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PRODUCTION SYSTEMS FOR COTTON
in
MISSOURI
I. Variety X Row Width X Soil Type
Interactions

W. P. Sappenfield



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PRODUCTION SYSTEMS FOR COTTON IN MISSOURI

W. P. Sappenfield

PREFACE

Profitable cotton production depends upon reliable cultural techniques to maximize efficiency. A less costly method of harvesting is needed. "Once-over" harvesting during favorable October weather is desirable. Production inputs in the northern extremes of the Mississippi Delta, especially southeast Missouri, are great and profit margins often are narrow. Seasons are short. Control of weeds is costly. Soils are variable. Diseases are prevalent. Weather is erratic and land prices, equipment, harvesting and ginning costs constantly are increasing. Efficient fruiting varieties, cultured and protected by practices that optimize plant efficiency, followed by optimum harvesting methods, could increase yield potential, reduce costs and optimize gin efficiency.

From 1970-75 production research was directed toward exploration of cultural systems that may improve yields, lint and seed quality, harvest and gin efficiency, yet blend with standard practices now used. Short range goals related to use of current varieties and standard equipment. Long range goals required exploration of more drastic considerations. Production of cotton grown in narrow rows, approaching broadcast culture and harvested by "brush-type" strippers was compared to standard methods.

Exploratory research included six major areas of interdisciplinary activity. Producer communication was provided.

- I. Variety x row-width x soil type interaction. (W. P. Sappenfield)
- II. Controlling weeds. (H. D. Kerr)
- III. Optimum nutritional requirements. (J. A. Roth)
- IV. Monitoring and control of cotton diseases. (C. H. Baldwin)
- V. Monitoring and control of cotton insects. (K. Harrendorf)
- VI. Production and harvesting equipment modification and use. (W. D. Boon)
- VII. Information dissemination. (J. H. Scott)

Summaries of results will be presented separately. The first, "I. Variety x Row Width x Soil Type Interaction" will be provided in this report. Additional reports will be forthcoming.

I

Variety x Row-Width x Soil Type Interactions

W. P. Sappenfield¹

INTRODUCTION

Selecting an adapted, productive variety often is the first major decision in establishing a profitable cotton production system. The sequence of land preparation, planting, cultural management, use of harvest aids and harvesting, each contribute a major input toward production of maximum lint yields at lowest cost. The need to increase production efficiency stimulated interest, in recent years, in variety, plant populations, row-width and soil type relationships (1,2,3,4,5,6,7,8,9,10,11,12). Few trials had been conducted in Missouri prior to 1970 relating varieties and variable row widths. Skip-row culture had not been researched. Preliminary trials with varieties grown in 20" and 40" row widths initiated in 1956 were discontinued because of the lack of narrow-row harvesting equipment.

Objectives of exploratory research started in 1970 included (1) determination of current varieties best suited for narrow-row and wide-row (skip row culture), (2) optimum row-width on heavy and light textured soils, (3) reselection within current varieties for improving their adaptation to minimum spacing, (4) soil type influences on variety and row-width culture, and (5) responses to genotype, row-width and soil type. Results of these studies conducted 1970-1974 are reported.

MATERIALS AND METHODS

VARIABLE ROW WIDTH-VARIETY TRIALS:

Row width variables emphasizing row widths less than 38" (conventional), varieties and/or strains and soil types included in tests each year were:

VARIETY ROW WIDTH-VARIETY TRIALS:

Row-Width	Variety	Soil Type
1970		
1. 38"	1. Auburn M	1. Sandy Loam
2. 30"	2. Delcot 277	2. Clay
3. 20"		
4. 10"		
5. 7"		

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VARIETY ROW WIDTH-VARIETY TRIALS:

-(Continued)

Row-Width	Variety	Soil Type
<u>1971</u>		
1. 38"	1. Auburn M	1. Sandy Loam
2. Twin (2-6" rows/38" bed)	2. Delcot 277	2. Clay
3. 20"	3. Mo-Del	
4. 10"	4. Stoneville 213	
(4th variable = Hill dropped v. s. drilled planting)		
<u>1972</u>		
1. 38"	1. Auburn M	1. Sandy Loam
2. 30"	2. Delcot 277	
3. 20"	3. Stoneville 213	
	4. Paymaster Dwarf	
	5. Quapaw	
	6. Auburn M-HPC ¹	
	7. Auburn M-NR ¹	
<u>1973</u>		
1. 38"	1. Auburn M	1. Sandy Loam
2. Twin (2-6" rows/38" bed)	2. Delcot 277	
3. 30"	3. Stoneville 213	
4. 20"	4. Deltapine 16	
	5. Quapaw	
	6. Coker 310	
	7. Auburn M-NR	
	8. HYC 72-1	
	9. HYC 72-2	
	10. DC-Okra	
<u>1974</u>		
1. 38"	1. Auburn M	1. Sandy Loam
2. Twins (2-6" rows/38" bed)	2. Delcot 277	
3. 20" D (Drilled)	3. Stoneville 213	
4. 20" HD (Hill dropped)	4. Deltapine 16	
	5. Quapaw	
	6. Coker 310	
	7. HYC 72-234	
	8. HYC 72-262/263	
	9. HYC 72-320	
	10. Mo 63-277 BR	

¹ Selected for adaptation to high plant populations and narrow rows.

Climatic variables encountered during the period of study were often extreme and trials on the clay soils were successful only two of five years, 1970-71. Planting dates, within-row seeding rates, fertilizer applications, weed, insect and disease control, defoliation and harvesting dates and practices were as conventional as conditions would permit. These are included in the following:

	1970		1971		1972		1973		1974	
	Sandy Loam	Clay	Sandy Loam	Clay	Sandy Loam	Clay	Sandy Loam	Clay	Sandy Loam	Clay
Date Planted	5/21 ¹	5/21 ¹	5/5 ⁴	5/4	5/15 ⁴	5/9 ⁴	5/17 ⁴		5/13 ⁴	5/14 ⁴
Fertilizer	50+50+50	75+75+75	50+50+50 ⁵	100+50+50	80+50+100		50+50+75		50+26+84	
Weed Control	Plow, Hoe, Karmex (pre)+MSMA (post)		Treflan (preplant)+MSMA (post)+cult		8	Test Discarded ⁷	8	Test Discarded ¹⁰	8	Test Discarded ¹¹
Insect Control	Recommended		Recommended		Recommended		Recommended		Recommended	
Irrigations	0	0	0	0	2 ⁶		0		0	
Defoliant	9/14	10/23	9/30	9/29	10/4		10/10		10/18	
1st Pick	11/3 ²	11/3 ²	10/14 ²	11/4 ²	10/26 ³		10/24 ³		10/31 ⁹	
2nd Pick	-	-	-	-	-		12/ 3		11/27	

¹ 38" rows planted with 4-row planter; all narrow rows planted with a grain drill; all plots hand thinned to three plants per 12" hills.

² Hand harvested 25' sections of interior rows (38", 30", 20" = 1 row; 10" and 7" = 2 rows; twin = 1 center bed only).

³ 38" = 4-row plots, middle two rows harvested spindle picker; center 30" row = one row spindle picker; 20" rows = 4-row plots, rows 1 and 3 harvested with 2-row spindle picker.

⁴ Planted with conventional 4-row planter with V-belt seed unit.

⁵ All narrow row plots (excluded 38") received directed liquid topdress spray of 80 lbs of N/acre July 7.

⁶ Sprinkle irrigations June 30 and July 14.

⁷ Continuously wet grounds prevented possible harvest until late winter with excessive loss of seed cotton due to weathering.

⁸ Same as 1971.

⁹ 20" rows harvested once over with a 4-20" row brush harvester, 38", 30" and twins were harvested with 2-row spindle picker.

¹⁰ Continuously wet grounds prevented planting at a reasonable date.

¹¹ Continuously wet grounds, poor and variable stands and very late maturity, freeze damage.

Yields and agronomic properties of all row width and variety combinations were determined from four replications. Boll and seed characteristics were obtained from random 60-boll samples from rows to be harvested from two replications. Fiber properties were secured from 1,200 gram "grab" samples of harvested seed cotton from the same two replications. During 1970-71 all variable row widths were arranged on 80" wide beds or equivalent, ie, 38" and 30" = 3-row plots; 20" = 4-row plots; 10" = 7 rows, etc.; twins = one twin bordered by 28" rows. From 1972 through 1974, 38" and twin row widths were grown in 4-row plots on conventional 38" beds while 30" and 20" row widths were grown on 80" beds in 3-row and 4-row plots, respectively. Hand harvesting was practiced during 1970-71 but a 2-row spindle picker, a 1-row spindle picker and a 4-20" row brush harvester were used during 1972-74. Comparisons of cultural systems justified use of the different harvesting practices.

Mean differences were compared by the new Duncan's Multiple Range Test of Significance determined from the various split plot analysis of variance procedures.

The following observations were made, analyzed statistically and are defined:

1. *Total Lint Yield* is expressed in pounds per acre.
2. *Lint Yield, 1st Pick* is reported in pounds per acre of lint produced by time of first picking, a good measure of early maturity.
3. *Percent 1st Pick:*
$$\frac{\text{Lint yield first pick}}{\text{Total lint yield}}$$
4. *Percent of 38" Rows:*
$$\frac{\text{Total lint yield variable treatment}}{\text{Total lint yield 38" rows (conventional)}}$$
5. *Lint Fraction:*
$$\frac{\text{Gram weight of ginned lint}}{\text{Gram weight of seed cotton sample}}$$
6. *Seed Index* is a measure of seed size, expressed as the gram weight of 100 fuzzy seeds.
7. *Boll Size* is the gram weight per boll of seed cotton.
8. *2.5% Span Length* is the average length of fiber, in inches, of two determinations on the raw fiber sample using the Fiber-Sample and Digital Fibrograph. Two and five-tenths percent of the fibers caught in the sample will extend this length or farther.
9. *Length Uniformity Index* is determined by:
$$\frac{50\% \text{ span length} \times 100}{2.5 \text{ span length}}$$
10. *50% Span Length* is the average length of fiber, in inches, of two determinations on the raw fiber sample using the Fibro-Sample and Digital Fibrograph. Fifty percent of the fibers caught in the sample holder will extend this length or farther.
11. *T₁ Fiber Strength:* The fiber strength of a bundle of fibers measured on the stelometer with the two jaws holding the fiber bundle separated by a 1/8-inch spacer. Strength is expressed as grams of force per tex.
12. *E₁ Fiber Elongation:* The percentage elongation at break of the center 1/8-inch of the fiber bundle measured for T₁ strength on the stelometer.
13. *Micronaire:* The fineness of the fibers taken from the ginned lint measured by the micronaire and expressed in standard (curvilinear scale) micronaire units.

14. *Colorimeter Rd* is a measure of the percentage reflectance; the higher the value, the lighter is the cotton.
15. *Colorimeter B*: Hunter's B value is a measure of increasing yellowness of the cotton.
16. *Trash Index*: Estimated on a scale 1-5; 1 = low trash content; 5 = high trash content.
17. *Yarn Tenacity* is the strength of 27 tex yarn expressed as grams force per tex.

SKIP ROW-VARIETY TRIALS:

During 1971, Auburn M and Delcot 277 varieties were grown in solid (conventional) and plant two-skip two 38" row systems on sandy loam and clay soils. During 1972 and 1973, Auburn M, Delcot 277 and Stoneville 213 were grown in solid, plant two-skip two, and plant two-skip one 38" row systems on sandy loam soils but on the clay soil in 1972 only. Planting dates, seeding rates, fertilizer applications, weed, insect and disease control, defoliation and harvesting dates and practices used were as conventional as conditions would permit. These are indicated in the following:

SKIP-ROW -VARIETY TRIALS

	1971		1972		1973	
	Sandy Loam	Clay	Sandy Loam	Clay	Sandy Loam	Clay
Date Planted	5/ 3	4/29	5/ 6	5/ 6	5/10	-
Fertilizer	80+50+50		80+50+100	100+50+100	50+50+75	-
Weed Control ^{1, 2}			Recommended Procedures			-
Insect Control			Recommended Procedures			-
Irrigation	0	0	0	0	0	-
Defoliant	9/30	9/29	10/ 2	10/ 9	10/18	-
1st Pick	10/12	10/12	10/26	10/16	10/24	-
2nd Pick	11/ 8	11/ 8	-	-	12/ 3	-

¹ Sandy Loam: Treflan (pre-emergence) + MSMA-Karmex (post-directed) + wide-sweep cultivation.

