UNIVERSITY OF ARKANSAS
DIVISION OF AGRICULTURE
Cooperative Extension Service

6-02

United States Department of Agriculture, University of Arkansas, and County Governments Cooperating

Cotton Comments

Options For Chemical Stalk Termination

Bill Robertson
Extension Agronomist - Cotton

Ken Smith
Extension Weed Scientist

Bob Scott
Extension Weed Scientist

Glenn Studebaker
Extension Entomologist

Jeremy Greene
Extension Entomologist

Situation

The practice of mechanical stalk destruction has changed significantly in the last few years as we have moved away from conventional tillage systems. In a conventional tillage system, the stalks are shredded low to the ground. Harvest aid programs containing Dropp or Roundup on non-Roundup Ready cotton generally provided sufficient regrowth inhibition until harvest just as we see today. The low shredding after harvest removed most if not all regrowth allowing a greater opportunity to keep regrowth in check. After shredding, a disk was often used to flatten beds to allow deep tillage operations used to break hardpans. These operations effectively destroyed the stalks. With the onset of Roundup Ready technology, a significant increase in the use of no-till and reduced tillage practices has been observed. In reduced or no-till systems stalks are shredded higher at 6 to 8 inches to reduce damage to rubber wheels on the planter the following season. The taller stalks maintain multiple nodes on the mainstem and often lower branches of the plant are left intact. This increases the ability of the plant to produce new growth with potential for square production.

Plant activity this fall has remained high. As a result many of our harvest aid programs worked well at reduced rates nearly the entire month of September. Heat unit accumulation for the month of September was 100 heat units higher this season compared to our 30-year average. The warmer temperatures and ample soil moisture levels have not only been responsible for helping to finish our crop off on a positive note, but is also responsible for the tremendous levels of regrowth present especially in our early cotton. The regrowth situation is much worse where harvest aid programs not containing Dropp were used. However, rain delays in harvest and good temperatures have created situations that cannot be addressed entirely by a harvest aid program.

Harvest aid programs containing Dropp at 0.1 lb product per acre will generally provide regrowth inhibition for two weeks. This timeframe provides regrowth inhibition to the point of being harvest ready. Squares can form on regrowth after 2 to 3 weeks of favorable growing conditions such as those seen this fall. Harvest aid programs used this fall not containing Dropp have been observed to have small squares on regrowth present at picking.

Problem

The Arkansas Boll Weevil Eradication Program (ABWEP) must continue to trap, monitor, and treat squaring or hostable fields. Entomologists indicate that hostable fields after harvest can offer quality food to build fat reserves in weevils they need for successful diapause and must be treated to avoid dragging eradication efforts out any longer than necessary. However, ABWEP budgets do not include the level of funding necessary to treat hostable fields after harvest to address our current situation.

Objective

The objective of this publication is to inform producers of chemical means to terminate cotton stalks in an effort to assist boll weevil eradication efforts in situations where tillage is not possible or desired. Benefits and risks associated with chemical control as well as regulations concerning the use of these compounds by the Arkansas State Plant Board will also be discussed.

Results and Discussion

Currently, various levels of regrowth can be observed in fields. It is possible to see freshly picked fields with no terminal regrowth and only slight levels of basal regrowth present all the way to fields with significant levels of regrowth from the bottom to the top of the stalk. The various conditions we face in regrowth present the challenges in choosing rates and timings for stalk termination.

Field studies conducted in South Texas last year (2001) evaluating the efficacy of 2,4-D and Harmony Extra for stalk termination reported that while Harmony Extra adversely affected regrowth and delayed squaring post-harvest, only 2,4-D provided control of regrowth (Sparks et al., 2002). Shredding of plants enhanced the activity of both Harmony Extra and 2,4-D. 2,4-D worked best when applied soon after shredding. They assumed that 2,4-D worked best after shredding as the damaged stalk provides a direct means for chemical uptake. Once the tissue heals uptake and performance is reduced. Efficacy of 2,4-D in the non-shredded stalks was generally 50% of that seen where stalks were treated after shredding and is not recommended. Based on producer experience in Texas the use of crop oil concentrate, (1% v/v) in spray volumes of at least 10 GPA of 2,4-D applied in a band behind the shredder is effective in controlling regrowth as well as squaring for up to 50 days.

