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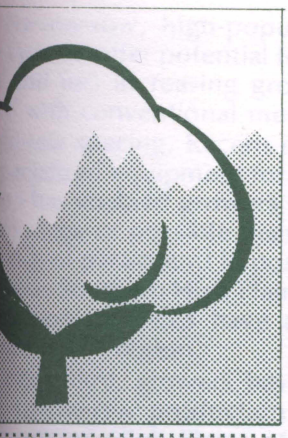

An Economic Comparison of Coventional and Narrow-Row Cotton Production—Southern High Plains of Texas

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Summary

Increasing interest in adopting narrow-row systems for cotton production in the Southern High Plains of Texas prompted an economic comparison of these new systems with conventional production systems for cotton. Previous experimental research indicated that narrow-row production methods have the potential for increasing returns and (or) reducing costs relative to conventional production methods.

A survey of known narrow-row growers conducted from 1971 to 1973 provided basic data for the study. Statistical tests of the yield series indicated that for irrigated production, the double-row method and the 32-inch single-row method produced significantly higher yields per crop acre than the conventional 40-inch single-row method. Without irrigation, only the 32-inch, 2×1 skip row method produced a significantly higher yield per crop acre than the conventional 40-inch, 2×1 skip row method on medium-textured soil. A cost and returns analysis of the different systems showed the potential for improving economic returns per crop acre by shifting to the higher yielding narrow-row methods for different soil types.

An analysis of equipment investment costs for converting from conventional production to higher yielding narrow-row methods indicated that although additional investment was required, the cost may be repaid from additional earnings within a relatively short time period.

Comparisons of lint quality between different methods revealed that narrow-row methods tend to produce slightly shorter staple length and increased micronaire in general than conventional methods, but there is no major difference in the value of lint produced. Comparisons of weed control costs indicated no major difference in herbicide use, cultivation practices, or hoeing costs between conventional and narrow-row methods of production except in the case of broadcast systems.

AN ECONOMIC COMPARISON OF CONVENTIONAL AND NARROW-ROW COTTON PRODUCTION — SOUTHERN HIGH PLAINS OF TEXAS

Kenneth B. Young and James R. Adams*

Narrow-row, high-population cotton production systems offer potential for reducing production cost and (or) increasing growers' returns as compared with conventional methods of 38- to 40-inch single-row spacing. Recent commercial production of specialized equipment for harvesting narrow-row cotton has enabled growers to consider a relatively broad range of possible planting patterns. Because cotton is of paramount importance as a cash crop in the Texas Southern High Plains economy, these new production practices have attracted considerable interest in the region.

Since 1970, growers have been experimenting with narrow-row production systems for cotton in the Southern High Plains of Texas. Such research organizations as the Texas Agricultural Experiment Station and the USDA, ARS, High Plains Research Foundation as well as seed companies have conducted experimental studies of this new method since the 1950's. However, no economic studies have been made of the experiences of Southern High Plains growers who have used these new systems under actual field conditions. The aim of this study was to assemble data from known narrow-row cotton growers in the region and to compare the economics of the new systems with conventional production methods to determine if their results with narrow-row cotton are consistent with findings of research studies.

Specific objectives of the study were as follows:

(1) To compare input-output relationships of narrow-row cotton production systems with conventional production systems under different resource situations;

(2) To compare weed control and other specific input costs associated with different planting systems;

(3) To compare investment requirements, costs, and returns of different narrow-row production systems with conventional systems;

(4) To compare differences in lint quality associated with different cotton production systems.

Previous research on narrow-row systems done in the High Plains has focused primarily on such technical aspects as harvesting equipment, selection of appropriate plant varieties for narrow-row spacing, water and fertilizer requirements, and weed control.

In general, field plot experiments have shown that narrow-row spacing increases yield over conventional row spacing. Wanjura and Hudspeth (1963) reported an average increase of 180 pounds per acre with broadcast spacing relative to 40-inch spacing on irrigated land. Ray, Hudspeth, and Holekamp (1959) reported a 10- to 15-percent increase in yields with row spacing less than 40 inches. Similar results were obtained in other experimental studies (Bradshears, Kirk, and Hudspeth, 1968; Kirk, Bradshaw, and Hudspeth, 1969; and Ray and Hudspeth, 1966). Some general guidelines on the expected costs and returns of narrow-row production were also developed in response to producer requests by researchers at the Texas Agricultural Experiment Station. However, no specific economic studies of these new systems for different resource situations had been conducted for the Southern High Plains before the present study.

Economic studies of narrow-row cotton production have recently been completed in other cotton-producing regions. A cost and return analysis of narrow-row systems compared with conventional production was completed for Arizona (Willet, Taylor, and Buxton, 1973). In addition, a study by Larson *et. al.* (1975) indicated that narrow-row cotton production in the lower Rio Grande Valley of Texas reduces insecticide and energy use as well as increases farm income in that region when compared with conventional cotton production.

Implications of small-plot research studies conducted in the Texas High Plains and of economic studies in other cotton-producing regions are that there are potential economic benefits in converting from conventional to narrow-row production systems for cotton in the High Plains.

