COMMERCIAL ULTRA-NARROW ROW COTTON PRODUCTION, MISSISSIPPI, 1999

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Abstract

An analysis of a 1999 sample of 13 no-till producers indicates that over a reasonable range of cotton lint prices, ultra narrow row cotton production may result in larger net returns per acre than conventional production practices. The largest percentage cost reduction is in fixed expenses. In general, total direct expenses per acre are also reduced, although UNRC usually results in higher seed and chemical expenses. UNRC has a lower total cost per pound compared to conventional cotton.

Introduction

Ultra narrow row cotton (UNRC) has received cyclical interest and attention over the past 40 years (Bader, et al). The introduction of new varieties, weed control options, and improvement in equipment technology have increased the probability that drill seeded cotton can be grown profitably. The development of broad spectrum over-the-top weed control technology and herbicide-tolerant varieties, precision drills, and close-row planters have stimulated recent interest.

Determining the optimum row width and spacing of cotton has been of interest for many years. Cooke and Meade (1911) reported that rainy weather and highly productive soil may cause a higher percentage of vegetative branches to develop at the expense of fruiting branches. Brown, in 1927, reported that close spacing is conducive to early maturity because it results in a higher percentage of primary bolls. Brown (1937) reported that the length of the mainstem is determined mainly by soil and water conditions, although differences by variety were acknowledged.

Kirk, Brashears, and Hudspeth examined the influence of row width and plant spacing on cotton production practices and yields on the Texas High Plains and reported their results in 1969. Sappingfield, et al (1969) and Anderson (1973) reported that narrow rows produced more yield, were earlier, and resulted in shorter plants than wide rows.

Methodology

During the 1999 production season, detailed information on every trip-across-the- field was taken from 13 commercial operations that employed UNRC production techniques on all or a significant part of their acreage. In most cases, (9), actual yields were recorded. At four locations MAFES personnel estimated yields by harvesting large blocks with a commercial stripper. The information was utilized to construct per acre budget tables.

The Department of Agricultural Economics, Mississippi State University, releases estimates of the per acre cost of production cotton on an annual basis. The Department's standard cotton budget labeled "Solid cotton, sandy soil, 8-row equipment, Delta Area" for the 1999 season (Robinson, p.6) reports total direct expenses per acre of $454.16. Total fixed expenses per acre are estimated at $82.93. Total specified expenses, the sum of direct and fixed expenses, based on a yield of 825 pounds of lint per acre, are $537.09 per acre. A cost of $22.00 per acre for boll weevil eradication was added to the standard budget, increasing total direct expenses to $476.16 per acre.

The Department's standard cotton budget for the Brown Loam labeled, "Cotton, 8-row equipment, Brown Loam Area", (Robinson, page 42), reports total direct expenses of $427.74. Total fixed expenses are estimated at $73.91. Total specified expenses are $501.65. A cost of $24.00 per acre for boll weevil eradication was added to the standard budget, increasing total direct expenses to $525.65.

The standard or conventional budgets are employed to compare net returns above total specified expenses for the conventional or standard methods of production and the 13 UNRC operations at $0.50, $0.60, and $0.70 per pound of lint. The price of cottonseed was fixed at $0.05 per pound.

Study Area

Eight of the cooperating farms (labeled grower 01-08) are located in the Brown Loam and five (labeled grower 09-13) are located in the Delta Region of the state. The Delta region is comprised of alluvial soils (water deposited) and generally lies west of the Mississippi River, south of Memphis, and north of Vicksburg. It varies in width from a few miles to more than 75 miles.

The Brown Loam region is located immediately east of the Delta. It is comprised of loess soils (wind blown). It ranges in width from less than 20 miles to approximately 60 miles.

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Both regions experienced a drought in 1999 and in most cases yields were depressed.

Results

Genetically modified seed (GMS) was utilized by most of the UNRC growers. The standard budget employs conventional seed. The UNRC budgets reflect the cost of boll weevil eradication. Boll weevil eradication costs were added to the standard budgets.

Table 1 reports the yield, tillage system, and variety type for the 13 growers and the two standard or conventional budgets. Seven of the growers employed double-stack GMS, labeled "BtRR". Three of the growers utilized BXN variety type. Two growers employed Bt varieties and only one UNRC grower employed a conventional variety.

