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BOLLGARD II EVALUATIONS IN ARKANSAS

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Abstract

Bollgard II, Monsanto lines DPLX-01L90-D and DPLX-01W94-D, were compared to Bollgard and conventional cotton in Jefferson County, AR, to determine efficacy against the Heliothine complex in cotton during 2001 and 2002. In both trials, Bollgard and Bollgard II reduced square damage and the presence of live larvae throughout the growing season when compared to the untreated conventional variety. This increased control resulted in greater yields in Jefferson County. The Bollgard II varieties used both years (DPLX01L90D in 2001 and DPLX01W94D in 2002) maintained the Heliothine larvae numbers and damage at very low levels for both years.

Introduction

Bollgard cotton *Gossypium hirsutum* (L.) containing the CryIAc endotoxin of *Bacillus thuringiensis* Berliner, became commercially available to cotton producers in 1996. Bollgard varieties since that time have provided growers excellent control of the tobacco budworm, *Heliothis virescens* F., for growers in Arkansas. Control of bollworm, *Helicoverpa zea* (Boddie), and other lepidopterous pests has been less dependable and foliar insecticide applications are sometimes needed for control. Bollgard II was developed to contain an additional toxin, CryX , to enhance the control of lepidopterous pests in cotton and hinder the development of resistance. Previous studies have shown Bollgard II to increase efficacy for bollworm and soybean looper (Allen et. al 2000; Stewart et. al 2000; Ridge et. al 2000). The purpose of this study was to compare the efficacy of Bollgard II to Bollgard and conventional cotton for control of lepidopterous pests. Observations were also made to compare agronomic characteristics of these varieties.

Materials and Methods

Studies were conducted on the Hooker Farm in Jefferson County, AR. The studies were planted on April 30 in 2001 and May 5 in 2002. The test consisted of a randomized complete split block design with four replications. The six treatments were the varieties: SureGrow 125 (Untreated Check), SureGrow 125 BR (Bollgard), DPLX-01L90-D (Bollgard II, 2001) and DPLX-01W94-D (Bollgard II, 2002) with each variety either treated or untreated with a foliar applied insecticide. Each plot was 8 rows wide and 50 feet long in 2001 and 4 rows by 50 feet long in 2002. Insecticides used in the study were cyfluthrin (Baythroid 2E) and spinosad (Tracer 4E). Applications were based on samples taken from mid-June to early August. Application dates at both locations using Baythroid were July 6 and July 11 in addition to two applications of Tracer on July 18 and August 3 during 2001. Tracer was applied at 0.067 lb ai/A in 2002 on July 9, 25 and August 5. Scouting data taken included damaged fruit counts and larval counts. Plots were machine picked Oct 23 in 2001 or October 31 in 2002. All data were analyzed using Analysis of Variance and LSD (P=.05)

Results and Discussion

Populations of tobacco budworm and cotton bollworm were lower than those observed in previous years in both 2001 and 2002. Normally, tobacco budworm populations are highest in late July through early August. While this trend held true, the overall bollworm:budworm ratio was higher throughout the growing season than normal.

Judging from data obtained throughout the growing season, Heliothine pressure was higher in Jefferson County during 2001 than 2002. No significant difference in square damage was observed between Bollgard and Bollgard II at either location (Table 1). Both the Bollgard and Bollgard II varieties resulted in fewer seasonal live larvae in plots when compared to untreated SureGrow 125 regardless of insecticide treatment. However, no differences were observed when compared to treated SureGrow 125, indicating a possible result of low budworm pressure as well as lower Heliothine pressure throughout the growing season (Table 2).

In Jefferson County, all treatments in both years yielded significantly higher than the untreated SureGrow 125, a direct result of increased Heliothine control (Table 3). No significant difference in yield was observed between Bollgard and Bollgard II regardless of insecticide treatment in 2001. However, yields of both Suregrow 125 untreated and treated in 2002 were significantly lower that treated and untreated Bollgard and Bollgard II. Bollgard and Bollgard II were very effective in controlling the Heliothine complex in 2001 and 2002. The Bollgard II varieties used both years (DPLX01L90D in 2001 and DPLX01W94D in 2002) maintained the Heliothine larvae numbers and damage at very low levels for both years.

References

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Table 1. Seasonal Average Heliothine Damaged Squares per 50 Examined: Heliothine Control on Bollgard and Bollgard II Cotton, Jefferson County AR 2001-2.

		Heliothine Damaged Squares / 50 Squares Seasonal AVG	
Treatment Variety	**Insecticide**	**2001**	**2002**
SG 125	untreated	10.2 a	2.25 a
SG 125	treated*	1.9 b	1.25 b
SG 125 BR	untreated	0.8 bc	0.125 b
SG 125 BR	treated*	0.5 bc	0.188 b
DPL X01L90 D (2001) DPL X01W94 D (2002)	untreated	0.1 c	0.0 b
DPL X01L90 D (2001) DPL X01W94 D (2002)	treated*	0.4 c	0.0 b

Means followed by the same letter do not significantly differ (P = 0.05).

Table 2. Seasonal Average Heliothine Larvae per 50 squares: Heliothine Control on Bollgard and Bollgard II Cotton, Jefferson County AR 2001-2.

		Heliothine larvae / 50 Squares	
Treatment Variety	**Insecticide**	**2001**	**2002**
SG 125	untreated	4.4 a	0.188 a
SG 125	treated*	0.5 b	0.125 a
SG 125 BR	untreated	0.1 b	0.063 a
SG 125 BR	treated*	0.1 b	0.063 a
DPL X01L90 D (2001) DPL X01W94 D (2002)	untreated	0.1 b	0.0 a
DPL X01L90 D (2001) DPL X01W94 D (2002)	treated*	0.1 b	0.0 a

Means followed by the same letter do not significantly differ (P = 0.05).

Table 3. Lint Yield Lbs/Acre: Heliothine Control in Bollgard & Bollgard II Cotton, Jefferson County AR, 2001-2.

		Yield Pounds Lint Per Acre	
Treatment Variety	**Insecticide**	**2001**	**2002**
SG 125	untreated	831.4 b	749 c
SG 125	treated*	1043.7 a	897 b
SG 125 BR	untreated	1108.7 a	1036 a
SG 125 BR	treated*	1145.1 a	1033 a
DPL X01L90 D (2001) DPL X01W94 D (2002)	untreated	1045.3 a	1097 a
DPL X01L90 D (2001) DPL X01W94 D (2002)	treated*	1010.4 a	1129 a

Means followed by the same letter do not significantly differ (P = 0.05).