Table 2. Average fiber properties from Pima Regional Tests, 1980.

	Fiber span length			Fiber strength	
	2.5%	50%	UR	T_1	Micronaire
Pima S-5	1.41	.67	48	31.3	3.77
P34	1.40	.69	50	32.7	4.03
P42	1.45	.70	48	31.3	3.76
P43	1.40	.69	49	32.6	3.99
P44	1.40	.66	47	31.1	3.82
P45	1.44	.69	48	33.7	3.98
P46	1.43	.70	49	33.0	3.84
E14	1.43	.68	47	31.1	3.92
E15	1.41	.68	48	31.7	3.63
E16	1.42	.67	48	32.7	3.53
P47	1.42	.71	50	34.6	4.17
P48	1.43	.70	49	33.4	3.68
P49	1.42	.69	48	31.5	3.96
P50	1.43	.70	49	31.4	3.73

Pima Cotton Genetics

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Summary

Hybrid cotton studies were continued by an evaluation of 33 Pima fertility restorer lines developed at Phoenix, Las Cruces, NM, and Athens, GA. These restorer lines showed varying degrees of heat tolerance with Phoenix derived lines generally performing best. The transfer of frego bract, nectariless, and glandless seed to Pima was continued. The conversion of twenty-three short-day G. barbadense germplasm stocks to a day-neutral habit was continued. The development of pure-line breeding stocks in one generation from F_1 plants was pursued through the use of doubled haploids derived via semigamy.

The inheritance of Pima mutant traits was studied to provide genetic information on potentially important characters and how these characters may be used to develop improved genetic populations. Thirty-three fertility restorer lines developed at Phoenix, Las Cruces, and Athens, Georgia showed varying degrees of heat tolerance as indicated by lack of pollen shed. The restorers developed at Phoenix showed the most heat tolerance and were the most productive. The transfer of genetic-cytoplasmic male sterility into six Pima experimental strains was begun. These stocks will increase the Pima germplasm available for possible use in hybrid cotton. The potential economic traits frego bract and nectariless for insect tolerance, and glandless seed for improved food and feed, and five dominant and nine recessive genetic markers continued to be transferred to Pima. A recessive leaf trait in experimental strain P32 was allelic with veins fused. Albivirescent-1 plant color was not allelic with virescent-5, -6. A dominant leaf trait in Pima S-3 was not allelic with crumpled leaves, veins fused, and Pima S-2 aberrant leaf. No new linkages were detected among 25 gene pairs tested in 1980.

Seed of 84 Gossypium barbadense L. primitive germplasm stocks were renewed for future use as sources of genetic variability. Twenty-three F_2 populations from crosses of short-day and day-neutral stocks were grown at Phoenix for seed production from flowering plants. This seed will be used to continue the conversion of the short-day stocks to a day-neutral habit allowing the primitive stocks to be evaluated under Arizona conditions during the summer. Twenty-nine primitive stocks from Peru were added to the collection. Requests for seed of 30 stocks were filled.

Additional haploids and doubled haploids from F_1 plants were produced via semigamy for pure lines in one generation. This procedure provides a more rapid means of establishing pure-line breeding stocks. The chromosome number of eight haploids from four F_1 sources was doubled with colchicine. An initial seed increase of 31 doubled haploids from six F_1 sources was made. Eighty-seven doubled haploids from six F_1 sources were evaluated for production potential. Eleven were rated above average for performance.

Several techniques were investigated that might be used to better identify heat tolerance in cotton. Differential leakage rates of electrolytes from leaf discs were converted to percent injury from heat stress. Electrolyte leakage reflected heat stress response of Pima S-5 and Pima S-3 but to a lesser extent than phenotypic differences observed in the field. Alexander's stain to estimate pollen abortion and a pollen germinating solution to estimate pollen viability indicated that pollen from dehiscent anthers was viable during July and August, 1980, from both heat tolerant and heat susceptible strains.