² Clay: Cotoran (pre-emergence) + MSMA-Karmex (post-directed) + wide-sweep cultivation.

Yields and agronomic properties of all combinations were determined from four replications. Boll and seed characteristics from hand harvested 25-boll random samples were determined from two replications. Lint fraction and fiber properties were determined on lint from 1,200 gram "grab" samples from the spindle picker harvested seed cotton from the same two replications. Significant differences were obtained by the New Duncan's Multiple Range Test of Significance determined by the split plot analysis of variance procedure.

RESULTS AND DISCUSSION

VARIABLE ROW WIDTH-VARIETY TRIALS, SANDY LOAM SOIL

1970 (*Table 1*): The highest lint yields were produced by Auburn M grown in 20-inch rows and Delcot 277 in 30-inch rows. Auburn M produced 20% more cotton in 20-inch rows compared to conventional 38-inch rows. Overall 20 and 30-inch rows

Table 1 Response of Two Cotton Varieties Grown in Four Row Widths on Sandy Loam Soil, Portageville, Mo., 1970.

Variety or Strain	Row Width Inches	Lint Per Acre ¹				Lint ¹ Fraction %	Seed ¹ Index Grams	Bell ¹ Size Grams	Fiber Properties ¹				
		Total Lbs.	1st Pick Lbs.	1st Pick %	38* Rows %				Length	Uniform- ity Index	Strength (T ₁) g/Tex	Elongation (E ₁) %	Micronaire
Asburn M	38*	618 b ³	---	---	100	36.07 d	13.20 a	6.77 a	1.13 a	49 a	17.40 a	8.75 a	4.05 a
Asburn M	30*	608 b	---	---	96	37.12 c-d	12.80 a-b	6.57 a-b	1.14 a	48 a	18.36 a	8.80 a	4.27 a
Asburn M	25*	740 a	---	---	120	37.25 c-d	12.47 a-c	6.32 a-c	1.12 a	49 a	17.17 a	8.64 a	4.17 a
Asburn M	19*	584 b	---	---	94	36.83 d	12.07 b-c	5.73 c	1.13 a	49 a	17.55 a	9.15 a	4.10 a
Asburn M	7*	433 c	---	---	70	37.87 b-c	11.73 c	5.92 b-c	1.09 a	48 a	16.90 a	8.66 a	4.10 a
Delcot 277	38*	585 b	---	---	100	37.95 b-c	12.27 a-c	6.70 a	1.15 a	49 a	17.65 a	9.07 a	4.12 a
Delcot 277	30*	653 a-b	---	---	112	37.93 b-c	12.73 a-b	6.35 a-c	1.14 a	48 a	17.90 a	8.84 a	4.12 a
Delcot 277	20*	628 b	---	---	107	38.35 a-b	11.87 b-c	6.60 a-b	1.12 a	49 a	17.80 a	8.69 a	4.13 a
Delcot 277	10*	476 c	---	---	81	38.23 a-b	12.53 a-c	6.10 a-c	1.10 a	48 a	16.82 a	8.76 a	3.93 a
Delcot 277	7*	450 c	---	---	77	39.03 a	11.73 c	6.25 a-c	1.15 a	50 a	17.81 a	8.72 a	4.20 a
Average	38*	601 b	---	---	100	37.31 b	12.73 a-b	6.73 a	1.14 a	49 a	17.52 a	8.91 a	4.08 a
Average	30*	630 a-b	---	---	105	37.52 b	12.77 a	6.46 a-b	1.14 a	48 a	18.13 a	8.82 a	4.19 a
Average	20*	684 a	---	---	114	37.80 b	12.17 b-c	6.46 a-b	1.12 a	49 a	17.45 a	8.67 a	4.15 a
Average	10*	530 c	---	---	85	37.53 b	12.30 a-c	5.92 b	1.11 a	49 a	17.19 a	8.95 a	4.02 a
Average	7*	441 d	---	---	73	38.45 a	11.73 c	6.08 a-b	1.12 a	49 a	17.36 a	8.69 a	4.15 a
Average	HD ²	593 a	---	---	---	37.60 a	12.61 a	6.68 a	1.13 a	49 a	17.77 a	8.98 a	4.13 a
Average	D ²	562 a	---	---	---	37.85 a	12.07 b	5.98 b	1.13 a	48 a	17.20 a	8.63 a	4.10 a

¹ Hill Dropped and Drilled combined for variety and row-width responses.² HD=Hill Dropped - D=Drilled³ Duncan's Multiple Range Test of Significance for .05 probability. Means or values followed by the same letter are not significantly different. Means or values not followed by the same letter are significantly different.

were the most productive followed by 38-inch, 10-inch and 7-inch rows, the least productive. Yield differences between hill dropped and drilled stands were not significant. The lint fraction was highest in 7-inch rows but the trait was not significantly different among the remaining row width variables. Seed index and boll size tended to decrease as row width decreased and in drilled plantings. Fiber length, length uniformity, fiber strength (T_1), elongation (E_1) and fineness (micronaire) were not significantly affected by variable row widths or seeding methods.

1971 (*Table 2*): Four varieties, Auburn M, Delcot 277, Mo-Del and Stoneville 213 were grown in 38, 20, 10-inch and twin rows. The early maturing Auburn M and Delcot 277 produced the highest lint yields in 38-inch rows and Auburn M in twin rows (2-10-inch rows on 38-inch beds), followed by Auburn M and Delcot 277 grown in 20 and 10-inch rows. The 38-inch rows tended to produce the most lint per acre but it was not significantly better than twin or 20-inch rows. Lint production tended to decline in narrower row spacing. Lowest yields were produced in 10-inch rows. Plant spacing within-row created no significant influence on yield but the lint fraction decreased in drilled plantings. Varieties demonstrated characteristic differences among most traits observed. Lint fraction, seed index, boll size and micronaire was lowest in 10-inch row plantings. Otherwise, few differences were observed for ginning, boll, seed and lint characteristics among 38, and 20-inch and twin-row plantings.

1972 (*Table 3*): Auburn M, Delcot 277, Stoneville 213, Paymaster Dwarf, Quapaw, Auburn M-HPC, Auburn M-NR and Quapaw-NR representing a wide range in maturity (ultra early to full season) were grown in 38, 30 and 20-inch rows. Overall, row width variables produced no significant yield differences. Minor differences were observed for row width variables within a given variety and significant differences occurred between varieties. Generally, Auburn M, an early maturing variety, produced the highest lint yields while the dwarf early and extremely determinate Paymaster Dwarf produced the lowest yields.

The number of days from planting to full maturity was estimated. Overall, 20 and 30-inch row widths matured 2-3 days earlier than 38-inch rows. Stoneville 213 matured at the slowest rate (163 days) while the earlier and more determinate types, Auburn M (149 days), and Quapaw (154 days) matured faster. Except for Auburn M grown in 38-inch rows, which matured in 146 days, the earlier determinate varieties grown in 20 and 30-inch rows appeared to mature approximately 10 days sooner than did Stoneville 213 in 20, 30 and 38-inch row widths.

Ginning, seed, boll and fiber characteristics varied more with varieties than among row widths but the weakest fiber was produced in 20-inch rows.

1973 (*Table 4*): Ten commercial varieties and experimental strains were grown in 38, 30, 20-inch and twin 6-inch rows, representing a wide range in genotype and maturity. Lint yields, averaging varieties grown on 38, 20-inch and twin rows, did not differ significantly. However, 30-inch rows produced the least. Poor performance of 30-inch rows appeared due to the 80-inch bed cultural system. Only the center row was harvested for lint yield determinations and the competitive effect of border rows suppressed the center row. The 80-inch bed system likely would prove unsatisfactory for use of 30-inch rows in cotton production.

Table 2 Response of Four Cotton Varieties Grown in Four Row Widths on Sandy Loam Soil, Portageville, Mo., 1971.

Variety or Strain	Row Width Inches	Lint Per Acre ²				Lint ² Fraction %	Seed Index Grams	Boll ² Size Grams	Fiber Properties ²				
		Total Lbs.	1st Pick Lbs.	1st Pick %	38* Rows %				Length		Strength (T ₁) g/Tex	Elongation (E ₁) %	Micronaire
									2.5% SL	Uniform- ity Index			
Auburn M	38*	1136 a-b	---	---	100	36.20 f-g	14.12 a-d	6.85 a-c	1.14 c-d	48 b-c	17.49 b	7.80 e	4.54 c-f
Auburn M	Twin ¹	1125 a-b	---	---	99	36.44 e-g	13.42 c-f	7.00 a-c	1.14 c-d	48 a-c	17.23 b	8.21 d-e	4.49 d-f
Auburn M	20*	1075 b-c	---	---	95	36.30 e-g	13.90 b-c	6.82 a-c	1.14 c-d	48 b-c	17.05 b	8.21 d-e	4.37 f-h
Auburn M	10*	1007 b-c	---	---	87	35.66 g	13.45 c-f	6.62 b-d	1.15 b-d	48 c	17.05 b	8.32 d	4.29 f-h
Delcot 277	38*	1216 a	---	---	100	38.04 b-d	13.27 d-f	7.15 a-b	1.12 a	49 a-c	18.51 a	9.32 a	4.19 g-h
Delcot 277	Twin	946 c-f	---	---	78	37.35 d-e	13.15 e-f	6.86 a-c	1.22 a	49 a-c	18.57 a	9.40 a	4.16 h
Delcot 277	20*	1054 b-d	---	---	87	37.72 c-d	14.07 a-d	7.02 a-b	1.21 a	49 a-c	18.46 a	9.30 a	4.19 g-h
Delcot 277	10*	996 b-e	---	---	82	37.24 d-f	12.87 f	6.84 a-c	1.22 a	49 a-c	18.66 a	9.23 a	4.12 h
MoDel	38*	931 d-f	---	---	100	36.09 g	14.60 a-b	7.24 a	1.16 b-c	49 a-c	18.77 a	9.13 a-b	4.74 b-d
MoDel	Twin	927 d-f	---	---	99	35.77 g	14.85 a	7.20 a	1.16 b-c	50 a	18.41 a	8.95 a-c	4.65 b-e
MoDel	20*	896 e-f	---	---	96	36.29 e-g	14.55 a-b	6.90 a-c	1.16 b-c	49 a-b	18.79 a	8.96 a-c	4.74 b-c
MoDel	10*	894 e-f	---	---	96	35.57 g	14.17 a-c	6.45 c-e	1.17 b	49 a-c	18.96 a	9.11 a-b	4.65 e-g
Stoneville 213	38*	902 e-f	---	---	100	39.41 a	11.97 g	6.19 d-f	1.13 d	49 a-c	16.97 b	8.55 c-d	5.16 a
Stoneville 213	Twin	869 e-f	---	---	96	38.99 a-b	11.65 g	5.92 f-g	1.15 b-d	48 a-c	17.36 b	8.62 b-d	5.14 a
Stoneville 213	20*	832 f	---	---	92	38.66 a-c	11.87 g	6.06 e-g	1.14 c-d	49 a-c	17.16 b	8.49 c-d	5.10 a
Stoneville 213	10*	826 f	---	---	92	38.14 b-d	12.00 g	5.69 g	1.14 c-d	49 a-c	17.44 b	8.51 c-d	4.84 b
Average	38*	1046 a	---	---	100	37.43 a	13.49 a	6.86 a	1.16 a	49 a	17.93 a	8.70 a	4.66 a
Average	Twin	967 a-b	---	---	92	37.14 a	13.27 a-b	6.75 a	1.17 a	49 a	17.89 a	8.60 a	4.61 a
Average	20*	964 a-b	---	---	92	37.24 a	13.60 a	6.70 a-b	1.16 a	49 a	17.87 a	8.74 a	4.61 a
Average	10*	931 b	---	---	89	36.63 b	13.12 b	6.38 b	1.17 a	49 a	18.03 a	8.79 a	4.62 b
Average	HD	985 a	---	---	---	37.29 a	13.39 a	6.68 a	1.17 a	49 a	17.95 a	8.79 a	4.59 a
Average	D	968 a	---	---	---	36.95 b	13.36 a	6.66 a	1.16 b	49 a	17.91 a	8.72 a	4.56 a

¹ 2-10 inch rows per one 38* width bed.² Hill Dropped and Drilled combined for row-width and variety responses.

