



Texas Agricultural Extension Service
The Texas A&M University System

Result Demonstration Report

1996 Tom Green County
Cotton Harvest Aid Demonstration
Cooperator: Chris Bubenik

Rick Minzenmayer, Jeff Ripley, Eric Zimmerman, and Billy Warrick *

Summary

Four harvest aid treatments were applied by airplane to All-Tex Atlas upland cotton on September 29, 1996 to prepare the crop for harvest. The plot was established on Chris Bubenik's Farm, nine miles northwest of Wall, Texas. The chemicals were applied to irrigated cotton that had 60 percent of its bolls open. Leaf shed was less than three percent and the cotton plant leaves were still green in color. All applied treatments resulted in a significant level of leaf defoliation when compared to the check.

Problem

In the Southern Rolling Plains of Texas, cotton is seeded late because of the delayed uniform planting date which is usually the third week in May. Because of this late planting date, many producers do not use harvest aids to terminate the cotton. However, due to favorable growing conditions, 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 challenge is to determine the best way to use the harvest aid materials, as inexpensively as possible, while providing consistent results in boll opening and leaf defoliation.

Objectives

Through the use of a field test: 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.

* Rick Minzenmayer, Extension Agent - IPM; Jeff Ripley and Eric Zimmerman, Tom Green County Extension Agents; and Dr. Billy Warrick, Extension Agronomist (San Angelo, Texas).

Materials and Methods

Cooperating County Producers: Chris Bubenik
Location: 9 miles northwest of Wall

Crop Production Information:

Planting Date: May 18 & 19, 1996
Planting Rate: 13.0 pounds per acre
Variety Planted: All-Tex Atlas
Planting Pattern: Solid on 40 inch spacing
Herbicide Applied: Prowl applied at 2.6 pints per acre, preplant incorporated, followed by 11.4 ounces of Direx plus 11.4 ounces of Caparol applied in an 18 inch band at planting
Number of Irrigations: Prewater only
Insecticides Applied: None
Fertilizer Applied: 283 pounds of 17-17-0-5 per acre was incorporated at the time Prowl was applied

Harvest Aid Application Information:

Date Applied: September 29, 1996
Wind Speed: 4 to 5 miles per hour
Wind Direction: South
Air Temperature: 68⁰ to 74⁰ Fahrenheit
Relative Humidity: 20% to 35%
Cotton Height: 28 to 40 inches
Application Device: Airplane
Carrier: 5 gallons of water per acre
Plot Size: 10 acres for each treatment applied

Rainfall Information (Date and Amount):

September 12	0.15 inch	October 4	0.06 inch
September 13	0.07 inch	October 21	0.05 inch
September 14	1.53 inches	October 22	0.01 inch
September 15	0.01 inch	October 27	0.29 inch
September 19	0.02 inch	October 28	1.91 inches
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Total	1.78 inches	Total	2.32 inches

Data Collection:

Three areas 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. Actual leaf counts and boll counts were made in each of the marked areas. Percent open bolls was determined by dividing the total number of bolls open enough to be harvested by the total number of bolls on the same plants. Percent defoliation was determined by dividing the total number of leaves remaining on the cotton plants by the original number of leaves (250 leaves) on the plants. Percent desiccation was determined by dividing the total number of leaves that had dried and remained attached to the plants by the original 250 leaves. 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. The regrowth rating system used was: 0 = no regrowth, 1 = regrowth up to the size of a quarter, 2 = regrowth between the size of a quarter and half-dollar, 3 = bigger than a half-dollar. Regrowth was active across the plot on all plants before the test was established. The information collected on October 7, 14 and 21 are reported in Tables 1, 2, and 3, respectively.

Results and Discussion

The First Eight Days

The graph on the next page reflects the hourly temperature for September 29 - October 5. Maximum daytime temperatures for the first four days were between 75 and 85 degrees fahrenheit. The air temperature for the next three days were between 65 and 75 degrees. The minimum temperatures for the first three nights were between 45 and 55 degrees and between 55 and 65 degrees for the rest of the week.

