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Fig. 1. Influence of deheading on Rio sweet sorghum. Left: deheaded boot stage Center: deheaded in flower stage. The deheaded plants produced many side branches with small heads. Right: check, not deheaded. Weight of seed heads caused plants to lean or lodge.

and May 1 plantings than in the June 1 plantings.

Deheaded plants lodged less and had more side branches than normal plants (Fig. 1). Less lodging and higher percent sucrose in the juice of deheaded plants compared with normal plants should reduce the cost of harvesting and processing deheaded plants.

Deheaded plants compared to normal plants showed a decrease in juiciness which is difficult to explain. Plant injury during head removal or excessive side branching may account for this decrease in juiciness. Preventing grain development by the use of male sterility rather than by head removal hopefully will result in an increase in percent sucrose without decreasing juice extraction.

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HEXAPLOID COTTON: SOME FIBER AND SPINNING PROPERTIES[1]

H. Muramoto[2]

ABSTRACT

Fibers from a strain of hexaploid cotton derived from an interspecific cross of *Gossypium hirsutum* L. × *G. sturtianum* Willis were evaluated. Due to the short fiber length and other characteristics of the hexaploid, 16 tex yarns were the finest spinnable at the laboratory. The overall spinning performance of the hexaploid was poor. The only acceptable traits, to date, seem to be fiber and yarn tenacity.

Additional index words: **Yarn tenacity, Yarn appearance, Yarn elongation, *Gossypium.***

HEXAPLOID cotton (2n=6X=78) developed through hybridization of *Gossypium hirsutum* L. (2n=4X=52) × *G. sturtianum* Willis (2n=2X=26) and the subsequent doubling of the chromosome number in the sterile F_1 hybrid (3n=3X=39) has been grown since 1965. The unusual fiber properties of the hexaploid cotton were reported by Muramoto (3) in 1969. The fibers of the hexaploid, although short, are unusually strong and produced strong 27 tex yarns when spun in microspinning tests. This paper reports the spinning performance of the hexaploid cotton fibers when processed in a standard spinning test.

MATERIALS AND METHODS

The development of the hexaploid cotton used in this research was reported by Muramoto (3, 4, 5) and da Silva (2). Because of the low yield and sterility problems associated with the hexaploid cotton, it was necessary to keep many of the plant materials in a bulk population. Individual plant selections were made each year and the progenies bulked. Adequate fiber samples (5.45 kg) were obtained for spinning tests in 1969 and 1970 by bulking the progenies of selection 6X-3. The check samples used for comparison were all Arizona experimental lines. Arizona Superokra is a selection out of an interspecific hybrid between M-8 Superokra and *G. barbadense.* Arizona Superokra #1 is a selection from M-8 Superokra, reselected in Arizona for six generations.

All cottons were ginned on a 25 saw gin. The check samples were cleaned on a commercial type seed cotton cleaner prior to ginning. Difficulty was experienced in cleaning the hexaploid seed cotton with a commercial type cleaner, so it was not cleaned in 1969. In 1970, the seed cotton of the hexaploid was cleaned by rubbing it on a 3/16 inch square mesh wire screen to remove the large number of motes.

The spinning tests were conducted at the Cotton Laboratory, Standards and Testing Branch, Cotton Division, Agricultural Marketing Service, U. S. Department of Agriculture, College Station, Texas.

RESULTS AND DISCUSSION

The spinning test results for 1969 and 1970 are shown in Table 1. In the 1969 test, carded yarns of 27 and 12 tex were requested, but because of the short fiber length of the hexaploid cotton, the finest yarn the spinning laboratory was able to spin was 16 tex. In 1970, 27 and 16 tex yarns were spun.

The 2.5% span length of the hexaploid was 0.86 inches in 1969 and 0.85 in 1970 as compared to 1.16 and 1.17 inches respectively, for Superokra. The uni-

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[2] Associate Agronomist and Associate Plant Geneticist, Agronomy and Plant Genetics Department, University of Arizona, Tucson, 85721.

