SIX YEAR SUMMARY OF HARVEST AID TESTING IN THE SOUTHERN ROLLING PLAINS OF TEXAS

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Abstract

Since cool temperatures occur in late-September and October when harvest aids are usually applied in the Southern Rolling Plains of Texas, tests were conducted to determine the response of cotton conditioners, defoliants, and desiccants under cooler environmental conditions. From 1992 through 1997, twenty-five different harvest aid chemicals have been used in 24 replicated small plot and nine large block tests. In these tests, 190 different harvest aid treatments have been evaluated. The harvest aids were applied alone or in combinations with other harvest aids and/or adjuvants. In these tests, the use of harvest aids generally resulted in increased leaf defoliation and desiccation. However, environmental conditions, maturity of the crop, variety of cotton and the management of soil moisture and nutrients are important variables that impact the performance of the harvest aid materials applied.

Introduction

Cotton produced in the Southern Rolling Plains of Texas is generally ready for harvest 30 days before the first killing freeze in the Fall. Due to the extra time that the cotton lint is exposed to weather, both yield and quality are reduced. Due to cool temperatures that occur in late-September and October when harvest aids are usually applied in the area, tests were initiated to determine the response of cotton conditioners, defoliants, and desiccants under cooler environmental conditions

Materials and Methods

All tests plots were established in Tom Green County (San Angelo, Texas vicinity) on cotton that had been furrow irrigated. In all test plots, the cotton plants were in an unstressed condition at the time that harvest aids were applied.

Number of Harvest Aid Tests Conducted			
Year	Type of Test Conducted	Number of Treat-ments	Plot Size
1992	4 Replicated Small Plots	48	13.33' X 60'
1993	4 Replicated Small Plots	28	13.33' X 602'
1993	4 Large Block	7	60 acres
1994	5 Replicated Small Plots	47	13.33' X 495'
1995	4 Replicated Small Plots	33	13.33' X 600'
1995	3 Large Block	8	56 acres
1996	3 Replicated Small Plots	21	13.33' X 635'

1996	2 Large Block	6	60 acres
1997	4 Replicated Small Plots	24	13.33' X 600'
Total	33 Tests	221	-

From 1992 through 1997, 25 different harvest aid chemicals have been used to establish 24 replicated small plots and nine large block tests. These tests evaluated 190 different harvest aid treatments. The harvest aids were applied alone or in combinations with other harvest aids and/or adjuvants.
Materials used included:

Harvest Aid Chemicals Applied in Test Plots from 1992-1997 in the Southern Rolling Plains of Texas		
Trade Name	Common Name	Marketed By:
Accelerate	Endothall	Elf Atochem North America, Inc.
CottonQuik	1-Aminomethan-amidedihydrogen-tetraoxosulfate + 2-Chloroethyl-phosphonic acid	Griffin Corporation
Cyclone	Paraquat	Zeneca Ag Products
DEF 6	Tribufos	Bayer
Defol 6	Sodium Chlorate	Drexel Chemical Corporation
DROPP 50W	Thidiazuron	AgrEvo USA Co.
Express	Tribenuron-methyl	DuPont Agricultural Products
Finish	Ethephon + Cyclanilide	Rhone-Poulenc
Flair	Endothall	Elf Atochem North America, Inc.
Folex	Tribufos	Rhone-Poulenc
Harvade	Dimethipin	Uniroyal Chemical Co., Inc.
Ignite	Glufosinate-ammonium	AgrEvo USA Co.
Ginstar	Thidiazuron + Diuron	AgrEvo USA Co.
Pick-Mor	Sodium Cacodylate + Cacodylic Acid + Sodium Chlorate	Moore Ag
Prep	Ethephon	Rhone-Poulenc
Quick Pick	Sodium Cacodylate + cacodylic acid	Platte Chemical Co.
Roundup	Glyphosate	Monsanto Agric. Co.

