Wharton County - 2016 Cotton Harvest Aid Trial

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Relevance

Often, it is advisable to delay the choice of harvest-aid treatment(s) to cotton until the crop is nearly ready to terminate, which is a balance between optimizing yield and preserving quality. While the cotton variety, soil type, and cultural inputs for a given cotton crop can be selected, the weather cannot. The final decision as to when and what harvest-aid product(s) to apply is made by the prudent producer near the time of the initial harvest-aid treatment.

Cotton harvest aid chemicals are generally grouped into three categories – defoliants, desiccants, and boll openers. Defoliants remove foliage from the cotton plant by stimulating ethylene production, which promotes the formation of an abscission layer at the base of leaf petioles. Defoliants can be classed into two categories: (1) hormonal defoliants such as thiadiazuron (Dropp®, FreeFall®, etc.), and (2) herbicidal defoliants such as tribufos (Folex®) and the PPO inhibitors (Aim®, Display®, Sharpen®, etc.). For conventional cotton (non-Roundup Ready), glyphosate may be used as an herbicidal defoliant. If applied at too high a rate, herbicidal defoliants may cause excessive leaf injury, preventing the formation of the abscission layer and resulting in “stuck” leaves.

Desiccants, such as paraquat (Gramoxone®) or sodium chlorate, simply kill and dry leaf and stem tissues. At the higher rates, these products act very rapidly and do not allow an abscission layer to form at the junction of leaf petioles and the stem, resulting in “stuck” leaves. Desiccants are typically used in stripper-harvested cotton to dry plant tissues after a defoliant has been applied. Desiccants can be used at lower rates to help defoliate cotton, but selecting the appropriate rate to defoliate and not desiccate is challenging and is dependent upon environmental conditions.

Boll openers contain the active ingredient ethephon. Within the plant, ethephon is converted to ethylene, which causes bolls to open at a more rapid pace. Increased levels of ethylene within the

plant also help activate abscission layers of the leaf petioles, further defoliating the plant. It is important to note that although ethephon does hasten the opening of bolls, it will not speed up the maturity of immature bolls. Additionally, boll openers tend to enhance basal and terminal leaf growth following application, thus timely harvest is more critical when using a boll opener.

Grower standards for cotton defoliation in the Upper Gulf Coast area of Texas tend to be one of two common mixtures: 1-2 oz. Dropp®, + 12-16 oz. ethephon (Prep®) + 4-6 oz. Folex®; or 4 oz. Ginstar® + 21 oz ethephon (Prep®) .

Response

Preparing cotton for harvest is not an exact science. Although there is much information on how and when to apply harvest aid chemicals, producers recognize that seasonal and crop conditions have effects on crop responses to harvest aid treatments that are not always predictable.

To demonstrate the performance of cotton harvest aides on the 2016 Upper Gulf Coast cotton crop in Wharton County, the Wharton County office of Texas A&M AgriLife Extension established a harvest aid test at El Campo, Texas. Wharton County Extension Agent - Agriculture, Corrie Bowen and County Extension Agent – IPM for Wharton- Matagorda-Jackson County, Kate Harrell cooperated with local cotton grower, Mr. Michael Watz for a cotton harvest aid test. Dr. Gaylon Morgan, Professor and State Extension Cotton Agronomist and Dale Mott, Extension Program Specialist designed the test based on products and rates recommended by the industry. They also provided the products, equipment, and assistance to apply the harvest aids and evaluated each treatment. The trial plot size was 13.33 feet wide by 40 feet in length. The application volume for each treatment was 11 gallons/acre carrier volume. Croplan® 3885B2XF was the cotton variety planted in the field where the defoliation study took place. At the time of the first application on August 2, 2016 the cotton crop was estimated to be at 52-54% Open Boll. This cotton field was moisture stress at the time of the first application.

The Wharton County Harvest Aid Test was sprayed with the initial treatments on August 2, 2016. A total of 16 treatments were evaluated (including an untreated control), with each treatment replicated three (3) times. Treatments designed to include a second application of harvest aid were applied on August 9, 2016. Each treatment was rated on August 9, 2016 (7-DAT) for percent Defoliation, Desiccation, Green Leaf, and Green Boll; and on August 12, 2016 (10-DAT) for percent Defoliation, Desiccation, Green Leaf, Green Boll, and Regrowth.

A turn row meeting was conducted on August 12, 2016 (10 days after first application) at the site of the Wharton County Harvest Aid Test. Dr. Gaylon Morgan walked participants through each treatment, describing each treatment, the treatment's performance, and recommended best management practices based on the results of the Wharton test. Approximate cost per acre for each treatment was provided to participants with the 7-day post-treatment results.

Results

Results for the Wharton, Texas Cotton Harvest Aid Trial are given below in **Table 1.** The 7 DAT Evaluation of % Defoliation, % Desiccation, % Green Leaf, and % Green Boll; and **Table 2**. 10 DAT Evaluation of % Defoliation, % Desiccation, % Green Leaf, and % Regrowth. Treatments are listed by active ingredient or product name of the treatment. Some treatments required a follow-up, second application of harvest aid. This is noted by Application Timing*, Application A = 8/2/2016; Application B = 8/9/2016. Table 1. Lists the estimated total cost/acre of each of the harvest aid treatments evaluated.

