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FIRST YEAR NO-TILL "THREE REGIMES"

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Abstract

Steadily increasing costs of production have resulted in declining and non-existent profits for cotton producers in the Mississippi Delta for several years. This problem combined with stagnant yields and a declining price has raised serious questions about the viability of cotton production in the Mississippi Delta. In an effort to address these questions, an intensive look at ways to reduce production costs for cotton in the area was begun in the year 2002. These efforts centered around three no-till systems of production, solid planted dryland cotton, solid planted irrigated cotton and full skip 2x1 dryland cotton. In addition, where possible insecticide applications were only made on the 20-inch band in an effort to reduce insect control costs. The first year's results of this study indicate that no-till production and other cost reducing practices offer some hope for reducing the cost of cotton production without any serious impact on yield. The largest cost reduction occurred in 2x1 dryland cotton, but a great deal of this cost reduction was more associated with the planting pattern than no-till.

Introduction

Cotton farmers in the Mississippi Delta have experienced declining and nonexistent profits for several growing seasons. Ten years ago average cost of production for one acre of cotton using conventional practices and 8-row equipment was $439.71 (Cotton 1993 Planning Budgets). The same report for the year 2002 indicates a cost of production of $563.91, an increase of $124.11 an acre (Delta 2002 Planning Budgets). During this period, yields have remained constant or declined slightly. The increased costs are associated with normal inflationary factors, particularly for agricultural chemicals and machinery. Other increased costs are associated with new technologies. The problem of ever increasing cost of production has become acute in the Mississippi Delta due to lack of improvement in yields, increased land rent, and the relatively low price received for cotton and cotton seed. This study is a beginning effort to look at production systems which might reduce costs while hopefully maintaining yields. The emphasis of this research is centered around conservation tillage and no-till farming systems. Emphasis is placed here not only to see if these systems offered some possibility of reducing costs but also to begin research that would document the economic effect of compliance with the Clean Water Act.

Methodology

In the 2000-2001 crop year, the field selected for this test had cotton produced in a conservation tillage regime, that is land preparation was accomplished with two to three tillage trips over the field and all postemergence activities being no-till, i.e., no cultivation. No tillage was conducted in the field used for this test in the fall of 2001 or during 2002. A conventional cotton variety was selected for this experiment (Stoneville 747). Three production systems were incorporated in the study: (1) no-till, solid planted cotton on 40-inch rows with no irrigation (dryland), (2) no-till solid planted cotton--irrigated, and (3) full skip 2x1 cotton (dryland). Budgets showing the inputs used for the various systems are included in Tables 1, 2 and 3. All production work was done with 4-row equipment as Delta Research and Extension Center owns no 8-row equipment, but costs were calculated using 8-row equipment. All ground applications of insecticides were made on a 20-inch band over the terminal of the plant only. Two such applications were made by ground. All aerial applications were broadcast. The cotton was harvested with a 2-row cotton harvester and seed cotton weighed in a boll buggy equipped with load cells. Lint percentage was assumed to be 34.5 percent and seed was assumed to equal 1.55 times the pounds of lint. Data collected included plant mapping, boll set, and node above white flower 5. The Node Above Cracked Boll 4 rule was used to determine defoliation date (Harris). The solid planted dryland plots were harvested September 17. The irrigated solid planted cotton and the 2x1 cotton were not harvested until November 18 due to an intensive and prolonged rainy period brought about by hurricanes Isidore and Lili (Table 4). Every effort was made to avoid harvesting these wet fields in an effort to preserve the no-till situation for future years. Unfortunately, this was not possible. Rutting was not severe but compaction was a problem such that this test will be repeated next year using conservation tillage practices, i.e. two to three tillage trips over the field. Yields in the irrigated solid and the skip-row cotton were considerably reduced due to wet weather and delayed harvest. Thus, an adjustment was required to make them equivalent to the dryland solid tests which were harvested without an extended period of inclement weather. Fortunately, another test at

