UPLAND COTTON RESULTS AND SPINNING PERFORMANCE

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The Season

1969 growing season was the hottest on record; however, until July, the temperatures were favorable for plant growth and development. Excessive fruit shed and vegetative growth occurred as a result of the high temperatures during most of July and August. The cotton leaf perforator was damaging to the crop, particularly in the Yuma and Maricopa counties. High temperatures, insect damage, and perhaps some other factors reduced the average yield per acre in Arizona by approximately 200 pounds when compared to 1968.

Earliness of Harvest

Since early harvest is becoming a standard production practice, percentage of crop harvested on various dates for selected varieties were compared as in 1968 (Table 1). These data indicate that 50% of the crop was ready for harvest by September 15 and the harvest could have been nearly complete by late October. Hopicala had the highest percentage of the crop harvested by September in 1969 which probably reflects the early fruit set (June) and boll shed that occurred later during the high temperature period. The data also emphasize the necessity of preserving the early squares and bolls.

Regional Tests

The Regional Variety Test was grown at three locations, but only harvested at Yuma and Phoenix. The varieties that fruited the earliest (Deltapine 6137, Stoneville 213, Deltapine 16) were the most productive and the varieties of Acala parentage were lowest (Table 2). Paymaster 111 was not adapted. Verticillium wilt was present at Yuma but not damaging to yield as it caused only a loss of a few leaves late in the season.

Arizona Advanced Strains Test

This test included the advanced strains of the earliest maturing, and most productive lines in the Arizona cotton breeding program. 6401-120-3-21 superiority of yield was demonstrated at both Yuma and Phoenix (Table 3) and its possessing quality comparable to commercially grown varieties is given in the spinning test results.

New Mexico Strains Test

The New Mexico Strains Test (Table 4) is conducted in cooperation with the New Mexico Agricultural Experiment Station to evaluate potential varieties for Classing District which demands the Acala 1517 quality fiber. These Acala varieties or strains possess some wilt tolerance. The strain B 4364 has been released by the New Mexico Agricultural Experiment Station as Acala 1517-70 which replaces the Acala 1517-BR2 presently grown.

Table 1

Percent of Crop Harvested by Date
Cotton Research Center
Arizona - 1968-69

Harvest Date	Variety							
	Deltapine 16		Hopicala		6218		6401	
	1968	1969	1968	1969	1968	1969	1968	1969
Sept. 1	23.1	24.2	16.8	37.4	27.4	31.1	26.8	31.5
15	66.0	64.2	51.6	54.8	66.9	47.7	67.3	49.2
Oct. 1	93.0	76.3	86.3	71.0	87.1	55.3	91.1	59.0
15	100.0	89.8	100.0	86.4	100.0	72.9	100.0	78.3
Nov. 1	-	95.8	-	96.8	-	94.5	-	96.4
15	-	100.0	-	100.0	-	100.0	-	100.0
Yield lbs. Seed Cotton per acre	3988	3267	3398	2356	3069	3024	3251	3859

Table 2

Regional Variety Test
Yield - Seed Cotton Per Acre
Arizona - 1969

Phoenix Variety	Lbs/acre*	Yuma Variety	Lbs/acre*
Deltapine 6137	4211 a	SS-32	3496 a
Deltapine 16	4165 ab	Deltapine 6137	3488 a
Stoneville 508	4107 ab	Stoneville 213	3435 ab
Stoneville 213	3955 abc	Coker 310	3342 abc
SS-32	3758 abcd	Deltapine 16	3325 abcd
Coker 417	3594 cde	Stoneville 508	3174 abcde
Coker 310	3512 def	Coker 417	3035 abcdef
Coker 201	3205 efg	1517V	3020 abcdef
Deltapine 5826	3156 fg	Deltapine 5826	2985 bcdef
B 4364	3105 fg	S-913	2918 cdefg
1517V	3008 g	Coker 201	2913 cdefg
Acala Imperial	2965 gh	6218	2860 cdefg
6218	2880 ghi	12302-4	2849 defg
Hopicala	2585 hij	Acala Imperial	2828 efg
12302-4	2579 hij	B 4364	2744 efg
S-913	2473 j	Hopicala	2680 fg
SJ-1	2312 j	SJ-1	2654 fg
Paymaster 111	2263 j	Paymaster 111	2483 g

C.V. 9.3% C.V. 10.9%

* Values followed by the same letter are not significantly different.

