USE OF THIOPHANATE METHYL AND DICRTOPHOS TO REDUCE HARDLOCK, BOLL DAMAGE AND ROT TO STINKBUGS

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Abstract

A study was conducted in a commercial cotton field in Colquitt County, GA in 2005 to evaluate the effects of multiple applications of Topsin 4.5F (thiophanate methyl) and Bidrin (dicrotophos) on the severity of damage from stinkbugs and the severity of hardlocked cotton bolls. A similar study was conducted at multiple sites in 2004. At that time it was determined that the use of thiophanate methyl did not reduce the severity of hardlock or reduce damage from stinkbugs. However, the trials in 2004 were carried out under low pressure from stinkbugs. The study conducted in 2005 was purposely located in a cotton field immediately adjacent to a production peanut field to insure significant pressure from stinkbugs. In the 2005 study it was found that not only did Topsin 4.5F significantly reduce the severity of hardlocked bolls, but also significantly reduced the internal boll damage associated with stinkbugs during much of the season. Applications of Topsin 4.5F also produced yields that were numerically, but not statistically, greater than the untreated control and not statistically different from plots treated with either Bidrin or Bidrin + Topsin 4.5F.

Introduction

The fungicide thiophanate methyl (Topsin-M) has been reported to reduce the severity of “Fusarium hardlock” on cotton and significantly increase yields in Florida. Hardlock is described as a malady where lint apparently forms normally; however for a variety of reasons, does not “fluff” properly and is difficult to pick with the use of a spindle picker. As hardlocked bolls often appear in fields where damage from stink bugs (*Nezara viridula* and *Euschistus servus*) is severe, the objective of this study was to determine if multiple applications of the fungicide thiophanate methyl, with and without the insecticide dicrotophos, would lead to a reduction in the number of hardlocked cotton bolls. In multiple field trials in 2004, the use of thiophanate methyl and/or dicrotophos did not lead to a significant reduction in hardlock or increase in yield. However, pressure from stinkbugs was not found to be severe in these trials.

A field trial similar to the ones from 2004 was conducted again in Colquitt County. In this study, plots were treated with Topsin 4.5F (thiophanate methyl), Bidrin (dicrotophos), Topsin 4.5F + Bidrin, or left completely untreated. This trial was

purposely planted in a commercial cotton field immediately adjacent to a large commercial peanut field in order to maximize pressure from stinkbugs. The objective in this study was to determine if the use of these products could reduce hardlock or other boll damage in the field.

Materials and Methods

A field trial was established in a commercial field planted to DP 555BR in Colquitt County. The experimental design was a randomized complete block with four replications. Each plot was 36 rows wide (36-in. row spacing) by 125 ft. in length. Treatments included a) unsprayed plots, b) plots that received only thiophanate methyl (Topsin 4.5F, 1.25 pt/A), c) plots that received only dicrotophos (8 fl oz/A) and d) plots that received both thiophanate methyl and dicrotophos on each spray date. Treatment applications were begun at first bloom (approximately 50% of the plants in the study had one open bloom) and reapplied on a bi-weekly basis for a total of four spray dates. Treatments were applied by the grower using a high clearance sprayer. During the season 25 bolls were examined from each plot on 12 July, 22 July, 29 July, 5 August, 12 August, and 19 August to evaluate for stinkbug feeding injury. Year end boll damage assessments were also conducted by collecting 100 bolls from each plot which comprised a representative sample of harvestable bolls at first open boll. Bolls were examined for internal bug damage. Bolls were considered damaged if a callous growth or wart was observed on the inner surface of the boll wall and/or stained lint was present. Hardlock was assessed in each plot by removing all of the cotton bolls in 3 linear ft of row immediately prior to harvest and comparing the number of hardlocked locules to the total number of locules from that sample area. Plots were harvested on 5 October and the yield was recorded.