At the eight day evaluation, the percent of open bolls and the percent defoliation was significant between treatments. All treatments and the check had significantly more open bolls than the Finish at 32 ounces plus Folex at 10 ounces treatment.

The amount of boll opening was at an appropriate level in all treatments except for the Finish at 32 ounces plus Folex at 10 ounces. However, the cotton bolls in the treatment area when cross-sectioned had dark seed coats and well developed cotyledons which indicated that they were mature.

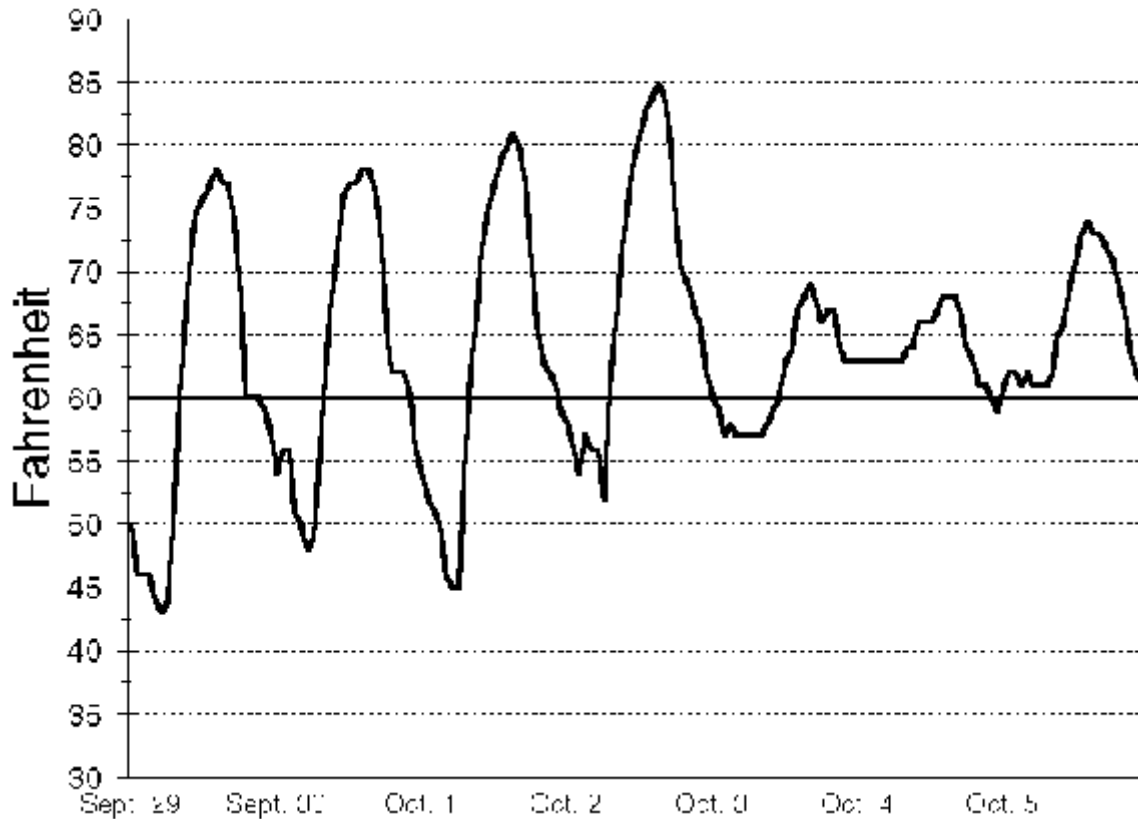
All treatments had significantly more defoliation than the check. Prep at 21 ounces plus Folex at 10 ounces and Finish at 32 ounces plus Ginstar at 4 ounces had significantly more defoliation than the Finish at 32 ounces plus Folex at 10 ounces. There was no apparent reason for the difference in the Finish at 32 ounces plus Folex at 10 ounces, it just existed. The summary of agronomic data collected at 8 days after treatments were applied are reported in Table 1.

