PIMA COTTON IMPROVEMENT

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The Regional Pima Test was grown at five locations in Arizona in 1967. The test included Pima S-2, Pima S-3, Pima S-4, and experimental strain 126-1. The experimental strain was developed by Drs. Bryan and Muramoto at Tucson. The locations where these tests were grown vary in elevation from approximately 1200 to 3000 feet.

The 1967 test results showed deviations from previous relative performances of Pima S-2, Pima S-3, and Pima S-4. In 1963-65, Pima S-4 averaged higher in yield than Pima S-2 at the lower elevations, and similar to Pima S-2 at the higher elevations. For the same period, Pima S-3 averaged considerably lower in yield than either Pima S-2 or Pima S-4 at the lower elevations, but all three yielded similarly at the higher elevations. In 1966, the results deviated from the 1963-65 average in that Pima S-4 yielded significantly higher than Pima S-3 at the higher elevations. In 1967, Pima S-2 performed relatively better at all elevations with the result that it was similar in yield to Pima S-4 at the lower elevations, and somewhat higher in yield than Pima S-3 or Pima S-4 at the higher elevations (Table 1). Both Pima S-3 and Pima S-4 had longer fiber than Pima S-2.

Experimental strain 126-1 is a relatively early cotton that yielded similar to Pima S-4 at all locations excepting Phoenix, where it yielded significantly lower than Pima S-4.

The Advanced and Preliminary Strains Tests grown at Phoenix included primarily strains best adapted at low elevations. The Advanced and Preliminary Strains Tests grown at Safford included primary strains best adapted at high elevations. Those strains included in the Advanced tests have been yield tested previously for one or more years. The strains included in the Preliminary tests have not been yield tested previously. Several strains included in these tests performed well.

The Advanced II Strains Test included the most primising strains from the 1966 Advanced Strains Test (low elevation) grown at Phoenix, and the 1966 Advanced Strains Test (high elevation) grown at Safford. This test was grown at Phoenix, and at two locations near Safford (Table 2). Strains 5934-23-3-6, 5934-23-2-1, and 5903-98-4-4 were from the 1966 low elevation test. One of these strains, 5934-23-3-6, averaged highest in yield. It gave a significantly higher yield than either check at two of the three locations. None of the strains from the 1966 high elevation test yielded well at Phoenix, but they were generally productive at high elevation. All strains had fiber lengths that were equal or longer than either check (Table 3).

Studies were continued with a line of Pima cotton that shows an abnormal form of reproduction called semigamy. The phenomenon of semigamy may be useful in the production of haploid plants at will. Haploids, when their chromosome number is doubled, produce pure lines. Evidence for utilizing semigamy to produce haploids was obtained from crossing the semigamous line, as female, with a multiple-marker stock. The multiple-marker stock, in contrast with normal Pima, has cream petals, orange pollen, virescent plant and cluster-growth

habit. Thus, its tissue can be identified at all stages of growth. Haploid plants from the above mentioned cross were sectored for maternal and paternal tissue, with the paternal tissue exhibiting the multiple-marker characteristics. These haploids were treated with the chemical colchicine, and male fertile flowers, indicating chromosome doubling, have been produced on four plants. Bolls were set on two of these plants.

Work toward developing breeding stocks with the characteristics glandless, nectariless, and resistance to cotton root-knot nematodes was continued.

Cooperators in the Pima Improvement Program include Arizona State University, Wilbur Wuertz, Carl and Phil Curtis, and Scott Pace.