All UNRC production is no-till after planting. Seven of the growers produced their cotton no-till while six employed tillage prior to planting.
The standard yields are 725 and 825 pounds of lint per acre for the Brown Loam and Delta respectively. Only two of the growers in the Brown Loam produced yields larger than the standard (725). Two of the five growers in the Delta produced yields in excess of 825 pounds of lint per acre.

Selected per acre cost items are reported in Table 2. Seed costs per acre were always higher for UNRC when compared to conventional, because more pounds of seed are required per acre. Most UNRC growers experience a seed technology fee for the GMS.

Generally there are no differences in fertilizer costs per acre. However, a few UNRC growers cut the rates, and used the cheapest sources resulting in fertilizer costs in the $20 per acre range or approximately half of the standard.

Only two of the growers in the Brown Loam experienced herbicide costs greater than the standard. Two additional growers had herbicide costs that were essentially equal to the standard. Four growers had herbicide costs substantially less than the standard. In the Delta, two of the five growers experienced herbicide costs greater than the standard.

1999 was a year with low insect pressure. The standard budgets reflect average or expected levels of insecticide use. In Table 2, all UNRC budgets have insecticide costs less than the standard, even when the GMS technology fee is considered.

Dollars per acre devoted to operator labor was less in all 13 UNRC budgets. The same is true for dollars per acre required for diesel fuel and repairs and maintenance. These items are related to trips-over-the-field.

Direct expenses per acre were uniformly less for UNRC than for the standard or conventional. Estimated fixed expenses were also less in every case. The per acre reduction in fixed expenses is consistent with the $30.10 per acre reduction reported by Wilson, et al. However, it is expected that the fixed expense estimates reported in Table 2 will be reduced another 25% to 30% when better estimates are obtained of the annual hours of use (number of acres per year) for the UNRC equipment.

Table 3 reports net returns per acre above total specified expenses for UNRC and conventional or standard practices and the difference (UNRC minus standard) or improvement due to UNRC when compared to the standard. When the price of cotton lint is $0.50 per pound, the standard budget loses $106.96 per acre in the Brown Loam. Three of the eight UNRC budgets have positive net returns. The improvement due to UNRC in the Brown Loam, at $0.50 per pound, ranges from $30 to more than $131 per acre.

Three of the five Delta budgets at $0.50 per pound produce positive returns ranging from approximately $25 to $71 per acre compared to the standard which loses $82.65 per acre. The improvement due to UNRC ranges from approximately $60 to $150 per acre. At $0.50 per pound the average improvement due to UNRC is $86.23 per acre.

At $0.60 per pound of lint the standard Brown Loam budget loses $34.46 per acre and the standard Delta budget loses $0.15 per acre. Five of the eight Brown Loam budgets result in positive net returns ranging from less than $10 to more than $90 per acre. All the UNRC budgets for the Delta have estimated net returns that are positive. They range from about $36 to more than $160 per acre. At $0.50 and $0.60 per pound of lint, all 13 of the UNRC budgets are superior to the standard.

At $0.70 per pound of lint, 11 of the 13 UNRC budgets provide estimates of net return that are larger than the standard. Because the 1999 actual yields for the 13 UNRC growers tended to be less than the budget yields for the standard or conventional practices, as price increased from $0.50 to $0.70, the tendency is for the difference between UNRC and the standard to narrow. However, when the UNRC yields approach (or exceed) the standard yield, the difference in net returns between the two systems will increase as price increases. The situation was observed with grower 04, 05, 09, and 12.

Summary

At a low price, $0.50 per pound of lint, even though seven of the 13 UNRC budgets indicate negative net returns, all 13 UNRC growers experienced net returns which were superior to those experienced by the standard budget for the region.

The average improvement in returns due to UNRC was $86.23 per acre.

When the price of cotton lint is $0.60, even though both of the standard budgets indicate negative net returns, ten of the 13 UNRC budgets indicate positive net returns and all 13 indicate returns greater than the standard. The average improvement due to UNRC was estimated at $79.45 per acre.

At a relatively high price, $0.70 per pound of lint, net returns per acre for the standard budget in the Delta region is $82.35. All of the Delta UNRC growers exceeded that amount, ranging from approximately $97 to $258 per acre. At $0.70 per pound of lint, six of the eight UNRC growers in the Brown Loam made higher net returns than the Brown Loam standard. The average improvement in returns due to UNRC was $72.66 per acre.