Table 3 Responses of Eight Cotton Varieties and Strains Grown in Three Row Widths on Sandy Loam Soil, Portageville, Mo., 1972.

Variety or Strain	Row Width Inches	Lint Per Acre				Lint Fraction %	Seed Index Grams	Boll Size Grams	Fiber Properties				
		Total Lbs.	1st Pick %	1st Pick %	38* Rows %				Length		Strength (T ₁) g/Tex	Elongation (E ₁) %	Micronaire
									2.5% SL	Uniformity Index			
Auburn M	38*	1045 a-c	---	---	100	36.60 f-b	13.10 a-c	6.02 d-f	1.14 c-d	48 b-c	17.60 e-l	8.07 a-e	4.40 j-l
Auburn M	30*	1109 a	---	---	106	37.62 c-f	13.00 a-c	6.40 a-f	1.11 e-f	48 b-e	17.55 f-l	8.07 a-e	4.57 h-l
Auburn M	20*	1107 a	---	---	106	36.70 f-b	13.10 a-c	6.55 a-f	1.12 d-e	47 b-e	16.90 h-l	7.90 c-e	4.52 h-l
Delcot 277	38*	974 a-b	---	---	100	38.67 a-d	12.20 c-f	6.57 a-e	1.20 a-b	48 b-e	19.67 a	8.85 a	4.40 j-l
Delcot 277	30*	1048 a-c	---	---	108	38.75 a-c	12.40 b-e	6.55 a-f	1.18 b	48 b-e	19.30 a-c	8.80 a-c	4.37 k-l
Delcot 277	20*	974 a-c	---	---	100	38.82 a-c	12.80 b-d	6.22 c-f	1.21 a	49 a-d	19.47 a-b	8.85 a-b	4.47 i-l
Stoneville 213	38*	882 c-g	---	---	100	38.77 a-c	11.10 g	5.80 e-f	1.14 c-d	49 a-d	17.70 e-l	8.20 a-e	5.22 a-c
Stoneville 213	30*	934 a-e	---	---	106	38.50 a-e	11.80 d-g	6.22 c-f	1.15 c	49 a-d	18.22 b-h	7.62 e-g	5.47 a
Stoneville 213	20*	919 b-f	---	---	104	38.60 a-d	11.80 d-g	5.77 e-d	1.14 c-d	48 b-e	17.27 g-l	7.95 b-e	5.32 a-b
Paymaster Dwarf	38*	735 g	---	---	100	38.85 a-b	11.20 f-g	5.87 e-d	1.05 h	50 a	16.50 i	8.70 a-d	4.80 e-d
Paymaster Dwarf	30*	787 f-g	---	---	103	39.42 a	11.60 e-g	5.85 e-f	1.04 h	50 a	17.55 f-l	8.32 a-e	4.90 e-h
Paymaster Dwarf	20*	773 e-g	---	---	105	38.70 a-d	11.30 f-g	5.65 f	1.05 h	50 a	16.47 i	8.22 a-c	4.60 h-l
Qaspaw	38*	1020 a-c	---	---	100	35.70 h	13.30 a-c	7.15 a-b	1.11 e-f	50 a	18.97 a-f	6.65 h	5.12 a-f
Qaspaw	30*	802 d-g	---	---	79	35.90 h	13.40 a-b	7.25 a	1.08 g	49 a-d	18.82 a-f	6.45 h	5.42 a-b
Qaspaw	20*	965 a-d	---	---	95	36.70 f-b	13.30 a-c	6.85 a-d	1.09 f-g	49 a-d	18.65 a-g	6.77 g-h	5.20 a-d
Auburn M-HPC	38*	928 a-f	---	---	100	38.02 b-e	12.70 b-d	6.27 b-f	1.12 d-e	49 a-d	18.02 c- ^h	7.77 d-f	4.67 h-k
Auburn M-HPC	30*	992 a-c	---	---	107	37.77 b-f	12.20 c-f	6.35 b-f	1.13 c-e	48 b-e	17.60 e-l	8.17 a-e	4.27 i
Auburn M-HPC	20*	922 b-f	---	---	99	37.35 e-g	14.00 a	6.27 a-f	1.13 c-e	49 a-d	17.02 h-l	8.15 a-e	4.77 e-j
Auburn M-NR	38*	1017 a-c	---	---	100	37.70 b-f	13.10 a-c	6.47 a-f	1.14 c-d	48 b-e	17.65 e-l	7.60 e-g	4.82 d-l
Auburn M-NR	30*	1094 a-b	---	---	108	37.75 b-f	12.40 b-e	6.52 e-f	1.12 d-e	49 a-d	18.05 c-h	8.10 a-e	4.72 g-k
Auburn M-NR	20*	942 a-e	---	---	93	37.52 d-f	12.90 b-c	6.02 d-f	1.11 e-f	48 b-e	17.72 d-l	7.57 e-g	4.73 f-k
Qaspaw NR	38*	947 a-e	---	---	100	36.35 g-h	13.30 a-c	6.97 a-c	1.09 f-g	49 a-d	19.00 a-e	6.90 f-h	5.27 a-c
Qaspaw NR	30*	898 c-g	---	---	95	36.25 g-h	13.20 a-c	6.97 a-c	1.09 f-g	48 b-e	19.12 a-d	6.52 h	5.15 a-e
Qaspaw NR	20*	912 b-f	---	---	96	36.15 h	13.00 a-c	6.80 a-d	1.11 e-f	49 a-d	18.52 a-g	6.55 h	5.07 b-g
Average	38*	943 a	---	---	100	37.58 a	12.50 a	6.39 a	1.12 a	49 a	18.14 a-b	7.86 a	4.84 a
Average	30*	954 a	---	---	101	37.75 a	12.50 a	6.52 a	1.11 b	49 a	18.28 a	7.76 a	4.86 a
Average	20*	939 a	---	---	100	37.57 a	12.77 a	6.28 a	1.12 a	48 a	17.76 b	7.76 a	4.84 a

Table 4 Responses of Ten Cotton Varieties and Strains Grown in Four Row Widths on Sandy Loam Soil, Portageville, Mo., 1973.

Variety or Strain	Row Width Inches	Lint Per Acre				Lint Fraction %	Seed Index Grams	Boll Size Grams	Fiber Properties				
		Total Lbs.	1st Pick Lbs.	1st Pick %	38* Rows %				Length		Strength (T ₁) g/Tex	Elongation (E ₁) %	Micronaire
									2.5% SL	Uniformity Index			
Auburn M	38*	741 d-l	697 d-l	94	100	35.90 l-n	14.40 a	7.20 a-c	1.10 f-g	46.0 a-d	17.10 b-l	8.15 d-h	4.15 l-m
Auburn M	Twin ¹	793 e-h	751 b-h	95	107	35.95 l-n	12.80 a-f	6.70 b-g	1.07 g-j	45.0 b-d	16.25 g-l	7.75 f-j	4.25 a-l
Auburn M	30*	592 j-k	486 j	97	68	37.40 h-l	13.20 a-e	6.50 b-l	1.06 g-i	47.0 a-b	16.35 f-l	7.80 f-j	4.25 g-k
Auburn M	20*	668 g-l	654 f-l	98	90	35.90 l-n	13.80 a-c	7.40 a-b	1.09 f-h	47.0 a-b	15.70 h-l	8.15 d-h	4.25 g-k
Delcot 277	38*	955 a-b	901 a	94	100	37.35 h-l	13.00 a-e	7.70 a	1.18 a-c	45.5 b-d	18.65 a-e	9.50 a-d	4.10 l-n
Delcot 277	Twin	884 a-d	865 a-c	98	87	38.55 a-l	12.80 a-f	6.55 b-h	1.15 c-e	45.5 b-d	18.05 a-g	9.00 a-d	3.75 o
Delcot 277	30*	648 g-l	626 g-l	97	68	40.10 a	12.40 a-f	6.60 b-h	1.15 c-e	45.5 b-d	18.55 a-f	10.00 a	3.80 n-o
Delcot 277	20*	921 a-c	893 a-b	97	96	38.20 c-l	13.40 a-d	6.90 a-f	1.17 b-d	46.0 a-d	18.80 a-c	9.40 a-b	3.85 m-o
Stoneville 213	38*	982 a	899 a	92	100	38.15 d-j	11.00 f	5.70 h-l	1.10 f-g	45.5 b-d	17.00 b-l	8.15 d-h	4.60 e-g
Stoneville 213	Twin	953 a-b	909 a	95	97	37.20 i-l	11.60 d-f	6.00 f-i	1.12 e-f	47.0 a-b	17.00 b-l	8.25 c-h	4.65 e-f
Stoneville 213	30*	629 i-j	611 h-j	97	65	40.05 a-b	11.20 e-f	5.80 g-l	1.09 f-h	45.5 b-d	17.15 b-l	7.90 e-l	4.70 b-o
Stoneville 213	20*	922 a-c	843 a-d	90	94	38.00 e-j	12.00 b-f	6.10 e-l	1.10 f-g	45.0 b-d	16.40 e-l	8.75 b-f	4.55 e-h
Deltafine 16	38*	869 a-e	797 a-f	92	100	38.20 c-l	12.60 a-f	7.05 a-d	1.14 d-e	46.0 a-d	17.80 a-b	8.90 b-e	4.70 b-e
Deltafine 16	Twin	878 a-d	774 a-f	88	101	39.90 a-b	11.40 d-f	6.00 f-i	1.12 e-f	45.0 b-d	17.80 a-b	9.25 a-c	4.25 e-l
Deltafine 16	30*	746 d-l	723 e-l	97	86	39.85 a-c	12.00 b-f	6.45 b-l	1.15 c-e	47.0 a-b	18.10 a-g	9.25 a-c	4.55 e-h
Deltafine 16	20*	841 a-f	788 a-f	94	97	39.75 a-d	12.20 b-f	6.25 c-l	1.15 c-e	47.0 a-b	17.80 a-b	9.15 a-d	4.75 a-d
Quapaw	38*	890 f-l	631 g-l	91	100	33.15 o	15.60 a-f	6.60 b-h	1.05 i-k	48.0 a	17.85 a-b	6.20 m	4.90 a-c
Quapaw	Twin	747 d-l	721 e-l	97	108	35.90 l-n	13.80 a-c	6.80 a-f	1.03 l	46.0 a-d	17.10 b-l	6.40 l-m	4.90 a-c
Quapaw	30*	486 k	467 k	96	70	34.45 n-o	14.00 a-b	7.05 a-d	1.06 h-k	46.5 a-e	17.55 h-m	6.80 j-m	4.55 a-e
Quapaw	20*	720 e-l	653 e-l	95	104	35.90 m-n	13.20 a-e	7.05 a-d	1.05 i-k	47.5 a	16.80 b-l	6.50 k-m	4.90 a-c
Coker 310	38*	752 d-l	653 f-l	87	100	37.60 g-k	11.80 c-f	6.45 b-l	1.19 a-b	44.0 d	17.80 a-b	6.90 l-m	4.60 e-g
Coker 310	Twin	871 a-e	842 a-d	97	116	39.45 a-e	11.20 e-f	5.55 l	1.17 b-d	45.0 b-d	17.60 b-h	7.15 h-m	4.65 e-f
Coker 310	30*	636 l-j	604 l-j	95	85	40.20 a	11.20 e-f	6.05 e-l	1.20 a	44.5 e-d	16.60 a-f	7.50 h-k	4.45 d-l
Coker 310	20*	776 e-l	696 d-l	90	103	38.05 e-j	11.40 d-f	6.10 d-l	1.20 a	46.0 a-d	18.00 a-f	7.50 h-k	4.60 e-g
Auburn M-NR	38*	840 a-f	809 a-e	96	100	37.75 f-k	13.00 a-f	6.50 b-l	1.07 g-j	46.5 a-e	16.45 e-l	7.50 h-k	4.30 f-j
Auburn M-NR	Twin	878 a-d	853 a-d	97	105	39.20 a-g	12.00 b-f	6.45 b-l	1.04 j-l	46.0 a-d	16.60 c-d	7.90 e-d	4.85 a-c
Auburn M-NR	30*	631 l-j	589 l-j	95	75	39.00 a-h	12.60 a-f	6.80 a-f	1.06 h-k	44.5 e-d	15.20 l	8.25 e-h	4.30 f-j
Auburn M-NR	20*	848 a-f	813 a-e	96	101	38.20 e-j	12.20 b-f	6.50 b-l	1.06 h-k	46.0 a-d	16.50 d-l	8.25 e-h	4.40 e-d
HYC72-1	38*	813 b-g	770 a-g	95	100	38.40 b-l	12.60 a-f	6.90 a-f	1.03 k-l	48.0 a	16.10 g-l	7.40 h-l	4.90 a-e
HYC72-1	Twin	842 a-f	810 a-e	96	104	38.55 a-l	11.20 e-f	6.20 d-l	1.03 k-l	48.0 a	16.00 g-l	7.75 f-j	5.00 a-b
HYC72-1	30*	640 l-j	617 h-l	96	79	39.25 a-g	11.80 c-f	6.15 d-l	1.03 k-l	45.5 b-d	15.70 h-l	7.65 g-j	4.75 a-d
HYC72-1	20*	912 a-c	891 a-b	98	112	38.00 e-j	12.00 b-f	6.85 a-f	1.02 l	46.0 a-d	16.40 e-l	7.40 h-l	5.05 a
HYC72-2	38*	878 a-d	795 a-f	91	100	36.00 l-n	13.20 a-e	7.35 a-b	1.09 f-h	46.0 a-d	17.25 b-l	7.15 h-m	4.25 g-k
HYC72-2	Twin	840 a-f	793 a-f	94	96	36.25 k-m	12.80 a-f	6.90 a-f	1.07 g-j	46.5 a-c	17.80 a-b	7.25 h-m	4.35 a-l
HYC72-2	30*	644 h-l	622 h-l	97	73	37.70 g-k	13.40 a-d	7.35 a-b	1.09 f-h	47.5 a	16.16 a-e	7.25 h-m	4.20 h-l
HYC72-2	20*	845 a-f	802 a-e	95	96	36.60 j-l	12.60 a-f	7.00 a-e	1.08 g-l	45.0 b-d	16.25 a-g	7.40 h-l	4.30 f-j

