

HYBRID COTTON RESEARCH - ARIZONA 1975

Lee S. Stith

A research update will suggest that hybrid cotton has more to offer the industry for the next 20 years than any practice or innovation presently on the horizon. Hybrid cotton is a major breakthrough. Hybrid cotton was first mentioned some two-three years ago in this report series. In the period since 1967, cytoplasmic male sterility has developed as the basis of the sterile seed lines and is 100% functional. Effective restorer lines have been the barrier to successful hybrid (F_1) seed production, but the problems are largely circumvented now and in 1975 an eight-acre production field was attempted at Salome, Arizona. An unexpected flood in the area destroyed this first production field in the United States.

Research in 1974 produced 217 F_1 (hybrids) of which 20 were nonsegregating for sterility. This gave proof that seven lines were good restorers that can be used to start the commercial program.

What does hybrid cotton offer Arizona and industry growers?

1. 16-38% increase in yield due to heterosis.
2. Resistance to Verticillium Wilt and any other disease whose resistance is a dominant trait.
3. Possible insect resistance. Preliminary research in Georgia suggests that boll weevils do not prefer the genetic stocks involved.
4. The opportunity for "tailor made" hybrid varieties that will fit maturity demands.
5. A new seed industry for Arizona.

Hybrid cotton is no doubt here to stay and cotton growers could be wise in supporting this area of cotton research.

SHORT-STAPLE BREEDING

W.D. Fisher and Lee S. Stith

The maturity distribution of the cotton crop based on percentages harvested by given dates has presented an interesting picture for cotton growers in Arizona. These data very graphically place in focus the 1975 growing season. Hand pickings were made in selected plots at two-week intervals starting September 1. Only fully opened bolls are harvested and the same plots are picked each time. The cotton at this location has usually been defoliated between October 1 and October 15. In Table 1, the percentage of the well known variety of "Deltapine 16" harvested by dates and total yield for each year 1968-75 can be examined. Of particular interest is the low percentage harvested on September 1, 1975 as compared to previous years, and also that until November 15 was necessary to complete the same percentage harvest as usually obtained by late October.

Table 1. Percent of Crop Harvested by Date, Cotton Research Center
Variety - Deltapine 16

Harvest Date	1968	1969	1970	1971	1972	1973	1974	1975
September 1	23.1	24.2	32.5	28.4	53.0	7.5	34.7	5.3
September 15	66.0	64.2	58.5	63.5	72.4	36.6	65.9	12.1
October 1	93.0	76.3	68.2	83.1	84.2	75.5	82.8	29.1
October 15	100	89.6	89.6	91.9	92.2	90.1	93.7	53.9
November 1	--	95.8	100	96.6	100	97.3	100	85.0
November 15	--	100	--	100	--	100	--	98.6
December 1	--	--	--	--	--	--	--	100
Yield lbs.								
Lint/Acre	1519	1508	765	1692	1686	1760	1540	843

1975 was abnormal in many respects - cool at planting, relatively cool during the summer and late in maturing in the fall. The data suggests what can happen and can be of value in planning irrigation cut-off and defoliation dates. Various other varieties and a potential new Arizona release (6608) are presented in Table 2.

Table 2. Percent of Crop Harvested by Date and Variety, Cotton Research Center, 1975

Date	Delta- Pine 16	Delta- Pine 16	Stone- ville 213	Stone- ville 256	6608
September 1	5.3	2.6	4.1	7.4	5.0
September 15	12.1	5.8	13.3	13.2	9.1
October 1	29.1	17.0	25.1	28.4	19.0
October 15	53.9	40.0	47.7	49.9	37.9
November 1	85.0	74.2	81.0	84.3	73.5
November 15	98.6	94.5	92.3	95.2	90.6
December 1	100	100	100	100	100
Yield lbs. Lint/Acre	843	793	809	1095	970

STERILITY STUDIES

W.D. Fisher and Lee S. Stith

Sterility in cotton as occurs in the Arizona environment was reported in the Cotton Report 1974 in detail for 12 varieties of cotton at two-three day intervals during the month of July. Experiments in 1975 were designed to determine whether altering the irrigation schedule would change the microclimate sufficiently to change the percentage of sterile flowers. Two irrigation schedules were used:

I ₁	I ₂ *
April 24	April 24
May 29	May 29
June 25	June 10
July 9	June 25
July 24	July 3
	July 24

*Six irrigations but July 9 omitted

June temperatures completely nullified the effects of increased June irrigations on flower fertility but withholding an irrigation in July and a resultant moisture stress did affect fertility as shown in Table 3.

Table 3. Fertility Percentages by Dates. CRC - 1975

Variety and Irrigation Levels	7/28	7/30	7/31	8/1	8/4	8/5	Lint lbs./Acre
I ₁ Deltapine 16	96	99	99	100	100	100	711
I ₁ 1517 V	85	97	98	97	97	98	469
I ₂ Deltapine 16	81	80	91	92	95	93	798
I ₂ 1517 V	57	53	65	80	79	82	590