

Two Pima cultivars, two upland cultivars, and four interspecific hybrids involving the four cultivars were evaluated for the second year under two irrigation levels at low and high elevations. The interspecific hybrid from a short Pima x a short upland continued to give an acceptable plant-height response over a range of environments.

Table 1. Yields from Pima Regional Tests, 1983.

	Salome, AZ		Maricopa, AZ		Safford, AZ		Anthony, NM		El Paso, TX		Mean						
	Pounds lint/A	Rank	Pounds lint/A														
P59	1424	a*	1	1324	a	2	840	a	2	841	abc	3	1014	a	2	1089	a
Pima																	
S-6	1283	b	2	1327	a	1	863	a	1	743	bc	5	1069	a	1	1057	ab
P53	1254	b	3	1296	a	3	636	c	6	922	a	1	819	c	6	985	abc
P51	1191	b	4	1264	a	4	820	a	3	783	bc	4	832	c	5	978	abc
P62	1154	b	6	1164	a	5	732	b	4	846	ab	2	928	b	3	965	bc
P58	1186	b	5	1133	a	6	702	bc	5	732	c	6	858	bc	4	922	c

*Yields in a given column followed by the same letter are not significantly different at the 5% level of probability.

Table 2. Plant heights from Pima Regional Tests, 1983.

	Salome, AZ	Maricopa, Az	Safford, AZ	Anthony, NM	El Paso, TX	Mean						
	<u>Inches</u>											
P59	40	b*	48	a	25	b	37	abc	27	ab	35	a
Pima												
S-6	39	b	48	a	28	a	40	a	28	a	37	a
P53	43	a	49	a	29	a	40	ab	29	a	38	a
P51	31	c	40	b	21	c	35	c	22	c	30	b
P62	26	d	35	c	21	c	36	bc	24	bc	28	b
P58	30	c	38	b	22	c	33	c	23	c	29	b

*Heights in a given column followed by the same letter are not significantly different at the 5% level of probability.

PIMA COTTON GENETICS

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Summary

Analyses showed that a dominant male-sterile gene was a new trait in cotton, and that kidney seed found in primitive cottons is recessive.

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The inheritance of Pima mutant traits was studied to provide genetic information on how mutants can be used most effectively to develop improved genetic populations. Genetic analyses of a male-sterile trait confirmed that it was conditioned by a new dominant gene for male sterility in cotton. The male-sterile gene was not linked with 22 other mutant traits. Linkage tests among eight other gene pairs were negative. Flowering response in 14 short-day primitive germplasm stocks was conditioned by one recessive gene pair. F₁ plants from crossing a day-neutral kidney seed stock and Pima S-5 had free seeds indicating that kidney-seed is a recessive trait. One morphologically aberrant Pima progeny was identified for genetic analysis. F₁, F₂, and backcross populations derived from crossing Pima stocks with a high-frequency (28%) and a normal frequency (2%) of four-lock bolls indicated that the four-lock boll trait is controlled by more than two gene pairs.

The transfer to Pima of potentially useful traits including nectariless, okra and lacinate leaf shapes, frego bract, and rugose boll for insect tolerance was continued. Pooled data from one BC₃F₂ and five BC₄F₂ populations confirmed that the nectariless trait is now segregating as expected in G. barbadense. A nectariless BC₃F₃ progeny was observed to have good production potential. Fertile plants from six BC₄F₂ populations were selected to isolate homozygous R lines in the transfer of genetic-cytoplasmic male sterility into six Pima experimental strains. Backcross five was made in the development of six Pima experimental strain A lines. Testcrosses involving Pima A and R lines again showed poor pollen shed early in the season at Maricopa, indicating incomplete fertility restoration by the R lines tested.

Semigamy continued to be used to produce haploids and doubled haploids in one generation. Eighteen haploids with G. harknessii cytoplasm and G. barbadense nuclear genomes were derived to produce 'A' lines for possible use in hybrid cotton. Fifty-two chimeral seedlings were derived to obtain haploid sectors for chromosome doubling with colchicine to combine G. hirsutum or G. barbadense cytoplasm with three G. hirsutum and three G. barbadense nuclear genomes. These stocks will be used to study cytoplasm and nuclear genome interactions. Seed of 69 doubled haploids were renewed. Fourteen of these doubled haploids were rated above average for performance.

The conversion of several short-day, primitive G. barbadense germplasm stocks to a day-neutral flowering habit was continued. The converted stocks will provide materials for future use in broadening the germplasm base and providing for potential germplasm enhancement of Pima cotton. Fifty-five short-day stocks were crossed with Pima S-5 to begin their conversion to a flowering habit. Sixteen F₂ populations from crosses of short-day stocks and Pima S-5 were grown at Maricopa for seed production from flowering plants. Four germplasm stocks from Brazil were added to the collection. Requests for seed of 88 stocks were filled. Seed of 66 stocks were renewed.