the same location with the same variety was interrupted by this weather. Half of the test had been harvested prior to the inclement weather pattern, and the second half harvested afterward at near the same time as the irrigated solid and the 2x1 cotton in this test. This test indicated a 40-percent reduction in yield due to weather. Thus, a 40-percent factor was used to calculate what the yields would have been prior to the inclement weather and those are reported herein. As only limited acreage was available for this study, it was decided not to plant a conventional solid dryland cotton treatment as the check for this study. Rather, the data reported in the Delta 2002 Planning Budgets were used for comparison. The 2x1 yields reflect costs for one acre of land, that is two-thirds acre of cotton, but all costs to a total acre are included.

Results

Yields between solid dryland and solid irrigated were essentially identical and the only added practices necessary for the irrigated cotton in 2002 was the cost of two irrigations, which was done with poly pipe. Specified costs include all direct or out-of-pocket costs and fixed costs for farm machinery but do not include land rent or general farm overhead. Specified costs for all three of the no-till production systems clearly indicated some cost reduction associated with no-till practices when compared with the conventionally planted dryland solid cotton. Much of the benefits associated with 2x1 cotton in this report would have occurred if conventional tillage practices were being used. The 2002 Delta Planning Budgets report a specified cost of $471.94 per acre for skip-row or $91.96 less than it costs to produce an acre of conventional, solid planted cotton. The study did indicate some modest cost reduction could be achieved utilizing the no-till pattern regardless of production systems. Table 1 indicated that the gross returns associated with the solid-planted dryland and irrigated cotton were very similar. Gross returns included both lint and seed.

Based upon returns above specified costs, only three production systems resulted in any positive returns above specified costs. These returns were small. Returns above specified costs were $25.22 per acre for dryland solid, $1.85 for irrigated solid, and $32.31 for the 2x1 planted cotton. The final information included in Table 5 reports a specified cost of production per pound of lint. Solid dryland cotton costs 57.2 cents per pound, solid irrigated 60 cents per pound, and 2x1 dryland cotton 56.1 cents per pound. Conventional cotton production costs 68.4 cents per pound (Delta 2002 Planning Budgets).

Conclusions

One year's work with various no-till cotton production systems indicated that some reduction in production costs were achieved using the no-till production system. This research project has been planned for five years. Some ground will be lost due to the need to subsoil down the row and rehip due to compaction and rutting associated with the harvest in 2002 under inclement weather conditions. The practices used in this study were based on data collected and published earlier (Parvin). Previous research collected from farmers with extensive experience in no-till cotton production indicated a yield reduction in some cases in the first year of moving to no-till production, but the long-term yield reduction was very small, if any. Therefore, the economic viability of no-till cotton production must be considered over a longer period of time. In addition, it should be pointed out that the apparent economic benefit to no-till production measured in the cost of production budgets may be relatively small when compared to the benefits accrued from significant reductions in total capital investment in farm machinery and a reduction in the total labor force required to operate cotton farms (Martin).

References

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Table 1. Summary of estimated costs and returns per acre, 40" solid cotton, dryland cotton, no-till, Suregrow 747.

Item	Unit	Price Dollars	Quantity	Amount Dollars
INCOME				
Cotton lint	lb	0.52	847.00	442.98
Cotton seed	lb	0.05	1313.00	66.96
TOTAL INCOME				509.94
DIRECT EXPENSES				
Custom spray	acre	9.00	1.00	9.00
Harvest aids	acre	10.49	1.00	10.49
Gin/dry	acre	67.76	1.00	67.76
Fertilizers	acre	59.92	1.00	59.92
Fungicides	acre	10.95	1.00	10.95
Herbicides	acre	80.29	1.00	80.29
Insecticides	acre	44.35	1.00	44.35
Seed	acre	10.40	1.00	10.40
Boll weevil eradication fee	acre	22.00	1.00	22.00
Service fee	acre	7.00	1.00	7.00
Adjuvants	acre	1.84	1.00	1.84
Custom fert/lime	acre	3.45	1.00	3.45
Custom harvest/haul	acre	16.94	1.00	16.94
Operator labor	hour	8.62	1.36	11.75
Hand labor	hour	6.44	1.13	7.30
Unallocated labor	hour	8.62	1.09	9.40
Diesel fuel	gal	0.80	10.88	8.70
Repair & maintenance	acre	32.96	1.00	32.96
Interest on op. cap.	acre	10.82	1.00	10.82
TOTAL DIRECT EXPENSES				425.36
RETURNS ABOVE DIRECT EXPENSES				84.57
TOTAL FIXED EXPENSES				59.34
TOTAL SPECIFIED EXPENSES				484.71
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				25.22