Table 1. 7 DAT Evaluation of % Defoliation, % Desiccation, % Green Leaf, and % Green Boll

Treat-ment	Product	Rate	App Timing*	% Defoliation August 9, 2016 7 Days After Trt.	% Desiccation August 9, 2016 7 Days After Trt.	% Green Leaf August 9, 2016 7 Days After Trt.	% Unopened Boll August 9, 2016 7 Days After Trt.	Approximate Cost, $/acre
1	Untreated Check			13.3 b	0.0 b	86.7 a	6.0 a	$0.00
2	Thidiazuron SC	2.4 oz/a	A	92.3 a	3.7 b	4.0 b	6.0 a	$3.97
	Ginstar	2 oz/a	A					
3	Thidiazuron SC	2.4 oz/a	A	91.2 a	1.0 b	7.8 b	4.1 a	$4.57
	Ginstar + NIS(0.25%)	2 oz/a	B					
4	Thidiazuron SC	2.4 oz/a	A	94.3 a	1.7 b	4.0 b	2.7 a	$7.85
	Ethephon	21 oz/a	A					
	Ginstar + NIS(0.25%)	2 oz/a	B					
5	Thidiazuron SC	2.4 oz/a	A	84.3 a	0.3 b	15.3 b	5.3 a	$6.94
	Ethephon	21 oz/a	A					
	Folex	4 oz/a	A					
6	Thidiazuron SC	2. 4 oz/a	A	88.0 a	1.0 b	11.0 b	4.7 a	$8.66
	Ethephon	26 oz/a	A					
	Folex	6 oz/a	A					
7	Thidiazuron SC	2.4 oz/a	A	91.3 a	1.0 b	7.7 b	3.7 a	$11.16
	Folex	4 oz/a	A					
	Ethephon	24 oz/a	B					
	Folex	8 oz/a	B					
8	Thidiazuron SC	2.4 oz/a	A	91.6 a	0.2 b	8.2 b	6.2 a	$12.41
	Folex	6 oz/a	A					
	Ethephon	32 oz/a	B					
	Folex	6 oz/a	B					
9	Thidiazuron	2.4 oz/a	A	93.3 a	1.7 b	5.0 b	6.0 a	$15.79
	Ginstar + NIS(0.25%)	2 oz/a	A					
	Display + NIS(0.25%)	1 oz/a	B					
10	Thidiazuron SC	2.4 oz/a	A	89.0 a	3.0 b	7.7 b	4.3 a	$10.56
	Ethephon	21 oz/a	A					
	Sharpen + MSO + AMS(7.5lb/100)	1 oz/a	B					
11	Thidiazuron SC	2.4 oz/a	A	90.0 a	7.0 a	3.0 b	4.0 a	$9.89
	Sharpen + MSO	0.5 oz/a	A					
	Sharpen + MSO + AMS(7.5lb/100)	1 oz/a	B					

12	Thidiazuron SC	2.4 oz/a	A	92.7 a	1.0 b	6.3 b	3.0 a	$17.66
	Ethephon	21 oz/a	A					
	ETX + COC	1.3 oz/a	B					
13	Thidiazuron SC	2.4 oz/a	A	90.7 a	0.3 b	9.0 b	3.0 a	$17.13
	Ethephon	21 oz/a	A					
	Action + MSO (2.5lb/100) + AMS	6 oz/a	B					
14	Thidiazuron SC	1.6 oz/a	A	93.3 a	1.0 b	5.7 b	1.3 a	$13.22
	Finish 6 Pro	21 oz/a	A					
	Ginstar + NIS	2 oz/a	B					
15	Thidiazuron SC	2.4 oz/a	A	90.3 a	1.0 b	8.7 b	3.3 a	$20.23
	Finish 6 Pro	21 oz/a	A					
	Gramoxone + NIS	24 oz/a	B					
16	Ginstar	4 oz/a	A	90.0 a	0.3 b	9.7 b	2.3 a	$8.73
	Ethephon + Freeway(1oz)	24 oz/a	A					
	LSD P=.05			8.92	2.19	9.47	2.83	
	Standard Deviation			5.33	1.31	5.66	1.69	
	CV			6.2	86.61	45.37	40.99	
	Treatment F			40.21	5.474	37.478	2.324	
	Treatment Prob (F)			0.0001	0.0001	0.0001	0.0261	

*Application A = 8/2/2016; Application B = 8/9/2016

Means followed by same letter do not significantly differ (P=.05, LSD)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

Table 2. 10 DAT Evaluation of % Defoliation, % Desiccation, % Green Leaf, and % Green Boll