A field study near Aubrey was conducted this fall (2002) to further evaluate the impact of rates and time of application after shredding of 2,4-D compared to Clarity and Harmony Extra. The study area was planted in a window from April 17 to 20 to PM1218BG/RR in a irrigated field that average 1050 lbs lint/A when picked September 17. The harvest aid program initiated September 3 consisted of a two-shot approach of Dropp (0.1 lb product/A) plus Aim (0.5 oz product/A with 1% v/v crop oil concentrate) followed by CottonQuik (3 pt product/A) plus Aim (0.5 oz product/A with 1% v/v crop oil concentrate). The study was initiated one week after picking on September 24. Significant levels of basal regrowth were present. Pinhead size squares were not plentiful but present on basal regrowth after shredding. The study site is in a no-till production system. The stalks were shredded 6 - 8" high as recommended for this program. Spray treatments were made with a broadcast sprayer calibrated at 10 GPA within one hour of shredding, 1, 3, and 5 days after shredding.

The time of application after shredding did not influence control of regrowth statistically for any treatment. However, regrowth control ratings did decrease numerically in the 2,4-D treatments at 13 days after shredding. This decrease may be attributed more to lack of time for the chemical to work than to timing after shredding. The 1.5 lb rate of 2,4-D ester was significantly better than any other treatment in the study (Table 1). However the control with 1.0 lb rate of ester was essentially identical to the 1.5 lb rate of the amine formulation. Treatments may sometimes be slow to show visible signs of activity. However, they can shut down plant activity in as little as thirty minutes after application (Bremer 1999). Generally, all fruit that might host weevils are shed within one week of treatment. All treatments in this study resulted in shed of squares rendering the regrowth non-hostable when rated 13 days after shredding. It is our belief that there is insufficient time prior to frost for plant recovery and regrowth to occur for additional squaring.

Recommendations

Early indications from our field study near Aubrey in 2002 indicate that 2,4-D is perhaps the best choice for chemical termination based on vegetative and reproductive response to treatment and the cost compared to alternative compounds (Table 1). The most cost effective means of making a chemical stalk termination application is to apply the pesticide in a band behind the shredder. An extra trip across the field is not needed and the product is applied at the best opportunity for uptake in the fresh wound. It appears that as the level of regrowth increases, the combined uptake from the fresh wound as well as from leaf area may result in reducing the importance of timing behind the shredder. If little to no regrowth is present, applications should be made directly behind the shredder. Dust behind the shredder has not been a problem when spray volumes of 10 GPA are used with crop oil concentrate. Shredders that do not match planting equipment row configuration may cause problems with skips in a field due to narrow or wide "guess rows". Spot spraying with a 4-wheeler can help address small problems. We are hesitant to apply 2,4-D with a cotton sprayer. Old cracked hoses present a challenge in cleaning a system to make it safe from even visual symptoms showing up in cotton fields sprayed the following year. However, sprayers can be cleaned after 2,4-D applications if good cleaning practices are followed. Custom application is a good and fast alternative but adds another cost at a time when money is short.

Regulatory and Other Concerns

We do not have all the data we would like to have at this particular point. It is important to remember that this is a one-year study. However, the data from Texas supports our findings. It is our belief that benefits far exceed any costs associated with treatment if measures are taken to insure proper application techniques. Once fields are treated, ABWEP personnel can discontinue monitoring, trapping, and treating fields as they become non-hostable. These actions save producer dollars as well as helping to bring faster closure to the eradication process. This can result in even greater savings. As with any pesticide application, special care must be taken to avoid off-target drift. It is important to read and follow the label for specific application and rotation restrictions. The Arkansas State Plant Board regulates application of 2,4-D. Buffer zones differ according to ground vs. aerial application during the season. It is very important to know and follow these guidelines for your zone with regard to application near susceptible crops.

References

Bremer, John. 1999. Suggestions for Successful Chemical Cotton Stalk Termination. Texas Agricultural Extension Service, The Texas A&M University System. SCS-1999-24. 2pp.

Sparks, Jr., A.N., J.W. Norman, Jr., C. Stichler, J. Bremer and S. Greenberg. 2002. Cotton Stalk Destruction With Selected Herbicides and Effect of Applications Methodology. Proc Beltwide Cotton Conferences. National Cotton Council, Memphis TN. 4pp.

Table 1. Percent control of regrowth relative to untreated check 13 days after shredding and estimated chemical cost including crop oil concentrate for all mixtures using a broadcast spray application.

Product	Rate/A	Regrowth Control[†] (%)	Cost ($/A)
2,4-D Amine	1.0 lb ai	78	3.90
2,4-D Amine	1.5 lb ai	83	5.85
2,4-D Ester	1.0 lb ai	84	4.38
2,4-D Ester	1.5 lb ai	94	6.57
Clarity	1.0 pt pr	57	11.63
Harmony Extra	0.6 oz pr	39	7.48

[†] LSD = 8.6