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THREE YEARS EXPERIENCE WITH SKIP-ROW COTTON PRODUCTION IN MISSISSIPPI, 1999-2001

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Abstract

At expected yields, current input costs, and output prices, skip-row cotton generates larger net returns per acre than solid cotton production.

Introduction

Researchers in the Department of Agricultural Economics, Mississippi State University, in cooperation with scientists at other locations and other agencies began investigating alternative systems of cotton production during the 1999 production season [Parvin and Cooke, 1999]. Initial research efforts focused on no-till cotton production [Parvin and Cooke, 2000] and ultra-narrow row cotton production systems [Parvin, Cooke, and Molin]. While preliminary survey results indicated both systems were promising, the researchers found that cotton production systems based on skip-row planting patterns [Parvin, Cooke, and McCarty] were an attractive alternative to standard methods (systems) of cotton production on a large portion of Mississippi cotton soils (acreage).

The relationship between cotton price and production costs has changed considerably in recent years. In the past, the distinction between a cotton acre and a land acre was important in an agronomic and economic sense. While the agronomic relationships are still valid, the economic distinction between a land acre and a cotton acre have vanished. All yields, costs, and returns, in this report, are reported on a land basis for dryland, or non-irrigated, cotton.

Relative to solid planted 40-inch cotton, full-skip, usually denoted "2 x 1", has an 80-inch skip between the drills in the skip-row. In other words, full-skip has an additional 40-inch skip for every third unplanted row. Narrow-skip planting pattern has a 64-inch skip between the drills in the skip-row, i.e., an additional 24-inch skip relative to solid planted but 16 inches less than a full skip pattern.

Solid cotton planted in 40-inch rows has 13,068 linear feet of row per acre, 40-inch 2x1 has 8,712.4, and narrow-skip has 10,052.3. A narrow-skip pattern is 76.92 percent cotton relative to solid planted cotton and full-skip is 67 percent cotton. Materials applied “down the row” are less in skip-row than solid planted cotton. Additionally, there is another important distinction. One turn, or round, through the field with a 4-row cotton picker in solid planted 40-inch cotton covers 320 inches. One turn with the same picker adjusted to harvest narrow-skip, covers 416 inches of width (480 with 40 inch 2x1). With skip-row pattern, the performance rates for the cotton harvesting units (pickers, boll buggies, and module builders) are improved so that their cost per acre is reduced. For example, the performance rate for a fully supported and efficient 4-row picker in 40” solid planted cotton is 0.177 hours per acre. The performance rate for the same picker in full-skip planted cotton is 0.118 hours per acre. One 4-row picker, boll buggy, module builder plus two tow tractors costs more than $400,000. Not only is harvest direct cost per acre reduced as a function of the change in performance rate, the potential exists to spread annual fixed cost over additional acres so that fixed cost per acre is also reduced.

In general, an acre of solid cotton exhibits higher yields than one acre of skip-row cotton. The narrower the skip, the closer the yield of skip-row cotton approaches the yield of solid planted cotton. Hence, narrow-skip exhibits higher yields than a full-skip pattern.

Yield

Most of the replicated research on skip-row planting patterns was conducted during the early 1970's. Table 1 summarizes five studies [Cooke; Cooke and Heagler; Cooke, Anderson, and Heagler; Cooke and Spurgeon; Fulgham, Williford, and Cooke] conducted by scientists at the Stoneville experiment station. Much of this research compared a full-skip pattern versus solid

planted cotton. The 1969 study indicates that skip-row cotton production on clay soils is not efficient. The Stoneville wide-bed planting pattern, which is closer to narrow-skip than 2 x 1, yielded on average 96.04 percent of solid. The other studies ranged from 88-92 percent of solid.

The Department of Agricultural Economics annual cost of producing cotton publications, utilize an expected yield of 825 pounds of lint per acre for solid planted cotton, 744 pounds per acre for full-skip, and 760 for narrow-skip.

