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COTTON STALK DESTRUCTION WITH 2,4-D HERBICIDE

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Abstract

Early harvest and stalk destruction when performed on an area-wide basis are among the most effective practices for managing overwintering boll weevils. The objective of this field study was to assess the effectiveness of 2,4-D amine for post-harvest cotton stalk destruction on both shredded and standing stalks. Six treatments were evaluated in the study: untreated shredded and standing stalks, shredded stalks sprayed one hour after shredding, shredded stalks sprayed seven days after shredding, standing stalks sprayed one day after picker-harvest, and standing stalks sprayed seven days after picker-harvest. Treatments sprayed immediately showed significantly greater control over treatments sprayed seven days later. However, both application timing treatments were acceptable, exhibiting over 95% control of cotton stalk regrowth 38 days after initial applications. At all observation periods, there were no differences in herbicide effectiveness between shredded or standing stalk treatments. Results from this study and monitoring of grower fields treated similarly in 2003 provide evidence that picker-harvested standing stalks can be effectively destroyed with 2,4-D amine.

Introduction

In its native habitat cotton is a perennial shrub that may survive for many years. The perennial habit of cotton allows it to regrow following harvest, providing the potential for development of hostable fruit (squares and bolls) for boll weevil feeding and reproduction. Under optimum environmental conditions, cotton plants can generate hostable fruit in three to five weeks following harvest. This provides overwintering weevils with additional food resources, enabling them to survive the winter and infest cotton fields the following spring. Early harvest and stalk destruction when performed on an area-wide basis are among the most effective practices for managing overwintering boll weevils. This is especially important in southern and eastern regions of Texas engaged in the Boll Weevil Eradication Program (~800,000 acres) because timely stalk destruction limits post-harvest spraying operations and saves the program/producers significant funds.

Shredding and mechanical tillage have been the normal means for destroying stalks, but late summer/early fall rainfall in the Rio Grande Valley, Coastal Bend, Upper Gulf Coast and Blacklands regions generally prolong the stalk destruction process, providing weevils additional food resources. In the western and northwestern regions, freezing temperatures generally kill the plant before hostable fruit is developed.

Several herbicides have been registered for cotton stalk destruction. Herbicides available include 2,4-D (ester and salt formulations), several dicamba products (Weedmaster, Clarity, Banvel), and Harmony Extra (thifensulfuron-methyl + tribenuron-methyl). For these products to be legal for cotton stalk destruction, the label must contain a section addressing “crop stubble” or specify cotton as the target pest following harvest.

The objective of this field study was to assess the effectiveness of 2,4-D amine for post-harvest cotton stalk destruction on both shredded and standing stalks.

Materials and Methods

A study was conducted in the Upper Gulf Coast near Wharton, Texas on the Glen Emshoff farm to study the effectiveness of 2,4-D amine for post-harvest cotton stalk destruction on both shredded and standing stalks. The variety was DPL 20B and it was planted March 26 and picker-harvested August 25, 2003. The harvest aid program consisted of Def (8 oz. product/acre) + Dropp (0.1 lbs. product/acre) + Prep (16 oz. product/acre).

Treatments included the following: untreated shredded and standing stalks, shredded stalks sprayed one hour after shredding, shredded stalks sprayed seven days after shredding, standing stalks sprayed one day after picker-harvest, and standing stalks sprayed seven days after picker-harvest. All sprayed treatments received 2,4-D amine at the rate of 1.0 lbs. a.i./acre + crop oil concentrate (0.5% v/v) applied to shredded and standing stalks as described. Stalks were cut with a rotary-type shredder on August 26 (6 to 8 inches in height). The herbicide was applied with a hand-held, broadcast CO_2 backpack sprayer set to deliver 13 gallons/acre @ 35 psi. Nozzles were TurboT-Jet 11002 spaced 20 inches apart. Plot dimensions were 40 feet long x 4 rows wide (40 inch rows).