Table 4 Continued

Variety or Strain	Row Width Inches	Lint Per Acre				Lint Fraction %	Seed Index Grams	Dell Size Grams	Fiber Properties					
		Total Lbs.	1st		38* Rows %				Length		Strength (T ₁) g/Tex	Elongation (E ₁) %	Micronaire	
			Pick Lbs.	Pick %					2.5% SL	Uniform- ity Index				
DC-Okra	38*	716 e-1	676 e-1	94	100	38.05 e-j	12.20 b-f	7.35 a-b	1.15 e-e	44.0 d	20.90 a	8.80 b-f	3.95 k-o	
DC-Okra	Twin	708 f-1	684 e-1	97	99	38.80 a-1	11.80 c-f	6.55 b-b	1.14 d-e	45.5 b-d	17.75 a-b	8.65 b-g	3.95 k-o	
DC-Okra	30*	493 k	470 j-k	95	69	29.40 a-f	12.80 a-f	6.65 b-b	1.16 e-d	44.5 c-d	18.70 a-d	8.75 b-f	3.90 l-o	
DC-Okra	20*	756 d-1	738 c-b	98	106	38.60 a-1	11.20 e-f	6.25 c-1	1.14 d-e	46.0 a-d	19.00 a-b	9.00 a-d	4.00 j-o	
Average	38*	824 a	763 a	98	100	37.05 b	12.64 a	6.88 a	1.11 a	46.0 a	17.62 a	7.87 a	4.44 a	
Average	Twin	839 a	807 a	96	102	37.87 b	12.14 b	6.20 b	1.10 a	46.0 a	17.17 a	7.93 a	4.48 a	
Average	30*	606 b	582 b	96	74	28.74 a	12.45 a	6.54 a-b	1.11 a	45.8 a	17.45 a	8.11 a	4.37 a	
Average	20*	821 a	780 a	95	100	37.69 b	12.60 a-b	6.64 a-b	1.11 a	46.0 a	17.42 a	8.15 a	4.46 a	

‡ 2-6 inch rows on one 38* bed.

Semi-determinate (Delcot 277) and indeterminate varieties (Stoneville 213 and Deltapine 16) produced the best average yields. Poor seed quality and seasonal adversities did not favor Auburn M and Quapaw, early determinate varieties that were productive in previous years. Some experimental strains (Auburn M-NR, HYC 72-1 and HYC 72-2), intermediate between the Auburn M type and Delcot 277 were equal to Delcot 277, Stoneville 213 and Deltapine 16 in productivity.

Cotton in 30-inch rows matured later than 38 and 20-inch and twin rows, producing significantly less at first picking and less total yield. No significant differences for lint yield at first picking occurred among 38 and 20-inch and twin rows. Twin rows were estimated to be 75% open 6-7 days earlier than other systems.

Dense plantings, 20-inch and twin rows although short in height, tended to increase the incidence of bacterial blight. Lodging was less in 20-inch and twin rows. Lint fraction was highest in 30-inch rows. Boll and seed size were reduced in twin rows but fiber length, length uniformity, fiber strength and elongation and micronaire were not significantly affected by the varying row widths. Varietal differences were significant.

1974 (Table 5): Three experimental strains (HYC 72-234, HYC 72-262/263 and HYC 72-320), selected for narrow row culture were compared with six commercial varieties and a bacterial blight resistant strain in 38-inch, twin rows, 20-inch rows drilled and 20-inch rows hill dropped.

The 20-inch row, hill dropped or drilled, produced the highest lint yields followed by conventional 38-inch rows. Twin rows produced the least.

Earliness of 20-inch row production was shown by yield of lint at first picking. Overall, 20-inch rows produced approximately 200 pounds of lint per acre more by October 31 than did 38-inch or twin rows.

Observation of initial flowering among 38-inch rows was approximately one day later than for 20-inch or twin rows. The estimate of 75% open bolls occurred approximately three days later for twin rows than for 20 and 38-inch rows. This may be a very conservative estimate in view of first pick differences. The number of barren plants was significantly greater in 20-inch drilled plots than for twin and 38-inch conventional or 20-inch rows hill dropped. Plant height was tallest in 38-inch rows and shortest in 20-inch drilled rows. Lodging was more obvious in 20-inch drilled rows.

Significant lint fraction differences were observed in the harvested samples but these obviously were due to trash content differences between spindle and brush stripper harvesting methods. The 4-20-inch row brush harvester was first used to harvest 20-inch row plots during 1974. No significant difference in seed size was noted but standard 38-inch rows tended to favor production of larger seeds with more dense linters. Boll size was largest in 38-inch rows and smallest in 20-inch drilled rows. Although no significant differences in 2.5% span length were observed, fiber length uniformity was reduced in 20-inch rows, indicating a shorter 50% span length. Fiber tended to become weaker and finer as row width decreased but these were not significantly reflected in spun yarn tenacity. However, a trend toward reduced yarn tenacity was noted.

HYC 72-320 and HYC 72-234, two strains selected for tolerance to close spacing and Mo 63-277BR, Delcot 277, Stoneville 213 and Auburn M were among the most productive of the ten varieties and strains grown. Maximum yields commonly occurred in 20-inch rows. The highest lint yield was 960 pounds per acre produced by HYC 72-234 grown in 20-inch hill dropped rows but it produced only 535 pounds in twin rows.

Table 5 Responses of Ten Cotton Varieties and Strains Grown in Three Row Widths on Sandy Loam Soil, Portageville, Mo., 1974.