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Methods and Materials

Study Area

The study area encompassed most of the Southern High Plains Region where cotton is produced (Figure 1). The study area has fine-, medium-, and coarse-textured soils under both irrigated and non-irrigated conditions.

Weather factors affecting cotton production in this region are relatively low rainfall, from 18 to 24 inches per year according to location, and a short growing season compared with other cotton-producing regions. The average growing season ranges from 204 to 221 days. Growers in the area also have difficulty establishing a satisfactory stand of cotton because of blowing sand during the planting season. They may have to replant several times. Thus, high winds also hinder cotton production in the region.

Method of Analysis

A survey of known narrow-row cotton growers in the Southern High Plains was conducted in 1971, 1972, and 1973 to obtain basic data for the comparison of narrow-row systems with conventional 40-inch single-row production. The survey covered 39 of approximately 100 producers who had experimented with narrow-row production in the region. Data obtained from the survey included information on lint yield, associated lint quality, production practices, and investment requirements for different narrow-row systems. To compare conventional or 40-inch single-row production with narrow-row systems, the survey also included growers who used conventional production methods on fields adjacent to narrow-row systems. The significance of yield differences between conventional and narrow-row production systems was evaluated by analysis of variance tests.

Crop enterprise budgets were developed to compare the costs and returns of all selected systems. Yield data reported in the survey were averaged for the 1971 to 1973 period. Input costs and product prices were incorporated for the situation in 1974. An assumed farm size of 750 acres, the average size of farm operations in the survey, was used to determine equipment utilization in the budgets. Ownership and operating costs per hour for machinery and equipment were computed using regular accounting procedures as employed in published budgets by the Texas Agricultural Extension Service. Enterprise budgets were stratified by planting pattern and soil type and for irrigation versus dryland.

Costs for alteration of existing equipment used for conventional production and for additional new equipment needed for narrow-row production were evaluated to determine the investment outlay for converting to narrow-row production. The break-even number of acres for this equipment conversion was estimated assuming no cost for land and management.

Average micronaire and staple length of lint produced with narrow-row systems were compared with that of conventional production on adjacent fields to evaluate economic implications that may result from possible differences in quality among the planting systems. Analysis of particular input requirements for narrow-row cotton production included a comparison of weed control costs among the different planting systems and an evaluation of narrow-row system response to fertilizer and water inputs on the basis of experimental data.[1]

Results and Discussion

Yield Comparisons

Average 1971 to 1973 lint yields with different plant spacing arrangements in the producer survey are shown in Tables 1 and 2. Yield data on non-irrigated, narrow-row systems were not available for fine-textured soils to compare with conventional production.

As indicated in Table 1, average lint cotton yield per crop acre with irrigation was higher for all narrow-row systems when compared with yields from conventional systems. However, the 14-inch double-row system on fine- and medium-textured soils with irrigation showed statistically significant higher yields as compared with conventional 40-inch single-row systems. Test results also showed that 32-inch single-row systems produced significantly higher yields per acre on irrigated medium- and coarse-textured soils than 40-inch single-row systems. Tests of other irrigated narrow-row systems compared with conventional systems indicated no significant yield differences. As shown in Appendix Table 1, there was considerable variation in yields among fields on different sites in each soil area for both selected test methods and conventional control methods for cotton production.

Yield response data for dryland cotton production given in Table 2 showed that most narrow-row systems also had higher average yields than conventional systems during 1971 to 1973. Analysis of variance indicated that the 32-inch 2×1 skip row system had a significantly higher yield than the 40-inch 2×1 skip row system on medium-textured soils. On coarse-textured soils, the 34-inch 2×2 skip row system had significantly lower yield than the 40-inch 2×2 skip row system. Both of these results, however, were significant only at the 10-percent level.

[1]The experimental data were used to evaluate fertilizer and water response rather than data in the producer survey as the producers used the same application levels for narrow-row systems that they used for conventional cotton production.

