



Applied Research Report

Cotton Bollworm Control with Bt Cotton

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Summary

Three types of worm control are available to cotton farmers in the varieties they plant. BollGuard cotton contains one Bt gene; BollGuard II and WideStrike cotton contain two Bt genes. Cotton varieties containing multiple Bt genes are reported to have better worm control than those containing only one Bt gene. A research trial was conducted to evaluate the efficacy of cotton varieties containing one and two Bt genes. While no statistical differences occurred between the Bt cotton varieties, boll damage for the single-gene Bt variety was not different from the non-Bt variety at mid-bloom. All Bt varieties had fewer bollworms found than the non-Bt. The two-gene Bt varieties consistently had numerically less damage than the single-gene Bt variety.

Objective

For several years, cotton varieties containing one Bt gene, sold as BollGuard, have been available to farmers. Currently two additional types of Bt cotton varieties are available, BollGuard II and Widestrike. These "new" Bt products contain two Bt genes and are marketed as providing superior worm control than cotton containing a single Bt gene. This project was conducted to determine the levels of worm control provided by cotton containing one or two Bt genes.

Materials and Methods

A split block trial with four replications was established by planting four cotton varieties on 13 April 2005. The varieties planted included one non-Bt Variety, FiberMax (FM) 800R; one "single gene" Bt variety FM 800BR; and two Bt varieties containing two Bt genes, FM 800B2R and Phytogen 470WR. Plots were 24 ft long with 38 inch row-widths. The planting rate was 4.2 seeds per foot, planted at a depth of 1.25 inches.

Data was collected weekly beginning at bloom and included assessing damage

on 1/3 grown squares and thumb-sized bolls, and NAWF.

Measurements for yield were not taken for several reasons. First, these worm control traits are available in many different varieties. Yield data will be better found in replicated variety trials which compare more than one variety of each type of Bt cotton. Second, environmental factors resulted in a poor stand and short bloom period which would not allow for a fair comparison.

Results and Discussion

At first bloom, plants averaged 5.49 nodes above white flower (NAWF), and by 6 July, all plots averaged less than 2 NAWF. Square damage was not different between the Bt varieties, but all Bt varieties had less square damage than the non-Bt variety for all dates data was collected.

No differences were found for boll damage at 29 June. However, by 6 July, the BollGuard II and Widestrike varieties had less boll damage than the non-Bt. On 13 July, all Bt varieties had less boll damage than the non-Bt variety. While data for the BollGuard variety was never statistically different from that of the BollGuard II or Widestrike varieties, the BollGuard variety had consistently higher values for square and boll damage.

Bollworm counts on 6 and 13 July were higher in the non-Bt variety than the Bt varieties.

Differences in bollworm control between Bt cotton varieties are important to cotton production, however, it is also important to check cotton variety trials to determine if other characteristics of the varieties containing these traits are desirable.

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Table 1. Number of worm damaged 1/3 grown squares in ten plants. Data was collected by checking one, first position, 1/3-grown square per plant.

	Jun-29-05	Jul-06-05	Jul-13-05
FM 800 R	0.9 a	2.0 a	0.4 a
FM 800 BR	0.3 b	0.6 b	0.0 b
FM 800 B2R	0.1 b	0.0 b	0.0 b
PHY 470 WR	0.0 b	0.0 b	0.0 b
LSD (P=.05)	0.57	0.93	0.27
Standard Deviation	0.55	0.90	0.26
CV	176.31	136.72	276.03
Replicate F	0.412	1.591	1.000
Replicate Prob(F)	0.8842	0.1926	0.4586
Treatment F	3.980	8.837	4.200
Treatment Prob(F)	0.0216	0.0006	0.0178

Table 2. Number of worm damaged thumb-sized bolls in ten plants. Data was collected by checking one, first position, thumb-sized boll per plant.

Rating Date	Jun-29-05	Jul-06-05	Jul-13-05
FM 800 R	0.1 a	1.4 a	2.5 a
FM 800 BR	0.0 a	0.5 ab	0.8 b
FM 800 B2R	0.0 a	0.1 b	0.0 b
PHY 470 WR	0.1 a	0.1 b	0.1 b
LSD (P=.05)	0.27	0.93	1.12
Standard Deviation	0.26	0.90	1.08
CV	409.41	168.89	127.77
Replicate F	0.818	0.837	0.980
Replicate Prob(F)	0.5828	0.5689	0.4716
Treatment F	0.636	3.455	9.133
Treatment Prob(F)	0.5999	0.0349	0.0005

Table 3. Number of cotton bollworms found in ten plants.

Rating Date	Jul-06-05	Jul-13-05
FM 800 R	1.0 a	0.9 a
FM 800 BR	0.1 b	0.0 b
FM 800 B2R	0.0 b	0.0 b
PHY 470 WR	0.0 b	0.0 b
LSD (P=.05)	0.49	0.59
Standard Deviation	0.47	0.56
CV	167.42	257.37
Replicate F	1.430	1.000
Replicate Prob(F)	0.2459	0.4586
Treatment F	8.409	4.831
Treatment Prob(F)	0.0007	0.0104

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