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RESEARCH ON BARKY COTTON In the July 1983 issue of *Textile Topics* (Vol. XI, No. 11), we carried a statement about discounting the value of cotton because of low micronaire and the presence of bark. The article stated that the Textile Research Center was evaluating barky cotton and mentioned that the project was organized in such a way that barky cotton was compared to cotton without bark, where fiber properties of both were selected as nearly as possible to the same values. Phase I, involving the spinning of sixteen bales (rather than the eighteen reported in July), has been completed and the yarns are being woven into fabric for additional evaluation. We would like to report at this time the results obtained from ring spinning only; a report on rotor spinning will be carried in next month's issue of *Topics*.

To assure a sufficient amount of cotton for evaluating spinning performance and yarn properties, we selected two bales of each quality. Inasmuch as Phase I involved eight lots, this required a total of sixteen bales. Four lots were made up of cotton without bark while the other four contained varying amounts of bark. Each lot without bark was compared with a lot that contained bark, and the pairings were made so that the two opposing lots had fiber properties as nearly the same as possible.

An outline of the pairings is given below.

Test A: Lot 1 - no bark
Lot 3 - with bark

Test B: Lot 4 - no bark
Lot 2 - with bark

Test C: Lot 5 - no bark
Lot 7 - with bark

Test D: Lot 8 - no bark
Lot 6 - with bark

We realize that much of the cotton produced in the world does not contain bark, and some of our readers may not be concerned with this at all. Even so, a significant portion of the cotton produced on the Texas High Plains, and consumed in the United States and other countries, sometimes does contain bark. As mentioned in July, 64% of the 3.5 million bales produced in the Lubbock area in 1981 contained some degree of bark and, therefore, this is an important issue to producers and the spinners using this cotton.

Bark comes from the surface of the plant, and like any other foreign material, attempts are made to separate it from the fiber prior to spinning. While it is part of the non-lint matter in a bale, all non-lint is not bark. In some cases, a bale of cotton will have rather high trash content but contain no bark. In others, the cotton might be very clean otherwise but will contain a small amount of bark. Apparently any bark is sufficient for a bale to be discounted at least one grade and perhaps two. In cases of heavy bark, the bale may be designated "Below Grade" and is not eligible for the USDA loan program. Lot 6 in this study was in that category.

In addition to normal testing of the cottons used in this project, thorough analysis of the non-lint content was made. We show the results of this in the following table.

NON-LINT CONTENT

Test Number	Lot Number	Description	Shirley Analyzer Non-Lint Percent: Bale Sample	Shirley Analyzer Non-Lint Percent: Card Sliver
A	1	No Bark	1.4%	0.3%
	3	Barky	2.4%	0.6%
B	4	No Bark	2.5%	0.6%
	2	Barky	4.6%	1.0%
C	5	No Bark	3.8%	0.6%
	7	Barky	2.2%	0.8%
D	8	No Bark	4.0%	0.9%
	6	Barky	6.2%	1.1%

The Shirley Analyzer non-lint percentages given on the preceding page were obtained from evaluation of samples taken from each bale and also from the card sliver, which we felt would more nearly represent the stock as it went to the spinning machine. It will be seen that while some of the lots designated as barky had fairly low non-lint percentages in the bale sample, the barky lots had higher non-lint in the card sliver than did the comparable no-bark lots. It is interesting to note that in Test C the barky lot (No. 7) had less foreign material than the no-bark cotton in the bale sample, but this was reversed after carding. It would appear that bark is more difficult to remove than normal leaf trash, and in some cases bark was observed all the way to spinning.

The following tables give information about fiber properties, yarn quality and spinning performance of the cotton included in each lot. We have listed the fiber information obtained from USDA and that from evaluating the cottons with the Motion Control HVI system at the Textile Research Center. We had no way of establishing the market value of the cotton used in this program, so we simply listed the 1983 loan values. This was easy to determine in every case except Lot 6 which had been designated "Below Grade" with no loan rate given.