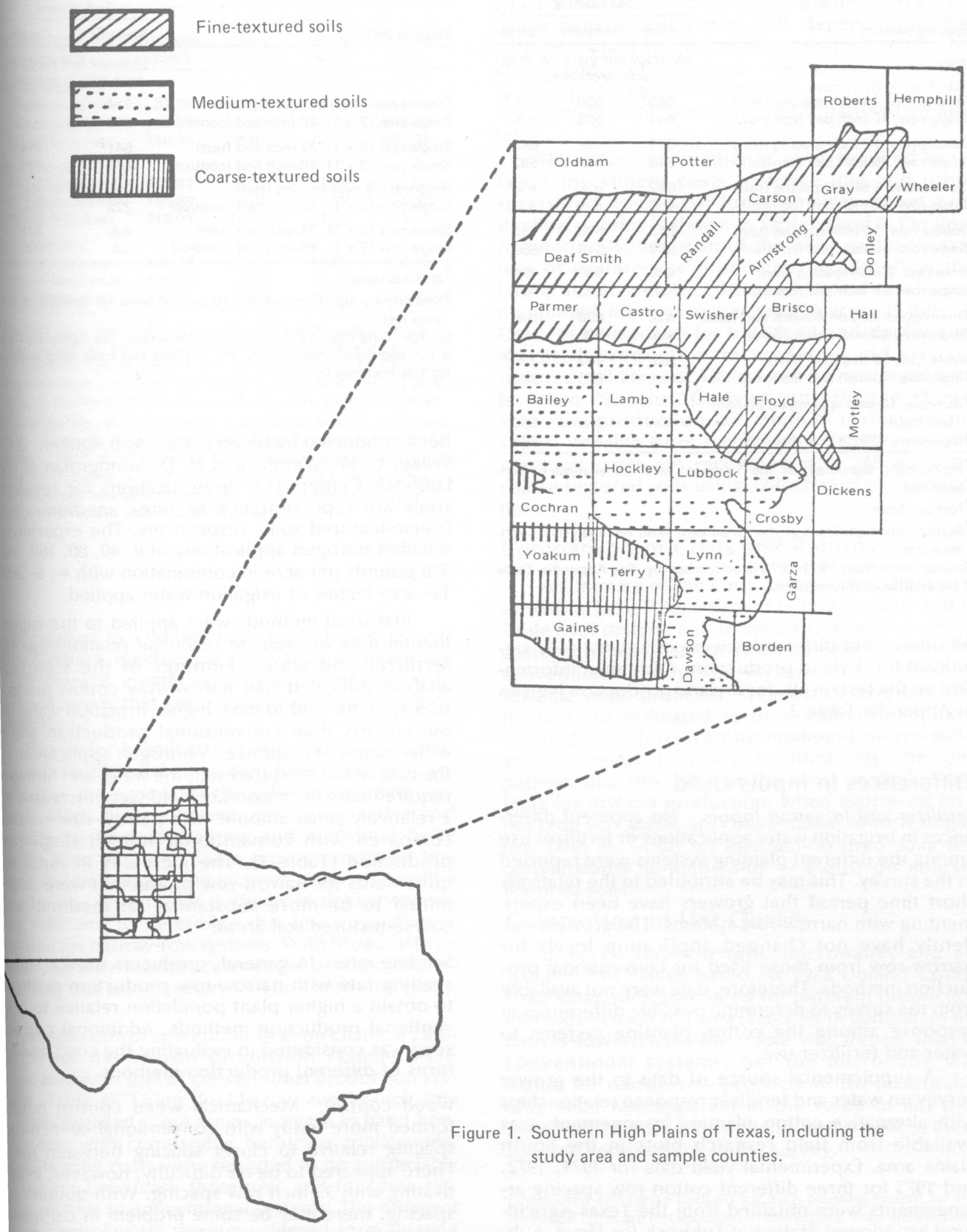

Figure 1. Southern High Plains of Texas, including the study area and sample counties.

TABLE 1. IRRIGATED COTTON YIELD COMPARISONS BY PRODUCTION METHODS AND SOIL TYPES, SOUTHERN HIGH PLAINS OF TEXAS, 1971-1973 AVERAGES

Spacing pattern	Soil texture		
	Fine	Medium	Coarse
	(Average lint yield per crop acre in pounds)		
Double-row, 14-inch spacing (test)	563[1]	600[1]	n.a.[2]
Single-row, 40-inch bed (control)	441	508	n.a.
Double-row, 12-inch spacing (test)	542	n.a.	648
Single-row, 40-inch bed (control)	518	n.a.	592
Double-row, 11-inch spacing (test)	542	n.a.	n.a.
Single-row, 40-inch bed (control)	450	n.a.	n.a.
Double-row, 10-inch spacing (test)	613	575	733
Single-row, 40-inch bed (control)	583	513	653
Broadcast, 8-inch spacing (test)	479	868	496
Single-row, 40-inch bed (control)	450	723	451
Three-row-drilled on 40-inch bed (test)	n.a.	600	n.a.
Single-row, 40-inch bed (control)	n.a.	575	n.a.
Single-row, 32-inch bed (test)	n.a.	742[1]	725[3]
Single-row, 40-inch bed (control)	n.a.	676	646
Four-row, 16-inch spacing on 80-inch bed (test)	n.a.	n.a.	550
Single-row, 40-inch bed (control)	n.a.	n.a.	488

[1]Statistically significant at the 1-percent level for analysis of variance test.

[2]Not available.

[3]Statistically significant at the 10-percent level for analysis of variance test.

Source: Data from 1971-1973 producer survey. See Appendix Table 1 for additional information.

TABLE 2. DRYLAND COTTON YIELD COMPARISONS BY PRODUCTION METHODS AND SOIL TYPES, SOUTHERN HIGH PLAINS OF TEXAS, 1971-1973 AVERAGES

Spacing pattern	Soil texture	
	Medium	Coarse
	(Average lint yield per crop acre in pounds)	
Double-row, 14-inch spacing (test)	214	n.a.[1]
Single-row (2 x 1), 40-inch bed (control)	225	n.a.
Single-row (2 x 1), 32-inch bed (test)	541[2]	414
Single-row (2 x 1), 40-inch bed (control)	472	400
Broadcast, 8-inch spacing (test)	266	n.a.
Single-row (2 x 1), 40-inch bed (control)	225	n.a.
Single-row (2 x 2), 34-inch bed (test)	n.a.	377[2]
Single-row (2 x 2), 40-inch bed (control)	n.a.	400

[1]Not available.

