

# **COST AND RETURN COMPARISONS OF TRANSGENIC AND CONVENTIONAL COTTON SYSTEMS IN ARKANSAS**

*Kelly J. Bryant, Charles T. Allen, Marwan S. Kharboutli,  
Kenneth L. Smith, Fred M. Bourland, and Larry D. Earnest<sup>1</sup>*

## **RESEARCH PROBLEM**

This was the second year of an ongoing study designed to examine the cost and returns associated with alternative pest control systems using transgenic and conventional cotton varieties. Ten varieties of conventional and transgenic seed were grown using best management practices with the goal of maximizing profits. Per acre cost of insect and weed control and returns were determined for each treatment. Some of the transgenic varieties offer increased net returns over some of the conventional varieties.

## **BACKGROUND INFORMATION**

The number of transgenic cotton varieties available for commercial production has increased greatly in recent years. Cotton producers now have several options when choosing transgenic cotton varieties. This study examined 10 transgenic and conventional cotton varieties to identify costs and returns in these cotton systems.

## **RESEARCH DESCRIPTION**

This study was composed of 10 treatments, each replicated four times. The treatments were conventional and transgenic cotton varieties and their respective insect and weed control programs. Each treatment was farmed with the goal of maximizing profits. This arrangement was planted at Rohwer in Southeast Arkansas and at Keiser in Northeast Arkansas in plots 40 ft long by 4 rows wide arranged in a randomized complete-block design using best management practices for each individual treatment. Standard fertilization and irrigation programs were used on all plots at both locations. Cotton was planted at the Southeast Arkansas location on 19 May, and at the Northeast Arkansas location on 12 May.

Per acre costs of insect and weed control were determined for each treatment using the Mississippi State Budget Generator. Technology fees and seed costs were based on 3.45 seed per row foot in Southeast Arkansas and 4.1 seed per row foot in

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<sup>1</sup> Area Extension Specialist - Farm Management, Extension Entomologist, Extension Associate, and Extension Weed Scientist, University of Arkansas Cooperative Extension Service, Southeast Research and Extension Center, Monticello; Cotton Breeder/Center Director, Northeast Research and Extension Center, Keiser; and Superintendent, Southeast Branch Station, Rohwer.

Northeast Arkansas. These figures were based on a 10 and 12 lb/acre seeding rate, respectively, for a medium-sized seed. Input prices were those used for the Arkansas 2000 Cotton Budgets, and returns over insect and weed control cost were calculated using the 5-year average price of cotton (\$0.685/lb). The cost of planting was estimated to be \$6.93/acre for varieties that received a herbicide application at planting, and \$6.30/acre for the varieties that did not.

## **RESULTS AND DISCUSSION**

The herbicide treatments at each location are depicted in Tables 1 and 2. All of the plots at the Southeast Arkansas location received a pre-plant incorporated application. The conventional plots received a preemergence application, while the herbicide-tolerant varieties each received one post-emergence application. All of the plots at the Northeast Arkansas location received two post-emergence applications, each specific to the transgenic technology of the variety. These applications were sufficient to control weed pests in all plots.

Insect pressure was very light in Arkansas in 1999. This was especially true at each location for this experiment. The insect control measures at each location are depicted in Tables 3 and 4. All of the plots at both locations received one early-season application for boll weevil and one late-season application for weevils. Additional sprays on the conventional varieties as opposed to the Bollgard varieties were not deemed necessary at either location.

Lint yields, weed and insect control costs, and returns for each treatment for each location are displayed in Tables 5 and 6. Neither yields nor returns were significantly different at the 5% level at either location. However, the trend in returns follows the trend in yield. The Stoneville varieties performed very well at the Southeast location and very poorly at the Northeast location. The two Roundup Ready varieties performed well at both locations. The Bollgard and stacked gene varieties yielded well but were ranked low due to high technology fees and no savings on insect control costs.

## **PRACTICAL APPLICATION**

The primary indicator of net returns in this study is lint yield. In general, as yields decrease net returns decrease. Large technology fees can be offset by high yields, but producers should avoid varieties that have large technology fees and low yields. In addition, these results indicate that some of the transgenic varieties offer increased net returns over some of the conventional varieties, especially in heavy weed or insect infested areas. Still, conventional varieties can result in high net returns, especially when weed or insect pressure is light.

