CHEMICAL COTTON STALK DESTRUCTION OPTIONS IN ENLIST™ COTTON

G.D. Morgan
D.A. Mott
Texas A&M AgriLife Extension Service
College Station, TX
D.D. Fromme
Texas A&M AgriLife Extension Service
Corpus Christi, TX
J.A. Lee
V.B. Langston
R. Lassiter
Dow AgroSciences
Indianapolis, IN

Introduction

The perennial life-cycle of cotton allows it to regrow following harvest in eastern and southern Texas and provides the potential for development of hostable fruit (squares and bolls) for boll weevil feeding and reproduction. Early harvest followed by stalk destruction is among the most effective cultural practices for managing over-wintering boll weevils when performed on an area-wide basis. Chemical stalk destruction provide producers with a timely, economical, and effective option for destroying cotton stalks, especially in reduced tillage systems. In eastern and southern cotton production regions of Texas, chemical stalk destruction has become a standard management strategy, because of its effectiveness, time efficiency, and economical feasibility.

Several herbicides have been registered for cotton stalk destruction since the inception of the boll weevil eradication program. Herbicides available include 2,4-D (ester and salt formulations) and several dicamba products (Weedmaster, Clarity, Banvel). Previous research has proven 2,4-D to be one of the most effective (high efficacy and consistency) and economically feasible product for cotton stalk destruction. Sparks et al. (2002) reported herbicide applications made shortly after shredding showed the best results, potentially due to the wounding effect and the lack of callus formation. However, Lemon et al. (2003) reported that herbicides, either 2,4-D amine or ester, application timing following shredding did not diminish the regrowth control from these products.

Now with various cotton seed companies developing transgenic cotton that will be tolerant to multiple herbicides, including 2,4-D and Dicamba, there is a lot of interest from producers and the Boll Weevil Eradication Program to look for alternative chemistries to aid with cotton stalk destruction. These chemical stalk destruction treatments should be as effective at preventing cotton from re-growing and developing boll weevil hostable fruit following harvest, should have minimal crop plant-back restrictions, and the system should be economically comparable to the current producer standard of 2,4-D.

Objectives

To identify chemical stalk destruction herbicides for controlling the 2,4-D tolerant cotton, Enlist™ Cotton.

To determine the impact of application timing on the efficacy of the evaluated herbicides for controlling cotton regrowth and fruit development.

Materials and Methods

Multiple studies with identical treatments were conducted in the Upper Gulf Coastal and Blacklands of Texas by Drs. Fromme and Morgan and supported by Dow AgroSciences. Enlist™ Cotton seed was planted in late-May at each location and was allowed to grow until the flowering stage when all treatments were mowed to a height of 4-6 inches. Five herbicides were applied to the cotton stalks at two different applications timings. See Table 1 and Table 2 for products, rates, and timings. The first application timing was within hours of shredding the cotton stalks. The second herbicide application timing was two weeks after shredding. A non-ionic surfactant 0.25%v/v was

included in each of the treatments presented in this poster. However, comparable herbicides and rates were evaluated without the addition of a surfactant, and the efficacy very similar.

Treatments were rated for percent regrowth at 2, 4, 6, and 8 weeks after shredding the cotton stalks. Additionally, at 6 and 8 weeks after shredding, cotton plant height and percent hostable plants where quantified by measuring 10 consecutive plants within a row. General observations of Enlist™ plant growth were noted, but not reported in this poster. This poster only includes the results from the 6 and 8 week after shredding for percent regrowth and percent hostable (fruting structure present).

Table 1. Location, Agronomics, and Application Information for Burleson and Ft. Bend County, TX 2012.

	Locations	
County of Study	Ft. Bend	Burleson
Variety	Enlist™ Cotton	Enlist™ Cotton
Shredding Date	July 25	July 16
Application Dates	July 25 and August 7	July 16 and July 30
Nozzles	11003	8002XR
GPA	12	15

Table 2. Herbicide product, rate, and active ingredients for Burleson and Ft. Bend County, TX 2012.

Amt Prod/A	Total lbs ae/A	2,4-D	2,4-DP	Dicamba
Superbrush Killer				
64 fl oz	1.65	0.95	0.47	0.24
Weedmaster				
32 fl oz	0.974	0.72		0.25
Clarity				
16 fl oz	0.5			0.5
Dichlorprop				
60 fl oz	2.0		2.0	

Results

Burleson County Location:

The 2,4-D applications did not suppress regrowth or fruit development compared to the untreated check (Table 3). There was no difference in herbicide efficacy for regrowth between the 0 and 14 days after shredding timing, except for Clarity at the 56 DAT rating at this location. Clarity and Weedmaster applications at 0 or 14 days after shredding did provide sufficient control of the cotton stalks at 39 days after shredding. However, substantial regrowth and hostable plants were observed by the 56 days after shredding rating. All the herbicides applied 14 days after shredding did have fewer hostable plants at the final rating date compared to the herbicides being applied at 0 days after shredding. The Dichlorprop provided the best overall regrowth and fruit development suppression at 56 days after shredding, regardless of the application timing. At the 14 days after shredding application, Super Brush Killer (2,4-D, 2,4-D-p-k, and dicamba) and Dichlorprop had only 5% and 0% hostable plants, respectively.

