



## BOLLGARD II PERFORMANCE IN ARKANSAS, 2001

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### RESEARCH PROBLEM

Bollgard II, Monsanto line DPLX-01L90-D, was compared to Bollgard and conventional cotton in Jefferson and Lincoln Counties, AR, to determine efficacy against the Heliiothine complex in cotton.

### BACKGROUND INFORMATION

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 Arkansas growers with excellent control of the tobacco budworm, *Heliothis virescens* F. However, control of bollworm, *Helicoverpa zea* (Boddie) and other lepidopterous pests has been less dependable with additional foliar insecticide applications being needed at times 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.

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## RESEARCH DESCRIPTION

Studies were conducted on the Hooker Farm in Jefferson County, AR, and on the McGraw Farm in Lincoln County, AR. The studies were planted on 30 April and 1 May at Jefferson and Lincoln County, respectively, with the same treatments used at both locations. The test consisted of a randomized complete block design with four replications. The six treatments were the varieties: Sure Grow 125 (untreated check), Sure Grow 125 BR (Bollgard), and DPLX-01L90-D (Bollgard II) with each variety either treated or untreated with a foliar-applied insecticide. Each plot was 8 rows wide and 50 feet long in Jefferson County and 4 rows by 50 feet long in Lincoln County. Insecticides used in the study were cyfluthrin (Baythroid 2E) and spinosad (Tracer 4E). Applications were based on weekly samples taken from mid-June to early August. Application dates at both locations using Baythroid were 6 July and 11 July in addition to two applications of Tracer on 18 July and 3 August. Scouting data taken included damaged fruit counts and larval counts. Plots were machine picked 23 October (Jefferson County) or 18 October (Lincoln County). All data were analyzed using Analysis of Variance and LSD ( $P=0.05$ ).

## RESULTS AND DISCUSSION

Populations of tobacco budworm (TBW) and cotton bollworm (CBW) were lower than those observed in previous years. Normally, tobacco budworm populations are highest in late July through early August. While this trend held true in 2001 (Fig. 1), 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 at the Jefferson County location compared to the location in Lincoln County (Fig. 2, 3, 5, and 6). No significant difference in square damage was observed between Bollgard and Bollgard II at either location (Fig. 2 and 5). Both the Bollgard and Bollgard II varieties resulted in fewer seasonal live larvae compared to untreated Sure Grow 125 regardless of insecticide treatment; however, no differences were observed when compared to treated Sure Grow 125, indicating a possible result of low budworm pressure as well as lower Heliothine pressure throughout the growing season.

In Jefferson County, all treatments yielded significantly higher than the untreated Sure Grow 125, a direct result of increased Heliothine control. Although Heliothine control was virtually identical between the locations, yield results were substantially different. Lincoln County yields were much lower than those observed in Jefferson County. No significant difference was observed between Bollgard and Bollgard II regardless of insecticide treatment. However, yields of untreated and treated Bollgard II were not significantly different than untreated Sure Grow 125. Based upon Heliothine control at this location and the results from Jefferson County, it is likely that other environmental influences affected yield at this location.

The data obtained from both locations indicate Bollgard and Bollgard II were very effective in controlling the Heliiothine complex in 2001. The economic benefit of these technologies, however, were not as clear due to the low insect pressure observed throughout the growing season. Further evaluation of Bollgard II is necessary to determine its feasibility in Arkansas cotton production.

### PRACTICAL APPLICATION

In both trials, Bollgard and Bollgard II significantly reduced square damage and the presence of live larvae throughout the growing season compared to the untreated conventional variety. This increased control resulted in greater yields in Jefferson County; however, Bollgard II yields were not significantly higher in Lincoln County. Further evaluation of Bollgard II is necessary to determine its feasibility in Arkansas cotton production.

### ACKNOWLEDGMENTS

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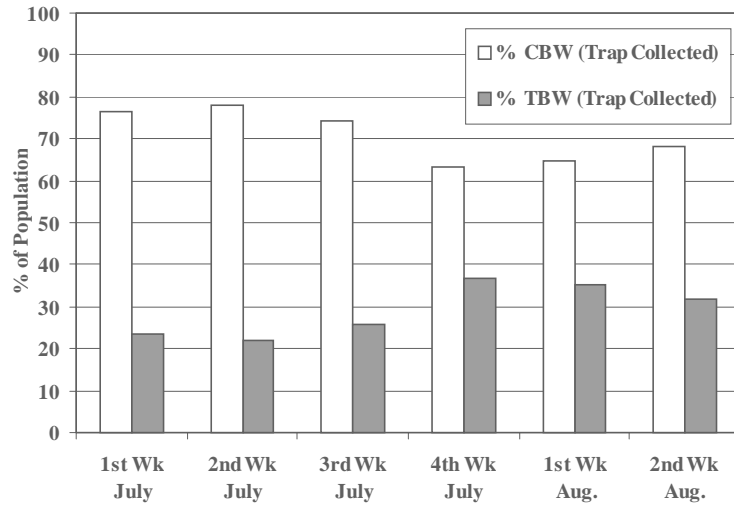


Fig. 1. Heliothine population distribution based on pheromone trap collections, Jefferson County, AR, 2001.

