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BT COTTON PERFORMANCE IN ARKANSAS IN 2003: AN ECONOMIC EVALUATION

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Abstract

The University of Arkansas has implemented side-by-side comparisons of Bollgard cotton varieties to non-Bt varieties each year since 1996. Partial budgeting was used to quantify the change in profit associated with growing the stacked gene variety rather than the single gene or conventional variety. For seventeen observations in Southeast Arkansas profit decreased $56.80 per acre on average. For five observations in Northeast Arkansas profit decreased $65.42 per acre on average.

Introduction

The number of transgenic cotton varieties available for commercial production has increased greatly in recent years. Cotton producers now have multiple choices when choosing transgenic cotton varieties. The choice of variety now dictates the insect and weed control programs that will or can be used. It is estimated that, in 2003, at least 77% of Arkansas' cotton acreage was planted to a stacked gene variety while an additional 11% was planted to a single gene Roundup Ready variety (Anonymous, 2003).

Methods

The University of Arkansas, in cooperation with Arkansas cotton producers, county agents and industry representatives, has implemented side-by-side comparisons of Bollgard cotton varieties to non-Bt varieties each year beginning in 1996 (Bryant et al., 2002). In 2003, stacked gene varieties were compared to Roundup Ready varieties in some cases and to conventional varieties in other cases. This poster presents the economic results of those comparisons.

Four cotton growers in southeast Arkansas and two in northeast Arkansas agreed to cooperate in these comparisons. In all areas, fields were chosen that were very similar in nature. Each field was managed using Best Management Practices for that field and variety. The primary differences in management between the two fields being compared in each observation involved insect control due to the presence or absence of the Bt gene. In cases where the stacked gene variety is compared to a conventional variety, herbicide programs also differ. However, differences in herbicide applications were ignored in this analysis. To make the economic comparison more fair in these cases, the technology fee assigned to the stacked gene variety was reduced by the amount attributable to the Roundup Ready technology. In short, a Bollgard alone technology fee was assigned to the stacked gene variety instead of a stacked gene technology fee.

Partial budgeting was used to quantify the change in profit associated with growing the stacked gene variety rather than the single gene or conventional variety. In each comparison, changes in revenue and variable costs were determined. Most of the input prices for insecticides, applications, seed and technology fee were obtained from the 2003 cotton production cost estimates published by the University of Arkansas (Bryant and Windham, 2002). Input prices that were not available in these publications were obtained by surveying local distributors. Cotton lint was valued at $0.57 per pound. This is the ten year average cotton price received by Arkansas farmers from 1993 to 2002 (Arkansas Agricultural Statistics Service, 2003).

Results and Discussion

Partial budgeting results for seventeen comparisons in Southeast Arkansas are displayed in **Table 1**. The "change in gross return" column lists the changes in gross returns associated with growing the Bt variety instead of the non-Bt variety. This change in returns is the result of the yield difference between the two varieties. Growing the Bt variety increased gross returns in six of the seventeen observations. The average change in gross return for the seventeen observations was negative $45.20 per acre.

The "change in variable cost" column lists the increase or decrease in variable cost associated with growing the Bt variety instead of the non-Bt variety. These changes are the result of differences in seed costs, technology fees, and insecticide pro-

grams. Of the seventeen observations, growing the Bt variety reduced variable cost on four occasions. On average, variable cost increased $11.60 per acre when growing the Bt varieties.

The "change in profit" column lists the increase or decrease in profit associated with growing the Bt variety. These changes in profit are the result of the changes in gross returns and the changes in variable costs. Profit increased in five of the seventeen observations. On average, profit decreased $56.80 per acre.

Partial budgeting results for five comparisons in Northeast Arkansas are displayed in **Table 2**. Growing the stacked gene variety caused a reduction in gross returns for all five observations. On average, gross returns decreased by $40.93 per acre.

Of the five observations, growing the stacked gene variety reduced variable costs on no occasion. On average variable cost increased $24.49 per acre when growing the stacked gene variety.

Change in profit was negative for all five observations. On average, profit decreased $65.42 per acre.

Bollgard cotton is often grown as a risk management tool. In these observations in this year, the advantage was to the non-Bt varieties.

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Table 1. Variety, Changes in gross returns, change in variable cost and change in profit when comparing. Bt varieties to non-Bt varieties: Southeast Arkansas.

Varieties	Change in Gross Returns ($/acre)	Change in Variable Cost ($/acre)	Change in Profit ($/acre)
ST 5599 BG/RR FM 966	131.67	(21.72)	153.39
DPL 451 B/R FM 966	60.99	14.15	46.84
ST 4892 BG/RR FM 958	19.38	(17.64)	37.02
ST 4892 BG/RR FM 958	42.75	25.98	16.77
DPL 451 B/R FM 968	39.90	32.59	7.31
DP 451 B/R DP 436 RR	14.25	25.20	(10.95)
ST 5599 BG/RR FM 966	0.00	18.37	(18.37)
DP 451 B/R DP 436 RR	(13.68)	9.31	(22.99)
FM 960 B/R FM 958	(13.68)	25.64	(39.32)
ST 4892 BG/RR FM 966	(61.56)	(2.01)	(59.55)
DPL 451 B/R FM 966	(57.00)	9.04	(66.04)
ST 4892 BG/RR FM 966	(55.29)	35.29	(90.58)
DPL 451 B/R FM 958	(97.47)	13.02	(110.49)
DP 451 B/R PSC 355	(121.98)	12.36	(134.34)
ST 4892 BG/RR FM 958	(178.41)	4.51	(182.92)
DPL 451 B/R FM 958	(224.01)	15.39	(239.40)
DPL 451 B/R FM 958	(254.22)	(2.30)	(251.92)
Average	($45.20)	$11.60	($56.80)

Table 2. Variety, Changes in gross returns, change in variable cost and change in profit when comparing stacked gene varieties to single gene varieties: Northeast Arkansas.

Varieties	Change in Gross Returns ($/acre)	Change in Variable Cost ($/acre)	Change in Profit ($/acre)
PM 1218 BG/RR SG 521 RR	($3.99)	$27.20	($31.19)
SG 215 BG/RR SG 521 RR	($6.27)	$27.37	($33.64)
PM 1218 BG/RR DPL 436 RR	($25.65)	$12.94	($38.59)
PM 1218 BG/RR FM 966	($44.46)	$27.58	($72.04)
PM 1218 BG/RR SG 521 RR	($124.26)	$27.37	($151.63)
Average	($40.93)	$24.49	($65.42)