Ft. Bend County Location:

Similar to Burleson county site, the 2,4-D applications had no suppression of regrowth or fruit development when applied immediately after shredding (Table 4). The 2,4-D did numerically suppress regrowth of the Enlist cotton when applied at 14 days after shredding; however, there was no suppression of fruit development. Each of the herbicides was more efficacious when applied at 14 days after shredding at this location. At 42 and 56 days after shredding rating, the cotton regrowth and presence of fruit was 12 and 10%, respectively, for Clarity. Weedmaster (2,4-D + dicamba) did not provide satisfactory control of cotton stalks with over 50% of the plants with hostable fruit. At the 56 days after shredding rating, Dichlorprop and the Super Brush Killer (2,4-D, 2,4-D-p, and dicamba) both suppressed regrowth to 5% or less and reduced fruiting plants to 7% or less when applied 14 days after shredding.

Conclusions:

The 2,4-D applications provided no or minimal suppression of regrowth or fruit development on the Enlist™ Cotton. The herbicide applications at 14 days after shredding were the most efficacious for minimizing cotton stalk regrowth and fruit development for all the herbicides containing dicamba, dichlrorprop, or combinations of these products.

For both locations and both applications timings, dichlorprop was identified as an effective herbicide for killing cotton stalks in Enlist™ Cotton.

Acknowledgements:

Funding provided by Dow AgroSciences, Texas A&M AgriLife Extension Service, and Cotton Incorporated.

Table 3. Cotton Stalk Regrowth and Hostable Plants Following the Application of Numerous Herbicides at 0 and 14 Days After Shredding in Burleson County, TX 2012.

Treatment	Rate (ae/a)	App. Timing (days after mowing)	Regrowth (%)		Hostable (%)	
			39 DAS[1]	56 DAS	39 DAS	56 DAS
2,4-D	1.0	0	83 a[2]	91 a	70 b	90 abc
2,4-D	1.0	14	88 a	93 a	70 b	100 a
Dichlorprop	2.0	0	1.5 e	3 e	0 d	24 ghi
Dichlorprop	2.0	14	0 e	0 e	0 d	0 i
Clarity	0.5	0	12 cde	43 cd	15 c	93 abc
Clarity	0.5	14	5 e	84 ab	0 d	14 hi
Super Brush Killer	1.65	0	6 de	31 d	5 cd	81 a-d
Super Brush Killer	1.65	14	4 e	30 d	0 d	5 i
Weedmaster	0.974	0	19 c	45 cd	0 d	81 a-d
Weedmaster	0.974	14	8 cde	50 cd	0 d	31 f-i
Untreated		0	89 a	94 a	73 ab	98 ab

[1] Days after shredding
[2] Means followed by same letter do not significantly differ (P=.05, LSD)

Table 4. Cotton Stalk Regrowth and Hostable Plants Following the Application of Numerous Herbicides at 0 and 14 Days After Shredding in Ft. Bend County, TX 2012.

Treatment	Rate (ae/a)	App. Timing (days after shredding)	Regrowth (%)		Hostable (%)	
			42 DAS[1]	56 DAS	42 DAS	56 DAS
2,4-D	1.0	0	87 ab[2]	87 ab	77 ab	83 a
2,4-D	1.0	14	57 cd	73 abc	87 ab	90 a
Dichlorprop	2.0	0	25 efg	38 de	20 cd	23 cd
Dichlorprop	2.0	14	2 g	3 f	3 d	7 d
Clarity	0.5	0	33 def	47 cd	43 bc	47 bc
Clarity	0.5	14	12 fg	12 ef	10 cd	10 d
Super Brush Killer	1.65	0	43 cde	58 bcd	70 ab	77 ab
Super Brush Killer	1.65	14	3 g	5 f	3 d	3 d
Weedmaster	0.974	0	63 bc	70 abc	90 a	90 a
Weedmaster	0.974	14	53 cd	57 bcd	43 bc	50 bc
Untreated		0	92 a	97 a	93 a	97 a

[1] Days after shredding
[2] Means followed by same letter do not significantly differ (P=.05, LSD)