

**EVALUATION OF TRICLOPYR AS
A POTENTIAL HARVEST AID**

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Abstract

Due to the annual problems with cotton regrowth in Central Texas, and the rapid acceptance of Roundup Ready cotton, a study was implemented to assess activity of triclopyr as a potential harvest aid. Def + Dropp tank mixes containing Remedy and Grandstand exhibited poor defoliation and considerable plant desiccation at two locations on non-Roundup Ready cotton varieties (Suregrow 125 and DP&L 33B). The Grandstand and Remedy treatments demonstrated unacceptable leaf desiccation and defoliation at all rates. Symptomology was very similar to paraquat, and complete leaf desiccation occurred within three DAT. At the College Station location, terminal and basal regrowth were present in all treatments that did not contain triclopyr. The Remedy and Grandstand treatments showed no terminal regrowth and only negligible basal regrowth at 21 DAT. At the Thrall location, no statistical differences were observed for terminal and basal regrowth. At the Thrall location with DP&L 436 RR, Def + Dropp + Remedy tank mixes exhibited poor defoliation and significant leaf desiccation at all three rates. However, the Def+Dropp +Grandstand tank mixes exhibited excellent defoliation and no plant desiccation. At this location, a differential response between the ester and salt formulations of triclopyr was evident. Terminal and basal regrowth data analysis indicated no statistical differences among treatments.

Introduction

Cotton typically is harvested in late August through September in Central Texas, a time period when late-summer precipitation reaches a high probability. September is the second highest rainfall month, averaging 4.74 inches. Consequently, wet conditions can delay harvest and allow the crop to develop significant regrowth. Regrowth after defoliation is an annual concern, especially for stripper-harvested cotton. Also, regrowth can occur following the

resumption of growth after cut-out, well before harvest aids are applied.

Cotton producers employ several means for addressing regrowth. Products that provide some regrowth suppression include the defoliant Dropp (thidiazuron) and Ginstar (thidiazuron + diuron). In addition, Roundup (glyphosate) can be applied to cotton either as a separate treatment about seven days prior to defoliation, or in a tank mix with a defoliant, resulting in good regrowth suppression. Roundup applied at 16 to 24 oz./acre to cotton at 30 to 50% open boll has been found to provide extended regrowth suppression (Landivar, 1994). However, glyphosate will not suppress regrowth in Roundup Ready cotton varieties. In 1999, Texas reported over 2.1 million acres of Roundup Ready cotton, and based on current trends this acreage will continue to increase, especially as more regionally adapted varieties are commercialized.

The herbicide triclopyr, designed for perennial weed and brush control, is known to have significant phytotoxic activity on cotton when applied at low rates (Jacoby et.al. 1990). Their study was designed to simulate the effects of off-target drift on juvenile and fruiting cotton. They did not assess the compound's affect on mature cotton. Due to the annual problems with cotton regrowth in Central Texas, and the rapid acceptance of Roundup Ready cotton, this study was implemented to assess activity of triclopyr as a potential harvest aid.

Methods

The study was conducted at two locations in Central Texas -- an irrigated site at the Texas A&M University Farm near College Station, Texas, and a dryland location at the Stiles Farm Foundation near Thrall, Texas. The varieties utilized represented transgenic and conventional technology — DP&L 436 (Roundup Ready), DP&L 33B (Bollgard), and Suregrow 125 (conventional). DP&L 436 and Suregrow 125 were used at the Thrall location and DP&L 33B was utilized at the College Station site. Plots were four rows wide x 75 feet in length. All determinations were made from the center two rows to avoid spray drift influence. Treatments were applied with a self-propelled Lee Spider Sprayer equipped with 11002 flat fan nozzles, spaced on 20-inch centers. The sprayer was operated at 30 psi (CO₂) and calibrated to deliver 10 gallons/acre at a speed of 4 mph. A nonionic surfactant was added to all treatments at 0.25% v/v. Initial treatments were applied August 16, 1999 between 10:00 and 2:00 pm. Defoliation, desiccation and green tissue observations were collected 7, 14 and 21 days after treatment (DAT). Terminal and basal regrowth were assessed at 21 DAT by evaluating five feet of the center two rows, utilizing a new method developed by Stichler, 1999. This method employs a set of illustrations representing six distinct stages of regrowth

