

THE IMPACT OF BTRR COTTON VARIETIES ON LABOR, EQUIPMENT AND ENVIRONMENTAL QUALITY

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Abstract

BtRR cotton varieties have reduced labor and equipment requirements, increased net returns, and improved environmental quality.

Introduction

In 2003, 92 percent of Mississippi's cotton acreage was planted to genetically modified seed (GMS). Bt varieties accounted for 15 percent, 16 percent was RR, and 61 percent was stacked (BtRR). Reduced tillage systems of production based on GMS have largely replaced conventional systems of production based on conventional varieties (non-genetically modified seed).

Materials and Methods

The Mississippi State University Budget Generator was utilized to estimate per acre budgets for four systems of cotton production in the Delta area of Mississippi.

- I. 8R-40" solid, conventional tillage, non-transgenic (conventional) variety [CT/CV].
- II. 8R-40" solid, reduced tillage, BtRR variety [RT/BtRR].
- III. 8R-40" solid, no-till, BtRR variety [NT/BtRR].
- IV. Ultra-Narrow Row (drilled 7.5 inches), no-till, BtRR variety [UNR/BtRR].

Reduced tillage is often referred to as conservation tillage or limited seedbed/chemical tillage. The budgeting technique employed 2003 input prices. Output prices selected were \$0.724/lb. for spindle (picker) harvested cotton, \$0.694/lb. for stripper harvested cotton, and \$0.044/lb. for cottonseed. Yield (lbs. of lint/a) was set to 825 for systems I, II, and III, and 700 for system IV. System I was compared to the other systems in terms of selected costs, returns, labor, and equipment. Pounds of active ingredients per acre (lbs. a.i./a) for pesticides (herbicides, insecticides, and defoliants) were utilized as a measure of environmental quality.

Results and Discussion

Table 1 reports estimated per acre revenue, selected costs, labor hours, and gallons of diesel fuel for each of the four systems of production. Total revenue for systems I, II, and III are the same, but total revenue for system IV is reduced 18 percent because of the reduction in assumed yield. Relative to system I, the direct cost associated with systems II and III is reduced seven percent, 19 percent for system IV. Estimated fixed cost is reduced 13 percent for system II, 19 percent for system III, and 61 percent for system IV.

Net returns are improved by 53 percent for system II, 59 percent for system III, and 34 percent for system IV. Estimated dollars per acre for insecticides are reduced 57 percent for systems II and III (does not include BtRR technology fee), and 80 percent for system IV. Herbicide costs are increased 1 percent for Systems II and III, and reduced 6 percent for System IV. The per acre cost of harvest aid materials is constant for systems I, II, and III, and reduced 18 percent for system IV.

Tractor driver labor hours are reduced 29 percent for system II, 42 percent for system III, and 50 percent for system IV. The reader is reminded that the number of tractor hours is equal to the number of tractor driver labor hours. Hand or support labor is reduced by 11 percent for system II, 15 percent for system III, and 27 percent for system IV.

Gallons of diesel fuel is reduced 20 percent for system II, 30 percent for system III, and 57 percent for system IV. The percentage differences for diesel fuel are less than the percentage for tractor driver labor hours for systems II and III, because diesel fuel for pickers (unchanged for systems I, II, and III) is included. Strippers use less fuel per acre than pickers. Repairs and maintenance charges are reduced 10 percent for system II, 18 percent for system III, and 54 percent for system IV.

Table 2 lists estimated pounds of active ingredients per acre for insecticides, herbicides, and harvest aids. In terms of the materials listed in Table 2, systems II and III are identical.

System I utilizes 2.5149 lbs.a.i./a. of insecticides. Systems II and III reduced that amount by 29 percent. System IV results in a 61 percent reduction in lbs.a.i./a. for insecticides. Systems II and III reduced herbicides (lbs.a.i./a.) by 10 percent, system IV by 52 percent. The harvest aid or defoliation program for systems I, II, and III is identical, resulting in 1.55 lbs.a.i./a. System IV does not utilize Dropp and adds Gramoxone, increasing harvest aid, lbs.a.i./a. by 10 percent.

Relative to system I, systems II and III reduced total lbs.a.i./a. by 14 percent. System IV results in a 42 percent reduction in lbs.a.i./a.

Table 1. Estimated per acre revenue, selected costs, labor, fuel, and equipment repairs and maintenance (R&M), 4 cotton production systems, Mississippi, 2004.

System		I. CT/CV	II. RT/BtRR	III. NT/BtRR	IV. UNR/BtRR
Item	Unit				
Total Revenue	\$	653.58	653.58	653.58	533.54
Direct Cost	\$	463.21	428.48	429.59	374.25
Fixed Cost	\$	100.44	87.82	81.07	39.18
Net Revenue	\$	89.93	137.28	142.92	120.11
Insecticides	\$	89.11	37.94	37.94	17.86
Herbicides	\$	34.97	35.45	35.45	29.24
Harvest Aids	\$	20.11	20.11	20.11	16.51
Labor					
Tractor Driver	hr	1.68	1.19	.98	.84
Hand	hr	.95	.85	.81	.69
Diesel Fuel	gal	21.74	17.33	15.30	9.36
R&M	\$	25.81	23.20	21.19	11.92

Table 2. Estimated pounds active ingredients per acre for insecticides, herbicides, and harvest aids, 4 cotton production systems, Mississippi, 2004.

System	I	II	III	IV
Insecticides				
Temik	.5250	.5250	.5250	
Vydate	.2516	.2516	.2516	.2516
Orthene	.7920	.7920	.7920	.5445
Tracer	.1600			
Bidrin	.1600	.1600	.1600	.1600
Karate	.1263	.0632	.0632	.0316
Curacron	.5000			
Total	2.5149	1.7918	1.7918	.9877
Herbicides				
Treflan	.5000			
Cotoran	.7500	.7500	.7500	
Staple	.0319			.0127
Caparol	.5000			
MSMA	1.0000			
Select	.0374			
Karmex	.8000	.8000	.8000	
Weathermax		1.7188	1.71888	1.7188
Total	3.6193	3.2688	3.2688	1.7315
Harvest Aid				
Dropp	.0500	.0500	.0500	
Prep	1.0000	1.0000	1.0000	1.1250
DeF	.5000	.5000	.5000	.3750
Gramoxone				.2078
Total	1.5500	1.5500	1.5500	1.7078
Total	7.6842	6.6106	6.6106	4.4270