Variety or Strain	Row Width Inches	Lint Per Acre					Seed Index Grams	Boll Size Grams	Fiber and Yarn Properties								
		Total Lbs.	Pick Lbs.	Pick %	Pick % ^b	Fraction %			Length		Elongation (E ₁) %	Strength		Colorimeter		Trash Index	Yarn Tenacity (27 Tex)
									2.5% SL	Uniformity Index		(T ₁) g./tex	Micronaire	Rd	B		
Auburn M	38*	741b-b	669e-m	90	100	35.20e-f	14.00a	7.40a	1.10f-j	43a-b	16.95j-k	7.93b-m	4.45a-e	72.0b-c	7.10a-e	2.0c	9.80b-m
Auburn M	Twine ¹	709b-l	638l-o	90	96	36.00b-e	13.60a-b	6.55a-h	1.09g-k	42a-c	17.22b-k	8.35b-k	4.05c-j	72.0b-c	6.90b-e	3.0b-c	9.85k-l
Auburn M	20*D ²	693b-l	692d-l	100	94	31.20b	11.80b-e	5.60b-j	1.03j-k	42a-c	14.83i	8.64b-l	4.25a-l	67.5g-j	7.35a-e	5.0a	8.90m
Auburn M	20*HD ³	785a-e	785b-g	100	106	31.50g-h	12.80a-d	6.50b-j	1.08h-k	43a-b	16.09k	8.44c-k	3.90f-k	70.5b-f	7.60a-e	4.5a	9.70l-m
Delcot 277	38*	562b-l	402r	71	100	37.15a-d	13.00a-d	6.85a-f	1.21a	43a-b	19.02a-f	9.84a-b	3.80f-k	70.5b-f	7.60a-d	4.0a-b	12.10a-c
Delcot 277	Twine	710b-l	543r-r	76	126	37.65a-d	13.40a-b	6.95a-e	1.19a-b	43a-b	19.10a-e	9.36a-f	3.95c-k	70.0c-g	7.45a-e	4.0a-b	11.95a-d
Delcot 277	20*D	824a-d	824a-d	100	146	30.55b	12.60a-e	6.20d-l	1.16a-e	41c-d	18.84a-f	8.47b-b	3.40k	67.5g-j	7.65a-c	5.0a	11.30c-d
Delcot 277	20*HD	809a-d	809b-e	100	144	31.30b	13.40a-b	6.80a-f	1.18a-c	42a-c	18.57a-b	9.75a-c	3.70b-k	67.5g-j	7.80a	5.0a	11.55b-f
Stonerville 213	38*	711b-l	692a-r	69	100	37.00a-d	12.80a-d	6.40b-l	1.15b-f	44a-b	18.42a-l	7.88b-m	4.55a-c	71.5b-c	7.30a-e	2.5c	11.05d-j
Stonerville 213	Twine	629d-l	450e-r	72	113	38.20a-c	12.00a-e	6.15d-l	1.12d-b	43a-b	17.18b-j	8.03g-m	3.95c-k	72.0b-c	7.00a-e	4.0a-b	11.30e-l
Stonerville 213	20*D	735f-h	735b-l	100	104	31.35b	11.80b-e	5.80g-j	1.12d-b	42a-b	17.32g-k	6.61n	4.00c-k	66.5b-j	7.20a-e	4.5a	10.30h-l
Stonerville 213	20*HD	862a-d	802b-f	100	113	32.45f-h	11.60b-e	6.00e-l	1.12d-b	41c-d	17.63f-j	7.60b-m	3.85e-k	68.0f-l	6.85c-e	5.0a	10.55f-l
Deltapine 16	38*	566g-l	398r	70	100	37.30a-d	11.80b-e	6.20d-l	1.16a-e	43a-b	17.78b-j	9.36a-e	4.35a-g	75.0a	6.95b-e	2.0c	10.95d-j
Deltapine 16	Twine	580f-l	443q-r	76	102	37.80a-c	11.20c-e	5.90f-j	1.13c-b	43a-b	18.41a-l	10.25a	4.20a-b	73.0a-b	6.95b-e	2.5c	11.15c-j
Deltapine 16	20*D	576f-l	574q-q	100	102	30.90b	10.60e	5.00j	1.10b-g	42a-c	17.84d-j	9.36a-f	3.65i-k	69.5c-g	7.00a-e	4.5a	10.55f-l
Deltapine 16	20*HD	633d-h	633g-o	100	112	31.15b	12.20a-c	6.10e-l	1.12d-b	42a-c	18.03c-j	9.58a-d	3.90d-k	69.0d-h	7.30a-e	4.5a	10.45g-l
Quapaw	38*	660c-l	594p-p	90	100	35.20c-f	13.00a-d	7.40a	1.06i-k	45a	18.20a-l	7.33b-m	4.50a-d	73.0a-b	7.10a-e	2.0c	11.50b-g
Quapaw	Twine	535i	514m-r	96	81	34.55d-g	12.60a-e	6.25c-l	1.05j-k	44a-b	18.95a-f	6.99b-m	4.50a-d	73.0a-b	6.85c-e	3.0b-c	11.70a-e
Quapaw	20*D	740b-h	740b-h	100	112	30.90b	12.60a-e	6.25c-l	1.04k	44a-b	17.13b-k	8.17e-l	4.25a-l	68.0f-l	7.45a-e	4.0a-b	10.25i-l
Quapaw	20*HD	785a-e	785b-g	100	119	30.55b	13.20a-c	6.75a-f	1.06h-k	43a-b	17.37g-k	7.25a-e	4.10b-j	68.5e-h	7.30a-e	4.5a	10.90d-j
Coker 310	38*	684b-l	459p-r	67	100	37.65a-d	12.20a-e	6.50a-h	1.19a-b	44a-b	19.44a-b	7.49f-m	4.80a	71.5b-d	7.45a-e	3.0b-c	11.35b-h
Coker 310	Twine	667c-l	544r-r	82	98	38.85a-b	11.20c-e	6.20c-l	1.17a-d	42a-c	19.40a-b	7.79b-m	4.55a-c	70.0c-g	7.10a-e	4.0a-b	11.25c-l
Coker 310	20*D	707b-h	707c-k	100	103	32.30f-h	11.00d-e	5.45i-j	1.17a-d	42a-c	18.64a-g	6.91h-j	3.80f-k	65.0j	7.45a-e	5.0a	11.05d-j
Coker 310	20*HD	758b-g	758b-g	100	111	31.85g-h	12.00a-c	6.50a-h	1.17a-d	42a-c	18.46a-l	7.43i-m	4.20a-j	65.5b-j	7.40a-e	5.0a	11.30e-l
HYC72-234	38*	719b-l	648f-m	90	100	36.10b-e	13.20a-c	7.40a	1.09g-k	44a-b	19.44a-b	7.79b-m	4.50a-d	71.5b-d	7.35a-e	2.5c	12.10a-c
HYC72-234	Twine	581f-l	540f-r	93	81	36.40a-e	12.40a-e	6.75a-g	1.04h-k	44a-b	19.22a-c	8.14e-l	4.10b-j	71.0b-e	7.30a-e	3.0b-c	11.90a-d
HYC72-234	20*D	741b-h	741b-h	100	103	31.20b	14.00a	6.40b-l	1.12d-b	41c-d	18.32a-j	9.31a-g	3.95e-k	68.0f-l	7.10a-e	5.0a	10.30h-l
HYC72-234	20*HD	960a	960a	100	134	30.80b	12.80a-d	6.80a-f	1.11e-i	43a-b	18.15b-j	7.85b-m	4.05c-j	68.5e-h	7.15a-e	4.5a	11.15c-j
HYC72-262/263	38*	676b-l	601b-p	89	100	36.90b-e	13.60a-b	7.10a-d	1.09g-k	45a	17.32g-k	7.28b-m	4.70a-b	72.0b-c	7.65a-e	2.5c	10.95d-j
HYC72-262/263	Twine	596c-l	563k-q	95	88	36.60a-e	12.20a-e	6.25c-l	1.08h-k	43a-b	18.41a-l	7.21k-n	4.15b-j	71.5b-d	6.85c-e	3.0b-c	11.15c-j
HYC72-262/263	20*D	745b-h	745b-h	100	110	32.35f-h	12.40a-e	6.15d-l	1.09g-k	42a-c	17.10c-k	6.83m-n	3.90d-k	70.0c-g	6.70a	5.0a	10.35h-l
HYC72-262/263	20*HD	723b-b	723b-p	100	107	31.20b	12.00a-e	6.20d-l	1.10f-j	43a-c	18.14b-j	7.56b-m	4.10b-j	70.0c-g	6.80d-e	4.5a	10.55f-l
HYC72-320	38*	818a-d	599b-p	73	100	37.10a-d	13.00a-d	7.30a-b	1.12d-b	44a-b	18.20b-j	7.71b-m	4.70a-b	71.0b-e	7.60a-d	3.0b-c	10.80a-c
HYC72-320	Twine	723f-h	586f-q	80	90	39.70a	11.80b-e	7.20a-c	1.10f-j	42a-c	18.90a-f	7.60b-n	4.40a-f	70.0c-g	7.35a-e	4.0a-b	10.55f-l
HYC72-320	20*D	871a-b	871a-b	100	107	32.25f-h	12.20a-e	6.60h-j	1.08h-k	41c-d	17.69f-j	8.03g-m	3.90d-k	69.0d-h	7.50a-e	4.5a	10.10j-l
HYC72-320	20*HD	766b-f	766b-g	100	94	30.80b	12.60a-e	6.85a-f	1.09g-k	43a-b	17.41g-k	7.55b-m	4.25a-l	68.0f-l	7.80a	4.5a	10.45g-l

Table 5 Continued

Variety or Strain	Row Width Inches	Lint Per Acre					Seed Index Grams	Boll Size Grams	Fiber and Yarn Properties									
		Total Lbs.	Pick Lbs.	Pick %	Pick % ⁵	Lint Fraction %			Length			Strength (F ₁) g/Tex	Elong- ation (E ₁) %	Microsaire	Cobolimeter		Trash Index	Yarn Tenacity (Z ₁ Tex)
									2.5% SL	Unifor- mity Index	44a-b				44a-b	44a-b		
MO63-277BR	38*	646d-i	520m-r	80	100	38.65a-b	12.80a-d	6.75a-g	1.19a-b	44a-b	19.29a-c	8.49c-k	3.75g-k	71.5b-d	6.85c-e	4.0a-b	12.70a	
MO63-277BR	Twins	756b-h	640g-o	85	117	35.52b-e	12.80a-d	6.45a-h	1.18a-c	44a-b	19.63a	8.59b-j	4.05b-f	70.5b-f	7.35a-e	4.5a	12.35a-b	
MO63-277BR	20*D	739b-h	739b-l	100	114	33.55e-h	12.00a-e	6.00e-l	1.16a-e	43a-b	19.40a-c	7.74b-m	3.60j-k	65.5l-j	7.25a-e	4.5a	11.65b-e	
MO63-277BR	20*HD	853a-c	853a-c	100	132	31.30b	12.00a-e	6.25c-l	1.15b-f	43a-b	19.23a-d	8.05f-m	3.75g-k	67.5g-j	7.33a-e	5.0a	11.10c-j	
Average	38*	678b-c	538b	79	100	36.75a	12.94a	6.92a	1.14a	44a	18.43a-b	8.11a	4.41a	72.0a	7.22a	2.75b	11.33a	
Average	Twins	642c	558b	87	95	37.13a	12.32a	6.47b	1.12a	43a	18.75a	8.22a	4.20a-b	71.3a	7.11a	3.50a-b	11.31a	
Average	20*D	737a-b	737a-b	100	109	31.60b	12.10a	5.84c	1.12a	42b	17.72b	8.05a	3.87b	67.6b	7.33a	4.70a	10.47a	
Average	20*HD	788a	788a	100	116	31.29b	12.46a	6.48b	1.12a	42b	17.91a-b	8.12a	3.97b	68.4b	7.27a	4.70a	10.77a	

¹ 2-6* rows on 38* beds.

² 20* rows drilled.

³ 20* rows hill dropped.

⁴ 38* and twins were spindle picker harvested; 20* were brush harvested.

⁵ Percent of total lint yields of 38* rows.

The earliest maturing varieties were HYC 72-234, Auburn M, Mo 63-277BR, Quapaw and HYC 72-262/263. HYC 72-234 produced 960 pounds of lint per acre with "once-over" harvest compared to the first pick lint yield of 398 and total lint yield of 566 pounds by Deltapine 16 grown in conventional 38-inch rows.

Experimental strains bloomed 2-3 days sooner than standard varieties, especially when they were grown in 20-inch rows. This was reflected in their rate of boll opening, reaching the 75% open boll stage from 5 to 12 days sooner than standard varieties. Auburn M, however, responded similar to the experimental strains HYC 72-262/263 grown in 20-inch rows which was 75% opened 16 days sooner than Coker 310 grown in 38-inch conventional rows.

Commercial varieties and experimental strains expressed their characteristic boll, ginning and fiber quality traits although variable row width spacing often modified these traits negatively as row and within row plant spacing decreased. Some earlier maturing experimental strains produced fiber that characteristically was shorter and coarser than most Delta varieties yet their yarn qualities were acceptable. Micronaire values for these generally were less affected by narrow rows than were commercial varieties.

1970-1974 (Table 6): Auburn M and Delcot 277 were grown in all trials in 38-inch conventional rows and 20-inch narrow rows during the 5-year period, 1970-1974. No real yield differences were found between row widths, varieties or row width-variety interactions. Seed size and fiber strength was reduced significantly in 20-inch row production. Fiber strength reduction was attributed largely to the response of Auburn M to 20-inch rows. Otherwise, no real differences were observed for lint fraction, boll size, fiber length, length uniformity, fiber elongation or micronaire. Characteristic varietal differences were noted.

1971, 1973-74 (Table 7): Auburn M, Delcot 277 and Stoneville 213 were grown in trials for three years in 38-inch, 20-inch and twin rows (2-rows per 38-inch bed). No significant lint yields were observed overall but row width-variety interaction trends were noted. Auburn M, the earliest variety, tended to produce 4% more in twin rows and 3% less in 20-inch rows during this period even though in some years significant deviations were observed. Delcot 277 and Stoneville 213, on the other hand, tended to produce less in twin rows compared to either 38-inch or 20-inch systems but differences were small. In 20-inch rows the reduced lint fraction likely was due to brush harvesting, 1974. Micronaire, variety and some row width-variety minor interaction differences were observed.

VARIABLE ROW WIDTH-VARIETY TRIALS, CLAY SOIL:

1970 (Table 8): Auburn M and Delcot 277 were grown in 38, 30, 20, 10, and 7-inch rows. Lint yield levels were very low due to late planting and rather dry conditions. Combining varieties, narrow rows produced the highest lint yields; 7-inch the highest followed by 10 and 20-inch rows. The lowest yields were obtained in 30 and 38-inch rows. This trend was consistent in response among varieties. Lint fraction increased, seed size, boll size, 2.5% span length, uniformity index, fiber strength, and micronaire decreased as row width was reduced. Fiber length of Delcot 277 was shortest in 38-inch rows but Auburn M was shortest in 7-inch rows. No yield differences were observed between drilled and hill dropped methods of planting but lint fraction, seed index, boll size and 2.5% span length was reduced in drilled plantings. Strength of fiber, elongation and micronaire were not affected.