(zero=no regrowth and five=new leaf canopy). This approach serves to standardize regrowth data collection and provides a better means of quantifying and comparing harvest aid treatments. Study sites were in the 60 to 70% open boll stage at application. Harvest aid treatments included tank mix combinations of Def (tribufos), Dropp, Roundup, Remedy (ester formulation of triclopyr - 3,5,6-trichloro-2pyridinyloxyacetic acid, butoxyethyl ester) and Grandstand {amine formulation of triclopyr - (3,5,6-trichloro-2pyridinyloxyacetic acid), triethylamine salt}. Remedy is a herbicide used for brush and perennial weed management. Grandstand is utilized in rice culture. Triclopyr is classified as an auxin type herbicide that accumulates in meristematic regions of the plant. Rates for these compounds represented 0.031, 0.063 and 0.126 lbs. acid equivalent/acre. Rates for all products are reported in product/acre. Dropp was included at the 0.2 lbs./A rate to provide a regrowth control comparison, although this rate is seldom used in Central Texas. Roundup is considered the standard for providing extended regrowth control and was included to provide regrowth comparisons for the non-Roundup Ready varieties. Remedy and Grandstand were tank mixed with Def +Dropp to simulate the probable use method.

Results

Dry and hot conditions prevailed during the latter 45 days of the season and into harvest. Consequently, little soil profile moisture was available at the College Station and Thrall locations, and only 0.01 inches of rainfall was received for the duration of the study. Heat unit accumulation for the study period totaled 549 DD60's. Total seasonal rainfall (April 15 to August 25) totaled 9.92 inches. Defoliation and desiccation ratings represent data collected at 14 DAT, and terminal and basal regrowth ratings represent data collected at 21 DAT.

College Station and Thrall Locations Cotton Varieties -- DP&L 33B and Suregrow 125

The standard defoliation treatment for the region is a tank mix of Dropp (0.1 lbs./A) + Def (12 oz./A). At each location, this treatment showed greater than 94% defoliation and no leaf desiccation (Tables 1 and 2). Dropp alone and Def/Dropp +Roundup treatments demonstrated good defoliation and negligible desiccation. However, the Def/Dropp + Grandstand/Remedy tank mixes exhibited poor defoliation and considerable plant desiccation. The Grandstand and Remedy treatments at all rates demonstrated leaf desiccation ranging from 28 to 53% and defoliation of 50 to 63%. Symptomology was very similar to paraquat, and complete leaf desiccation occurred within three DAT. No differences were observed between the ester and salt formulations of triclopyr. At the College Station location, terminal and basal regrowth was present in all treatments that did not contain triclopyr (Table 1). The Remedy and Grandstand treatments

showed no terminal regrowth and only negligible basal regrowth at 21 DAT. The next best treatment was the tank mix of Dropp + Roundup. However, across all treatments regrowth was less than ½ inch in diameter and would have presented no harvest problems. At the Thrall location, terminal and basal regrowth were present in all treatments and were ½ to 1 inch in size (Table 2). However, no statistical differences were observed among treatments. Significantly less terminal and basal regrowth were observed at 14 DAT with the Remedy and Grandstand treatments (data not presented), but at 21 DAT these differences were not detectable.

Thrall Location Cotton Variety – DP&L 436

The Dropp (0.1 lbs./A) + Def (12 oz./A) treatment showed 97% defoliation and no leaf desiccation (Table 3). Dropp alone demonstrated excellent defoliation, while Def alone showed only 82% leaf drop. Def +Dropp + Remedy tank mixes exhibited poor defoliation and significant leaf desiccation at all three rates. Defoliation ranged from 50 to 63% and desiccation ranged from 28 to 42%. The Def + Dropp +Grandstand tank mixes; however, exhibited excellent defoliation and no plant desiccation. At this location, a differential response between the ester and salt formulations of triclopyr was evident. Terminal and basal regrowth data analysis indicated no statistical differences among treatments (Table 3). Across all treatments, regrowth ranged from ¼ to 1 inch in size.

Summary

The standard defoliation treatment of Def+Dropp showed excellent defoliation and no leaf desiccation at all locations. Def +Dropp tank mixes containing Remedy and Grandstand exhibited poor defoliation and considerable plant desiccation at two locations on non-Roundup Ready cotton varieties (Suregrow 125 and DP&L 33B). The Grandstand and Remedy treatments demonstrated unacceptable leaf desiccation and defoliation at all rates. Symptomology was very similar to paraquat, and complete leaf desiccation occurred within three DAT. At the College Station location, terminal and basal regrowth were present in all treatments that did not contain triclopyr. The Remedy and Grandstand treatments showed no terminal regrowth and only negligible basal regrowth at 21 DAT. At the Thrall location, no statistical differences were observed for terminal and basal regrowth. At the Thrall location with DP&L 436 RR, Def +Dropp + Remedy tank mixes exhibited poor defoliation and significant leaf desiccation at all three rates. However, the Def+Dropp+ Grandstand tank mixes exhibited excellent defoliation and no plant desiccation. At this location, a differential response between the ester and salt formulations of triclopyr was evident. Terminal and basal regrowth data analysis indicated no statistical differences among treatments. The use of Remedy and Grandstand as potential harvest aids

requires further examination; however, DowAgroSciences has elected not to pursue additional harvest aid studies with the compound.

