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EFFICACY OF VIPCOT FOR CONTROL OF THE BOLLWORM/TOBACCO BUDWORM COMPLEX IN NORTHWEST LOUISIANA

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Abstract

A trial was conducted in 2004 at the Red River Research Station in Bossier City, LA, (Bossier Parish) to assess the efficacy of VipCot cotton lines in controlling the bollworm/ tobacco budworm complex under field conditions. The trial was designed to evaluate several VipCot lines for bollworm/tobacco budworm control under sprayed (based on thresholds) and non-sprayed conditions. In general, all transgenic strains had significantly less damage and larval infestation in squares, flowers, and bolls compared to Coker 312 whether from sprayed or non-sprayed main plots. Although few significant differences occurred among the VipCot lines, Cot 202 and 203 consistently had less damage and lower larval infestations in squares, flowers and bolls compared to Cot 102.

Introduction

Two of the most important cotton pests in the mid-south region of the US are the bollworm, *Helicoverpa zea* (Boddie) and the tobacco budworm, *Heliothis virescens* (F.). During 1986, field control failures attributed to pyrethriod resistance were observed in Arkansas, Louisiana, and Mississippi (Leonard et al. 1987, Luttrell et al. 1987, Roush and Luttrell 1987). By the mid 1990s, pyrethriod resistance had reached levels which made the pyrethroids nearly ineffective against populations of the tobacco budworm.

Fortunately, with the commercialization of Bt cotton in 1996, cotton growers had a new tool for managing populations of pyrethroid resistant tobacco buidworms. Bt cotton also provided some control/suppression of the bollworm and other secondary lepidopteran pests.

VipCot is a new transgenic cotton, which is derived from *Bacillus thuringiensis* (Berliner) as are Bollgard™ and Bollgard™ II cottons. VipCot has a different mode of action than the endotoxins currently available in commercial transgenic cottons that provides growers with alternate transgenic management strategies (Shotkoski et al. 2003). Unlike Bollgard™ cottons, the insecticidal protein (Vip3A) is secreted during the vegetative phase of bacterial development and is therefore classified as an exotoxin. The Bollgard™ proteins are classified as endotoxins and are secreted during the reproductive stage (Shotkoski et al. 2003, Mascarenhas et al. 2003).

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Materials and Methods

Cotton was planted 24 May and plots were 8 rows x 30 ft (9.1 m) on 40-inch (1 m) centers. Experimental design was a split-plot treatment arrangement with 4 replications. Main plots were VipCot strain and subplots were with and without pyrethoid applications for bollworm/tobacco budworm control. Main plots consisted of variety or strain with a given treatment threshold for the bollworm/tobacco budworm complex sprayed subplots. Treatments were as follows: 1) Cot 102 – sprayed at economic damage for Cot 102, 2) Cot 102 – sprayed at economic damage for Cot 202, 3) Cot 202 – sprayed at economic damage for Cot 202, 4) Cot 203 – sprayed at economic damage for Cot 202, and 5) Coker 312 – sprayed at economic damage for Coker 312. Economic damage was determined for each plot by its threshold and the recommendations of the Louisiana Cooperative Extension Service for control of the bollworms / tobacco budworms in transgenic and non-transgenic cotton. Treatment 1, Cot 102 (threshold of economic damage in Treatment 1) received 2 applications of Karate Z at 0.03 lb (AI)/acre on 30 Jul and 4 Aug. Treatment 5, Coker 312, received 3 applications of Karate Z at 0.03 lb (AI)/acre on 14 and 30 Jul, and 4 Aug. Treatments 2, 3, and 4

never reached the threshold requiring insecticide applications for the bollworm/tobacco budworm complex based on Louisiana Cooperative Extension Service guidelines.

Results and Discussion

Mean damage and larval infestation of squares, flowers, and bolls for the sprayed plots are show in Figure 1. Coker 312 had significantly more square damage and live larvae in squares compared to all other strains. Square damage and larvae in squares was not significantly different among transgenic strains. Only the Cot 102 with 2 Karate applications and the Cot 203 had significantly fewer damaged flowers than the Coker 312 treatment. All strains, except Cot 102 with no pyrethroid applications, had significantly fewer larvae in flowers compared with the non-transgenic Coker 312. Likewise, all strains, except the unsprayed Cot 102, had significantly fewer damaged bolls then the Coker 312 plot. No significant differences in larvae in bolls occurred among strains.

Mean damage and larval infestation of squares, flowers and bolls for the unsprayed plots are show in Figure 2. In general, all transgenic strains had significantly less damage and larval infestation in squares, flowers, and bolls compared to the Coker 312 non-transgenic check.