[2]Statistically significant at the 10-percent level for analysis of variance test.

Source: Data from 1971-1973 producer survey. See Appendix Table 2 for additional information. No dryland test trials were available for fine-textured soils.

All other yield differences were not statistically significant for dryland production. Additional information on the test results for dryland production is given in Appendix Table 2.

Differences in Inputs Used

Fertilizer and Irrigation Inputs: No apparent differences in irrigation water applications or fertilizer use among the different planting systems were reported in the survey. This may be attributed to the relatively short time period that growers have been experimenting with narrow-row systems. The growers evidently have not changed application levels for narrow-row from those used for conventional production methods. Therefore, data were not available from the survey to determine possible differences in response among the cotton planting systems to water and fertilizer use.

A supplemental source of data to the grower survey on water and fertilizer response relationships with alternative cotton planting arrangements was available from field research plots in the South Plains area. Experimental yield data for 1971, 1972, and 1973 for three different cotton row spacing arrangements were obtained from the Texas Agricultural Experiment Station at Lubbock for Floyd, Lubbock, and Dawson Counties. The experiments had been conducted by Levon L. Ray, A. B. Onken, O.C. Wilke, C. W. Wendt, and H. D. Sunderman at the Lubbock Center. The three locations for research trials are representative of fine-, medium-, and coarse-textured soils, respectively. The experiment entailed nitrogen applications of 0, 40, 80, 160, and 320 pounds per acre in combination with 4-, 8-, and 12- acre inches of irrigation water applied.

Statistical methods were applied to the experimental data to evaluate response relationships for fertilizer and water. Findings of the statistical analysis indicated that narrow-row cotton production systems tend to have higher irrigation water requirements than conventional production and a wider range of response to nitrogen application. In the case of fine-textured soil, the water and nitrogen requirements for maximum yield were increased by a relatively small amount with narrow-row systems compared with conventional 40-inch single-row production (Table 3). The increases in input requirements for narrow-row production were determined to be more substantial for medium- and coarse-textured soil areas.

Seeding rate: In general, producers used a higher seeding rate with narrow-row production methods to obtain a higher plant population relative to conventional production methods. Additional cost for seed was considered in evaluating the costs and returns of different production methods.

Weed control: Mechanical weed control is performed more easily with conventional 40-inch row spacing relative to closer spacing between rows. There appeared to be no difficulty, however, in cultivating with 32-inch row spacing. With double-row spacing, there may be some problem in cultivating between the middles of the rows without damaging the cotton plants, and mechanical cultivation can

TABLE 3. ESTIMATED NITROGEN AND WATER REQUIREMENTS FOR MAXIMUM LINT YIELD, THREE COTTON PLANTING SYSTEMS, FINE-, MEDIUM- AND COARSE-TEXTURED SOILS, SOUTHERN HIGH PLAINS OF TEXAS, 1971-1973[1]

Soil Type and Planting Pattern	Nitrogen (Lbs.)	Irrigation (Acre-inch)	Rainfall (Acre-inch)[2]	Lint yield (Lbs.)
Fine-textured:				
40-inch single-row	87.55	5.27	12.20	611.74
10-inch double-row	123.37	5.91	12.20	658.49
10-inch broadcast	118.75	6.01	12.20	662.98
Medium-textured:				
40-inch single-row	143.81	9.27	11.59	715.68
10-inch double-row	186.39	14.07	11.59	731.75
10-inch broadcast	316.02	16.36	11.59	743.78
Coarse-textured:				
40-inch single-row	170.73	8.62	12.27	648.46
10-inch double-row	179.93	9.44	12.27	653.82
10-inch broadcast	208.95	11.99	12.27	714.08

[1]The data were obtained from experimental field research plots in Floyd, Lubbock, and Dawson Counties to supplement results of the survey of cotton growers conducted from 1971 to 1973. Experiments were conducted by Levon L. Ray, A. B. Onken, O. C. Wilke, C. W. Wendt, and H. D. Sunderman at the Lubbock Center.

[2]Rainfall for May through August. Total rainfall in 1971, 1972, and 1973 – Floydada (fine-textured soils) 25.48 inches, in 1971, 20.51 inches in 1972, 20.96 inches in 1973; Lubbock (medium-textured soils) 21.76 inches in 1971, 24.87 inches in 1972, 15.16 inches in 1973; Lamesa (coarse-textured soils) 19.08 inches in 1971, 24.82 inches in 1972, and 16.52 inches in 1973.

only be used to a limited extent with broadcast systems. Where mechanical cultivation is more difficult, there is greater reliance on hand hoeing to remove weeds that are not controlled by herbicide applications.

Except for broadcast systems, no major differences in mechanical cultivation operations were reported in the survey for the different planting systems. With most systems, growers used a rod weeder just before planting and cultivated twice during June and July. Some growers reported that they could eliminate one summer cultivation with a narrow-row system, but evidence in the survey was not sufficient to determine that less cultivation is needed for narrow-row systems. With broadcast systems, the only mechanical method of weed control available was using a rotary hoe one time after planting.