Table 1. Chris Bubenik's 1996 Rhone-Poulenc Cotton Harvest Aid Test (Tom Green County) October 7, 1996 (Eight days after treatments were applied)

Harvest Aids Applied	Rate Applied Per Acre (ounces)	Harvest Aid Cost Per Acre	% Open Bolls (8 DAT)	% Defoliation (8 DAT)	% Desiccation (8 DAT)	Regrowth Rating Top (8 DAT)	Regrowth Rating Bottom (8 DAT)
Finish + Ginstar	32 + 4	\$??.??	86.0 a	79.3 a	2.3	0	0
Prep + Ginstar	21 + 4	\$13.99	91.0 a	62.3 ab	6.7	0	0.3
Finish + Folex	32 + 10	\$??.??	62.7 b	40.3 b	6.0	0	0
Prep + Folex	21 + 10	\$11.49	80.3 a	72.0 a	4.3	0	0
Check	-	\$0.00	79.3 a	0.0 c	0.7	0	0

NOTE: The individual or combination of letter a, b, or c shown beside the number are to indicate statistical significance. There is no statistical difference between numbers that have the same letter to the side (even when there appears to be a large difference in results between the harvest aid chemicals applied).

1996 Hourly Air Temperatures



The Second Week

The graph on the next page reflects the hourly temperature for October 6 - 12, 1996. Maximum daytime temperatures for the entire week ranged between 70 and 87 degrees fahrenheit. The minimum temperatures for four of the seven nights were between 45 and 55 degrees and for the other three nights the temperature was between 55 and 65 degrees.

At the 15 day evaluation, the percent of open bolls, the percent defoliation, and the percent top regrowth was significant between treatments. The amount of boll opening progressed rapidly during this time period with the percent of open bolls being a minimum of 81 percent. However, all treatments and the check had significantly more open bolls than the Finish at 32 ounces plus Folex at 10 ounces treatment.

All treatments had significantly more defoliation than the check. Finish at 32 ounces plus Ginstar at 4 ounces had significantly more defoliation than the Finish at 32 ounces plus Folex at 10 ounces.

The regrowth in the top of the plant was significantly different between treatments but the size of leaves were still small enough not to impact harvest. The summary of agronomic data collected at 15 days after treatments were applied are reported in Table 2.

The Third Week

The graph on the page 7 reflects the hourly temperature for October 13 - 19, 1996. Maximum daytime temperatures for the first five days ranged between 80 and 87 degrees fahrenheit. The minimum temperatures for three of the seven nights were above 60 degrees and three of the nights were between 45 and 55 degrees.

At the 22 day evaluation, the percent of open bolls and the percent defoliation was significant between treatments. The amount of boll opening progressed well during this time period with the percent of open bolls being a minimum of 90 percent. However, all treatments and the check had significantly more open bolls than the Finish at 32 ounces plus Folex at 10 ounces. Also, there was a significant difference in the amount of open bolls between the Prep at 21 ounces plus Folex at 10 ounces and the check.

All treatments had significantly more defoliation than the check. All applied treatments had significantly more leaf defoliation than the Finish at 32 ounces plus Folex at 10 ounces treatment. The summary of agronomic data collected is reported in Table 3.

Weather Information

Weather information used in the graphs were obtained from the National Weather Service in San Angelo. The weather information closely matches the maximum and minimum air temperatures recorded at the field weather station. There was only a slight difference in the amount of rainfall recorded at the field weather station.