Treat-ment	Product	Rate	App Timing*	% Defoliation August 12, 2016 10 Days After Trt.	% Desiccation August 12, 2016 10 Days After Trt.	% Green Leaf August 12, 2016 10 Days After Trt.	% Unopened Boll August 12, 2016 10 Days After Trt.	% Regrowth August 12, 2016 10 Days After Trt.
1	Untreated Check			13.3 b	0.0 a	86.7 a	2.0 a	12.7b
2	Thidiazuron SC	2.4 oz/a	A	94.3 a	1.3 a	4.3 b	2.3 a	3.7b
	Ginstar	2 oz/a	A					
3	Thidiazuron SC	2.4 oz/a	A	93.7 a	1.7 a	4.7 b	3.3 a	3b
	Ginstar + NIS(0.25%)	2 oz/a	B					
4	Thidiazuron SC	2.4 oz/a	A	95.3 a	1.0 a	3.7 bc	2.0 a	3b
	Ethephon	21 oz/a	A					
	Ginstar + NIS(0.25%)	2 oz/a	B					
5	Thidiazuron SC	2.4 oz/a	A	88.0 a	0.3 a	11.7 b	3 a	4.3b
	Ethephon	21 oz/a	A					
	Folex	4 oz/a	A					
6	Thidiazuron SC	2. 4 oz/a	A	90.0 a	0.7 a	9.7 bc	2.3 a	5.3b
	Ethephon	26 oz/a	A					
	Folex	6 oz/a	A					

7	Thidiazuron SC	2.4 oz/a	A	98.0 a	0.3 a	1.7 bc	2.0 a	3b
	Folex	4 oz/a	A					
	Ethephon	24 oz/a	B					
	Folex	8 oz/a	B					
8	Thidiazuron SC	2.4 oz/a	A	98 a	1 a	0.4 bc	1.8 a	1.8b
	Folex	6 oz/a	A					
	Ethephon	32 oz/a	B					
	Folex	6 oz/a	B					
9	Thidiazuron	2.4 oz/a	A	97.3 a	1.3 a	1.3 bc	2.0 a	1.7b
	Ginstar + NIS(0.25%)	2 oz/a	A					
	Display + NIS(0.25%)	1 oz/a	B					
10	Thidiazuron SC	2.4 oz/a	A	98.0 a	1.3 a	0.7 bc	0.3 a	2b
	Ethephon	21 oz/a	A					
	Sharpen + MSO + AMS(7.5lb/100)	1 oz/a	B					
11	Thidiazuron SC	2.4 oz/a	A	98 a	2.0 a	0 c	0.3 a	1.3b
	Sharpen + MSO	0.5 oz/a	A					
	Sharpen + MSO + AMS(7.5lb/100)	1 oz/a	B					
12	Thidiazuron SC	2.4 oz/a	A	96 a	0.7 a	3.3 bc	1.0 a	4b
	Ethephon	21 oz/a	A					
	ETX + COC	1.3 oz/a	B					
13	Thidiazuron SC	2.4 oz/a	A	95.7 a	1.7 a	2.7 bc	3.0 a	2.7b
	Ethephon	21 oz/a	A					
	Action + MSO (2.5lb/100) + AMS	6 oz/a	B					
14	Thidiazuron SC	1.6 oz/a	A	97.0 a	0.7 b	2.3 bc	0.3 a	8.7ab
	Finish 6 Pro	21 oz/a	A					
	Ginstar + NIS	2 oz/a	B					
15	Thidiazuron SC	2.4 oz/a	A	97.7 a	1.7 a	0.7 bc	0.7 a	6.7b
	Finish 6 Pro	21 oz/a	A					
	Gramoxone + NIS	24 oz/a	B					
16	Ginstar	4 oz/a	A	90.3 a	0.3 a	9.3 bc	1.0 a	13a
	Ethephon + Freeway(1oz)	24 oz/a	A					
	LSD P=.05			6.22	1.38	6.44	2.24	4.13
	Standard Deviation			3.72	0.83	3.86	1.34	2.47
	CV			4.13	82.6	43.13	77.87	51.51
	Treatment F			92.748	1.557	89.171	1.66	6.639
	Treatment Prob(F)			0.0001	0.1491	0.0001	0.1179	0.0001

*Application A = 8/2/2016; Application B = 8/9/2016

Means followed by same letter do not significantly differ
(P=.05,LSD)
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.

Conclusions

Treatments with Folex® were slightly less effective than treatments with Ginstar®. Treatments that included Ginstar® showed a 5-10% better % defoliation at than treatments with Folex® at 7 DAT; 4-6 % better % defoliation at 10 DAT. Treatments that included Ethephon (Prep®) showed the most sign of regrowth at 7 DAT, with 15.3% green leaf using the common treatment of 2.4 oz Dropp®, 4 oz of Folex®, and 21 oz of Prep®. Ethephon did not increase the percentage of open bolls at the 7 or 10 day rating. This may be due to the mature cotton and hot, dry weather during the time following the application.

Experience gained from conducting this test resulted in increased success in reaching specific goals of boll opening, defoliation, desiccation, and regrowth suppression.

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