Weed control costs other than mechanical cultivation for narrow-row production systems were compared with that of conventional production systems (Table 4). Using double-row and 32-inch row systems entailed some minor increase in hand hoeing costs with comparable herbicide applications. Hand hoeing costs were reported to be appreciably higher for broadcast, three-row, and four-row systems relative to conventional systems. The different weed control costs were considered in evaluating the costs and returns of each system.

Machinery Inputs: Investment costs to convert from conventional to most narrow-row production systems can include the purchase of a broadcast-type cotton harvester, additional planter boxes, cultivator sweeps, and a grain drill, depending on the particular plant spacing arrangement adopted. The conventional cotton stripper may be used on 32-inch or wider spacing arrangements, requiring less investment than converting to other narrow-row systems.

The estimated number of acres required to recover investment costs of harvesting and other specialized equipment for alternative cotton production systems is shown in Tables 5 and 6. On fine-textured soils, adoption of the most profitable system of double-row production would allow the farmer to recover the cost of additional specialized equipment for conversion on 420 acres (Table 5). Costs of conversion for broadcast and double-row irrigated production in medium- and coarse-textured soil areas of Table 5 can be recovered with less than 750 acres. Costs of converting to 32-inch skip row production on medium-textured soils shown in Table 6 are recovered with 180 acres. Investment costs are recovered with 248 acres on coarse-textured soils using 32-inch skip row production.

Comparison of Costs and Returns

A summary of the costs and returns data is presented in Table 7 for irrigated cotton systems and in Table 8 for dryland cotton systems.[2] Comparisons of cost-return data for each narrow-row system with conventional production on adjacent fields show that the most profitable systems for irrigated production are estimated to be double-row for fine-textured soils, broadcast for medium-textured soils, and double-row for coarse-textured soils. The comparison also showed that the most profitable systems for dryland production, when expressed on a per crop acre basis, are conventional 40-inch single-row (2-in — 1-out) on medium-textured soils and conventional 40-inch (2-in — 2-out) on coarse-textured soils.

Comparison of Lint Quality

Average staple length, micronaire, and associated lint values based on 1973 Upland Cotton Loan Rates were compared for different production methods in each soil area (Table 9). In general, in the narrow-row systems the staple was shorter than in conventional systems, but the micronaire was higher for narrow-row production. No measurable difference was apparent in the value of lint produced with the different systems on the basis of these selected comparisons in the survey.

[2]Completed enterprise budgets for each planting system for the three soil types are not included in this report. They are available in the Department of Agricultural Economics at Texas Tech University.

TABLE 4. COMPARISONS OF HERBICIDE USE AND HAND HOEING COSTS BETWEEN NARROW-ROW AND CONVENTIONAL CO TON PRODUCTION SYSTEMS, SOUTHERN HIGH PLAINS OF TEXAS, AVERAGES FOR 1971 TO 1973

Comparisons Conventional vs. Narrow-row	*Fine-textured soils*		*Medium-textured soils*		*Coarse-textured soils*	
	Herbicide (pts.)[1]	Labor cost	Herbicide (pts.)[1]	Labor cost	Herbicide (pts.)[1]	Labor cost
14-inch, irrigated double-row	1.17	$ 2.83	1.00	$ 4.00	–	–
40-inch, irrigated single-row	1.17	3.17	1.00	5.00	–	–
12-inch, irrigated double-row	1.15	3.25	–	–	1.50	$ 5.00
40-inch, irrigated single-row	1.15	3.00	–	–	1.50	5.00
11-inch, irrigated double-row	1.50	4.50	–	–	–	–
40-inch, irrigated single-row	1.50	4.00	–	–	–	–
10-inch, irrigated double-row	1.18	4.25	1.75	4.00	1.00	9.00
40-inch, irrigated single-row	1.18	3.75	1.75	2.75	1.12	5.25
8-inch, irrigated broadcast	1.50	10.00	–	–	–	–
40-inch, irrigated single-row	1.50	4.50	–	–	–	–
40-inch, irrigated three-row	–	–	*1.25*	*6.00*	–	–
40-inch, irrigated single-row	–	–	1.25	3.00	–	–
32-inch, irrigated single-row	–	–	1.50	3.50	1.33	4.67
40-inch, irrigated single-row	–	–	1.50	2.75	1.33	3.83
10-inch, dryland double-row	–	–	1.00	5.00	–	–
40-inch, dryland single-row	–	–	1.33	3.50	–	–
10-inch, dryland broadcast	–	–	1.00	7.00	–	–
40-inch, dryland single-row (2 x 1)	–	–	1.33	3.50	–	–
80-inch, irrigated four-row	–	–	–	–	1.00	9.50
40-inch, irrigated single-row	–	–	–	–	1.25	6.25
34-inch, dryland single-row (2 x 2)	–	–	–	–	1.00	3.00
40-inch, dryland single-row (2 x 2)	–	–	–	–	1.25	2.50

[1]Herbicide at $1.90 per pint.