Results

The results from this study are presented in Table 1 and Table 2. Use of Bidrin (8 fl oz/A) or a dual applications of Bidrin and Topsin 4.5F (1.0 pt/A) significantly reduced internal boll damage from stinkbugs throughout the season, reduced the incidence of hardlock, and improved lint yield over the untreated control. Applications of Topsin 4.5F without Bidrin significantly reduced incidence of hardlock, numerically reduced the internal damage from stinkbugs, and numerically increased lint yield over the untreated control. However, these numerical yields were not statistically significant. For the first four dates of boll assessment (12 Jul, 22 Jul, 29 Jul, and 5 Aug), the differences between internal damage in samples treated with Topsin alone and a combination of Bidrin + Topsin were not significantly different. However, differences were significant later in the season. The levels of year-end boll damage as measured as % internal damage, % lint stain, and lint yield were not significantly different between plots treated with Topsin, Bidrin, or Bidrin + Topsin.

Discussion

In numerous field trials conducted in 2003 and 2004, the use of Topsin fungicide could not be correlated with a reduction in hardlock of cotton. In these earlier trials, stinkbugs were either controlled in the plots with insecticides, or damage from the insects was low in both treated and untreated plots. In the study conducted in 2005, damage from stinkbugs was severe in untreated plots, in large part due to the close proximity of a peanut field.

In the 2005 Colquitt County trial, use of the fungicide Topsin 4.5F consistently reduced the internal damage from stinkbugs. Although this reduction was not typically statistically different from the untreated control, the trend was very interesting. From this data, it appears that use of a fungicide reduced damage attributed to an insect pest. It may be that application of Topsin to the developing bolls reduces introduction of fungal pathogens through the puncture wound, or perhaps the Topsin affects the feeding behavior of the stinkbugs.

Use of Topsin 4.5F significantly reduced the severity of hardlock in this study. Though not statistically significant, less hardlock was found in plots treated with Bidrin and Bidrin + Topsin than in plots treated with Topsin alone. Based upon the data, there was no significant difference in hardlocked bolls in plots that were treated with Topsin and Bidrin or Bidrin alone. Therefore, it appears that the reduction in hardlocked bolls in this study was a result of management of damage caused by stinkbugs rather than the additive control of damage from stinkbugs and some other cause, perhaps of fungal origin.

Although Topsin 4.5F seemed to be an effective means for reducing hardlock and improving yields in fields where significant damage occurs from stinkbugs, the control was not as good as that provided by Bidrin. Additionally, applying both Topsin and Bidrin to a plot did not improve yields of reduction of hardlock over Bidrin alone. Finally, because use of Bidrin is less expensive for the grower than use of Topsin, there appears to be little incentive to use this fungicide for control of hardlock that is associated with stinkbugs.

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Table 1. Measure of internal damage from stinkbugs, 2005.

Treatment	Internal boll damage from stinkbugs per sample of 25 bolls					
	12 July	22 July	29 July	5 August	12 August	19 August
Untreated control	3.0 a	6.75 a	14.0 a	8.25 a	17.25 a	16.0 a
Topsin 4.5F (1.0 pt/A)	1.5 ab	4.25 ab	6.25 b	1.75 ab	11.5 a	10.5 a
Bidrin (8 fl oz/A)	0.25 b	1.5 c	2.75 b	2.5 ab	1.75 b	2.25 b
Topsin 4.5F + Bidrin	1.0 b	2.25 bc	1.0 b	0.25 b	1.5 b	1.75 b

Numbers within the same column followed by the same letter are not significantly different at p≤.05 as determined with Fisher's protected LSD.

Table 2. Year-end boll damage and lint staining from stink bugs, percent hardlock, and lint yields 2005.

Treatment	Year-End Stink Bug Damage		% Hardlock 3-ft of row	Yield lb/A
	% Internal damage	% Stain/rot		
Untreated control	52.3 a	30.5 a	61.5 a	625 b
Topsin 4.5F (1.25 pt/A)	26.5 ab	12.2 ab	26.1 b	886 ab
Bidrin (8 fl oz/A)	7.1 b	4.2 b	18.8 b	1108 a
Topsin 4.5F + Bidrin	8.5 b	6.0 b	14.8 b	1021 a

Numbers within the same column followed by the same letter are not significantly different at p≤.05 as determined with Fisher's protected LSD.