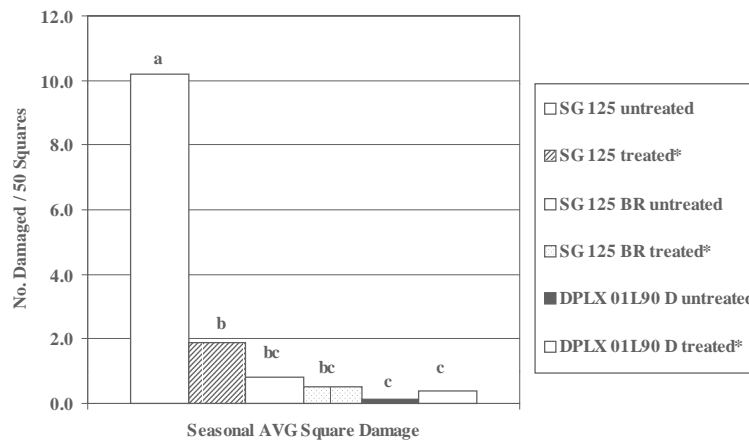
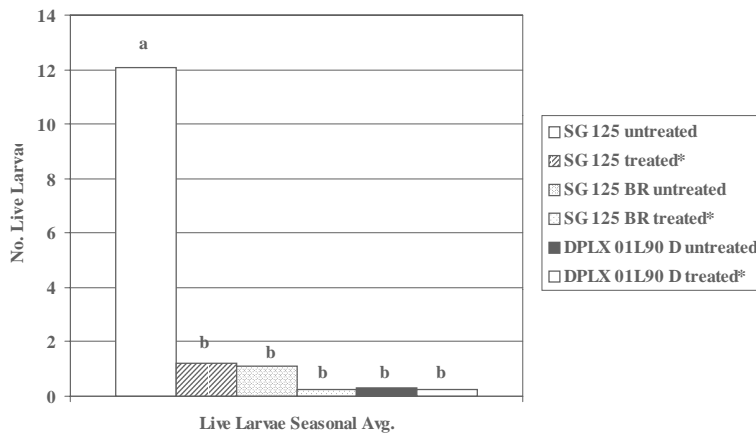
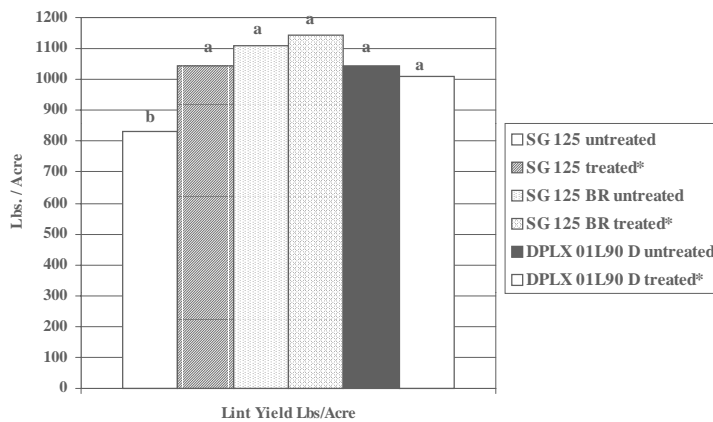


Fig. 2. Seasonal average Heliothine square damage: Heliothine control in Bollgard and Bollgard II cotton, Jefferson County, AR, 2001.



**Fig. 3. Live Heliiothine larvae seasonal average: Heliiothine control in Bollgard and Bollgard II cotton, Jefferson County, AR. 2001.**



**Fig. 4. Lint yield: Heliiothine control in Bollgard and Bollgard II cotton, Jefferson County, AR. 2001.**

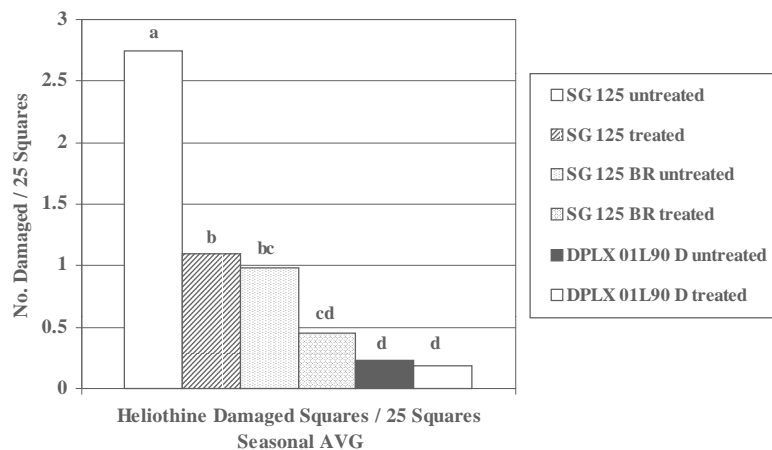


Fig. 5. Seasonal average Heliothine square damage: Heliothine control in Bollgard and Bollgard II cotton, Lincoln County, AR. 2001.

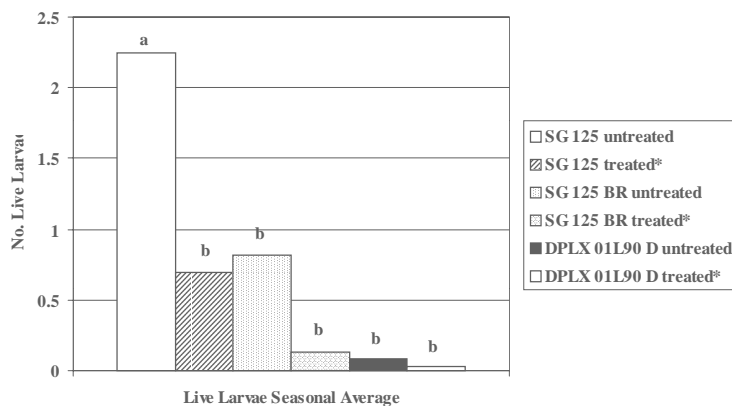


Fig. 6. Live Heliothine Larvae seasonal average: Heliothine control in Bollgard and Bollgard II cotton, Lincoln County, AR. 2001.