TABLE 5. EQUIPMENT BREAK-EVEN ANALYSIS FOR CONVERTING FROM CONVENTIONAL TO NARROW-ROW COTTON PRODUC- TION SYSTEMS WITH IRRIGATION, SOUTHERN HIGH PLAINS OF TEXAS, 1974

	Type of production system used									
	Comparison 1		Comparison 2		Comparison 3		Comparison 4		Comparison 5	
Breakeven analysis for soil areas	40-inch single-row	Double-row	40-inch single-row	8-inch broadcast	40-inch single-row	32-inch single-row	40-inch single-row	8-inch three-row	40-inch single-row	16-inch four-row
Fine-textured soils										
Yield per land acre	448 lbs.	565 lbs.	450 lbs.	479 lbs.	–	–	–	–	–	–
Net return per land acre[1]	$28.74	$63.04	$15.09	$24.62	–	–	–	–	–	–
Acres to breakeven	315[2]	420[3]	600[2]	1072						
Medium-textured soils										
Yield per land acre	510 lbs.	588 lbs.	723 lbs.	868 lbs.	676 lbs.	742 lbs.	575 lbs.	600 lbs.	–	–
Net return per land acre[1]	$26.60	$54.82	$88.36	$128.36	$74.64	$73.86	$45.47	$54.43	–	–
Acres to breakeven	338[2]	480[3]	105[2]	202[3]	120[2]	135[2]	195[2]	488[3]	–	–
Coarse-textured soils										
Yield per land acre	622 lbs.	690 lbs.	451 lbs.	496 lbs.	646 lbs.	725 lbs.	–	–	488 lbs.	550 lbs.
Net return per land acre[1]	$62.44	$85.80	$13.78	$37.22	$70.54	$71.75	–	–	$23.52	$42.64
Acres to breakeven	142[2]	308[3]	652[2]	705[3]	128[2]	135[2,4]	–	–	382[2]	615[3]

[1]Net returns computed in Table 7.

[2]Two-row brush stripper @ $9,000.

[3]Broadcast harvester @ $24,000 and grain drill @ $2,350.

[4]Additional investment in planter and cultivator @ $800.

TABLE 6. EQUIPMENT BREAK-EVEN ANALYSIS FOR CONVERTING FROM CONVENTIONAL TO NARROW-ROW SYSTEMS FOR DRYLAND PRODUCTION, SOUTHERN HIGH PLAINS OF TEXAS, 1974

Breakeven analysis for soil areas	Type of production system used[1]							
	Comparison 1		Comparison 2		Comparison 3		Comparison 4	
	40-inch single-row (2x1)	40-inch double-row	40-inch single-row (2x1)	32-inch single-row (2x1)	40-inch single-row (2x1)	Broadcast	40-inch single-row (2x2)	34-inch single-row (2x2)
Medium-textured soils								
Yield per land acre	150 lbs.	214 lbs.	315 lbs.	451 lbs.	150 lbs.	266 lbs.	–	–
Net returns per land acre[1]	$2.28	–$2.44	$49.02	$55.46	$2.28	$20.69	–	–
Acres to breakeven	3945[2]	n.a.[5]	180[2]	180[2,4]	3945[2]	1275[3]	–	–
Coarse-textured soils								
Yield per land acre[2]	–	–	267 lbs.	345 lbs.	–	–	200 lbs.	222 lbs.
Net return per land acre	–	–	$32.02	$39.34	–	–	$25.36	$22.57
Acres to breakeven	–	–	278[2]	248[2,4]	–	–	352[2]	435[2,4]

[1]Net returns computed from Table 8.

[2]Two-row brush stripper @ $9000.

[3]Broadcast harvester @ $24,000 and grain drill @ $2,350.

[4]Addition investment in planter and cultivator @ $800.

[5]Not available.

TABLE 7. ESTIMATED COSTS AND RETURNS OF NARROW-ROW PRODUCTION SYSTEMS FOR IRRIGATED COTTON RELATIVE TO CONVENTIONAL PRODUCTION ON NEARBY SITES, SOUTHERN HIGH PLAINS OF TEXAS, 1974

Costs and returns for soil area	Type of production system used					
	Comparison 1		Comparison 2		Comparison 3	
	40-inch single-row	10- to 14-inch double-row	40-inch single-row	8-inch broadcast	40-inch single-row	32-inch single-row
	(dollars per crop acre)					
Fine-textured soils						
Gross receipts[1]	$189.11	$214.50	$170.57	$181.70	–	–
Variable costs[2]	134.12	125.42	129.23	129.71	–	–
Fixed costs[3]	26.25	26.04	26.25	27.37	–	–
Net returns[4]	28.74	63.04	15.09	24.62	–	–
Medium-textured soils						
Gross receipts[1]	193.41	224.50	274.38	319.40	256.39	281.60
Variable costs[2]	135.79	138.80	155.00	156.35	150.73	175.43
Fixed costs[3]	31.02	30.88	31.02	34.69	31.02	32.31
Net returns[4]	26.60	54.82	88.36	128.36	74.64	73.86
Coarse-textured soils						
Gross receipts[1]	235.76	258.15	172.04	189.80	246.38	275.50
Variable costs[2]	140.68	139.58	125.62	123.21	143.20	170.17
Fixed costs[3]	32.64	32.77	32.64	29.37	32.64	33.58
Net returns[4]	62.44	85.80	13.78	37.22	70.54	71.75

Assuming a price of $0.30 per pound for cotton lint and $100 per ton for seed.

