ULTRA NARROW ROW COTTON: ECONOMIC EVALUATION OF 1996 BASF FIELD PLOTS

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Abstract

Enterprise budgets were developed for ultra narrow row and conventional cotton on five farms participating in field tests of UNR cotton in 1996. The results indicated a positive per acre return over variable and fixed costs for UNR cotton on all five farms. The per acre return over variable and fixed costs for UNR cotton was lower than the per acre return over variable and fixed costs for conventional cotton on only one of the five farms in the study. Fixed costs per acre were lower for UNR cotton than for conventional cotton. Variable cost per acre for UNR cotton was lower than for conventional cotton on two farms and higher on three farms. Yield differential between UNR and conventional cotton seemed to be the most important factor in determining relative profitability between UNR and conventional cotton. Farms that experienced a substantial yield increase of UNR over conventional cotton had lower per pound cost of production and higher profits for UNR cotton relative to conventional cotton.

Introduction

The concept of increasing cotton yields by planting in closer rows has existed for at least 75 years. However, only recently has technology become available that make this concept feasible. Improved herbicides and growth regulators have made feasible decreased row widths that were not possible using traditional cultivation methods. Row widths of 30 inches have been adopted by some farmers. This "narrow" row cotton is grown and harvested in essentially the same manner as cotton grown in more traditional row widths of 36 inches. The concept evaluated in this paper is substantially different from narrow row conventional tillage cotton.

Ultra narrow row (UNR) cotton is planted with a precision drill planter with row spacing of 10 inches or less. This precludes the use of mechanical cultivation and the use of herbicides that require a hooded sprayer. Instead of using a cotton picker, a finger stripper is used to harvest the cotton. Further, growth of the plants must be closely controlled with a growth regulator. Thus, weed management, management of growth of the plant, and harvesting are substantially different in UNR cotton than in conventional or narrow row cotton.

The purpose of this project is to evaluate the costs and returns of UNR cotton and make some comparison with the cost and returns of conventional cotton. Results from five field tests in 1996 of UNR cotton conducted by five farms throughout the Southeast, Delta, and Texas in cooperation with BASF Corporation are used to complete the evaluations.

Data and Methods

Information on each operation performed in production of UNR for land preparation for planting through harvesting and ginning was collected from each participating farm by the investigators or by representatives of BASF Corporation. The information consisted of the type of operation (e.g. planting, spraying), number of trips across the field, equipment used in the operation, products used in the operation (e.g. herbicide, fertilizer), month in which the operation occurred, yields, and price of the cotton and cotton seed sold. This information was also collected for conventional cotton grown by the five cooperating farms. It is important to note that in most cases the conventional cotton was planted at different times and was not grown in the same field as the ultra narrow cotton. Thus, in most cases a direct comparison between the UNR and conventional cotton is not appropriate.

The information collected was used to construct enterprise budgets for each farm for both UNR and conventional cotton. The five cooperating farms were located in Alabama, Louisiana, Texas, Tennessee, and Mississippi. Table 1 gives the farm location, BASF representative, acres of UNR cotton in the 1996 test, and the acres of conventional cotton grown by the farm. The results from the enterprise budgets are used to evaluate variable cost, fixed cost, and net return per acre and per pound for UNR cotton and conventional cotton. The effects of price discount and yield are examined.

Results and Discussion: Yield

Yields for both UNR and conventional cotton are given in table 2. Although, yields were higher for UNR than for conventional cotton on four out of five farms, any comparison between conventional and UNR cotton must consider that the yield for conventional may be an average yield for all the conventional cotton planted by a farm, while the UNR yield is for the limited acres planted to UNR cotton. Further, planting dates for UNR were generally later than for conventional cotton. With the exception of the Mississippi farm, soil types on which the UNR and conventional cotton were planted may have differed substantially. In some cases, the UNR cotton was planted on less productive soils than the conventional cotton since a comparative advantage for UNR over conventional planted on marginal soils is thought to exist. However, on the Mississippi farm the UNR cotton was planted on the

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same type soil as the soil in which the conventional cotton was planted.