Table 6 The Responses of Auburn M and Delcot 277 Cotton Varieties Grown in 38" and 20" Row Widths on Sandy Loam Soil, Portageville, Mo. 1970-74 (5 year averages)

Variety or Strain	Row Width Inches	Lint Per Acre				Lint Fraction %	Seed Index Grams	Boll Size Grams	Fiber Properties				
		Total Lbs.	1st Pick Lbs.	1st Pick %	38" Rows %				Length		Strength (T ₁) g/Tex	Elongation (E ₁) %	Micronaire
									2.5% SL	Uniformity Index			
Auburn M	38"	867 a	---	---	100	35.88 b	13.92 a	6.70 a	1.14 b	47 a	17.38 b	8.36 b	4.33 a
Auburn M	20"	873 a	---	---	101	35.26 b	13.20 a	6.77 a	1.11 c	46 a	16.26 c	8.28 b	4.16 a
Delcot 277	38"	872 a	---	---	100	37.94 a	12.80 a	7.04 a	1.18 a	47 a	18.46 a	9.32 a	4.13 a
Delcot 277	20"	903 a	---	---	104	37.11 a	13.28 a	6.68 a	1.18 a	47 a	18.60 a	9.17 a	4.09 a
Average	38"	870 a	---	---	100	36.91 a	13.36 a	6.87 a	1.16 a	47 a	17.92 a	8.84 a	4.23 a
Average	20"	888 a	---	---	102	36.18 a	13.24 b	6.72 a	1.14 a	47 a	17.43 b	8.73 a	4.12 a

Table 7 The Responses of Auburn M, Delcot 277 and Stoneville 213 Cotton Varieties Grown in 38", 38" Twins and 20" Row Widths on Sandy Loam Soil, Portageville, Mo., 1971 and 1973-74 (3 year averages).

Variety or Strain	Row Width Inches	Lint Per Acre				Lint ¹ Fraction %	Seed Index Grams	Boll Size Grams	Fiber Properties				
		Total Lbs.	1st Pick Lbs.	1st Pick %	38" Rows %				Length		Strength (T ₁) g/Tex	Elongation (E ₁) %	Micronaire
									2.5% SL	Uniformity Index			
Auburn M	38"	866 a-b	---	---	100	35.63 b	14.47 a	7.05 a	1.12 b-c	46 a	17.30 b-c	8.14 b	4.38 b-c
Auburn M	Twins	902 a-b	---	---	104	36.12 b	13.23 b	6.82 a-b	1.10 d	46 a	16.86 c	8.12 b	4.30 b-c
Auburn M	20"	844 a-b	---	---	97	34.25 c	13.47 b	6.88 a	1.11 c-d	46 a	16.24 d	8.43 b	4.08 c-d
Delcot 277	38"	912 a-b	---	---	100	37.57 a	13.87 b	7.30 a	1.20 a	46 a	18.57 a	9.49 a	3.97 d
Delcot 277	Twins	856 a-b	---	---	94	37.88 a	13.20 b	6.90 a	1.19 a	46 a	18.42 a	9.34 a	3.93 d
Delcot 277	20"	944 a	---	---	104	36.10 b	13.87 a-b	7.00 a	1.19 a	46 a	18.74 a	9.49 a	3.92 d
Stoneville 213	38"	869 a-b	---	---	100	38.22 a	11.90 c	6.17 b-c	1.13 b	47 a	17.57 b	8.22 b	4.78 a
Stoneville 213	Twins	815 b	---	---	94	38.03 a	11.80 c	6.07 c	1.13 b	46 a	17.56 b	8.39 b	4.57 a-b
Stoneville 213	20"	834 a-b	---	---	96	36.15 b	11.73 c	6.03 c	1.12 b-c	45 a	17.23 b-c	8.25 b	4.45 b
Average	38"	882 a	---	---	100	37.14 a	13.14 a	6.84 a	1.15 a	46 a	17.75 a	8.62 a	4.38 a
Average	Twins	874 a	---	---	99	37.34 a	12.74 a	6.59 a	1.14 a	46 a	17.61 a	8.62 a	4.27 a-b
Average	20"	857 a	---	---	97	35.50 b	13.02 a	6.64 a	1.14 a	46 a	17.41 a	8.72 a	4.15 b

¹ 1974, 20" rows were brush harvested biasing lint percent.

Table 8 Response of Two Cotton Varieties Grown in Four Row Widths on Heavy Clay Soil, Portageville, Mo., 1970.

Variety or Strain	Row Width Inches	Lint Per Acre ¹					Seed ¹ Index Grams	Boll ¹ Size Grams	Fiber Properties ¹				
		Total Lbs.	1st Pick Lbs.	1st Pick %	38* Rows %	Lint ¹ Fraction %			Length		Strength (T ₅) g/Tex	Elongation (E ₅) %	Micronaire
									2.5% SL	Uniform- ity Index			
Auburn M	38*	194 d-e	---	---	100	37.13 d	11.80 a-b	5.40 b-c	1.12 c	49 a-c	17.76 b	8.44 d	4.18 a-b
Auburn M	30*	172 e	---	---	89	37.23 d	11.73 a-c	5.00 c	1.11 c-d	49 a-c	17.73 b	8.10 d	4.18 a-b
Auburn M	20*	234 c	---	---	121	36.45 d	11.07 b-d	5.75 a-b	1.11 c-d	49 a-c	17.81 b-c	8.29 d	3.93 b-d
Auburn M	10*	248 c	---	---	128	38.72 c	10.67 d-e	5.18 c	1.10 d	47 d-e	16.98 b-c	8.52 c-d	3.80 c-d
Auburn M	7*	278 a-b	---	---	143	38.95 c	9.33 e	4.37 d	1.08 e	47 d-e	16.29 c	8.98 c	3.75 c-d
Delcot 277	38*	182 d-e	---	---	100	38.72 c	12.07 a-b	6.00 a	1.18 b	50 a	20.18 a	9.68 b	4.20 a-b
Delcot 277	30*	207 d	---	---	108	39.12 a-c	12.40 a	6.10 a	1.20 a	50 a	20.52 a	10.30 a	4.23 a
Delcot 277	20*	255 b-c	---	---	133	39.00 b-c	12.00 a-b	5.68 a-b	1.19 a-b	49 a-c	20.34 a	10.25 a	4.00 a-c
Delcot 277	10*	252 b-c	---	---	131	40.27 a	10.73 c-d	5.02 c	1.19 a-b	49 a-c	20.03 a	10.36 a	3.77 c-d
Delcot 277	7*	309 a	---	---	156	40.22 a-b	10.10 d-e	4.40 d	1.19 a-b	48 c-d	20.11	9.73 b	3.70 d
Average	38*	193 c	---	---	100	37.92 b	11.93 a	5.70 a	1.15 a-b	50 a	18.97 a-b	9.06 a	4.19 a
Average	30*	189 c	---	---	98	38.17 b	12.07 a	5.55 a	1.16 a	49 a	19.13 a	9.20 a	4.21 a
Average	20*	244 b	---	---	120	37.72 b	11.53 a	5.72 a	1.15 a-b	49 a	18.68 a-c	9.27 a	3.97 a-b
Average	10*	250 b	---	---	130	39.49 a	10.40 b	5.10 a	1.14 b	48 b	18.51 b-c	9.44 a	3.78 b
Average	7*	289 a	---	---	150	38.58 a	9.72 b	4.38 b	1.14 b	48 b	18.20 c	9.35 a	3.72 b
Average	HD	236 a	---	---	---	39.10 a	11.45 a	5.54 a	1.16 a	49 a	18.83 a	9.27 a	4.00 a
Average	D	230 a	---	---	---	38.06 b	10.81 b	5.04 b	1.14 b	48 b	18.56 a	9.26 a	3.95 a

¹ Hill Dropped and Drilled, combined for variety and row width responses.

1971 (Table 9): Auburn M, Delcot 277, Mo-Del and Stoneville 213 were grown in 38, 20 and 10-inch and twin rows. No significant lint yield differences were obtained among 38 and 20-inch and twin rows. Ten-inch rows produced significantly less than the former. Varieties responded similarly to row width. Drilled rows produced less than hill dropped rows. The highest lint fraction was obtained in 38-inch rows. Small bolls were produced in 10-inch rows. Fiber length tended to increase in 10-inch rows. Micronaire was lowest in 10-inch rows. Seed size, fiber length uniformity and strength were not affected by row width. Auburn M and Delcot 277 produced slightly longer fiber in 10-inch rows but Stoneville 213 fiber was slightly shorter in 10-inch rows. Mo-Del did not vary significantly in fiber length with changes in width of row. Characteristic varietal differences were observed. Only boll size was reduced in drilled plantings whereas method of seeding produced no effect on other traits.

1970-71 (Table 10): Auburn M and Delcot 277 were grown in 38 and 20-inch rows during the 2-year period, 1970-71. No acceptable trials resulted during 1972-74 due to seasonal abnormalities and stress on stand, growth and development and harvestability.

Combining years and varieties, 38 and 20-inch rows did not produce significantly different effects on lint yield and all other traits measured. Only characteristic varietal differences in lint fraction, fiber length, fiber strength and elongation were noted.

TOTAL LINT YIELD FOR VARIABLE ROW WIDTHS, COMBINING VARIETIES WITHIN YEARS ON SANDY LOAM AND CLAY SOIL, 1970-74:

In two of five years, 1970 and 1974, 20-inch rows produced greater total lint yields than did conventional 38-inch rows on sandy loam soil. During the remaining three years, 1971-1974, 20-inch rows produced lint yields equal to those obtained in 38-inch rows. Yet in the three to five year averages the 20-inch row system, produced lint yields only slightly greater than did 38-inch rows. The increased yield, earlier maturity and "once-over" harvest of 20-inch rows during 1974 was most significant. New experimental strains, likely better adapted to narrow rows, were most impressive.

During the two test years on clay soil, 1970-71, 20-inch rows were significantly better than 38-inch rows only during 1970 when general yield level was very low. The two-year average favored 20-inch rows by only 35 pounds of lint, hardly to be considered significant. Because of frequently restricted plant growth on heavy soils, narrow rows should prove a distinct production advantage on these soils but soil and weather conditions did not permit sufficient testing over years to accurately evaluate the narrow row concept on heavy southeast Missouri soils during 1970-74.

ROW WIDTH-VARIETY COMBINATIONS PRODUCING HIGHEST YIELDS ON SANDY LOAM AND CLAY SOILS, 1970-74:

Sandy Loam Soil (Table 12):

1970: Auburn M grown in 20-inch drilled rows produced significantly higher lint yields than either Auburn M or Delcot 277 grown in 38-inch rows.

