (C.O.C.) followed by -------> Aim + Ethephon + Agridex	8.0 oz. + 16 oz. + 19.2 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$9.50 + $4.75 + $1.39 followed by ----> $4.23 + $4.38 + $3.25	100	76.0 c	13.7 ab
Check followed by -------> Aim + Ethephon + Agridex	- followed by -----> 1oz. + 1 pt. + 1 qt.	- followed by ----> $4.23 + $4.38 + $3.25	100	41.7 e	10.0 bcd
FirstPick + Aim + Induce followed by -------> Aim + Ethephon + Agridex	48.0 oz. + 0.75 oz. + 9.6 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$9.00 + $3.17 + $1.50 followed by ----> $4.23 + $4.38 + $3.25	100	72.7 cd	19.7 a

Table 2. Continued.

Harvest Aid Chemicals Test Plot (4 rows of each)	Rate Applied Per Acre	Cost of Harvest Aid Per Acre	% Open Bolls	% Defoliation	% Desiccation
FirstPick + Ginstar + Induce followed by -------> Aim + Ethephon + Agridex	48.0 oz. + 3.0 oz. + 9.6 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$9.00 + $4.44 + $1.50 followed by ----> $4.23 + $4.38 + $3.25	100	94.0 ab	3.0 cde
FirstPick + Ginstar + Induce followed by -------> Aim + Ethephon + Agridex	32.0 oz. + 3.0 oz. + 9.6 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$6.00 + $4.44 + $1.50 followed by ----> $4.23 + $4.38 + $3.25	100	95.0 a	2.7 cde
Ginstar followed by -------> Aim + Ethephon + Agridex	5.0 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$7.40 followed by ----> $4.23 + $4.38 + $3.25	100	97.7 a	1.7 de
Finish 6 Pro + Ginstar + Induce followed by -------> Aim + Ethephon + Agridex	24.0 oz. + 3.0 oz. + 9.6 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$12.94 + $4.44 + $1.50 followed by ----> $4.23 + $4.38 + $3.25	100	97.3 a	1.0 e
Def + Prep + Induce followed by -------> Aim + Ethephon + Agridex	16.0 oz. + 16.0 oz. + 9.6 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$6.25 + $4.75 + $1.50 followed by ----> $4.23 + $4.38 + $3.25	100	71.0 cd	9.7 bcd
Gramoxone Inteon + Prep + Induce	5.0 oz. + 21 oz. + 9.6 oz. followed by -----> 1oz. + 1 pt. + 1 qt.	$1.10 + $6.23 + $1.50 followed by ----> $4.23 + $4.38 + $3.25	100	62.0 d	4.7 cde

NOTE: In Table 2 the individual or combination of letter a, b, c, d or e shown beside 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). Also, to account for 100 percent of the leaves you would add the percent defoliation plus the percent dessication and subtract from 100. The difference represents the percentage green leaves still remaining on the plant.

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- Nichino America who provided the ET
- Syngenta Crop Protection, Inc. who provided the Gramoxone Inteon
- Tri-State Chemical DBA United Agra Products (UAP) who provided the C.O.C. (Herbimax)
- Valent USA Corporation who provided the Resource

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