Wharton County - 2015 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 products 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 ethephone. 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 the 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 tends 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 demonstration the performance of cotton harvest aides on the 2015 Upper Gulf Coast cotton crop in Wharton County, the Wharton County office of Texas A&M AgriLife Extension established a harvest aid test at Crescent, Texas. Wharton County Extension Agent, Corrie Bowen cooperated with the Wharton County Fair Board to utilize a portion of a cotton field owned by the Wharton County Fair Association 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 rated 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 12.67 feet wide by 45 feet in length. The application volume for each treatment was 11 gallons/acre of total mix.

The Wharton County Harvest Aid Test was sprayed with the initial treatments on August 12, 2015. A total of 15 treatments were evaluated (including an untreated control), with each treatment replicated two (2) times. Treatments designed to include a second application of harvest aid were applied on August 18, 2015. Each treatment was rated on August 18, 2015 (6-DAT) and August 21, 2015 (9-DAT) for percent Defoliation, Desiccation, Green Leaf, and Green Boll.

A turn row meeting was conducted on August 21, 2015 (9 days post treatment) at the site of the Wharton County Harvest Aid Test. Dr. Gaylon Morgan walked participants through each treatment, describing each treatment, how each one performed, 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 6-day post-treatment results.

Results

Results for the Wharton, Texas Cotton Harvest Aid Trial are given below in **Table 1.** The 6 DAT Evaluation of % Defoliation, % Desiccation, % Green Leaf, and % Green Boll ; and **Table 2**. 9 DAT Evaluation of % Defoliation, % Desiccation, % Green Leaf, and % Green Boll. Treatments are listed by active ingredient of the treatment. Some treatments required a follow-up, second application of harvest aid. This is noted by Application Timing*, Application A = 8/12/2015; Application B = 8/18/2015. Table 2. Lists the estimated cost/acre of each of the harvest aid treatments.

Table 1. 6 DAT Evaluation of % Defoliation, % Desiccation, % Green Leaf, and % Green Boll

Treatment	Product	Rate	Application Timing*	Defoliation (%) 8/18/2015	Desiccation (%) 8/18/2015	Green Leaf (%) 8/21/2015	Green Boll (%) 8/18/2015
1	Untreated			3.5c	0a	96.5a	15a
2	Thiadiazuron	2.4 oz/a	A	82.5ab	0a	17.5bc	15a
2	Thiadiazuron	2.4 oz/a	B				
3	Thiadiazuron	1.6 oz/a	A	77.5ab	1a	21.5bc	13.5a
3	Ginstar +NIS	2.0 oz/a	B				
4	Thiadiazuron	1.6 oz/a	A	72.5ab	0a	27.5bc	13a
4	Ethephon	21 oz/a	A				
4	Ginstar +NIS	2.0 oz/a	B				
5	Thiadiazuron	2.4 oz/a	A	72.5ab	0a	27.5bc	17.5a
5	Ethephon	21 oz/a	A				
5	Folex	4 oz/a	A				
6	Thiadiazuron	2.4 oz/a	A	95.5a	1.5a	3c	10a
6	Ethephon	21 oz/a	A				
6	Folex	6 oz/a	A				
7	Thiadiazuron	2.4 oz/a	A	88.5ab	0a	11.5bc	9.5a
7	Folex	4 oz/a	A				
7	Ethephon	24 oz/a	B				
7	Folex	8 oz/a	B				
8	Thiadiazuron	1.6 oz/a	A	70ab	0a	30bc	20a
8	Ethephon	12 oz/a	A				
8	Folex	4 oz/a	A				
9	Ethephon	21 oz/a	A	68.5ab	1a	30.5bc	12.5a
9	Ginstar + NIS	4.0 oz/a	A				
10	Thiadiazuron	1.6 oz/a	A	86ab	0a	14bc	13.5a
10	Ginstar + NIS	2.0 oz/a	A				
10	Display + NIS	1.0 oz/a	B				

11	Thiadiazuron	1.6 oz/a	A	72.5ab	0a	27.5bc	13.5a
11	Ginstar	2.0 oz/a	A				
11	Sharpen+ MSO+AMS	1.0 oz/a	B				
12	Thiadiazuron	1.6 oz/a	A	88.5ab	5a	11.5bc	12a
12	Sharpen+ MSO+ AMS	0.5 oz/a	A				
12	Sharpen+ MSO+ AMS	1.0 oz/a	B				
13	Thiadiazuron	1.6 oz/a	A	63.5b	0a	36.5b	15a
13	Ethephon	21 oz/a	A				
13	ETX + COC @ 1%	1.3 oz/a	B				
14	Thiadiazuron	1.6 oz/a	A	82.5ab	0a	17.5bc	11a
14	Finish	21 oz/a	A				
14	Ginstar +NIS	2.0 oz/a	B				
15	Thiadiazuron	2.4 oz/a	A	85ab	0a	15bc	7.5a
15	Finish	21 oz/a	A				
15	Gramoxone +NIS	24 oz/a	B				
16	Thiadiazuron	2.4 oz/a	A	80ab	0a	20bc	15a
16	Finish	21 oz/a	A				
16	Gramoxone +NIS	32 oz/a	B				
	Mean			74.31	.53	25.47	13.34
	LSD			30.34	4.33	30.81	9.21
	STD DEV			14.14	2.02	14.36	4.29
	CV			19.03	379.7	56.39	32.17