1971: Auburn M, grown in drilled and hill dropped 38-inch or twin rows and Delcot 277 grown in drilled or hill dropped 38-inch rows and 20-inch hill dropped rows produced significantly more lint yield than Stoneville 213 grown in conventional

Table 9 Response of Four Cotton Varieties Grown in Four Row Widths on Heavy Clay Soil, Portageville, Mo., 1971

Variety or Strain	Row Width Inches	List Per Acre ²				List Fraction %	Seed Index Grams	Boll Size Grams	Fiber Properties ²				
		Total Lbs.	1st Pick Lbs.	1st Pick %	38* Rows %				Length		Strength (T ₁) g/Tex	Elongation (E ₁) %	Micronaire
									2.5% SL	Uniformity Index			
Auburn M	38*	825 a-c	---	---	100	36.15 c-d	13.52 c-e	6.75 a	1.15 e-f	49 a	16.86 g-h	8.58 g-h	4.37 d-f
Auburn M	Twinn ¹	818 a-c	---	---	99	35.70 d-e	12.60 b-d	6.66 a-b	1.15 e-f	49 a	16.91 f-h	8.72 f-h	4.44 e-e
Auburn M	20*	887 a-b	---	---	108	35.65 d-e	13.92 a-c	6.67 a-b	1.15 e-f	49 a	16.55 h	8.36 h	4.40 d-e
Auburn M	10*	723 c-d	---	---	88	34.92 e-f	13.96 a-c	6.29 b-d	1.16 d-e	49 a	16.85 g-h	8.81 e-h	4.26 e-g
Delcot 277	38*	957 a	---	---	100	38.29 a	12.75 e-f	6.56 a-b	1.22 a-b	50 a	18.45 a	9.73 a-b	4.16 g-h
Delcot 277	Twinn	970 a	---	---	101	37.75 a-b	12.95 d-f	6.57 a-b	1.21 b	49 a	18.35 a-b	9.86 a	4.19 f-h
Delcot 277	20*	899 a-b	---	---	94	37.92 a-b	12.32 f	6.47 a-c	1.22 a-b	50 a	18.34 a-b	9.22 b-f	4.17 g-h
Delcot 277	10*	754 b-d	---	---	79	36.52 c	12.30 f	6.27 b-d	1.23 a	48 b	18.13 a-c	9.50 a-c	4.01 h
MoDel	38*	536 e	---	---	100	36.02 c-d	13.65 b-d	6.72 a	1.18 c	49 a	17.69 b-e	9.53 a-c	4.52 b-d
MoDel	Twinn	614 d-e	---	---	115	35.64 d-e	14.35 a-c	6.76 a	1.17 c-d	50 a	17.79 a-b	9.19 b-g	4.64 a-c
MoDel	20*	615 e	---	---	115	35.39 d-e	14.70 a	6.64 a-b	1.17 c-d	50 a	18.38 a	9.36 a-e	4.71 a-b
MoDel	10*	491 e	---	---	92	34.42 f	14.42 a-b	6.12 c-e	1.18 c	49 a	17.87 a-d	9.45 a-d	4.50 c-d
Stoneville 213	38*	830 a-c	---	---	100	38.16 a-b	11.35 g	5.94 d-e	1.14 f-g	50 a	17.27 d-g	8.67 f-h	4.80 a
Stoneville 213	Twinn	865 a-c	---	---	104	38.14 a-b	11.05 g	5.75 e-f	1.14 f-g	49 a	17.54 c-f	8.86 d-h	4.77 a
Stoneville 213	20*	817 a-c	---	---	98	37.89 a-b	11.30 g	5.94 d-e	1.15 e-f	49 a	17.16 e-h	8.85 d-h	4.72 a-b
Stoneville 213	10*	620 d-e	---	---	75	37.40 b	11.35 g	5.52 f	1.13 g	49 a	16.94 g-h	9.05 c-g	4.64 a-c
Average	38*	787 a	---	---	100	37.16 a	12.82 a	6.49 a	1.17 b	49 a	17.57 a	9.13 a-b	4.47 a
Average	Twinn	817 a	---	---	104	36.81 b	12.99 a	6.44 a	1.17 b	49 a	17.65 a	9.16 a-b	4.51 a
Average	20*	805 a	---	---	102	36.71 b	13.06 a	6.43 a	1.17 b	50 a	17.61 a	8.95 b	4.50 a
Average	10*	647 b	---	---	82	35.82 c	13.01 a	6.05 b	1.18 a	49 a	17.42 a	9.20 a	4.35 b
Average	HD	808 a	---	---	---	36.71 a	13.05 a	6.49 a	1.17 a	49 a	17.63 a	9.11 a	4.47 a
Average	D	720 b	---	---	---	36.54 a	12.89 a	6.22 b	1.17 a	49 a	17.50 a	9.11 a	4.44 a

¹ 2-10 inch rows per one 38* width bed.² Hill Dropped and Drilled combined for row width and variety responses.

Table 10 The Responses of Auburn M and Delcot 277 Cotton Varieties Grown in 38" and 20" Row Widths on Heavy Clay Soil, Portageville, Mo., 1970-71 - (2 year averages).

Variety or Strain	Row Width Inches	Lint Per Acre				Lint Fraction %	Seed Index Grams	Boll Size Grams	Fiber Properties				
		Total Lbs.	1st Pick Lbs.	1st Pick %	38" Rows %				Length		Strength (T ₁) g/Tex	Elongation (E ₁) %	
									2.5% SL	Uniformity Index			Micronaire
Auburn M	38*	530 a	---	---	100	36.52 b	12.93 a	6.35 a	1.14 c	49 a	17.36 b	8.58 b	4.37 a
Auburn M	20*	568 a	---	---	107	35.78 b	12.90 a	6.65 a	1.14 c	49 a	16.91 b	8.49 b	4.13 a
Delcot 277	38*	603 a	---	---	100	38.70 a	12.40 a	6.47 a	1.20 b	50 a	19.17 a	9.95 a	4.15 a
Delcot 277	20*	590 a	---	---	98	38.18 a	12.47 a	6.07 a	1.22 a	50 a	18.03 a	9.47 a	4.15 a
Average	38*	579 a	---	---	100	37.61 a	12.67 a	6.41 a	1.17 a	50 a	18.26 a	9.26 a	4.26 a
Average	20*	567 a	---	---	98	36.98 a	12.60 a	6.36 a	1.18 a	49 a	17.97 a	8.98 a	4.14 a

Table 11 Total Lint Yields for Variable Row Widths, 1970 - 1974, Combining Varieties Within Years, on Sandy Loam and Clay Soil, Portageville, Mo.

TOTAL LINT YIELD (LBS/ACRE) ¹										
SANDY LOAM SOIL										
Width	1970	1971	1972	1973	1974	2 Yr. Average 1970-1971	3 Yr. Average 1970-72-73	3 Yr. Average 1971-73-74	5 Yr. Average 1970-1974	
38*	601 b	1046 a-b	943 a	824 a	678 b-c	824	789	849	818	
Twins	---	907 a-b	---	839 a	642 c	---	---	816	---	
30*	630 a-b	---	954 a	606 b	---	---	730	---	---	
20"D	---	---	---	---	737 a-b	---	---	---	---	
20*HD	684 a ²	864 a-b	939 a	821 a	788 a	824	815	858	839	
10*	530 e	531 b	---	---	---	731	---	---	---	
7*	441 d	---	---	---	---	---	---	---	---	
CLAY SOIL										
38*	193 c	787 a	---	---	---	490	---	---	---	
Twins	---	817 a	---	---	---	---	---	---	---	
30*	189 c	---	---	---	---	---	---	---	---	
20*HD	244 b	805 a	---	---	---	525	---	---	---	
10*	250 b	647 b	---	---	---	449	---	---	---	
7*	289 a	---	---	---	---	---	---	---	---	

¹ Duncan's multiple range test of significance applicable only with years and soil type.

² Drilled and hill dropped, combined.

Table 12 Row Width and Variety Combinations That Produced the Highest Lint Yields on Sandy Loam and Clay Soil, Portageville, Mo., 1970-74.

Year	Row Width	Optimum Combination		Lint Yield (Lbs./A)	Standards ¹		Delcot 277 (Lbs./A)
		Variety	Variety Classification (Maturity)		Stoneville 213 (Lbs./A)	Auburn M (Lbs./A)	
1970	20*D	Auburn M	Early	972 a	---	697 b-c	625 b-c
	20*HD	Delcot 277	Med-early	794 a-b			
SANDY LOAM SOIL							
1971	38*HD	Delcot 277	Med-early	1218 a	909 f-j	1115 a-d	1218 a-c
	38*D	Delcot 277	Med-early	1213 a			
	38*D	Auburn M	Early	1157 a-b			
	Twins HD	Auburn M	Early	1125 a-c			
	Twins D	Auburn M	Early	1125 a-c			
	38*HD	Auburn M	Early	1115 a-d			
	20*HD	Delcot 277	Med-early	1101 a-e			
	20*HD	Auburn M	Early	1078 a-f			
	20*D	Auburn M	Early	1073 a-f			
	10*HD	Auburn M	Early	1071 a-f			
10*HD	Delcot 277	Med-early	1060 a-g				
1972	30*	Auburn M	Early	1109 a	882 c-g	1045 a-c	974 a-d
	20*	Auburn M	Early	1107 a			
	30*	Auburn M-NR	Early	1094 a-b			
	30*	Delcot 277	Med-early	1048 a-c			
	38*	Auburn M	Early	1045 a-c			
	38*	Quapaw	Extra-early	1020 a-c			
	38*	Auburn M-NR	Early	1017 a-c			
	30*	Auburn M-HPC	Extra-early	992 a-c			
	20*	Delcot 277	Med-early	974 a-d			
	38*	Delcot 277	Med-early	974 a-d			
	20*	Quapaw	Extra-early	965 a-d			
	38*	Quapaw-NR	Extra-early	947 a-e			
	20*	Auburn M-NR	Early	942 a-e			
30*	Stoneville 213	Intermediate	934 a-e				
38*	Auburn M-HPC	Extra-early	928 a-f				
1973	38*	Stoneville 213	Intermediate	982 a	982 a	740 d-l	954 a-b
	38*	Delcot 277	Med-early	955 a-b			
	Twins	Stoneville 213	Intermediate	953 a-b			
	20*	Stoneville 213	Intermediate	922 a-c			
	20*	Delcot 277	Med-early	921 a-c			
	20*	HYC72-1	Early	912 a-c			
	Twins	Delcot 277	Med-early	884 a-d			
	Twins	Deltafine 16	Full Season	878 a-d			
	Twins	Auburn M-NR	Extra-early	878 a-d			
	38*	HYC72-2	Early	878 a-d			
	Twins	Coker 310	Med-early to Intermediate	871 a-e			
38*	Deltafine 16	Full Season	869 a-e				
20*	Auburn M-NR	Extra-early	846 a-f				

Table 12 Continued

Year	Row Width	Optimum Combination		Lint Yield (Lbs/A)	Standards ¹		Delcot 277 (Lbs/A)
		Variety	Variety Classification (Maturity)		Stoneville 233 (Lbs/A)	Auburn M (Lbs/A)	
	20*	HYC72-2	Early	845 a-f			
	Twins	HYC72-1	Early	842 a-f			
	20*	Deltapine 16	Full Season	841 a-f			
	38*	Auburn M-NR	Extra-early	840 a-f			
	38*	HYC72-2	Early	840 a-f			
1974	20*HD	HYC72-234	Extra-early	960 a	771 b-f	741 b-b	963 b-f
	20*D	HYC72-309	Extra-early	871 a-b			
	20*HD	MO63-277BR	Med-early	853 a-c			
	20*D	Delcot 277	Med-early	824 a-d			
	38*	HYC72-309	Extra-early	816 a-d			
	20*HD	Delcot 277	Med-early	809 a-d			
	20*HD	Stoneville 213	Intermediate	802 a-d			
	20*HD	Auburn M	Early	785 a-e			
	20*HD	Quapaw	Extra-early	785 a-e			
	CLAY SOIL						
1970	7*HD	Auburn M	Early	343 a	---	156 g	178 e-g
	7*D	Delcot 277	Med-early	334 a-b			
	7*D	Auburn M	Early	333 a-b			
	7*HD	Delcot 277	Med-early	324 a-b			
	20*D	Delcot 277	Med-early	321 a-b			
	20*HD	Auburn M	Early	303 a-c			
	10*HD	Delcot 277	Med-early	303 a-c			
	20*HD	Delcot 277	Med-early	296 a-c			
	10*D	Auburn M	Early	289 a-d			
	10*HD	Auburn M	Early	279 a-d			
20*D	Auburn M	Early	268 a-e				
1971	38*HD	Delcot 277	Med-early	1021 a	911 a-e	858 b-g	893 a-f
	Twins HD	Delcot 277	Med-early	991 a-b			
	Twins HD	Stoneville 213	Intermediate	963 a-c			
	Twins D	Delcot 277	Med-early	960 a-d			
	20*HD	Delcot 277	Med-early	922 a-e			
	20*D	Auburn M	Early	914 a-e			
	38*HD	Stoneville 213	Intermediate	910 a-e			
	38*D	Delcot 277	Med-early	893 a-f			

¹ Hill Dropped 38* rows.

38-inch rows. No row width-variety combination exceeded the lint yields of either Auburn M or Delcot 277 grown in conventional 38-inch rows. The lint yields of Stoneville 213 grown in twin, 20 or 10-inch rows were less than those for conventional 38-inch rows (Table 2).