The statistical design was a split plot, with shredded/standing stalks serving as the main plot and timing as the split effect. All data were subjected to analysis of variance. The shredded/standing stalks x herbicide timing interaction was not significant; therefore, only the main effects are presented. Observations were taken September 12, 19, 26 and October 3. Regrowth control ratings were collected and based on a 0 to 100% scale relative to the untreated check.

Results and Discussion

During the 38 day study duration, 573 DD60s were accumulated, averaging 15.1 DD60s/day. Total rainfall received was 5.73 inches.

Figures 1 and 2 show the effects of application timing of 2,4-D on cotton stalk control. With the exception of the September 26 rating, the treatments sprayed immediately showed significantly greater control over treatments sprayed seven days later. However, both application timing treatments were acceptable, exhibiting over 95% control of cotton stalk regrowth at the October 3 rating (38 days after initial application). Studies conducted in south Texas (S. Livingston, personal communication, 2003) and the Rio Grande Valley (Sparks et al., 2002) have shown better control from immediate applications, and in some instances applications made seven days later were ineffective.

Cotton seedlings began emerging September 12 and there was no effect from the herbicide application on the cotyledons. However, the first and second true leaves did exhibit hormone herbicide symptomology, indicating some root uptake. The standard procedure for controlling cotton seedlings is a second application of 2,4-D amine at the rate of 0.5 lbs. ai/acre. This application was made September 26 and provided 100% control of cotton seedlings (data not shown).

Figure 3 demonstrates the effects of stalk management (shredding or standing stalks) on stalk mortality. At all observation periods, there were no differences in herbicide effectiveness between shredded or standing stalk treatments. Prior to this research, it was believed that stalks required shredding for effective control. However, a few growers in the Coastal Bend have been treating standing stalks and reporting excellent results. Our study confirms this producer experience. Studies conducted in south Texas (S. Livingston, personal communication, 2003) and the Rio Grande Valley (Sparks et al., 2002) have shown better control from shredded stalk treatments and stripper-harvested stalks as opposed to picker-harvested standing stalk treatments. Results from this study and monitoring of grower fields treated similarly in 2003 provide evidence that picker-harvested standing stalks can be effectively destroyed with 2,4-D amine.

No squares were observed in any 2,4-D amine treatments. Pin-head squares were observed in the untreated standing stalks September 19, and in the shredded stalks September 26.

Conclusions and Recommendations

2,4-D amine is extremely effective in controlling cotton stalks, and minimizes problems associated with off-target drift (ie. ester formulations). Based on current knowledge, the initial application should be at the rate of 1 lbs. ai/acre. Generally, a second application of 0.5 lbs. a.i./acre will be necessary for control of any remaining live stalks and emerged cotton seedlings. Thorough coverage is essential so applications should be made with 5 to 15 gallons of water/acre. Also, the addition of surfactant at a minimum rate of 0.5% v/v is recommended.

Shredded Cotton Stalks

To obtain optimum results, cotton stalks should be shredded (6 to 8 inch height) and the spray application should be made soon after shredding. Best results are achieved if the herbicide is applied immediately after, or within a few hours of shredding. To achieve optimum effectiveness, some growers have mounted spray booms directly on their flail shredders and are banding their herbicide during the shredding operation, and achieving excellent results.

Standing Cotton Stalks

Standing cotton stalks should be sprayed soon after harvest (within 0 to 7 days) for optimum control. **Stalk regrowth is not necessary for the treatment to be effective.** Excellent control has been achieved from both picker- and stripper- harvested cotton.