Table 2. Chris Bubenik's 1996 Rhone-Poulenc Cotton Harvest Aid Test (Tom Green County)
 October 14, 1996 (15 days after treatments were applied)

Harvest Aids Applied	Rate Applied Per Acre (ounces)	Harvest Aid Cost Per Acre	% Open Bolls (15 DAT)	% Defoliation (15 DAT)	% Desiccation (15 DAT)	Regrowth Rating Top (15 DAT)	Regrowth Rating Bottom (15 DAT)
Finish + Ginstar	32 + 4	\$???.??	97.7 a	90.3 a	2.7	0 b	0.7
Prep + Ginstar	21 + 4	\$13.99	97.7 a	67.7 ab	2.7	0.7 ab	0.7
Finish + Folex	32 + 10	\$???.??	81.3 b	58.0 b	7.3	0.7 ab	0.3
Prep + Folex	21 + 10	\$11.49	97.0 a	82.7 ab	5.0	0 b	1.0
Check	-	\$0.00	96.0 a	5.3 c	1.0	1.0 a	0

NOTE: The individual or combination of letter a, b, or c shown beside the number are to indicate statistical significance. There is no statistical difference between numbers that have the same letter to the side (even when there appears to be a large difference in results between the harvest aid chemicals applied).

1996 Hourly Air Temperatures

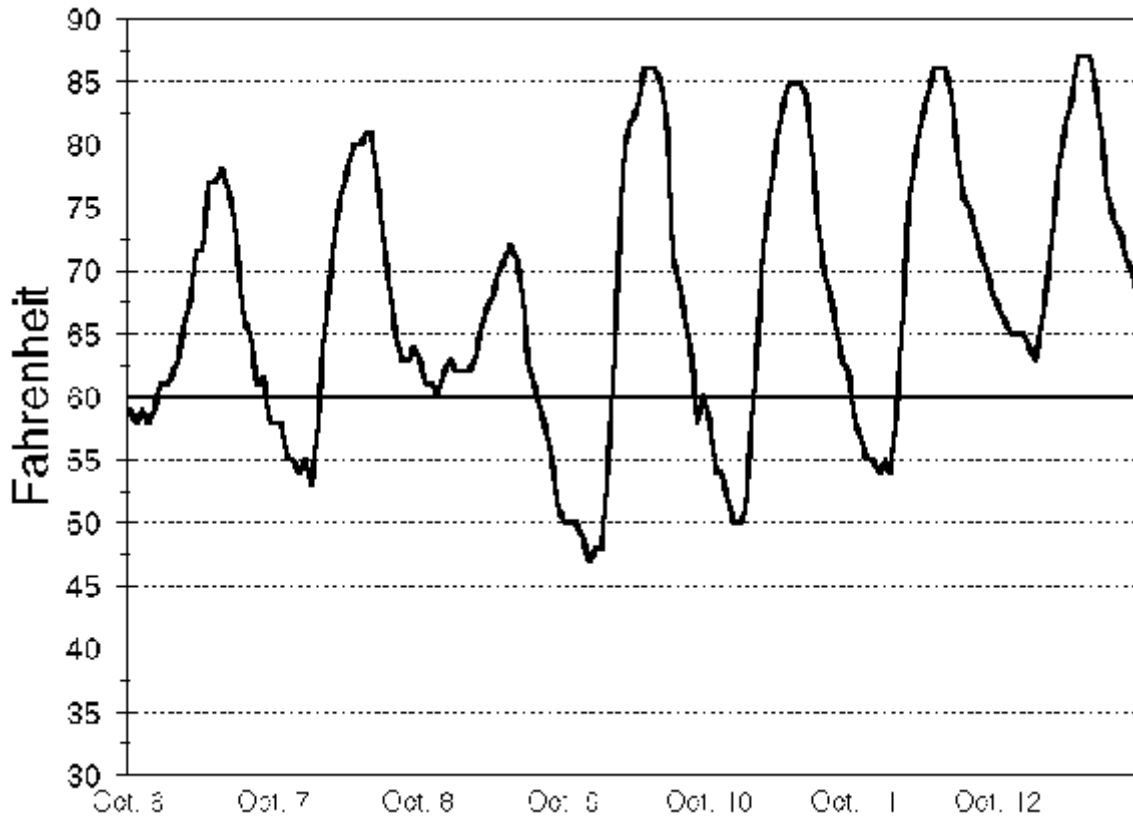
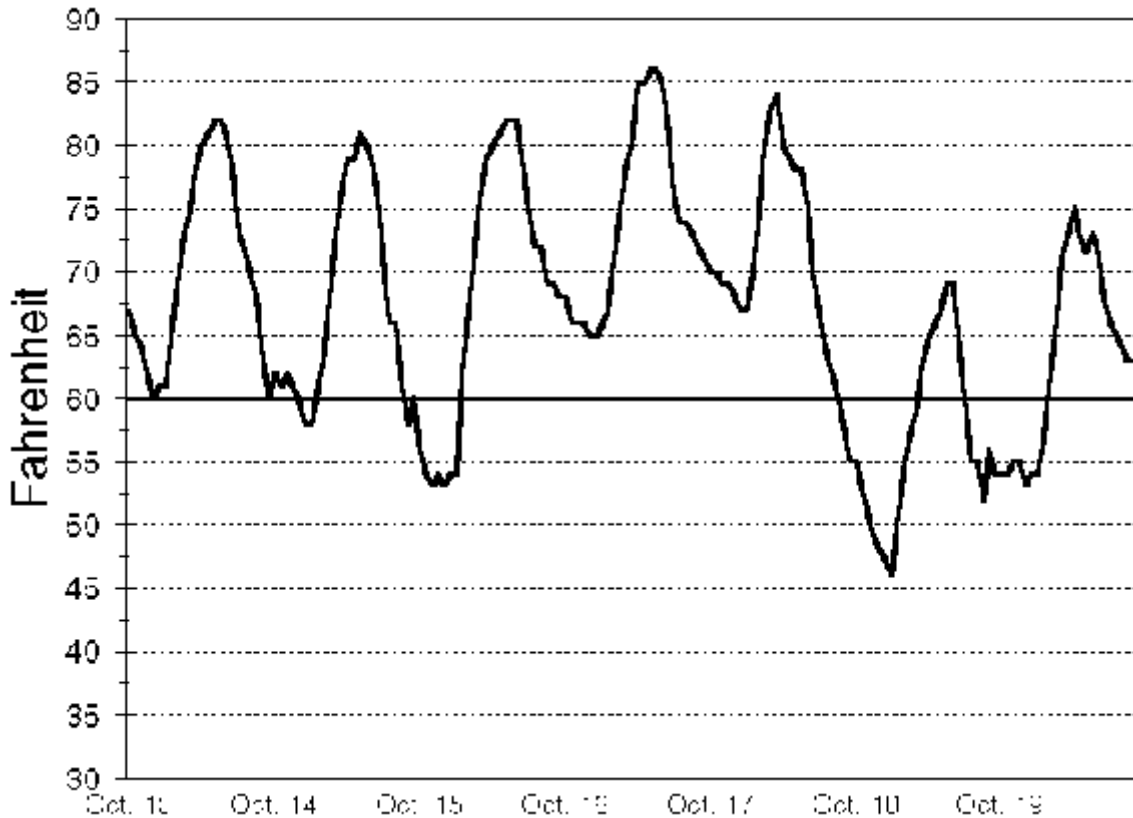


Table 3. Chris Bubenik's 1996 Rhone-Poulenc Cotton Harvest Aid Test (Tom Green County)
 October 21, 1996 (22 days after treatments were applied)