Harvest Price

Harvest prices were available on three of the five farms surveyed. The Mississippi farm reported an average price of 78 cents per pound for conventional cotton with an approximate discount of 200 points for UNR cotton. The Louisiana farm reported an average price received of 65 cents per pound for conventional cotton with a discount of about 200 points on UNR cotton. The Tennessee farm reported an average price for conventional cotton of 72 cents with no discount for UNR cotton. To complete the budgets for the Texas and Alabama farms, a price of 70 cents per pound for conventional cotton and a 200 point discount for UNR cotton are assumed. Harvest price per pound for each farm is given in table 3.

Budget Overview

Summaries of the budgets for each farm for UNR cotton are presented in table 4. Summaries of the budgets for conventional cotton are presented in table 5. The budgets do not reflect the full economic cost of producing cotton since they do not include a charge for overhead, land, or management. The budgets include charges for variable costs such as fertilizer and lime, crop protection chemicals, labor, interest on operating money, and equipment repairs and maintenance, but do not include land rent. Fixed costs include depreciation for equipment, taxes, insurance, and interest on investment in equipment. To eliminate the effects of different age equipment used on different farms, new equipment prices are used in computing equipment investment. To facilitate comparison of different farms and production methods, equipment is assumed to be allocated over enough crop acreage to be fully utilized. This modification is necessary to evaluate potential fixed costs for UNR cotton, since, in actuality, any equipment specialized to UNR cotton is allocated over only the limited acres in the tests. Variable, fixed, and total cost per pound for both UNR and conventional cotton are given in tables 6 and 7.

Variable Cost

Variable cost per acre for UNR cotton ranges from a low of $287 on the Texas farm to $467 on the Louisiana farm (table 4). Variable cost per acre for the remaining three farms was clustered from $307 and $343. Variable cost per pound of lint yield for UNR cotton ranged from a low of 33 cents on the Texas farm to a high of 53 cents on the Tennessee farm (table 6). Variable cost per pound of yield on the Mississippi farm at 34 cents was similar to the Texas farm, while the Louisiana and Alabama farms were similar at 46 and 44 cents, respectively. Crop protection chemicals, the largest category within variable cost, ranged from $108 per acre for the Alabama farm to $259 per acre for the Louisiana farm. Excluding the Louisiana farm, the range for chemical cost is $108 to $160 per acre. Fertilizer and lime cost should be interpreted with caution since fertilization and liming rates in one particular year will depend on rates in previous years. Custom operations include insect scouting, custom spraying, and aerial spraying. Most of the variation in custom operations can be attributed to the extent a farm used custom or aerial spraying. Farms varied substantially in both seeding rate and seed price for UNR cotton.

Variable cost per acre for the conventional cotton was about $40 less per acre than for UNR cotton for the Louisiana, Texas, and Alabama farms (tables 4 and 5). Variable cost per pound for conventional cotton ranged from a low of 37 cents for The Mississippi farm to a high of 52 cents for the Alabama farm. Variable cost per pound was higher for conventional versus UNR cotton on every farm with the exception of the Tennessee farm. For the Tennessee and Mississippi farms, variable cost per acre was almost identical for conventional and UNR cotton. The potential sources of variation between conventional and UNR variable cost per acre are numerous. Seeding costs are obviously higher for UNR cotton. Differences in fertilizer and lime cost can be potentially attributed to differences in fertility of location of conventional and UNR cotton and differences in previous rates of fertilization. Chemical cost per acre for UNR versus conventional were similar for the Tennessee, Louisiana, and Texas farms. Chemical cost per acre was $62 lower for conventional on the Mississippi farm and $44 lower for conventional cotton on the Texas farm.

Fixed Cost

Fixed costs for UNR cotton ranged from a low of $30 per acre for the Tennessee farm to $46 per acre for The Mississippi farm. The Mississippi, Louisiana, and Texas farms had almost identical fixed costs for UNR cotton, with the Alabama farm only being $5 to $7 lower per acre at $39. The only factor causing differences among farms for fixed costs for UNR cotton is the number of operations performed and type of equipment used. For example, if one farm combined two tasks into one operation so that there was only one trip across the field, then the farm would have lower fixed costs than a farm that completed the two tasks in two trips across the field. Fewer trips across a field may have resulted in a lower proportion of the cost of a tractor or piece of equipment being allocated to cotton production versus production of other crops (unless it is a piece of equipment used only for cotton, for example, a cotton picker). Similarly, a farmer using a more expensive piece of equipment to perform an operation has potentially higher fixed cost for that operation than a farmer using a less expensive piece of equipment for the same operation. The exception is when the more expensive piece of equipment performs the operation in less time and is allocated over more acres than the less expensive equipment.