Table 1. Regional Pima Tests in Arizona, 1967

	Phoenix (CRC)	Coolidge (Wuertz)	Marana (Exp. Sta.)	Safford (Curtis)	Safford (Pace)
			Pounds lint/acre		
Pima S-2	837 a	803 a	851 a	1106 a	802 a
Pima S-3	434 c	472 b	840 a	1040 ab	686 b
Pima S-4	838 a	808 a	841 a	986 bc	671 b
126-1	760 b	758 a	879 a	951 c	680 b
			Percent first pick		
Pima S-2	90	87	100	84	86
Pima S-3	86	87	100	76	79
Pima S-4	90	90	100	84	82
126-1	89	91	100	87	86
			Percent lint		
Pima S-2	34.8	37.0	37.4	38.7	37.7
Pima S-3	31.6	34.4	35.7	37.3	36.5
Pima S-4	34.2	36.3	37.6	38.2	36.9
126-1	32.3	33.9	35.4	36.7	36.3
			Fiber length (2.5% span)		
Pima S-2	1.46	1.36	1.37	1.33	1.34
Pima S-3	1.52	1.41	1.43	1.37	1.39
Pima S-4	1.50	1.38	1.40	1.40	1.39
126-1	1.50	1.42	1.39	1.39	1.38
			Fiber strength (T_1)		
Pima S-2	27.3	28.0	28.6	25.7	27.6
Pima S-3	27.1	26.6	29.1	24.4	26.2
Pima S-4	28.3	27.7	29.3	26.0	27.3
126-1	27.0	26.5	28.5	25.4	26.8
			Micronaire		
Pima S-2	3.75	3.81	3.81	3.90	3.83
Pima S-3	3.63	3.55	3.57	3.80	3.64
Pima S-4	3.82	3.71	3.79	3.84	3.71
126-1	3.88	3.75	3.68	3.69	3.83

At a given location, yields followed by the same letter are not significantly different at the 5% level.

Table 2. Yield from Advanced Strains Test II at three locations in Arizona, 1967.

	Phoenix (CRC)	Safford (Curtis)	Safford (Exp. Sta.)	Mean
		Pounds lint/acre		
5934-23-2-6	979 a	1126 a	780 a	962
5934-23-2-1	808 b	1084 ab	697 ab	863
6001-84-2	671 def	1084 ab	822 a	859
5903-98-4-4	723 bcd	1027 ab	763 a	838
Pima S-4	774 bc	967 b	727 a	823
5922-501	698 cde	988 b	765 a	817
HB 143-1	645 def	1066 ab	711 ab	807
5902-40-3-1	580 f	1059 ab	715 ab	785
5812-170-1-26	615 ef	995 ab	715 ab	775
5902-27-6-1	667 def	1034 ab	588 b	763
Pima S-3	438 g	986 b	711 ab	712

At a given location, yields followed by the same letter are not significantly different at the 5% level.

Table 3. Fiber data from Advanced Strains Test II at three locations in Arizona, 1967.

	Phoenix (CRC)			Safford (Curtis)			Safford (Exp. Sta.)		
	Length (2.5% span)	Strength (T_1)	Micron-aire	Length (2.5% span)	Strength (T_1)	Micron-aire	Length (2.5% span)	Strength (T_1)	Micron-aire
5934-23-2-6	1.50	29.9	3.74	1.41	26.8	3.84	1.47	29.2	3.77
5934-23-2-1	1.49	29.9	3.70	1.42	27.2	3.74	1.44	29.1	3.73
6001-84-2	1.48	31.5	3.82	1.41	27.7	3.77	1.45	29.2	3.71
5903-98-4-4	1.52	30.6	3.79	1.39	26.4	3.77	1.43	29.1	3.66
Pima S-4	1.47	29.5	3.98	1.38	26.4	3.85	1.42	27.4	3.73
5922-501	1.49	30.5	3.67	1.41	28.0	3.52	1.46	29.8	3.68
HB 143-1	1.49	29.8	3.67	1.42	26.0	3.60	1.50	28.8	3.43
5902-40-3-1	1.50	31.3	3.81	1.42	27.7	3.68	1.46	29.6	3.78
5812-170-1-26	1.51	31.3	3.89	1.44	28.2	3.67	1.48	29.4	3.70
5902-27-6-1	1.51	32.1	3.89	1.45	27.2	3.79	1.48	29.6	3.79
Pima S-3	1.48	29.0	3.81	1.38	24.6	3.74	1.43	26.0	3.74