Harvest Aids Applied	Rate Applied Per Acre (ounces)	Harvest Aid Cost Per Acre	% Open Bolls (22 DAT)	% Defoliation (22 DAT)	% Desiccation (22 DAT)	Regrowth Rating Top (22 DAT)	Regrowth Rating Bottom (22 DAT)
Finish + Ginstar	32 + 4	???.??	99.3 ab	92.7 a	0.7	1.3	2.2
Prep + Ginstar	21 + 4	\$13.99	98.3 ab	86.7 a	4.0	1.7	1.8
Finish + Folex	32 + 10	???.??	90.7 c	73.0 b	3.3	2.7	1.8
Prep + Folex	21 + 10	\$11.49	100.0 a	91.7 a	1.7	2.2	2.3
Check	-	\$0.00	96.7 b	29.3 c	0.3	2.7	2.0

NOTE: The individual or combination of letter a, b, or c shown beside the number are to indicate statistical significance. There is no statistical difference between numbers that have the same letter to the side (even when there appears to be a large difference in results between the harvest aid chemicals applied).

1996 Hourly Air Temperatures



Economic Analysis

Without there being a significant difference in boll opening, there should not be a difference in lint yield between the treatments. Without a difference in yield, then an economic advantage from the use of harvest aids is difficult to calculate. However, 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.

Conclusions

Four harvest aid treatments were applied by airplane to All-Tex Atlas upland cotton on September 29, 1996 to prepare the crop for harvest. The plot was established on Chris Bubenik's Farm, nine miles northwest of Wall, Texas. The chemicals were applied to irrigated cotton that had 60 percent of its bolls open. Leaf shed was less than three percent and the cotton plant leaves were still green in color. All applied treatments resulted in a significant level of leaf defoliation when compared to the check.

Acknowledgements

I want to take this opportunity to thank:

- Chris Bubenik for his help in plot establishment and management.
- Clint Culp and Justin Collins for their assistance in making plant counts on plots during September and October.
- Rhone-Poulenc Ag Company for their support of harvest aid research conducted in the Trans-Pecos and Southern Rolling Plains areas of Texas.
- Dee and Paula Sims with Three Rivers Flying Service for establishing the test plot.

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

- Rhone-Poulenc Ag Company who provided the Finish, Folex and Prep
- AgrEvo USA Company who provided the Ginstar.

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Chris Bubenik's Cotton Harvest Aid Test
Tom Green County, 1996
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Weather Information from National Weather Service in San Angelo, Texas (1996)

Month	Avg. Max Air Temp.	Avg. Min Air Temp.	Total Rainfall (inches)	Avg. Wind Speed	Avg. Solar Radiation	Total DD 60s (heat units)
May 22 - 31	94.4	68.9	0.65	11.7	21.7	216.5
June	95.2	69.4	1.81	7.8	22.3	669.0
July	97.9	72.9	0.26	8.1	25.4	787.5
August	92.2	70.5	7.66	7.0	21.3	661.5
September	83.9	62.0	1.92	6.6	13.4	401.0
October	78.7	51.5	2.42	8.1	6.0	186.0

Date	Max. Air Temp.	Min. Air Temp.	Rainfall (inches)	Avg. Wind Speed
October 1	81	45	0	5.8
October 2	86	52	0	5.9
October 3	70	56	0.1	8.2
October 4	69	59	0.06	5.8
October 5	74	59	0	4.3
October 6	79	57	0	2.5
October 7	82	53	0	2.2
October 8	72	51	0	6.4
October 9	87	47	0	5.1
October 10	86	50	0	5.5
October 11	86	53	0	10.5
October 12	88	63	0	12.5
October 13	83	59	0	8.7
October 14	81	57	0	9.5
October 15	83	52	0	6.6
October 16	87	65	0	11.4
October 17	84	56	0	13.2
October 18	69	45	0	7.7
October 19	75	53	0	13
October 20	88	63	0	11.7
October 21	81	37	0.05	11.7
October 22	62	35	0.01	12
October 23	73	33	0	6.9
October 24	77	49	0	6.5
October 25	83	49	0	10.7
October 26	87	56	0	8.8
October 27	75	52	0.29	6.8
October 28	59	49	1.91	4.7
October 29	74	47	0	12
October 30	78	42	0	4.4
October 31	80	52	0	9.9