Variable costs include seed, chemical, tractors and irrigation equipment, labor, hail insurance, custom harvest, ginning, and interest on operating capital.

For equipment only and not including land or management costs.

Three-row systems with 8-inch spacing between rows were also compared with conventional 40-inch single-row on medium-textured soils which produced net returns per acre of $54.43 and $45.47, respectively. On coarse-textured soils, a four-row pattern on an 80-inch bed produced $42.64 per acre net returns compared with $23.52 per acre for conventional 40-inch single-row spacing.

TABLE 8. ESTIMATED COSTS AND RETURNS OF NARROW-ROW PRODUCTION SYSTEMS FOR DRYLAND COTTON PRODUCTION RELATIVE TO CONVENTIONAL PRODUCTION ON NEARBY SITES, SOUTHERN HIGH PLAINS OF TEXAS, 1974

Costs and returns for soil area	Type of production system used							
	Comparison 1		Comparison 2		Comparison 3		Comparison 4	
	40-inch single-row (2x1)	40-inch double-row	40-inch single-row (2x1)	32-inch single-row (2x1)	40-inch single-row (2x1)	8-inch broadcast	40-inch single-row (2x2)	34-inch single-row (2x2)
	(dollars per crop acre)							
Medium-textured soils								
Gross receipts[1]	$85.51	$81.20	$177.59	$186.90	$85.51	$100.80	–	–
Variable costs[2]	66.42	67.01	88.42	103.21	66.42	70.09	–	–
Fixed costs[3]	15.67	16.63	15.67	17.18	15.67	10.02		
Net returns	3.42	–2.44	73.50	66.51	3.42	20.69	–	–
Coarse-textured soils								
Gross receipts[1]	–	–	152.00	157.20	–	–	152.00	143.10
Variable costs[2]	–	–	90.42	93.92	–	–	87.16	90.70
Fixed costs[3]	–	–	13.57	16.10	–	–	14.11	14.15
Net returns	–	–	48.01	47.18	–	–	50.73	38.25

[1]Assuming a price of $0.30 per pound for lint and $100.00 per ton for seed.

[2]Variable costs include seed, chemicals, tractors and irrigation equipment, labor, hail insurance, custom harvest, ginning, and operating capital.

[3]For equipment only and not including land or management costs.

TABLE 9. COMPARISONS OF LINT QUALITY BETWEEN NARROW-ROW AND CONVENTIONAL COTTON PRODUCTION, SOUTHERN HIGH PLAINS OF TEXAS, AVERAGES FOR 1971 TO 1974

Comparisons Conventional vs. narrow row	Fine-textured soils			Medium-textured soils			Coarse-textured soils		
	Staple	Micronaire	Value[1]	Staple	Micronaire	Value[1]	Staple	Micronaire	Value[1]
14-inch, irrigated double-row	31.0/32	3.1	$14.60	30.0/32	3.0	$14.15	–	–	–
40-inch, irrigated single-row	31.7/32	2.9	13.72	30.0/32	3.0	14.15	–	–	–
12-inch, irrigated double-row	31.5/32	3.2	15.18	–	–	–	31.0/32	3.4	$15.70
40-inch, irrigated single-row	32.0/32	2.9	14.02	–	–	–	31.1/32	3.3	15.70
10-inch, irrigated double-row	31.1/32	3.2	14.95	30.0/32	3.6	15.05	30.5/32	3.6	15.82
40-inch, irrigated single-row	32.0/32	2.7	13.80	31.0/32	3.4	16.05	30.5/32	3.5	15.82
11-inch, irrigated double-row	32.0/32	3.5	16.95	–	–	–	–	–	–
40-inch, irrigated single-row	32.0/32	3.0	15.15	–	–	–	–	–	–
8-inch, irrigated broadcast	29.0/32	3.5	15.50	30.0/32	3.5	15.95	31.0/32	3.6	16.20
40-inch, irrigated single-row	31.0/32	3.5	16.40	31.0/32	3.0	14.60	31.0/32	3.5	15.93
40-inch, irrigated three-row	–	–	–	31.0/32	3.4	15.70	–	–	–
40-inch, irrigated single-row	–	–	–	31.0/32	3.4	15.70	–	–	–
32-inch, irrigated single-row	–	–	–	31.8/32	3.6	16.81	31.3/32	3.5	16.58
40-inch, irrigated single-row	–	–	–	32.2/32	3.6	17.12	31.7/32	3.5	16.53
80-inch, irrigated four-row	–	–	–	–	–	–	31.5/32	3.4	16.32
40-inch, irrigated single-row	–	–	–	–	–	–	31.5/32	3.4	16.32
10-inch, dryland double-row	–	–	–	30.0/32	3.5	15.95	–	–	–
40-inch, dryland single-row (2x1)	–	–	–	31.0/32	3.5	16.40	–	–	–
32-inch, dryland single-row (2x1)	–	–	–	31.3/32	3.6	16.35	31.3/32	3.7	16.58
40-inch, dryland single-row (2x1)	–	–	–	31.7/32	3.4	15.93	31.3/32	3.6	16.58
10-inch, dryland broadcast	–	–	–	30/32	3.5	15.95	–	–	–
40-inch, dryland single-row (2x1)	–	–	–	31/32	3.5	16.40	–	–	–
34-inch, dryland single-row (2x2)	–	–	–	–	–	–	32.0/32	4.0	16.95
40-inch, dryland single-row (2x2)	–	–	–	–	–	–	33.0/32	4.2	17.65

[1]Value per hundredweight of lint cotton based upon 1973 upland cotton loan rates for light spotted strict low middling.