- 1972: Only Auburn M grown in 20 and 30-inch rows and Auburn M-MDR (mass selected for tolerance to close spacing) grown in 30-inch rows produced significantly greater lint yields than Stoneville 213 grown in 38-inch rows. However, these were not better than either Auburn M or Delcot 277 grown in 38-inch rows.
- 1973: Stoneville 213 (intermediate) and Delcot 277 (medium early) grown in conventional 38-inch rows, produced lint yields equal to or greater than any row width-variety combination. Inferior planting seed quality and seasonal adversities were unfavorable to performance of early and determinate varieties like Auburn M and Quapaw.
- 1974: The early maturing experimental strain HYC 72-234, selected for adaptation to narrow-row production, produced significantly better lint yields than Stoneville 213, Auburn M, or Delcot 277 grown in 38-inch rows. Lint production of Delcot 277 in 38-inch rows was significantly reduced but when grown in 20-inch rows, Delcot 277 lint production was among the highest. Higher production trends were generally observed in 20-inch rows for both commercial varieties and new strains.

Clay Soil (Table 12):

- 1970: General yield levels were very low. Plant growth was critically reduced and subsequent lint production was generally favored in narrow rows (7, 10 and 20-inch) compared to conventional 38-inch rows.
- 1971: Stoneville 213 and Delcot 277 grown in conventional 38-inch rows produced lint yields equal to or better than any other row width or variety combination. Lint production by Auburn M grown in 38-inch rows was exceeded only by Delcot 277 also in 38-inch rows.

SKIP-ROW VARIETY TRIALS, 1971-73:

Sandy Loam Soil (Table 13): The plant two-skip two production system produced only 64% as much lint per acre as did solid 38-inch row plantings when total acreage was considered during the 3-year period, 1971-73. The plant two-skip one system produced an estimated 89% of solid plantings during two years, 1972-73. Although the plant two-skip two and plant two-skip one systems produced more lint per acre compared to solid plantings when actual planted acreage was considered, the additional production was less than the potential of solid plantings over total acres. The semi-determinate, medium early Delcot 277 and the indeterminate, intermediate maturing Stoneville 213 used the additional between row space in skip rows more efficiently and produced more lint than did Auburn M, an early determinate variety. Auburn M utilized soil areas best in solid plantings and least in the plant two-skip two system.

Larger seed were produced in plant two-skip two rows but no overall response to skip rows was observed for lint fraction, boll size, 2.5% span length, fiber length uniformity, strength, elongation and micronaire. However lint fraction was highest for Delcot 277 in solid plantings. Micronaire was greater in plant two-skip one than in solid plantings of Stoneville 213.

Clay Soil (Table 14): The overall response of plant two-skip two was roughly one-half of the lint yield of solid plantings, suggesting that the actual production potential of cotton plants is relatively constant over a wide range of between-row spacings on clay soil. When actual planted acres were considered the lint yields, combining

Table 13 Response of Three Cotton Varieties Grown in Solid Rows, Plant Two-Skip One and Plant Two-Skip Two Plantings on Sandy Loam Soil, Portageville, Mo., 1971-73.

Variety or Strain	Row Width Inches	Lint Per Acre (Lbs)						Lint ¹ Fraction %	Seed ¹ Index Grams	Boll ¹ Size Grams	Fiber Properties ¹				
		1971-73		1972-73		Percent of Solid Planting					Length				
		3 yr. average Total Acres	Planted Acres	2 yr average Total Acres	Planted Acres	71-73	72-73				2.5% SL	Uniformity Index	Strength (T ₁) g/Tex	Elongation (E ₁) %	Micronaire
Auburn M	Solid	984 a	984 c	864 b-c	864 d	100	100	36.62 c-d	13.20 a-c	6.80 a-c	1.09 c	48 a	17.12 c	7.90 c-d	4.22 d-e
Auburn M	2 + 1	---	---	804 c	1206 b	---	93	35.45 d-e	13.50 a-b	7.10 a-b	1.11 b-c	47 a	17.20 c	8.20 c	4.42 c-d
Auburn M	2 + 2	625 d	1180 b	507 e	1008 c	64	64	34.87 e	13.60 a	6.87 a-c	1.10 b-c	47 a	17.07 c	7.93 c-d	4.30 d-e
Delcot 277	Solid	1160 a	1160 b	1035 a-b	1035 c	100	100	38.50 a	13.20 a-c	7.02 a-b	1.17 a	48 a	19.27 a-b	9.02 a	4.20 d-e
Delcot 277	2 + 1	---	---	857 b-c	1285 a-b	---	83	36.47 c-d	12.45 b-d	7.15 a-b	1.18 a	48 a	19.70 a	8.77 a-b	4.20 d-e
Delcot 277	2 + 2	741 c	1462 a	660 d	1350 a	64	66	36.00 d-e	13.50 a-b	7.35 a	1.19 a	46 a	18.72 a-c	8.90 a	4.07 e
Stoneville 213	Solid	---	---	896 b	896 d	---	100	38.00 a-b	11.20 e	6.07 c-d	1.13 b	48 a	17.20 c	8.15 c	4.67 b-c
Stoneville 213	2 + 1	---	---	830 b-c	1245 b	---	93	38.62 a	11.35 d-e	5.67 d	1.13 b	47 a	17.37 c	8.37 b-c	5.00 a
Stoneville 213	2 + 2	---	---	637 d	1275 a-b	---	71	37.25 b-c	12.25 c-e	6.42 b-d	1.13 b	47 a	17.72 b-c	7.57 d	4.95 a-b
Average	Solid	1072 a	1072 b	932 a	932 b	100	100	37.71 a	12.53 b	6.63 a	1.13 a	48 a	17.87 a	8.36 a	4.37 a
Average	2 + 1	---	---	830 b	1245 a	---	89	36.85 a	12.43 b	6.64 a	1.14 a	47 a	18.09 a	8.45 a	4.54 a
Average	2 + 2	683 b	1301 a	624 c	1214 a	64	67	36.04 a	13.12 a	6.88 a	1.14 a	47 a	17.84 a	8.14 a	4.44 a

¹ 1972-73 averages.

Table 14 Response of Four Cotton Varieties Grown in Solid Rows, Plant Two-Skip One and Plant Two-Skip Two Plantings on Clay Soil, Portageville, Mo., 1971-72.

Variety or Strain	Row Width Inches	Lint Per Acre (Lbs)						Lint Fraction ¹ %	Seed Index ¹ Grams	Boll Size ¹ Grams	Fiber Properties ¹				
		1971-72		1972		Percent of Solid Planting					Length				
		2 yr. average Total Acres	Planted Acres	1 year Total Acres	Planted Acres	71-73	1972				2.5% SL	Uniformity Index	Strength (T ₁) g/Tex	Elongation (E ₁) %	Micronaire
Auburn M	Solid	662 a	662 a	659 a	659 b	100	100	36.97 d-e	11.90 a-c	5.55 b-e	1.11 d-e	47 b	17.60 b-d	7.62 e	4.22 e
Auburn M	2 + 1	---	---	476 b	714 a-b	---	72	36.02 f	12.40 a-b	5.42 c-e	1.12 c-e	48 a-b	17.87 a-c	7.65 e	4.27 d-e
Auburn M	2 + 2	315 b	637 a	328 c	656 b	40	50	36.15 e-f	12.05 a	5.07 b-e	1.14 b-d	48 a-b	17.50 b-d	7.95 c-e	4.27 d-e
Delcot 277	Solid	---	---	690 a	690 a-b	---	100	38.90 a-b	12.20 a-b	5.77 b-d	1.16 a-b	48 a-b	18.20 a-b	8.52 a-d	4.40 c-e
Delcot 277	2 + 1	---	---	540 b	810 a	---	78	38.32 a-c	11.90 a-c	6.50 a	1.16 a-b	49 a-b	18.87 a	8.70 a-c	4.52 c-d
Delcot 277	2 + 2	---	---	381 c	761 a-b	---	55	36.00 a-c	12.30 a-b	6.07 a-b	1.18 a	48 a-b	19.05 a	8.20 b-e	4.50 c-e
Stoneville 213	Solid	668 a	668 a	680 a	680 a-b	100	100	39.25 a	11.70 d	5.02 e-f	1.12 c-e	48 a-b	16.90 c-d	7.90 d-e	5.07 b
Stoneville 213	2 + 1	---	---	476 b	713 a-b	---	70	39.27 a	11.10 c-d	5.20 d-f	1.10 c	48 a-b	16.37 d	7.85 d-e	5.42 a
Stoneville 213	2 + 2	330 b	661 a	330 c	660 b	50	49	38.85 a-b	10.49 d	4.77 f	1.13 b-e	48 a-b	16.95 b-d	8.10 c-e	5.05 b
869-868	Solid	---	---	694 a	694 a-b	---	100	38.22 b-c	11.70 b-c	5.40 c-e	1.16 a-b	50 a	17.07 b-c	8.12 a	4.52 c-d
869-868	2 + 1	---	---	487 b	731 a-b	---	79	37.82 c-d	11.80 a-c	5.85 b-c	1.15 a-c	48 a-b	17.57 b-d	8.90 a-b	4.60 c
869-868	2 + 2	---	---	379 c	757 a-b	---	55	37.27 d	12.30 a-b	5.92 b-c	1.18 a	48 a-b	16.90 c-d	8.97 a-b	4.65 c
Average	Solid	665 a	665 a	651 a	681 a	100	100	38.34 a	11.62 a	5.44 a	1.14 a-b	48 a	17.59 a	8.29 a	4.56 a
Average	2 + 1	---	---	495 b	742 a	---	73	37.86 a-b	11.80 a	5.74 a	1.13 b	48 a	17.07 a	8.27 a	4.71 a
Average	2 + 2	323 b	649 a	354 c	708 a	40	52	37.72 b	11.90 a	5.59 a	1.16 a	48 a	17.69 a	8.31 a	4.62 a

¹ 1972 only.

varieties, were equal. No border row effect was measured; thus there was no significant beneficial yield response to skip rows.

Lint fractions tended higher in solid plantings. Micronaire was highest for Stoneville 213 in plant two-skip one plantings.

SUMMARY

Exploratory cotton production research relating variable row width, drilled and hill dropped seeding methods, varieties and experimental strains, grown on sandy loam and clay soils was conducted in southeast Missouri, 1970-74.

Cotton grown in 20-inch rows produced lint yields equal to or better than that produced by 38-inch conventional rows. During two of five years 20-inch row production was significantly better than 38-inch row production, but when combining varieties and years yield differences between 20 and 38-inch rows were insignificant on sandy loam soil. On clay soil, data were not sufficient to be conclusive but 20-inch rows tended to produce the highest lint yields.

Yield differences between hill dropped and drilled seeding methods were non-significant. Minor differences among the characteristics measured were observed.

Skip row culture did not reveal production advantages on either sandy loam or clay soils, especially when total acres involved were considered.

Varietal response to variable row widths was inconsistent but generally those varieties that performed best in conventional 38-inch rows also performed well in 20-inch rows. Performance of new strains, selected for adaptation to narrow rows, demonstrated potentials for developing "narrow row varieties". Improved semi-determinate varieties appeared generally better suited to the 20-inch row, "wide-bed" cultural system in most years than either full season, indeterminate or extremely determinate varieties.

The lint fraction, seed index, boll size, fiber length, length uniformity and elongation frequently varied with row width, variety and sometimes, row width-variety interactions. However, fiber fineness as measured by the micronaire showed frequent trends toward production of finer fiber as row widths decreased. Although yarn tenacity generally was not significantly reduced as row width decreased in 1974, some varieties produced the strongest yarns from fiber obtained from 38-inch rows.

"Once-over" harvest, early maturity, optimum lint yields, acceptable fiber quality, and new strain performances were suggestive of potential positive economic gains through use of narrow-row, short season cultural systems.

Inconsistent performance of current varieties, lack of varieties adapted to narrow culture, limited harvesting equipment and inconclusive data for clay soils suggest cautious conversion to the narrow row production system. Commercial production should be limited presently to field-scale trials to permit development of "on farm" total operations under production conditions where narrow-row culture appears advantageous and as suitable harvesters become available.

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