Pima Cotton Improvement

Carl V. Feaster and E. L. Turcotte,
Research Agronomist and Research Geneticist, respectively

The Pima Regional Test was harvested at seven locations in Arizona in 1978. The test included Pima S-5, and 9 experimental strains. Strains P34, P37, P39, P41 and P42 were developed at Phoenix under low-elevation conditions. E9, E10, E11 and E12 were developed at El Paso under high-elevation conditions.

Table 1 includes yield data from seven Pima Regional Tests in Arizona - one low-elevation location (Phoenix), three intermediate-elevation locations (Salome, Wenden and Marana) and three high-elevation locations (Safford area). Strains P34 and P39 were the only strains that averaged higher in yield than Pima S-5. These two strains also averaged highest in yield in 1977. P41 and P42 generally were best adapted at low-elevation (Phoenix), and the E numbered strains were best adapted under high-elevation conditions. P34 and P39 have relatively long, strong fiber that is slightly coarser than that from Pima S-5 (Table 2). The strength of yarn from P34 is similar to that from Pima S-5 and is higher than that from P39. It appears that the higher fiber strength of P34 off-sets the negative effect its higher micronaire has on the strength of fine count yarn.

Replicated strip plantings, including Pima S-5 and either two or three experimental strains, were grown at Phoenix and Safford. The following are pounds of lint/acre from these tests.

	Phoenix			Safford	
	Pounds lint/acre	Rank		Pounds lint/acre	Rank
Pima S-5	762	3	Pima S-5	891	3
P34	968	1	P34	987	2
P37	731	4			
P39	964	2	P39	1109	1

Both P34 and P39 were more productive than Pima S-5.

Advanced and Preliminary Tests of strains selected at low and high elevations were continued at Phoenix and Safford. Strains that showed the most promise were those included in the Preliminary Low-elevation Strains Test grown at Phoenix. Several of these strains were from 2-3 weeks earlier than Pima S-5 and 21 of the 23 strains yield tested for the first time were equal or higher in yield than was Pima S-5.

Summary

1. P34 is an advanced experimental strain that is somewhat earlier and short statured than Pima S-5. It has been tested beltwide for the past three years and has averaged higher in yield than Pima S-5.

2. Several early-generation experimental strains tested in 1978 appeared productive, were much earlier, and had a much shorter plant stature than either Pima S-5 or P34.

Table 1. Yields from Pima Regional Tests, Arizona, 1978.

	Phoenix		Salome (Hunter)		Wenden (Alder)		Marana (Clark)		Safford (Curtis)		Safford (Station)		Safford (Layton)		Average
	Pounds lint/A	Rank	Pounds lint/A	Rank	Pounds lint/A	Rank	Pounds lint/A	Rank	Pounds lint/A	Rank	Pounds lint/A	Rank	Pounds lint/A	Rank	pounds lint/A
P39	1105ab	3	1130ab	2	1231a	1	1228a	1	1000ab	3	1023ab	4	1496a	1	1173
P34	1134ab	2	1088ab	3	1119ab	4	1137b	3	898bc	6	1048ab	2	1464ab	2	1127
PS-5	934c	6	1176a	1	1197ab	2	1027cd	7	734e	9	951abc	6	1302cd	7	1046
P37	1074b	5	995b	10	981abc	8	1076bc	4	839cd	7	925bc	7	1395bc	3	1041
P42	1166a	1	1008ab	8	1133ab	3	1037cd	6	745de	8	918bc	8	1254d	8	1037
E12	683d	9	1062ab	5	941bc	9	1075bc	5	1053a	1	993abc	5	1304cd	6	1016
E11	705d	8	1045ab	6	789c	10	1139b	2	1032a	2	1066a	1	1308cd	5	1012
E9	723d	7	1076ab	4	1067ab	6	1024cd	8	901bc	5	911bc	9	1347cd	4	1007
E10	533e	10	1036ab	7	1027abc	7	984d	9	975ab	4	1029ab	3	1112e	9	957
P41	1091ab	4	998ab	9	1084ab	5	894e	10	583f	10	876c	10	1101e	10	947

Table 2. Average fiber properties from eight Pima Regional Tests, Arizona, 1978.

	Fiber span length			Fiber strength	Micronaire
	2.5%	50%	UR	T_1	
Pima S-5	1.37	.72	52	30.9	3.84
P34	1.36	.74	55	32.6	4.06
P37	1.36	.72	53	32.7	4.06
P39	1.38	.73	53	30.8	4.08
P41	1.43	.75	52	32.4	3.62
P42	1.40	.74	53	31.3	3.84
E9	1.36	.71	52	31.8	3.88
E10	1.40	.73	52	31.0	3.77
E11	1.35	.72	53	30.9	3.99
E12	1.40	.75	53	31.5	3.80

Pima Cotton Genetics

E. L. Turcotte and Carl V. Feaster
Research Genetist and Research Agronomist, respectively

The phenomenon of semigamy, discovered in Pima cotton, has become an effective tool for the production of haploid plants. Fifty-one chimeral plants were produced via semigamy in 1978 for selection of haploid branches of paternal tissue. These will be treated with colchicine for chromosome doubling. Twenty-eight haploids from four F_1 sources were doubled. Fifty-nine doubled haploids from five sources were evaluated in the field for production potential, boll and fiber properties. Eleven were judged to have good production potential. Seven doubled haploids produced via semigamy were grown in a performance test for yield, boll, and fiber property determinations and comparison with Pima S-5. Two doubled haploids yielded similar and five yielded less than Pima S-5. Boll and seed properties of the doubled haploids were generally within acceptable limits. Fiber lengths of all seven doubled haploids were shorter than Pima S-5. Two doubled haploids had higher, four similar, and one lower T_1 values compared with Pima S-5. For micronaire, one doubled haploid was coarser, one similar, and five finer than Pima S-5. These results support prior evidence that large numbers of doubled haploids must be screened to locate those few that combine adequate yield and fiber properties.

The transfer of naked seed (N_1) to Pima was completed. The transfer of four dominant and 12 recessive traits was continued. Among these are the potential economic traits nectariless, glandless, frego bract, and genetic-cytoplasmic male sterility.

Naked seed (N_1) was indicated to be linked with glandless seed. Thirty-two gene pairs were shown to be not linked. A dominant Pima male-sterile mutant was named Male sterile-11 (*Ms11*). A leaf mutant found in Pima S-4 in 1975 was inherited as a monogenic recessive.

Seed of 98 *Gossypium barbadense* L. germplasm stocks were renewed. Most of these are short-day stocks from South America.