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Appendix Tables

APPENDIX TABLE 1. IRRIGATED COTTON YIELD COMPARISONS BY PRODUCTION METHODS AND SOIL TYPES, SOUTHERN HIGH PLAINS OF TEXAS, 1971-1973[1]

	Average lint yield per crop acre in pounds											
	Fine-textured soil			F-Value	Medium-textured soil			F-Value	Coarse-textured soil			F-Value
Spacing pattern	1971	1972	1973		1971	1972	1973		1971	1972	1973	
Double-row, 14-inch spacing (test)	431	650	600		500	600	700		n.a.[3]	n.a.	n.a.	
	400	750	700									
	300	631	602	15.28[2]				17.29[2]				
Single-row, 40-inch bed (control)	300	470	600		450	475	600		n.a.	n.a.	n.a.	
	266	490	510									
Double-row, 12-inch spacing (test)	300	600	650		n.a.	n.a.	n.a.		621	600	632	
	350	600	750	0.71					719	700	618	2.94
Single-row, 40-inch bed (control)	250	580	700		n.a.	n.a.	n.a.					
	300	500	776						600	575	600	
Double-row, 11-inch spacing (test)	325	600	700	6.37	n.a.	n.a.	n.a.		n.a.	n.a.	n.a.	
Single-row, 40-inch bed (control)	300	500	550		n.a.	n.a.	n.a.		n.a.	n.a.	n.a.	
Double-row, 10-inch spacing (test)	475	600	650		400	600	600		700	850	650	
	600	600	750	0.60	450	700	700	1.94				2.97
Single-row, 40-inch bed (control)	476	522	700		400	500	550		625	688	648	
	400	600	800		450	576	600					
Broadcast, 8-inch spacing (test)	387	450	600		635	1210	760		400	450	600	
				0.50				0.93				1.09
Single-row, 40-inch bed (control)	300	500	550		550	789	840		355	488	512	
Three-row drilled on 40-inch bed (test)	n.a.	n.a.	n.a.		450	650	700		n.a.	n.a.	n.a.	
								0.43				
Single-row, 40-inch bed (control)	n.a.	n.a.	n.a.		500	600	625		n.a.	n.a.	n.a.	
Single-row, 32-inch bed (test)	n.a.	n.a.	n.a.		700	700	800		600	700	800	
					700	700	800	18.52[2]	700	750	800	11.27[4]
					736	697	845					
Single-row, 40-inch bed (control)	n.a.	n.a.	n.a.		600	650	700		566	616	792	
					650	699	756		600	600	700	
Four-row, 16-inch spacing on 80-inch bed (test)	n.a.	n.a.	n.a.		n.a.	n.a.	n.a.		500	500	550	
									600	500	650	
												1.58
Single-row, 40-inch bed (control)	n.a.	n.a.	n.a.		n.a.	n.a.	n.a.		375	525	564	

[1]Source: Data from 1971-1973 producer survey.

[2]Statistically significant at the 1-percent level for analysis of variance test.

[3]Not available.

[4]Statistically significant at the 10-percent level for analysis of variance test.

APPENDIX TABLE 2. DRYLAND COTTON YIELD COMPARISONS BY PRODUCTION METHODS AND SOIL TYPES, SOUTHERN HIGH PLAINS OF TEXAS 1971-1973[1]

	Average lint yield per acre in pounds							
	Medium-textured soil			F-Value	Coarse-textured soil			F-Value
Spacing pattern	1971	1972	1973		1971	1972	1973	
Double-row, 12-inch spacing (test)	200	100	300		n.a.[3]	n.a.	n.a.	
	182	156	342					
				0.62				
Single-row (2x1), 40-inch bed (control)	150	150	350		n.a.	n.a.	n.a.	
	142	n.a.	400					
Single-row (2x1), 32-inch bed (test)	450	500	600		200	400	500	
	500	500	550		300	500	500	
	475	641	650		349	348	626	
				4.04[2]				0.11
Single-row (2x1), 40-inch bed (control)	300	476	516		200	400	400	
	350	522	668		266	532	600	
Broadcast, 8-inch spacing (test)	108	205	484		n.a.	n.a.	n.a.	
				0.94				
Single-row (2x1), 40-inch bed (control)	146	150	379		n.a.	n.a.	n.a.	
Single-row (2x2), 34-inch bed (test)	n.a.	n.a.	n.a.		200	300	500	
								10.24[2]
Single-row (2x2), 40-inch bed (control)	n.a.	n.a.	n.a.		276	438	546	

[1]Source: Data from 1971-1973 producer survey. No dryland test trials were available for the fine-textured soils.

[2]Statistically significant at the 10-percent level for analysis of variance test.

[3]Not available.

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