Table 1. Spinning test results comparing carded yarns of hexaploid cotton and *G. hirsutum* for 1969 and 1970.

	Hexaploid, 6X-3		Arizona experimentals		
			Superokra		Superokra #1
Test item	1969	1970	1969	1970	1970
Staple (32nd inches)	26	28	34	36	35
Fiber length: (Fibrograph)					
Inches 2.5% span	0.86	0.85	1.16	1.17	1.10
Uniformity index	46	45	45	45	46
Manufacturing*: Waste (%)	18.22	15.78	10.80	11.98	10.38
Yarn tenacity and appearance					
27 tex (cN/tex & grade)	12.3	12.1 BG	12.7	12.2 D+	11.0 B
16 tex (cN/tex & grade)	10.6	10.6 BG	--	11.1 BG	10.6 C
12 tex (cN/tex & grade)	--	--	10.4	--	--
Avg appearance index	80	60	90	70	100
Yarn elongation (%) 27 tex	5.2	4.9	7.2	6.3	6.3
16 tex	4.6	4.4	--	5.9	5.8
12 tex	--	--	5.7	--	--
Yarn imperfection 27 tex	69	103	43	69	23
16 tex	58	102	--	54	24
12 tex	--	--	26	--	--

* Carding rate to 5.67 kg/hour with 2.27 kg fed to first picker.

formity index was about the same for the hexaploid and the check varieties.

Manufacturing was at a carding rate of 5.67 kg per hour with 2.27 kg fed to the first picker. Under these conditions, the manufacturing waste percentage of the hexaploid was excessive. The waste was 18.22% in 1969 and 15.78% in 1970; as compared to 10.80 and 11.98% for the check in those two years.

The hexaploid produced good yarn tenacity in spite of the short fibers. The tenacities of 27 tex yarns from the hexaploid were 12.3 and 12.1 cN/tex for 1969 and 1970, as compared to 12.7 and 12.2 (1969) and 11.0 cN/tex (1970) for the *G. hirsutum* checks. The 1969 test doesn't allow a comparison of 12 tex yarns because the check was spun in 27 and 12 tex yarns while the hexaploid was spun in 27 and 16 tex yarns. In 1970, the 16 tex yarn tenacities were 10.1 cN/tex for the hexaploid and 11.1 and 10.1 cN/tex for the checks. The laboratory reported in 1969 that they did not experience any difficulties in spinning yarns of 16 tex but could not spin yarns as fine as 13 tex. In 1970, the laboratory did experience some difficulties with processing the hexaploid cotton because its fibers stuck to the roll on the card, requiring special attention to get enough card sliver for further processing. Sugar on the fibers can cause similar problems, but no determination for sugar was made. The trouble might be traced to the fact that this is the first time in the history of cotton spinning that fibers from plants with more than the normal 52 chromosomes were ever processed in a standard spinning laboratory. The lack of familiarity with processing this type of cotton may have been the problem. *G. sturtianum* which contributed 26 chromosomes to the hybrid is lintless.

Yarn appearance grade of the hexaploid was poor. The 1970 grades for the hexaploid were BG (below grade) as compared to the checks which had a BG and a C, on a scale where A+ grade is the highest.

The yarn appearance index for the hexaploid was 80 and 60 in 1969 and 1970, respectively, compared to the index of 90, 70, and 100 for the checks, on a scale of 100 indicating average. This shows that the yarn apearance of the hexaploid is not good and is lacking in what is required for good yarn appearance.

The yarn elongation tests show that hexaploid yarns do not stretch as much as the checks. The observations of Beasley (1) and my own observations from laboratory fiber analysis suggest that the thick walled fibers of the hexaploid may be a factor. The yarn data show that there is approximately 25% more stretch in the *G. hirsutum* yarns than the hexaploid yarns.

The yarn imperfections for the hexaploid were excessive. The 1969 data show that the yarn imperfections of the hexaploid were about 50% greater than the check. The 1970 data show similar or greater differences.

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