References

Sparks, A.N., J.W. Norman, C. Stichler, J. Bremer, and S. Greenburg. 2002. Cotton stalk destruction with selected herbicides and effect of application methodology. Proc. Beltwide Cotton Conferences. CD-ROM

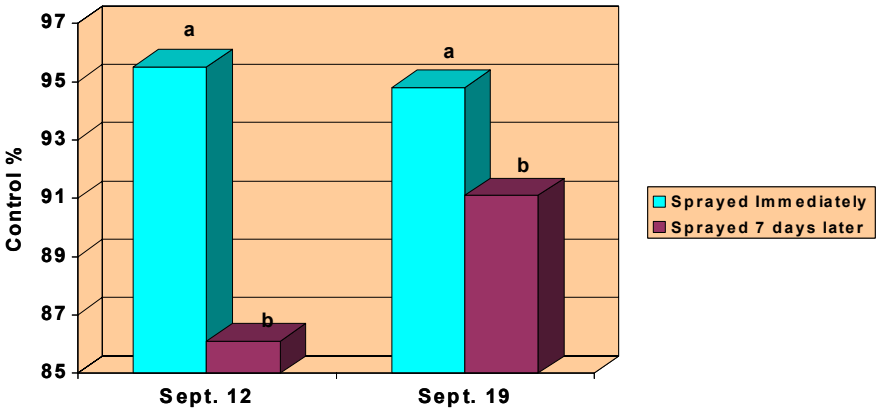

Figure 1. Effects of Application Timing of 2, 4 - D Amine on Cotton Stalk Control.

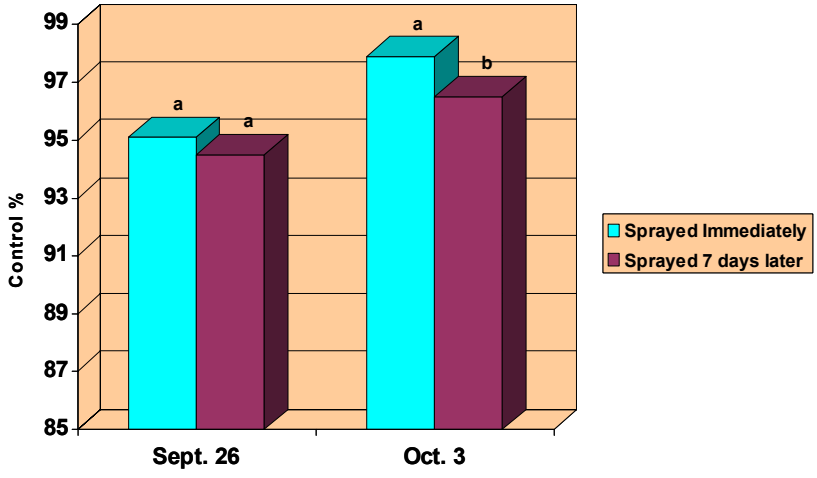

Figure 2. Effects of Application Timing of 2, 4 – D Amine on Cotton Stalk Control.

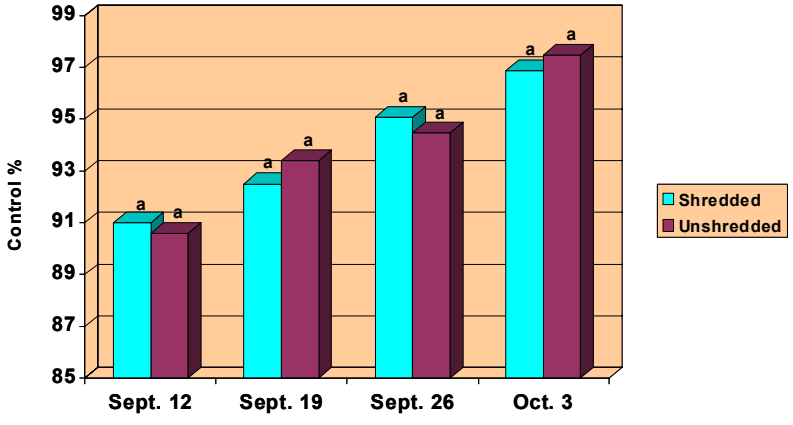

Figure 3. Effects of 2, 4 – D Amine and Shredding on Cotton Stalk Control.