Fixed costs for conventional cotton were higher than for UNR cotton for every farm. Fixed costs for conventional cotton are $5 to $15 per acre higher than for UNR cotton.

This is primarily due to the difference in the cost of a stripper versus a picker. The fixed cost per pound is a function of the yield as well as equipment costs. Fixed cost per pound for conventional cotton was 1 to 8 cents per pound higher than for UNR cotton. It is important to note that since finger strippers are not currently manufactured, there are no prices available. Thus, the price for a John Deere bush stripper was used in computing fixed cost for UNR cotton.

As noted, fixed cost per acre in this analysis is calculated assuming that equipment is allocated over enough crop acres for full utilization. In order to realize a lower fixed cost for UNR versus conventional cotton, a farmer considering growing UNR cotton would need to grow enough UNR cotton to maximize use of a newly purchased stripper or maximize use by custom harvesting for other farms. A farmer considering adding more cotton acres to his operation may find the lower cost of a stripper versus picker (almost $100,000) to be enticing, particularly if the additional land available to him is suited to growing UNR cotton.

Net Returns

Per acre return over variable cost was lower for UNR cotton than for conventional cotton on only one of the five farms. On the Tennessee farm return over variable cost was $83 less for UNR than for conventional cotton. Return over variable cost for UNR and conventional cotton was similar on the Louisiana farm and only about $50 higher on the Mississippi farm. The returns over variable costs on the Texas and Alabama farms were substantially higher for UNR versus conventional cotton.

Any comparison of returns for the conventional versus UNR cotton in this study must be qualified by the fact that the UNR plots may or may not have been planted on land similar in nature to the conventional cotton. A true comparison of the costs and returns of the two types of cotton would require that plots of both be planted in the same field, so that environmental and soil conditions are as close to identical as possible. This was not the case for this study.

Despite this qualification, one can conclude from this study that, under the appropriate conditions, UNR cotton has the potential to yield net returns as high as those of conventional cotton. Note, that those farms on which UNR cotton showed the largest net return advantage over conventional cotton were those that had the lowest yields for conventional cotton. This is consistent with other studies that indicate that UNR cotton may fit into farming operations that have some acreage that is less productive or even marginal for cotton production. It is also consistent with studies that show that UNR cotton may be less profitable than conventional cotton on highly productive soils.

Break-even yields for both UNR and conventional cotton are reported in tables 8 and 9. Break-even yield is defined as the yield required for the return over variable and fixed costs to equal zero. With the exception of the Tennessee farm, break-even yields are higher for conventional cotton than for UNR cotton.

Conclusions

Enterprise budgets for UNR cotton on all five farms indicate a positive per acre return over variable and fixed costs for UNR cotton. The results also seem to suggest that under the appropriate conditions, UNR can be at least as, if not more, profitable than conventional cotton. The per acre return over variable and fixed costs for UNR cotton was lower than the per acre return over variable and fixed costs for conventional cotton on only one of the five farms in the study. Fixed costs per acre appear to be $5 to $15 lower for UNR cotton than for conventional cotton. However, variable cost per acre may be as much as $40 higher for UNR versus conventional cotton. Farms with lower conventional yields require a larger percentage yield increase in UNR cotton for UNR net return to be as large as the conventional net return. However, those farms with low conventional yields show the largest differences between average conventional yield and the UNR test plot yield. Thus, UNR cotton may hold the most potential for farms or land on farms that have low conventional cotton yields.

This study should not be viewed as conclusive concerning the comparison between net returns for UNR and conventional cotton. In this study, UNR cotton costs and returns for field tests are compared against average costs and returns for conventional cotton. Future research should include a comparison of cost and returns for conventional and UNR cotton under controlled and similar test conditions.

Table 1. Farm location, BASF representative and cotton acreage.