Table 3

Advanced Strains Tests
Yield - Seed Cotton Per Acre
Arizona - 1969

Phoenix Variety	Lbs/acre*	Yuma Variety	Lbs/acre*
6401-120-3-21	4287 a	6401-120-3-21	3604 a
Deltapine 16	3749 b	6401-120-3	3589 a
6206	3703 b	6401-111-23	3264 ab
6401-120-3	3667 b	Deltapine 16	3212 ab
Acala Imperial	3585 bc	6402-120-5	3148 b
6401-3-7	3442 bcd	6401-119-2	3119 b
6401-13-3	3439 bcd	6401-13-3	3093 b
6401-111-23	3421 bcd	6401-108-1	3064 b
6401-109-2	3415 bcd	6412-104-22	3038 b
6412-104-22	3333 cd	Acala Imperial	2997 b
6401-106-21	3257 cde	6401-30-24	2985 b
6401-119-2	3254 cde	6401-109-2	2971 b
6402-120-5	3199 de	6401-106-21	2965 b
6401-30-24	3190 de	6402-121-21	2927 b
6401-108-1	3184 de	6206	2910 b
6402-121-22	2746 f	6401-3-7	2898 b
C.V. 6.78%		C.V. 9.15%	

* Values followed by the same letter are not significantly different.

Table 4

New Mexico Strains Test
Yield - Seed Cotton Per Acre (Curtis Farm)
Safford, Arizona-1969

Variety or strain	Lbs/acre*
688	3126 a
B 5955	2799 ab
B 4364	2796 ab
Hopicala	2720 bc
1479	2624 bc
2127	2555 bcd
2361	2552 bcd
B 3080	2490 bcd
1517V	2480 bcd
B 5935	2431 bcd
B 5949	2428 bcd
1955	2421 bcd
1517 (Strain)	2400 cd
2070	2383 cd
1142	2345 cd
2178	2198 d

C.V. 10.4%

* Values followed by the same letter are not significantly different.

Yarn Strength and Spinning Performance

The spinning performance of 2 varieties and 3 Arizona strains is shown in Table 5.

Strain 6218 is comparable to Hopicala in yarn strength. The 6401 strains are somewhat lower in yarn strength than Hopicala but superior when compared to Deltapine 16. Strain 6401-120-3-21 is a fourth generation selection from 6401-120-3 and the two are very similar in spinning performance, yield and general appearance.

Genetic and Hybrid Cotton Investigations

Hybrid Cotton: The cytoplasmic-genetic male sterility mechanism present in *Gossypium hirsutum* may provide commercial exploitation of the phenomenon of heterosis. In certain areas of the irrigated southwestern United States (as Arizona), environmental conditions for producing cotton may be altered or controlled to such a degree as to affect the success of hybrid seed production. The male sterility present in the *G. anomalum* and *G. arboreum* cytoplasms appeared nearly complete where the maximum daily temperature was above 75°F and below 105°F during the flowering period. Seed was produced at the rate of 1642 pounds per acre in experimental plantings in Arizona in 1969.

Flat-square: This disorder which appeared in Arizona fields in epiphytotic proportion in 1962 and has appeared occasionally since the initial outbreak, was found to be under genetic control. Flat-square has been variously attributed to lygus bug injury, nutrient supply, weather conditions, insecticide or herbicide applications, etc.

Using homozygous inbred lines of Acala parentage which exhibited flat-square and a doubled haploid line free of the disorder, as parental sources of material, flat-square was found to be quantitatively inherited, with low heritability (9%), involving a large number of genes (estimated 28 factor pairs) acting additively without evidence of epistasis or maternal effects. A threshold effect may be involved.

Analyses of agronomic characteristics indicate that flat-square plants produced more flowers per plant but had lower yields than those free of the disorder. Flat-square plants also produced smaller bolls with lower lint percentages of seed cotton than the non-flat-square lines. Other fiber properties evaluated were not affected.

Table 5

Spinning Performance - Arizona Grown Cotton
Commercial Varieties and Arizona Strains
1968 Crop[1]

Strain	Yarn Strength and Grade				Break	Fiber Length		Yarn	Yarn Imperfections		%
	22's	Gr	50's	Gr	Factor	2.5% Span	Unit	Appear.	22's	50's	P & C Waste
Hopicala	134	B^+	50	C^+	2724	1.14	48	110	20	15	9.64
Deltapine 16	107	B^+	38	C	2127	1.16	45	105	18	12	7.62
6401-120-3-21	119	A	43	C^+	2384	1.11	47	115	10	7	7.01
6401-120-3	121	A	44	C^+	2431	1.13	48	115	10	8	7.03

1 Samples grown at Cotton Research Center, Phoenix, Arizona. Spun by Texas A & M University AMS Spinning Laboratory.