Note: Cost of production estimates are based on last year’s input price.

Table 2. Summary of estimated costs and returns per acre, 40" 2x1 dryland cotton, no-till, Suregrow 747.

Item	Unit	Price Dollars	Quantity	Amount Dollars
INCOME				
Cotton lint	lb	0.52	790.00	431.17
Cotton seed	lb	0.05	1224.50	62.44
TOTAL INCOME				475.61
DIRECT EXPENSES				
Custom spray	acre	9.00	1.00	9.00
Harvest aids	acre	15.82	1.00	15.82
Gin/dry	acre	63.20	1.00	63.20
Fertilizers	acre	45.81	1.00	45.81
Fungicides	acre	7.33	1.00	7.33
Herbicides	acre	69.03	1.00	69.03
Insecticides	acre	37.63	1.00	37.63
Seed	acre	6.96	1.00	6.96
Boll weevil eradication fee	acre	22.00	1.00	22.00
Service fee	acre	7.00	1.00	7.00
Adjuvants	acre	1.23	1.00	1.23
Custom fert/lime	acre	3.45	1.00	3.45
Custom harvest/haul	acre	15.80	1.00	15.80
Operator labor	hour	8.62	1.32	11.38
Hand labor	hour	6.44	1.14	7.34
Unallocated labor	hour	8.62	1.06	9.10
Diesel fuel	gal	0.80	10.62	8.49
Repair & maintenance	acre	30.81	1.00	30.81
Interest on op. cap.	acre	15.67	1.00	15.67
TOTAL DIRECT EXPENSES				387.11
RETURNS ABOVE DIRECT EXPENSES				88.50
TOTAL FIXED EXPENSES				56.18
TOTAL SPECIFIED EXPENSES				443.30
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				32.31

Note: Cost of production estimates are based on last year's input price.

Table 3. Summary of estimated costs and returns per acre, 40" solid irrigated cotton, no-till, Suregrow 747.

Item	Unit	Price Dollars	Quantity	Amount Dollars
INCOME				
Cotton lint	lb	0.52	842.00	440.36
Cotton seed	lb	0.05	1305.00	66.55
TOTAL INCOME				506.92
DIRECT EXPENSES				
Custom spray	acre	9.00	1.00	9.00
Harvest aids	acre	10.49	1.00	10.49
Gin/dry	acre	67.76	1.00	67.76
Fertilizers	acre	59.92	1.00	59.92
Fungicides	acre	10.95	1.00	10.95
Herbicides	acre	80.29	1.00	80.29
Insecticides	acre	44.35	1.00	44.35
Seed	acre	10.40	1.00	10.40
Boll weevil eradication fee	acre	22.00	1.00	22.00
Service fee	acre	7.00	1.00	7.00
Adjuvants	acre	1.84	1.00	1.84
Custom fert/lime	acre	3.45	1.00	3.45
Custom harvest/haul	acre	16.94	1.00	16.94
Operator labor	hour	8.62	1.36	11.75
Hand labor	hour	6.44	1.13	7.30
Irrigation labor	hour	6.44	0.11	0.73
Unallocated labor	hour	8.62	1.09	9.40
Diesel fuel	gal.	0.80	15.33	12.26
Repair & maintenance	acre	34.70	1.00	34.70
Interest on op. cap.	acre	10.93	1.00	10.93
TOTAL DIRECT EXPENSES				431.51
RETURNS ABOVE DIRECT EXPENSES				75.40
TOTAL FIXED EXPENSES				73.54
TOTAL SPECIFIED EXPENSES				505.06
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				1.85

Note: Cost of production estimates are based on last year’s input price.