Farm Location	BASF Representative	Acres of UNR Cotton	Acres of Conventional Cotton
Somerville, Tennessee	Sam Atwell	20	2500
Benoit, Mississippi	Wade Stewart	17	1900
Clayton, Louisiana	Brad Guice	20	1400
Demmitt, Texas	Russ Perkins	40	500
Dothan, Alabama	Scott Rushing	50	850

Table 2. Yield (pounds) per acre for ultra narrow row in five 1996 field tests and farm yields for conventional cotton.

	TN Farm	MS Farm	LA Farm	TX Farm	AL Farm
Conventional	750	943	900	556	503
UNR	625	1020	1009	870	695

Table 3. Price per pound for ultra narrow row in five 1996-field tests and for conventional cotton on the selected farms.

	TN Farm	MS Farm	LA Farm	TX Farm	AL Farm
Conventional	$0.72	$0.78	$0.65	$0.70	$0.70
UNR	$0.72	$0.76	$0.63	$0.68	$0.68

Table 4. Summary of budgets for ultra narrow row cotton.

	TN Farm	MS Farm	LA Farm	TX Farm	AL Farm
Gross Revenue					
Cotton	450	775	649	592	486
Cottonseed	56	91		77	62
Total Revenue	506	866	649	669	548
Variable Cost					
Seed	24	20	22	18	32
Fertilizer Lime	25	16	83	17	51
Chemicals	161	146	259	120	108
Custom Operations	30	28	57	10	7
Fuel, Lube, Repair	12	24	24	22	19
Labor	8	11	11	7	11
Ginning	62	92		87	69
Operating Interest	8	5	11	6	6
Other					3
Total Variable Cost	330	343	467	287	307
Return over Variable Cost	176	523	182	382	241
Fixed Cost					
Interest	13	22	21	19	18
Deprec, Tax, Insur.	17	24	24	21	21
Total Fixed Cost	30	46	45	40	39
Return over Fixed & Var. Cost	146	477	137	342	202

Table 5. Summary of budgets for conventional tillage cotton.

	TN Farm	MS Farm	LA Farm	TX Farm	AL Farm
Gross Revenue					
Cotton	540	735	598	389	352
Cottonseed	67	84		49	45
Total Revenue	607	819	598	439	397
Variable Cost					
Seed	10	9	7	6	5
Fertilizer, Lime	74	25	54	17	40
Chemicals	154	84	256	120	64
CustomOperations	32	32	55	10	7
Fuel, Lube, Repair	20	71	33	34	42
Labor	8	26	12	12	21
Ginning	75	94		56	75
Operating Interest	9	7	13	5	5
Other					3
Total Variable Cost	348	347	430	260	263
Return over Variable Cost	259	472	168	179	134
Fixed Cost					
Interest	19	52	25	26	32
Deprec, Tax, Insur.	23	60	29	31	37
Total Fixed Cost	42	113	55	57	69
Return over Fixed & Var. Cost	217	359	113	122	65

Table 6. Cost per pound and yields for UNR cotton.[1]

	TN Farm	MS Farm	LA Farm	TX Farm	AL Farm
Yield Pounds/acre	625	1020	1009	870	695
Variable Cost $/pound	0.53	0.34	0.46	0.33	0.44
Fixed Cost $/pound	0.05	0.04	0.05	0.05	0.06
Total Cost $/pound	0.58	0.38	0.51	0.38	0.50

[1]Total cost is the sum of variable and fixed accounting costs. It does not represent full economic cost.

Table 7. Cost per pound and yields for conventional cotton.[1]

	TN Farm	MS Farm	LA Farm	TX Farm	AL Farm
Yield Pounds/acre	750	943	900	556	503
Variable Cost $/pound	0.46	0.37	0.48	0.47	0.52
Fixed Cost $/pound	0.06	0.12	0.06	0.1	0.14
Total Cost $/pound	0.52	0.49	0.54	0.57	0.66

[1]Total cost is the sum of variable and fixed accounting costs. It does not represent full economic cost.

Table 8. Breakeven yields for UNR cotton[1]

	TN	MS	LA	TX	AL
Yield (pounds)	500	512	813	481	509

[1]Breakeven yield is defined as the yield required for return over fixed and variable cost to equal zero.

Table 9. Breakeven yields for conventional cotton[1]

	TN	MS	LA	TX	AL
Yield (pounds)	542	694	746	453	474

[1]Breakeven yield is defined as the yield required for return over fixed and variable cost to equal zero.