Super Boll	Ethephon	Griffin Corporation
Other Materials Tested		
31041A		Rhone-Poulenc
BAS-123		BASF Ag.
Buchman EXP.		Buchman Laboratories
Desiccant L-10	Arsenic Acid	Elf Atochem North America, Inc.
Morex UBI-9237		Moore Ag
TD2335		Elf Atochem North America, Inc.
VPG 6444 EC		Voluntary Purchasing Groups

Test Plot Establishment Information

Established: Late September to mid-October
Test Locations: Tom Green County, Texas
Cotton Variety: Paymaster HS-26,
All-Tex Atlas,
Paymaster HS-200 and
Deltapine NuCOTN 35 B
Application Device: Small plots were established with a self-propelled sprayer
Large blocks were established by airplane.
Nozzle Arrangement: 3 to 5 nozzles per row.
Nozzle Type: Combination of hollow-cone and flat fan
Pressure: 30 to 40 p.s.i.
Carrier: 11.5 to 23 gallons of water per acre
Boom Height: 3 to 6 inches above average plant height
Plot Size: Except for 1992, all replicated small plots were 13.33 feet wide by 495 feet long or more.
Test Design: All small plots were replicated 3 or 4 times

Data Collection

Prior to applying harvest aids, 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. 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 (i.e. 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.

Results and Discussion

Instead of giving a plot by plot summary for the six years, this discussion will reflect the combined information from the 24 replicated small plot tests and nine large block tests conducted from 1992 - 1997. A plot summary is available for each test upon written request. Requests can be sent to: 7887 U.S. Highway 87 North, San Angelo, TX., 76901.

Tests were established in late September to mid-October. In most tests, cool nighttime temperatures slowed the activity of the harvest aids applied. The nighttime temperatures usually ranged from 50 to 60 degree Fahrenheit. It was not unusual to have two to five nights in the 40 to 50 degree range during the two week period after test establishment.

Nighttime air temperatures after treatments were applied			
Year	Days 0 to 7	Days 8 to 14	Days15 to 21
1992	1 day below 50^0 F	no day below 50^0 F	1 day below 50^0 F
1993	1 day below 50^0 F	4 days below 50^0 F	7 days below 50^0 F
1994	1 day below 50^0 F	1 day below 50^0 F	2 days below 50^0 F
1995	5 day below 50^0 F	2 days below 40^0 F	3 days below 40^0 F
1996	3 days below 50^0 F	2 days below 50^0 F	1 day below 50^0 F
1997	3 days below 50^0 F	3 days below 50^0 F	-

The major factors impacting harvest aid performance in the Southern Rolling Plains of Texas were:

1) Environmental conditions that effect the cotton plants response to the harvest aids applied. Weather conditions throughout the growing season impacts plant development and ultimately the plants response to harvest aids applied. Low temperatures and cloud cover after harvest aids are applied can slow plant development and response. Few harvest aids provide control or suppression of regrowth, thus rainfall events that result in sufficient soil moisture accumulation to initiate new growth is a concern.

The cool nighttime temperatures reduced the effectiveness of Prep and Prep combinations in opening bolls. In all but one test conducted, this reduction was not offset by using a higher rate of Prep. When nighttime temperatures fell below 60 degrees Fahrenheit the plants response to DROPP was reduced sharply. Cloudy conditions had a significant impact on desiccation in tests where Cyclone was applied.

2) Environmental conditions at the time of application. Temperature, relative humidity and wind speed are factors that impact the amount of time spray droplets remain on the plant. Some wind is beneficial for the distribution of the material throughout the plant canopy. Wind speeds above five miles per hour reduce the time the droplet remains on the plant. Relative humidity above 70 percent allows a droplet twice as much time on the plant as relative humidity below 30 percent. Temperature above 80 degrees reduces the amount of time the droplet remains on the plant. In most instances concerning harvest aids, an extended period of absorption generally increases the response of the cotton plant to the materials applied.

3) Maturity of the cotton when harvest aids are applied. Whether a defoliant or a desiccant is used, it is advantageous to allow the cotton as much time as possible to mature. Once the desired maturity range is reached the response of the plant to harvest aids applied is significantly increased.

