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A STUDY OF COTTON AGING In the July and August 1984 issues of *Textile Topics* (Vol. XII, Nos. 11 and 12), we reported on a study of the effects of age on cotton quality. We mentioned that part of the cotton involved in the study remained after the test in April 1984, and we stated that the final testing would be done in the period between April and June 1985. The final testing actually was conducted on March 19, 1985, a little ahead of schedule. This means that the cotton in this study was tested over a period of three years, although the cotton itself was approaching four years of age. (It was harvested and ginned in the fall of 1981.)

The July 1984 report gave the background for this program, and we feel it worthwhile to repeat some of the information published last year along with the final testing results and the conclusion of the study. Therefore, we quote from the July 1984 *Topics*:

"For almost as long as the textile industry has been using cotton, there have been concerns about the quality of the fiber after storage for a great length of time. Today there are a number of textile manufacturers who do not care to use cotton that has been stored for more than two or three years, although studies have found that it processes quite well and can be spun into yarn of satisfactory quality. In one recent case, a bale of cotton was found to have been stored for 15 years. Although the fiber had changed color somewhat (increased in yellowness), it was still a spinnable material with no apparent physical deterioration. In this instance, no comparison could be made with the quality of the cotton immediately after harvesting and ginning, nor was there an opportunity to compare spinning performance and yarn quality with what it might have been originally.

"In the fall of 1981, a textile company approached the Textile Research Center about the possibility of a loss in yarn strength as a result of using cotton stored for more than one year. This prompted TRC to undertake a program which might develop useful information on this subject. The investigation was initiated with the acquisition of six bales similar to the cotton used by the interested spinner. These were all tested separately, and when processing began samples from each bale were blended together. The blend was completely tested and spun into two yarn numbers, N_e 6 and 22, on a Rieter m1/1 rotor spinning machine."

From the August 1984 issue of *Textile Topics* we have extracted the following:

"The cotton used in the program was harvested during the latter part of 1981. The first testing was done in June 1982 and further testing was conducted on a regular basis until May 1983. At that point, the remaining cotton from each bale was set aside for annual evaluation, and the next testing was conducted in April 1984. The remainder of each bale is being held in storage for one more evaluation in 1985."

The 1985 evaluation has been completed, and we are presenting the results from the last portion of the study in Tables I and II on the following pages. (Tables of data from earlier testing are too extensive to be presented again, and we ask our readers to refer to the July and August 1984 issues of *Textile Topics*.) Graph 1 shows the trend in yellowness, fiber tenacity, and yarn count-strength-product. It can be seen that there was a definite increase in yellowness of the cotton and a significant decrease in yarn strength for both the N_e 6 and 22 yarns. However, there was very little change in the fiber tenacity during the three-year period.

It seems unlikely that the deterioration of cotton with time would be linear, although attempts to characterize the increase in Yellowness Index or the decrease in yarn strength by means of logarithmic relationships produced little or no improvement in correlation. Yarn strength has been shown to be defined primarily by fiber tenacity. Tenacity, however, did not show a significant deterioration with time. If the decline in yarn strength can be attributed to a loss in fiber strength, this apparent anomaly might be explained in terms of sampling error or instrument error. These possible sources of error may have contrib-

uted to the variability of the data which did not show any trend in fiber tenacity with time. It should be pointed out that while the decrease in yarn strength was statistically significant, it still was very slight and might not even be noticed in certain yarn numbers. When considering these findings, it would seem that the quality of this cotton held up remarkably well during its three and one-half years of age.

Fiber and yarn testing were conducted by the technicians in our materials evaluation laboratory. The early part of this was supervised by Mrs. Reva E. Whitt, and the last testing was under the direction of Harvin Smith. Open-end spinning was supervised by John B. Price, who was also responsible for conducting the statistical analyses and preparing the report for the Natural Fibers & Food Protein Commission of Texas. We take this opportunity to express our appreciation to NFFPC for permission to publish this report.

VISITORS The 1985 Maid of Cotton, Michelle Pitcher of St. Louis, MO, visited the Textile Research Center on March 9, accompanied by her tour manager, Beth Shepard. Other visitors during March included Michele Woodruff, Cotton Incorporated, Raleigh, NC; Roger Bolick, Allied Plastics & Fibers, Hopewell, VA; Mark Housley, Milliken Chemicals, Inman, SC; Emil Delgado, Milliken Chemicals, Spartanburg, SC; Joseph A. Fullmer, Jr. and Curtis A. Thompson, Manville Building Materials Corporation, Denver, CO; Michael T. Hoffman, Manville Building Materials Corporation, Waterville, OH; Charles E. Diller, Manville Building Materials Corporation, Toledo, OH; Samuel B. Spencer, Johns-Manville Sales Corporation, Denver, CO; and Jeffrey B. Samet, City Venture Corporation, Minneapolis, MN.

Also visiting were Enrique Gandara, Agro Cosechadorias, Guatemala City, Guatemala; Miroslav Cuculiza, H.C. and B. Corporation, Tegucigalpa, Honduras; and Liu Donglin, Wang Zhongda and Zhu Yanguo, from Yangchan Petrochemical Co., Peking, People's Republic of China, who were accompanied by Dale T. Brock and M. W. Kellogg, Houston, TX. Additionally, some 150 students from other universities and from various colleges at Texas Tech University visited the Center during the month.

TABLE I

ROTOR SPINNING TRIAL RESULTS

FIBER DATA:			
Testing Date		March 19, 1985	
	Micronaire	3.65	
Length:	UHM Length (in)	1.008	
	Uniformity Ratio (%)	79.75	
Tensile:	Str. (1/8" gg)(g/tex)	24.75	
	Elongation (%)	6.25	
	Leaf	30	
	Gray	33.0	
	Color	34.0	
MacBeth 1500 C. I. E.	X	69.6	
	Y	71.0	
	Z	69.5	
Yellowness Index	(%)	21.75	
Date Spun		March 19, 1985	
Days Since First Sampling		1082	
YARN PROPERTIES:			
Skein Test:			
Actual Yarn Number (N_e)		5.93	21.40
CV% of Yarn Number		1.0	0.8
Count-Strength-Product		2309	1832
CV% of CSP		1.5	2.6
Single -Yarn Tensile Test:			
Tenacity (g/tex)		14.11	12.72
Mean Strength (g)		1405	351
CV% of Strength		5.7	7.1
Elongation (%)		9.10	6.14
CV% of Elongation		5.1	7.6
Spec. Work of Rupture (g/tex)		0.693	0.433
CV% of Work of Rupture		10.1	13.6
Uster Evenness Test:			
Non-Uniformity (CV%)		13.83	16.52
Thin Places/1,000 yds		2	45
Thick Places/1,000 yds		42	263
Neps/1,000 yds		44	478
Hair Count/100 yds		396	165
ASTM Yarn Grade		B	C

TABLE II

SPINNING SPECIFICATIONS

Rotor Spinning Machine	Rieter m1/1	
Nominal Yarn Number (N_e)	6/1	22/1
Rotor Type	45 mm	
Rotor Speed (rpm)	45K	55K
Opening Roller Type	T.52	
Opening Roller Speed (rpm)	6.08K	5.56K
Draft	44.2	160.8
Twist Multiplier (α_e)	4.94	4.0
Yarn Speed (yd/min)	104.2	67.8
Navel	Smooth	

GRAPH 1

INFLUENCE OF TIME ON SELECTED FIBER AND YARN PROPERTIES