**Table 1. Herbicide programs for three classes  
of cotton varieties: Southeast Arkansas, 1999.**

Conventional	Roundup Ready	Buctril Tolerant
Prowl 4 EC at 1.8 pt/acre	Prowl 4 EC at 1.8 pt/acre	Prowl 4 EC at 1.8 pt/acre
Zorial 80WP at 0.625 lb/acre	Zorial 80WP at 0.625 lb/acre	Zorial 80WP at 0.625 lb/acre
PPI on 12 May 1999	PPI on 12 May 1999	PPI on 12 May 1999
Cotoran at 1.2 pt/acre	Roundup Ultra at 1.5 pt/acre	Buctril 4EC at 1 pt/acre
Preemergence on 19 May 1999	Banded on 9 June 1999	Banded on 9 June 1999

**Table 2. Herbicide programs for three classes  
of cotton varieties: Northeast Arkansas, 1999.**

Conventional	Roundup Ready	Buctril Tolerant
Staple at 0.4 oz/acre	Roundup Ultra at 2.25 pt/acre	Buctril at 1.5 pt/acre
Banded on 11 June 1999	Broadcast on 10 June 1999	Banded on 10 June 1999
Bladex at 1.5 pt/acre	Bladex at 1.5 pt/acre	Bladex at 1.5 pt/acre
MSMA at 3.0 pt/acre	Roundup Ultra at 1.5 pt/acre	Buctril at 1.0 pt/acre
Directed on 3 July 1999	Directed on 3 July 1999	Directed on 3 July 1999

**Table 3. Insecticide programs for conventional and  
Bollgard cotton varieties: Southeast Arkansas, 1999.**

Conventional	Bollgard
Vydate CLV at 8.5 oz/acre	Vydate CLV at 8.5 oz/acre
Provado at 3.75 oz/acre	Provado at 3.75 oz/acre
18 June 1999	18 June 1999
Karate Z at 1.83 oz/acre	Karate Z at 1.83 oz/acre
31 July 1999	31 July 1999

**Table 4. Insecticide programs for conventional  
and Bollgard cotton varieties: Northeast Arkansas, 1999.**

Conventional	Bollgard
Vydate CLV at 10 oz/acre	Vydate CLV at 10 oz/acre
22 June 1999	22 June 1999
Karate at 3.2 oz/acre	Karate at 3.2 oz/acre
4 August 1999	4 August 1999

**Table 5. Lint yields, weed and insect control costs, and returns for each treatment; Southeast Arkansas, 1999.**

Variety	Lint	Weed	Insect	Tech. Fee, Seed,	Returns <sup>z</sup>
	Yield	Control	Control	and Planter	
	lb/acre	----- cost/acre -----		-----	\$/acre
ST 474	1153 a <sup>y</sup>	\$31.37	\$30.55	\$16.62	\$711.27 a
DP 5415 RR	1148 a	\$35.05	\$30.55	\$23.26	\$697.52 a
NuCotn 33B	1077 a	\$31.37	\$30.55	\$42.96	\$632.87 a
PM 1220RR	1044 a	\$35.05	\$30.55	\$26.07	\$623.47 a
ST BXN47	1039 a	\$38.04	\$30.55	\$20.69	\$622.44 a
PM 1560BG	1064 a	\$31.37	\$30.55	\$44.55	\$622.37 a
DP 5415	987 a	\$31.37	\$30.55	\$15.37	\$598.81 a
PM 1218BG/RR	1032 a	\$35.05	\$30.55	\$53.08	\$588.24 a
DP 5111	955 a	\$31.37	\$30.55	\$15.37	\$576.89 a
DP 458 B/RR	943 a	\$35.05	\$30.55	\$49.89	\$530.47 a

<sup>z</sup> Returns over weed control costs, insect control costs, technology fee, seed costs, and cost of planting. Assuming a cotton price of \$0.685/lb. Returns with the same letter are not significantly different at the 5% level.

<sup>y</sup> Yields with the same letter are not significantly different at the 5% level.

**Table 6. Lint yields, weed and insect control costs, and returns for each treatment; Northeast Arkansas, 1999.**

Variety	Lint	Weed	Insect	Tech. Fee, Seed,	Returns <sup>z</sup>
	Yield	Control	Control	and Planter	
	lb/acre	----- cost/acre -----		-----	\$/acre
DP 5415 RR	1,329 a <sup>y</sup>	\$27.68	\$19.16	\$25.63	\$837.66 a
DP 5111	1,258 a	\$26.02	\$19.16	\$16.33	\$800.10 a
DP 5415	1,189 a	\$26.02	\$19.16	\$16.33	\$752.67 a
PM 1220 RR	1,163 a	\$27.68	\$19.16	\$29.00	\$720.78 a
PM 1218BG/RR	1,197 a	\$27.68	\$19.16	\$58.40	\$714.62 a
PM 1560BG	1,154 a	\$26.02	\$19.16	\$48.54	\$696.87 a
NuCotn 33B	1,127 a	\$26.02	\$19.16	\$46.41	\$680.27 a
ST 474	1,038 a	\$26.02	\$19.16	\$17.82	\$647.98 a
ST BXN47	1,036 a	\$30.46	\$19.16	\$23.57	\$636.78 a
DP 458 B/RR	1,073 a	\$27.68	\$19.16	\$54.55	\$633.39 a

<sup>z</sup> Returns over weed control costs, insect control costs, technology fee, seed costs, and cost of planting. Assuming a cotton price of \$0.685/lb. Returns with the same letter are not significantly different at the 5% level.

<sup>y</sup> Yields with the same letter are not significantly different at the 5% level.