4) Cotton variety. Picker-type cotton varieties were easier to defoliate and open bolls on than stripper-type

cotton. Weather delays in harvesting generally reduced yield more in picker-type cotton varieties than in stripper-type cotton varieties.

In the tests conducted from 1992 to 1996 the varieties used in the harvest aid tests (stripper-type cotton) were those identified by producers as the most challenging for opening bolls, leaf defoliation and regrowth. Producers plant the stripper-type varieties due to their stormproof bolls which reduce the amount of lint loss, as compared to open boll varieties, when weather related harvest delays occur. It is interesting to note that the number of acres being planted to picker-type cottons is increasing as producers gain a better understanding of harvest aids through experience.

5) Management to reduce available soil moisture and nutrients is important for regrowth suppression. Soil moisture and nutrients at the end of the production season should be depleted to the point that regrowth potential is limited. However, soil moisture and nutrients levels should be high enough to keep the plant from suffering stress which would reduce the absorption of the harvest aid materials applied.

Ginstar has proven to be the most consistent harvest aid tested in reducing and suppressing regrowth. However, due to the price of Ginstar, it will continue to be used as tank mix partner as an effort to reduce the expense of preparing the crop for harvest.

Experience gained from conducting these tests resulted in increased success in reaching specific goals of boll opening, defoliation, desiccation, and regrowth suppression. It was noted early in the testing program that desiccation up to 20 percent was not economically detrimental and often the benefit of regrowth suppression obtained from desiccation offset the potential loss in the value of the lint.

Application of harvest aid materials to mature cotton as the air temperature is increasing combined with high relative humidity, cloudless days, warm daytime and nighttime temperatures resulted in better performance from the harvest aids tested.

Conclusions

Since cool temperatures occur in late-September and October when harvest aids are usually applied in the Southern Rolling Plains of Texas, tests were conducted to determine the response of cotton conditioners, defoliants, and desiccants under cooler environmental conditions. From 1992 through 1997, twenty-five different harvest aid chemicals have been used in 24 replicated small plot and nine large block tests. In these tests, 190 different harvest aid treatments have been evaluated. The harvest aids were applied alone or in combinations with other harvest aids and/or adjuvants. In these tests, the use of harvest aids generally resulted in increased leaf defoliation and desiccation. However, environmental conditions, maturity of the crop, variety of cotton and the management of soil moisture and nutrients are important variables that impact the performance of the harvest aid materials applied.

Product Information and Disclaimer

Accelerate® is a product marketed by Elf Atochem North America, Inc.,
BAS-123 is a product tested by BASF Ag.
Buchman Experimental is a product of Buchman Laboratories,
CottonQuik™ is product marketed by Griffin Corporation,
Cyclone® is a product marketed by Zeneca Ag Products,
Def® 6 is a product marketed by Bayer,
Defol® 6 is a product marketed by Drexel Chemical Corp.,
Desiccant L-10 is product marketed by Elf Atochem North America, Inc.,
DROPP® 50WP is a product marketed by AgrEvo USA Company,
Express® is a product marketed by E. I. duPont de Nemours & Co. (Inc.),

Finish® is a product marketed by Rhône-Poulenc Ag Company,
Flair® is product marketed by Elf Atochem North America, Inc.,
Folex® 6-EC is a product marketed by Rhône-Poulenc Ag Company,
Ginstar® is a product marketed by AgrEvo USA Company
Griffin Experimental is a product of Griffin Corporation,
Harvade® is a product marketed by Uniroyal Chemical Co., Inc.
Ignite® is a product marketed by AgrEvo USA Company,
Morex UBI-9237 is a product marketed by Moore Ag
Pick-Mor® is a product marketed by Moore Ag
Prep™ is a product marketed by Rhône-Poulenc Ag Company,
Quick Pick® is a product marketed by Platte Chemical Company,
Roundup® is a product marketed by Monsanto Agricultural Company,
SuperBoll ™ is product marketed by Griffin Corporation,
TD2335 is a product owned by Elf Atochem North America, Inc.,
VPG 6444 EC is a product owned by Voluntary Purchasing Groups, Inc.,
31041A was a product under review by Rhône-Poulenc Ag Company.