

# **BOLLGARD II® VERSUS BOLLGARD® SISTER-LINE ECONOMIC COMPARISONS - 2003**

**Walt Mullins and Jim Hudson**

**Monsanto Company**

**St. Louis, MO**

## **Introduction**

Bollgard II® cotton, which contains two B.t. genes, Cry1Ac and Cry2Ab, has been evaluated in small, regulated trials for several years across the Cotton Belt. Federal registration of Bollgard II in December of 2002 allowed for commercial launch with cotton growers in 2003. This report summarizes the results of large-scale field trials in LA, MS, AR, TN, AL, GA, SC, NC and VA in 2003. Our objectives were threefold: (1) to determine differences in insecticide spray numbers and costs among the technologies (Bollgard II, Bollgard and non-B.t.) under grower conditions (2) to determine the impact of technologies on yield and (3) to compare the overall economics of current Bollgard II varieties with “sister-line” Bollgard and non-B.t. varieties under grower conditions.

## **Materials and Methods**

All comparisons were made under large plot of field-sized grower conditions in LA, MS, AR, TN, AL, GA, SC, NC and VA. Most locations included comparisons of a Bollgard II, Bollgard and non-B.t. variety. In MS, LA and a few other locations, Bollgard II was compared to a Bollgard variety only. Only sister-line comparisons were made to minimize the impact of varietal differences on yield (primarily DP424 BII/R vs SG215 B/R vs SG521 R and DP468 BII/R vs DP458 B/R vs DP5415 R). Each variety/technology was managed independently for insect control needs. Each variety was scouted and treated for worms based on local thresholds. Treatment widths varied, but in most cases corresponded to the cooperator’s equipment for a sprayer width strip to allow each treatment to be sprayed independently of the adjacent variety. All plots were managed uniformly across treatments for agronomic practices such as irrigation, fertility, weed control, etc. All cost inputs (including insecticide costs and tech fees) were recorded. Lint yields were determined. Gross income was determined based on lint value of \$0.65 per pound.

## **Results and Discussion**

The economic advantage (or disadvantage) of a Bollgard II variety compared to other technologies will depend on a number of factors, including insect pressure as only one of them. Sister-line comparisons (lines derived from the same parental background) were used in this study to minimize the agronomic differences that are inherent variety to variety. Insect pressure in 2003 was generally moderate to light, depending on the area. In spite of the generally low insect pressure, Bollgard II reduced the number of total insecticide sprays and increased yields and economic return compared to Bollgard and non-B.t. varieties.

Since true isolines of varieties with and without transgenic traits do not exist, comparisons such as the ones in this study represent not only technology (insect control) comparisons, but also varietal (agronomic quality/fit) comparisons. Understanding the true economic value of an insect control trait, beyond its insecticide cost replacement value, will require tests involving multiple years and conditions, with the trait in multiple elite varietal backgrounds. This is the first year that grower managed economic comparisons have been conducted for Bollgard II, and the existing Bollgard II lines are derived from older germ-plasm. Further testing with the Bollgard II trait in more elite varietal backgrounds will be necessary to understand Bollgard II’s full value relative to the newer, more elite Bollgard varieties that are currently available.

## **Conclusions**

- Bollgard II averaged 0.6 fewer insecticide sprays than Bollgard
- Bollgard II averaged 19 pounds more lint yield per acre than Bollgard
- Bollgard II averaged \$14.63 more economic return per acre than Bollgard
- Bollgard II averaged 1.6 fewer insecticide sprays and \$39.69 more economic return per acre than non-B.t.

Table 1. All Orthogonal Comparisons of Bollgard vs Bollgard II (67 Comparisons).

	<b>Bollgard</b>	<b>Bollgard II</b>
Total No. Insecticide Sprays	3.2	2.6
Total No. Worm Sprays	1.3	0.1
Total Insecticide Costs/Acre (Sprays + Applications Costs)	\$30.28	\$22.21
Lint Yield/Acre	914	933
Net Dollar Return/Acre	\$540.69	\$555.32

**Bollgard II Economic Advantage = \$14.63/Acre**

Table 2. Mississippi and Louisiana Bollgard vs Bollgard II (24 Comparisons).

	<b>Bollgard</b>	<b>Bollgard II</b>
Total No. Insecticide Sprays	5.7	4.8
Total No. Worm Sprays	2.2	0.2
Total Insecticide Costs/Acre (Sprays + Application Costs)	\$54.71	\$44.01
Lint Yield/Acre	1009	1035
Net Dollar Return/Acre	\$573.17	\$593.61

**Bollgard II Economic Advantage = \$20.44/Acre**

Table 3. Southeast Bollgard vs Bollgard II (30 Comparisons in AL, GA, SC, NC, VA).

	<b>Bollgard</b>	<b>Bollgard II</b>
Total No. Insecticide Sprays	1.5	1.0
Total No. Worm Sprays	0.8	0.1
Total Insecticide Costs/Acre (Sprays + Application Costs)	\$12.88	\$7.88
Lint Yield/Acre	850	857
Net Dollar Return/Acre	\$520.78	\$526.25

**Bollgard II Economic Advantage = \$5.47/A**

Table 4. Arkansas and Tennessee Bollgard vs Bollgard II (10 Comparisons).

	<b>Bollgard</b>	<b>Bollgard II</b>
Total No. Insecticide Sprays	2.4	2.1
Total No. Worm Sprays	0.4	0.1
Total Insecticide Costs/Acre (Sprays + Application Costs)	\$19.03	\$16.49
Lint Yield/Acre	865	903
Net Dollar Return/Acre	\$518.74	\$539.93

**Bollgard II Economic Advantage = \$21.19/A**

Table 5. All Orthogonal Comparisons Non-B.t. vs Bollgard vs Bollgard II (40 Comparisons in AR, TN, AL, SC, NC, VA)

	<b>Non-B.t.</b>	<b>Bollgard</b>	<b>Bollgard II</b>
Total No. Insecticide Sprays	2.9	1.7	1.3
Total No. Worm Sprays	2.1	0.7	0.1
Total Insecticide Costs/Acre (Sprays + Application Costs)	\$26.89	\$14.42	\$10.03
Lint Yield/Acre	795	853	869
Net Dollar Return/Acre	\$489.98	\$520.27	\$529.67

**Bollgard II Economic Advantage Over non-B.t. = \$39.69/A**