*Application A = 8/12/2015; Application B = 8/18/2015

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. 9 DAT Evaluation of % Defoliation, % Desiccation, % Green Leaf, and % Green Boll

Treatment	Product	Rate	App timing *	Defoliation (%) 8/21/2015	Desiccation (%) 8/21/2015	Green Leaf (%) 8/21/2015	Green Boll (%) 8/21/2015	Estimated Cost ($/a)
1	Untreated			12.5c	0a	87.5a	22.5a	$0.00
2	Thiadiazuron	2.4 oz/a	A	95.5a	0a	4.5cd	16cd	$4.13
2	Thiadiazuron	2.4 oz/a	B					
3	Thiadiazuron	1.6 oz/a	A	93.5a	0a	6.5cd	10a	$4.34
3	Ginstar +NIS	2.0 oz/a	B					
4	Thiadiazuron	1.6 oz/a	A	96a	0a	4cd	13.5a	$7.95
4	Ethephon	21 oz/a	A					
4	Ginstar +NIS	2.0 oz/a	B					
5	Thiadiazuron	2.4 oz/a	A	94.5a	0a	5.5cd	14.5a	$7.70
5	Ethephon	21 oz/a	A					
5	Folex	4 oz/a	A					
6	Thiadiazuron	2.4 oz/a	A	96.5a	0.5a	3cd	9.5a	$8.72
6	Ethephon	21 oz/a	A					
6	Folex	6 oz/a	A					
7	Thiadiazuron	2.4 oz/a	A	97aa	0.5a	2.5cd	10a	$12.28
7	Folex	4 oz/a	A					
7	Ethephon	24 oz/a	B					
7	Folex	8 oz/a	B					
8	Thiadiazuron	1.6 oz/a	A	97a	0a	3cd	18.5a	$5.47
8	Ethephon	12 oz/a	A					
8	Folex	4 oz/a	A					
9	Ethephon	21 oz/a	A	92.5a	0a	7.5c	12a	$9.55
9	Ginstar + NIS	4.0 oz/a	A					
10	Thiadiazuron	1.6 oz/a	A	94a	1a	5cd	10a	$7.19
10	Ginstar + NIS	2.0 oz/a	A					
10	Display + NIS	1.0 oz/a	B					
11	Thiadiazuron	1.6 oz/a	A	96.5a	1.5a	2cd	11a	$6.97
11	Ginstar	2.0 oz/a	A					
11	Sharpen+ MSO+AMS	1.0 oz/a	B					
12	Thiadiazuron	1.6 oz/a	A	95.5a	1a	3.5cd	11a	$17.51
12	Sharpen+ MSO+ AMS	0.5 oz/a	A					
12	Sharpen+ MSO+ AMS	1.0 oz/a	B					

13	Thiadiazuron	1.6 oz/a	A	82.5b	0a	17.5b	13.5a	$11.81
13	Ethephon	21 oz/a	A					
13	ETX + COC @ 1%	1.3 oz/a	B					
14	Thiadiazuron	1.6 oz/a	A	96.5a	0a	3.5cd	15a	$15.17
14	Finish	21 oz/a	A					
14	Ginstar +NIS	2.0 oz/a	B					
15	Thiadiazuron	2.4 oz/a	A	95.5a	3.5a	1d	8.5a	$12.89
15	Finish	21 oz/a	A					
15	Gramoxone +NIS	24 oz/a	B					
16	Thiadiazuron	2.4 oz/a	A	94.5a	4.5a	1d	10a	$12.94
	Mean			89.38	.78	9.84	12.84	
	LSD			5.58	3.53	6.08	13.02	
	STD DEV			2.62	1.66	2.85	6.11	
	CV			2.93	212.2	28.97	47.56	

*Application A = 8/12/2015; Application B = 8/18/2015

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

Based on the observations of the Wharton, Texas Cotton Harvest Aid Study, 1.6 oz of thiadiazuron (Dropp®, FreeFall®, etc) on the initial treatment did not hold regrowth, according to the 9-DAT evaluation. The 2.4 oz of Drop® is where we should be this year on Dropp® (thiadiazuron) rates. If putting out Ethephon (Prep®) it's important to have thiadiazuron Dropp® with it at 2.4 oz/acre to prevent regrowth. In addition, Folex®, we found that 6 oz of Folex®/acre showed improved results over the 4 oz rate.

As was expected, Gramoxone® as a follow up treatment (8/18) helped to knock off mature leaves, but did nothing to control regrowth. The Fall of 2015 on the Texas Gulf Coast was one that presented frequent rain showers. Controlling regrowth in 2015 was a common issue along Upper Texas Gulf Coast. PPO products such as Aim®, ET®, Display®, and Sharpen® do the best at destroying cotton regrowth. Carfentrazone (Aim®) and pyraflufen ethyl (ET) are herbicides that inhibit the production of protoporphyrinogen oxidase (PPO) in the plant. The end result of PPO inhibition is quick disruption of cell membranes and a build-up of ethylene in the leaf causing it to abscise. Sharpen® showed to be the most effective PPO option in this study for regrowth suppression at 1 oz/acre.

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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