Conclusions

All VipCot lines had significantly less damage and fewer live larvae in squares, flowers, and bolls compared with the unsprayed Coker 312. Although almost no significant differences occurred among the VipCot lines, Cot 202 and 203 consistently had less damage and fewer live larvae in squares, flowers, and bolls compared with Cot 102

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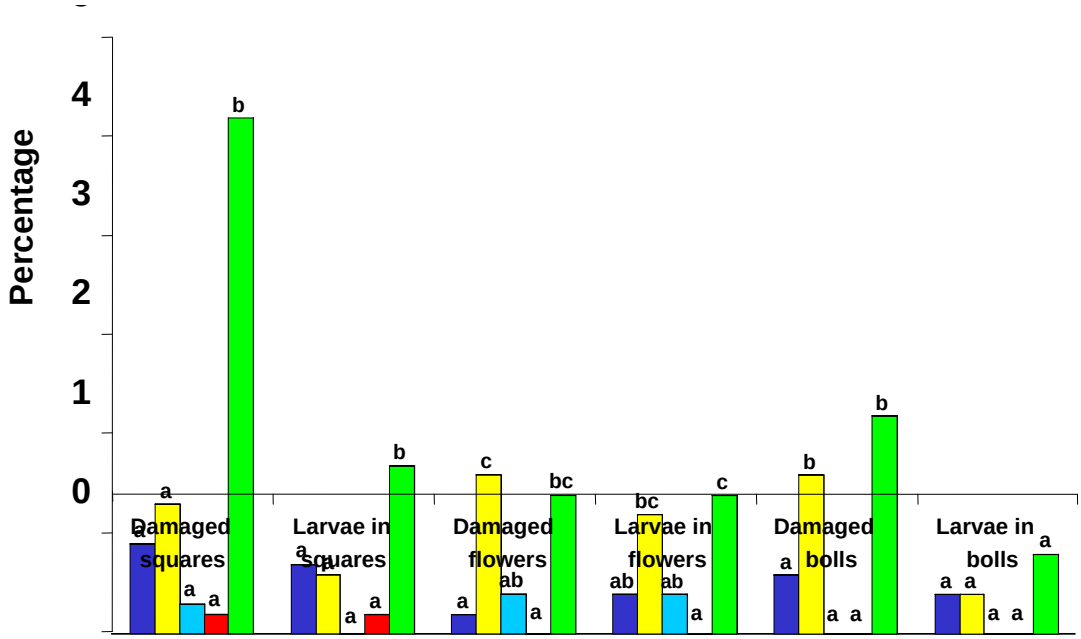

Figure 1. Bollworm/tobacco budworm damage and larval infestation in squares, flowers, and bolls in sprayed plots. Means within a grouping followed by the same letter are not significantly different (P≤0.05, DNMRT).

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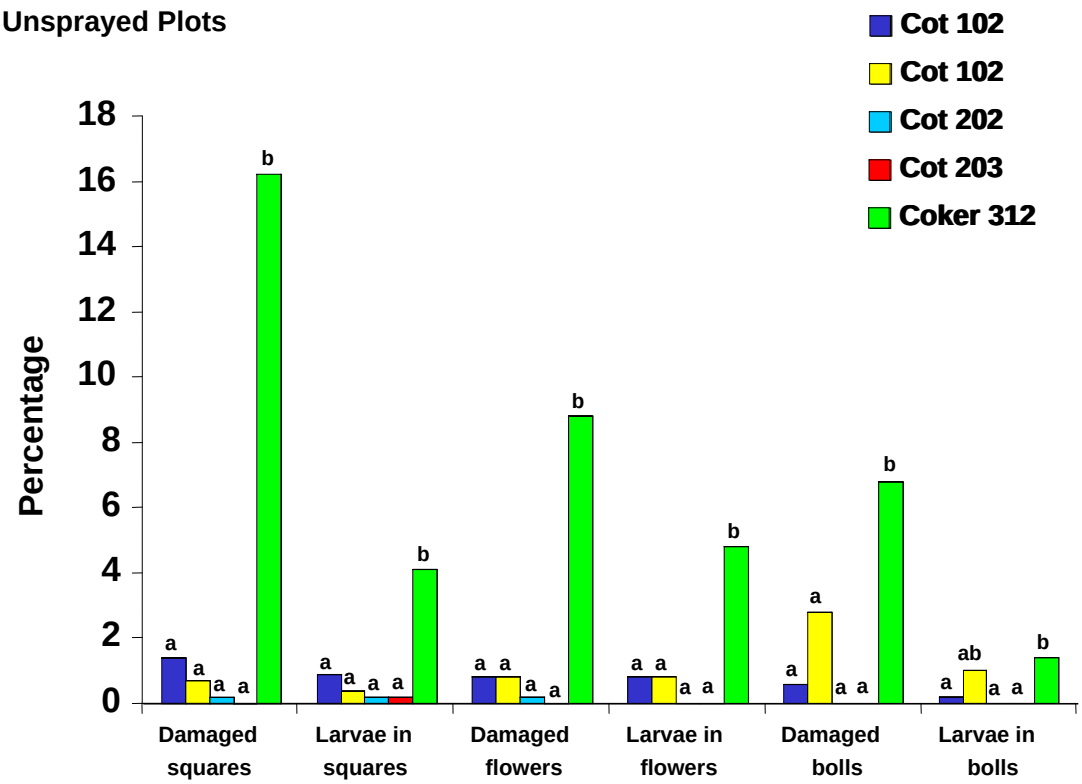

Figure 2. Bollworm/tobacco budworm damage and larval infestation in squares, flowers, and bolls in unsprayed plots. Means within a grouping are not significantly different ($P \leq 0.05$, DNMRT).