Methodology

The Department of Agricultural Economics, Mississippi State University, releases estimates of the per acre cost of producing cotton on an annual basis [Robinson, et al; Parvin, et al 1999, 2000]. The department's standard cotton budget is labeled "Solid cotton, sandy soil, 8-row equipment, usual practices, Delta Area". During the three-year period, estimated total direct expenses per acre have ranged from $460.92 to $485.63 (Table 2). Estimates of equipment fixed costs (labeled fixed expenses) have varied from $78.40 to $83.91 per acre. he standard budget is employed to compare net returns above total specified expenses for the standard system of production (8 row-40" solid) and 8 row 40" 2x1. Cotton lint is priced at $0.61 per pound. The price of seed is fixed at $0.05 per pound (1.55 pounds of seed per pound of lint).

During the 1999, 2000, and 2001 production season, detailed information on every trip across the field was taken from more than 100 commercial cotton operations that employed alternative cotton production methods. Actual yields were recorded. The information was utilized to construct per acre budget tables for each of the operations by employing the Mississippi State Budget Generator [Laughlin and Spurlock].

Many of the alternative cotton production systems were based on skip-row patterns. The most common pattern was 40" 2x1 (full-skip). On average, yields observed during the 3-year study for the 40" 2x1 production system were well above the expected level of 744 pounds of lint per acre. However, the study was not designed to compare solid versus skip-row yield. The study had limited observations where a grower produced both solid and skip-row cotton and no observations where a grower produced both on the same soil type. Hence, for purposes of this report, relative yields were set at their expected levels of 825 and 744.

Results

Even though the 2x1 system generated 81 fewer pounds of lint per acre and total revenue was decreased by $54.88 per acre, it improved net returns per acre because direct cost and fixed cost per acre were lowered. The improvement in estimated net returns per acre was remarkedly stable, ranging from $28.54 to $31.22 per acre and averaging $29.63.

Case Study

Detailed information was obtained from a grower that has made major adjustments in his method of cotton production during the 3-year study period. He shifted from 8R-38" solid standard production to 12R-30" 2x1 [Parvin, Cooke, and Stephens]. When the crop was grown the same by both systems (the only difference in cost was due to equipment size and linear feet of row per acre) direct cost per acre was reduced by $82.04 or 19.0% from $432.83 to $350.79. Fixed cost per acre was reduced by $36.61 for a cost reduction of $118.65 per acre.

When the grower shifted from standard production practices to limited seedbed/chemical tillage (LS/CT-paratill and no-till after emergence) the cost reduction improved by $23.21 from $118.65 to $141.86 per acre. When he adopted no-till techniques, the cost reduction improved by another $15.48, from $141.86 to $157.34 per acre.

Conclusions

Reasonable individuals can argue about how much of the difference in net returns is due to differences in soil type, variety, production system, and years (weather). However, these limited observations indicate that the 2x1 system of production may be superior to the standard system of production on many soil types in the mid-south. However, one thing is clear, most mid-south cotton farmers will grow their cotton differently (less cost per acre and less costly per pound) in the year 2002 than in the recent past. A few started in 1999. More started in 2000. Many started in 2001. Most growers will produce cotton in 2002 radically different than they did in 1999.

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Table 1. Relative yield per acre, solid vs. skip-row planting pattern, Delta area of Mississippi.

Year	Ref.	Soil	Length of study	Planting pattern	Yield	Solid yield	% of solid
1969	4	Sand	4	2x1	711	790	90.00
		Loam		2x1	627	710	88,31
		Clay		2x1	393	580	67.76
1972	2	Sand	4	2x1	640	730	87.67
1973	9	Sand	4	Stoneville Wide Bed	777	809	96.04
1975	1	Sand	3	2x1	675	730	92.47
1975	7	Sand	3	2x1	675	767	88.01
1988	8	Sand	4	Narrow-skip	760	825	92.12

Table 2. Per acre yield, cost and revenue, two cotton production systems, Mississippi, 1999-2001.

Year	System	Yield	Total Revenue	Direct Cost	Fixed Cost	Net Revenue
1999	40” solid	825	558.94	460.92	82.92	15.10
1999	40” 2x1	744	504.06	394.55	63.19	46.32
2000	40” solid	825	558.94	485.05	78.40	-4.51
2000	40” 2x1	744	504.06	415.87	63.57	24.62
2001	40” solid	825	558.94	485.63	83.91	-10.60
2001	40” 2x1	741	504.06	422.09	64.03	17.94