Table 4. Summary of estimated costs and returns per acre, 8-row 40" solid cotton, dryland cotton, sandy soil, usual practices, standard variety, Delta Area, Mississippi, 2002.

Item	Unit	Price Dollars	Quantity	Amount Dollars
INCOME				
Cotton lint	lb	0.52	825.00	431.47
Cotton seed	lb	0.05	1279.00	65.22
TOTAL INCOME				496.70
DIRECT EXPENSES				
Custom spray	acre	18.50	1.00	18.50
Harvest aids	acre	17.37	1.00	17.37
Gin/dry	acre	66.00	1.00	66.00
Fertilizers	acre	50.82	1.00	50.82
Fungicides	acre	17.52	1.00	17.52
Herbicides	acre	36.19	1.00	36.19
Insecticides	acre	83.42	1.00	83.42
Seed	acre	10.40	1.00	10.40
Boll weevil eradication fee	acre	22.00	1.00	22.00
Growth regulators	acre	9.96	1.00	9.96
Service fee	acre	7.00	1.00	7.00
Adjuvants	acre	0.41	1.00	0.41
Custom fert/lime	acre	17.26	1.00	17.26
Custom harvest/haul	acre	16.50	1.00	16.50
Operator labor	hour	8.62	1.95	16.78
Hand labor	hour	6.44	1.48	9.50
Unallocated labor	hour	8.62	1.56	13.42
Diesel fuel	gal.	0.80	18.25	14.60
Repair & maintenance	acre	43.61	1.00	43.61
Interest on op. cap.	acre	11.09	1.00	11.09
TOTAL DIRECT EXPENSES				482.41
RETURNS ABOVE DIRECT EXPENSES				14.28
TOTAL FIXED EXPENSES				81.48
TOTAL SPECIFIED EXPENSES				563.90
RETURNS ABOVE TOTAL SPECIFIED EXPENSES				-67.19

Note: Cost of production estimates are based on last year's input price.

Table 5 . Rainfall at Tribbett, MS, 9/18/02 to 11/07/02.

Date	Rainfall (in.)	Date	Rainfall (in.)
9/19/02	1.83	10/24/02	0.58
9/20/02	1.76	10/25/02	0.08
9/25/02	1.43	10/26/02	0.03
9/26/02	3.19	10/27/02	0.02
10/3/02	1.51	10/28/02	0.02
10/7/02	0.16	10/29/02	0.01
10/9/02	0.16	10/30/02	0.01
10/11/02	0.85	11/4/02	0.01
10/12/02	0.89	11/5/02	0.04
10/19/02	0.01	11/6/02	0.03
10/20/02	0.01	11/7/02	1.08
Total rainfall 9/18/02 to 11/07/02			13.71 in

Table 6. Four systems of no-till cotton production, 2002

No-till system	Yield lb/acre	Specified costs $/acre	Gross returns @ 52¢/lb $/acre	Returns above specified costs $/acre	Specified costs/lb lint $/lb
Solid - dryland	847	484.71	509.94	25.22	.572
Solid - irrigated	842	505.06	506.92	1.85	.600
2x1 - dryland[1]	790	443.30	475.61	32.31	.561
Conventional solid dryland[2]	825	563.90	496.70	-67.20	.684

[1]Adjusted 40 percent for fall weather.

[2]Delta 2002 Planning Budgets–Budget Report 2001-005. Dec. 2001. This system is conventional tillage not no-till.