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2002 BOLLGARD II™ PERFORMANCE IN THE MID-SOUTH

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Abstract

Bollgard II™ cotton was evaluated across the mid-South and East Texas to determine efficacy against heliothine caterpillar pests in 2002. Two types of studies were conducted across the region with crop consultants and academics. Studies consisted of "System" type trials and Unsprayed trials. Varieties included in each study consisted of a Bollgard II cotton line compared to a Bollgard® and non-B.t. cotton recurrent parent at each experiment site. Mean percent square and boll damage caused by heliothines was less in Bollgard II lines compared to Bollgard recurrent parents and considerably less than damage obtained in non-B.t. recurrent parents. Lint yield per acre was also greater in Bollgard II lines compared to Bollgard and non-B.t. recurrent parents. Bollgard lines exhibited greater yields than the non-B.t. recurrent parents.

Introduction

Bollgard II cotton was developed by the direct insertion of the *cry2Ab* gene into DP50B Bollgard cotton containing the *cry1Ac* gene (Greenplate et. al. 2000). Bollgard II cotton offers a two-fold advantage to cotton growers. Bollgard II has consistently provided better efficacy against most lepidopteran pests of cotton than Bollgard (Stewart et. al. 2000, Jackson et. al. 2000, Rahn et. al. 2001, Pitts 2001, Jost 2001, Norman and Sparks 2001, Catchot 2001, Adamczyk et. al. 2001, Brickle and Catchot 2002, Howell and Pitts 2002, Jackson et. al. 2003, Sivasupramaniam et. al. 2003, Coots and Pitts 2003, Sherrick et. al. 2003). With the addition of the *cry2Ab* gene, Bollgard II cotton lines have a greater potential for insect resistance management (IRM) than Bollgard. This is due to the additive interaction of the 2 B.t. toxins in the Bollgard II lines. In 2002, Greenplate et. al. showed that in diet overlay studies, co-expression of *cry1Ac* and *cry2Ab* had a 3-6 fold bioactivity level over Bollgard cotton expressing only *cry1Ac*.

Materials and Methods

Two types of studies were conducted across the mid-South in 2002 to compare efficacy of Bollgard II to Bollgard and non-B.t. recurrent parents. Studies included "system" type trials and unsprayed trials. Unsprayed trials were not treated for lepidopteran insects at any time in the growing season. However, when non-lepidopteran insects reached threshold levels the entire experimental area was oversprayed with a pesticide that had little or no lepidopteran activity. In the system trials, each variety was managed independently according to threshold with respect to lepidopteran insects. As in the unsprayed trials, when non-lepidopteran insects reached threshold, the entire test area was oversprayed with a pesticide that had little or no lepidopteran activity. Varieties included in the study were DP50BII (Bollgard II), DP50B (Bollgard) and DP50 (non-Bollgard) or DP33BII (15985, Bollgard II), DP33B (Bollgard) and DP5415 (non-Bollgard). Data includes seasonal means of percent heliothine damaged squares and bolls for the mid-South region. Seasonal means for each site only include averages for weeks where damage was actually recorded. Where gin turnout was not provided 32% turnout was assumed for all varieties.

Results and Discussion

Mean percent heliothine damaged squares and bolls were less in Bollgard II than in Bollgard or non-B.t. cotton in unsprayed trials in the mid-South. Bollgard cotton also sustained less percent damaged squares and bolls than non-B.t. cotton recurrent parents (Table 1). Lint per acre was also greater in Bollgard II cotton than Bollgard or non-B.t. cotton recurrent parents for unsprayed trials (Table 1). System trials were conducted to represent "the best effort to manage insects in a non-B.t. variety with insecticides." These results are directly compared to Bollgard and Bollgard II management systems that may or may not include supplemental insecticide treatments. Results from the system trials indicated that mean percent heliothine damaged squares and bolls were less in Bollgard II compared to Bollgard or non-B.t. cotton recurrent parents despite efforts to manage heliothines with pesticide applications (Table 2). Lint per acre was also greater in Bollgard II than either Bollgard or non-B.t. recurrent parents (Table 2). When data were analyzed across all locations regardless of test type, the same trends were apparent. Bollgard II obtained less percent square and boll damage than Bollgard or non-B.t. cotton recurrent parents (Table 3). Lint per acre was also greater in Bollgard II for all locations than either Bollgard or non-B.t. cotton recurrent parents (Table 3). These data indicate that Bollgard II is providing increased efficacy of heliothines particularly the cotton bollworm, *Helicoverpa zea* (Boddie), over Bollgard and substantially greater efficacy over non-B.t. varieties, even when they are aggressively treated with pesticides for control of heliothine pests.

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Table 1. Seasonal means of heliothine damaged squares and bolls and lint per acre of non-B.t., Bollgard, and Bollgard II cotton in unsprayed trials in 2002.

	% Square Damage	% Boll Damage	Lint/Acre
Non-B.t.	11.24	8.66	902
Bollgard	2.47	2	1137
Bollgard II	0.52	0.15	1185

Data includes seven locations across the mid-South.

Table 2. Seasonal means of heliothine damaged squares and bolls and lint per acre of non-B.t., Bollgard, and Bollgard II cotton in system trials in 2002.

	% Square Damage	% Boll Damage	Lint/Acre
Non-B.t.	7.31	8.16	833
Bollgard	1.55	3.25	941
Bollgard II	0.79	0.6	1001

Data includes four locations for percent square damage and six locations for percent boll damage and yield across the mid-South.

Table 3. Seasonal means of heliothine damaged squares and bolls and lint per acre of non-B.t., Bollgard, and Bollgard II cotton across all trials in 2002.

	% Square Damage	% Boll Damage	Lint/Acre
Non-B.t.	9.37	7.93	870
Bollgard	1.95	2.4	1047
Bollgard II	0.53	0.33	1100

Data includes thirteen locations for percent square damage and yield and fourteen locations for percent boll damage across the mid-South.