References

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Table 1. Defoliation, Desiccation and Regrowth Ratings at College Station – Cotton Variety DP&L 33B.

Treatment	Rate	Def (%)	Des (%)	Trgrw Rating	Bgrw Rating
Def	12 oz.				
Dropp	0.1 lbs.	94	0	1.5	1.5
Def	12 oz.				
Roundup	16 oz.	89	0	1.8	2.2
Dropp	0.2 lbs.				
Roundup	16 oz.	94	2	0.3	1.5
Dropp	0.2 lbs.	88	7	0.8	1.7
Def	12 oz.				
Dropp	0.1 lbs.				
Remedy	1 oz.	52	47	0.3	0
Def	12 oz.				
Dropp	0.1 lbs.				
Remedy	2 oz.	47	53	0	0.3
Def	12 oz.				
Dropp	0.1 lbs.				
Remedy	4 oz.	51	48	0	0
Def	12 oz.				
Dropp	0.1 lbs.				
Grandstand	1.3 oz.	53	45	0	1.0
Def	12 oz.				
Dropp	0.1 lbs.				
Grandstand	2.6 oz.	50	33	0	0.8
Def	12 oz.				
Dropp	0.1 lbs.				
Grandstand	5.2 oz.	50	50	0	0.7
LSD (P=.05)		8.7	18.0	0.8	0.9

Table 2. Defoliation, Desiccation and Regrowth Ratings at Thrall – Cotton Variety Suregrow 125.

Treatment	Rate	Def (%)	Des (%)	Trgrw Rating	Bgrw Rating
Def	12 oz.				
Dropp	0.1 lbs.	97	1	3.7	2.3
Def	12 oz.				
Roundup	16 oz.	92	3	2.3	2.0
Dropp	0.2 lbs.				
Roundup	16 oz.	95	2	3.3	3.0
Dropp	0.2 lbs.	83	5	3.7	3.0
Def	12 oz.				
Dropp	0.1 lbs.				
Remedy	1 oz.	62	38	3.0	3.0
Def	12 oz.				
Dropp	0.1 lbs.				
Remedy	2 oz.	60	40	2.7	2.0
Def	12 oz.				
Dropp	0.1 lbs.				
Remedy	4 oz.	60	40	3.0	2.7
Def	12 oz.				
Dropp	0.1 lbs.				
Grandstand	1.3 oz.	63	37	3.0	3.0
Def	12 oz.				
Dropp	0.1 lbs.				
Grandstand	2.6 oz.	63	28	3.0	2.7
Def	12 oz.				
Dropp	0.1 lbs.				
Grandstand	5.2 oz.	62	40	3.3	3.3
LSD (P=.05)		8.4	11.7	NS	NS

Table 3. Defoliation, Desiccation and Regrowth Ratings at Thrall – Cotton Variety DP&L 436.

Treatment	Rate	Def (%)	Des (%)	Trgrw Rating	Bgrw Rating
Def	12 oz.				
Dropp	0.1 lbs.	97	1	1.4	1.9
Def	12 oz.	82	2	3.0	3.3
Dropp	0.2 lbs.	94	2	2.0	2.0
Def	12 oz.				
Dropp	0.1 lbs.				
Remedy	1 oz.	63	28	0.7	1.0
Def	12 oz.				
Dropp	0.1 lbs.				
Remedy	2 oz.	50	45	1.3	1.0
Def	12 oz.				
Dropp	0.1 lbs.				
Remedy	4 oz.	53	42	1.3	1.7
Def	12 oz.				
Dropp	0.1 lbs.				
Grandstand	1.3 oz.	100	0	2.0	2.0
Def	12 oz.				
Dropp	0.1 lbs.				
Grandstand	2.6 oz.	100	0	1.3	1.7
Def	12 oz.				
Dropp	0.1 lbs.				
Grandstand	5.2 oz.	98	2	1.3	1.3
LSD (P=.05)		22	9	NS	NS