Over a reasonable range of prices, this sample of 13 UNRC growers, based on their actual 1999 yields and estimated costs, are better off than the standard or conventional budgets based on expected yields and costs. As the price of lint increases from $0.50 to $0.70, the improvement in returns, on average, becomes smaller. However, for the four UNRC growers with the largest yields, the improvement in returns become larger.

Table 1. Yield (pounds of lint per acre), tillage and variety type by production system and region, Mississippi, 1999.

Production System	Region	Grower	Variety Type	Tillage	Yield	Difference
Standard	Brown Loam	-	Conventional	Tilled	725	-
UNRC		01	BtRR	No-Till	622	-103
		02	BtRR	No-Till	526	-199
		03	BtRR	Tilled	530	-195
		04	BtRR	No-Till	772	47
		05	BtRR	No-Till	740	15
		06	Bt	No-Till	701	-24
		07	BXN	No-Till	612	-113
		08	BtRR	Tilled	650	-75
Average (01-08) 644						-81
Standard	Delta	-	Conventional	Tilled	825	-
UNRC		09	BtRR	Tilled	931	106
		10	BXN	Tilled	820	-5
		11	BXN	Tilled	603	-222
		12	Bt	No-Till	851	26
		13	Conventional	Tilled	685	-140
Average (09-13) 778						-47

Table 2. Selected Per Acre Cost Items by Production System and Region, Mississippi, 1999.

Production System	Region	Grower	Seed	Fert.	Herb.	Insect.	Direct Expenses	Fixed Expenses	Total Specified Expenses
Standard	Brown Loam	-	14.40	44.01	48.20	74.61	451.74	73.91	525.65
		01	35.00	47.03	45.69	14.37	365.55	48.25	413.79
		02	35.00	39.43	28.40	2.21	331.80	48.96	380.76
		03	32.80	40.20	24.63	2.21	325.62	55.51	381.12
		04	35.00	49.80	46.50	13.50	390.43	45.08	435.51
		05	35.00	49.80	32.68	12.53	362.26	47.82	410.08
		06	34.65	49.80	58.63	13.50	385.67	44.80	430.47
		07	33.25	49.80	69.95	34.51	372.05	45.08	417.13
		08	34.00	16.50	22.50	9.48	297.15	54.16	351.31
Standard	Delta		14.40	45.04	48.89	77.51	454.16	82.93	537.09

Production System	Region	Grower	Seed	Fert.	Herb.	Insect.	Direct Expenses	Fixed Expenses	Total Specified Expenses
UNRC		09	36.00	20.40	36.01	29.22	418.82	47.44	466.26
		10	38.00	31.59	26.11	24.71	350.81	76.71	427.51
		11	38.00	31.59	26.11	24.71	319.86	52.05	371.91
		12	37.62	16.44	86.01	0.00	426.89	39.32	466.21
		13	28.20	15.55	71.68	55.69	361.37	57.05	418.42

Table 3. Estimated per acre net returns above total specified expenses by production system and region, selected prices of cotton lint, and improvement in net returns due to UNRC (UNRC minus standard).

Price			----$0.50----		----$0.60----		----$0.70----	
Production System	Region	Grower	Net Returns	Difference	Net Returns	Difference	Net Returns	Difference
Standard	Brown Loam	-	-106.96		-34.46		38.04	
UNRC		01	-54.59	52.37	7.61	42.07	69.81	31.77
		02	-76.96	30.00	-24.36	10.10	28.24	-9.80
		03	-75.02	31.94	-22.02	12.44	30.98	-7.06
		04	10.34	117.30	87.54	122.00	164.74	126.70
		05	17.37	124.33	91.37	125.83	165.37	127.33
		06	-25.62	81.34	44.48	78.94	114.58	76.54
		07	-63.68	43.28	-2.48	31.98	58.72	20.68
		08	24.04	131.00	89.04	123.50	154.04	116.00
Standard	Delta	-	-82.65		-0.15		82.35	
UNRC		09	71.49	154.14	164.49	164.64	257.59	175.24
		10	46.04	128.69	128.04	128.19	210.04	127.69
		11	-23.66	58.99	36.64	36.79	96.94	14.59
		12	25.24	107.89	110.34	110.49	195.44	113.09
		13	-22.82	59.83	45.68	45.83	114.18	31.83
Average (01-13)			86.23		79.45		72.66	

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