TEST A

Fiber Data				
	Lot 1 (No Bark)		Lot 3 (Barky)	
USDA Length (inches)	1-1/32		1-1/32	
USDA Grade	SM Lt Spt (22)		M Lt Spt (32)	
USDA Micronaire	4.4		4.4	
1983 Loan Rate	53.85 cents/lb		52.95 cents/lb	
MCI High Volume Testing Results (TRC)				
Length (inches)	1.00		1.00	
Length Uniformity (%)	82.0		82.0	
Micronaire	4.5		4.2	
Strength (g/tex)	25.4		22.7	
Elongation (%)	7.3		7.3	
Yarn Data				
Spinning System	Ring		Ring	
Nominal Yarn Number (N_e)	6/1	22/1	6/1	22/1
Nominal Twist Multiplier	3.50	3.75	3.50	3.75
Actual Yarn Number (N_e)	6.14	21.97	6.09	21.98
CV% of Yarn Number	2.2	1.6	2.1	1.4
Skein Strength (lbs)	384	90	385	91
CV% of Strength	4.2	5.8	3.9	3.0
Count-Strength-Product	2358	1977	2345	2000
CV% of CSP	2.5	4.8	2.7	2.5
Single Yarn Tenacity (g/tex)	12.84	13.16	13.53	13.06
Mean Strength (g)	1240	353	1314	352
CV% of Break	8.8	12.0	8.5	11.1
Elongation (%)	8.7	6.6	8.9	6.5
Uster Non-Uniformity (CV%)	16.49	21.23	15.87	20.90
Thin Places/1,000 yds	32	374	29	374
Thick Places/1,000 yds	84	933	50	850
Neps/1,000 yds	11	151	6	140
ASTM Yarn Grade	B	C	B	B
Spinning Ends Down/1,000 Sp. Hrs	4.37	39.42	7.16	25.64
Spindle Speed (rpm)	6,000	10,000	6,000	10,000
Ring Diameter (inches)	2	2	2	2
Front Roll Speed (rpm)	220	181	220	181
Front Roll Diameter (inches)	1	1	1	1

TEST B

Fiber Data				
	Lot 4 (No Bark)		Lot 2 (Barky)	
USDA Length (inches)	1-1/32		1-1/32	
USDA Grade	SLM Lt Spt (42)		LM Lt Spt (52)	
USDA Micronaire	4.4		4.4	
1983 Loan Rate	49.45 cents/lb		43.75 cents/lb	
MCI High Volume Testing Results (TRC)				
Length (inches)	1.02		1.01	
Length Uniformity (%)	80.0		80.0	
Micronaire	4.4		4.3	
Strength (g/tex)	25.9		26.3	
Elongation (%)	7.0		6.7	
Yarn Data				
Spinning System	Ring		Ring	
Nominal Yarn Number (N_e)	6/1	22/1	6/1	22/1
Nominal Twist Multiplier	3.50	3.75	3.50	3.75
Actual Yarn Number (N_e)	6.10	22.37	6.39	21.45
CV% of Yarn Number	1.7	1.7	1.7	2.1
Skein Strength (lbs)	375	87	354	93
CV% of Strength	2.8	5.6	4.4	4.2
Count-Strength-Product	2288	1946	2262	1995
CV% of CSP	1.8	4.6	3.2	3.5
Single Yarn Tenacity (g/tex)	12.99	12.28	12.81	13.31
Mean Strength (g)	1264	335	1158	367
CV% of Break	8.5	10.2	9.5	14.7
Elongation (%)	8.4	5.9	7.7	5.6
Uster Non-Uniformity (CV%)	15.49	20.82	16.46	21.56
Thin Places/1,000 yds	18	343	36	416
Thick Places/1,000 yds	66	945	106	1052
Neps/1,000 yds	10	242	27	345
ASTM Yarn Grade	C+	B	C	C
Spinning Ends Down/1,000 Sp. Hrs	3.50	49.24	8.48	25.56
Spindle Speed (rpm)	6,000	10,000	6,000	10,000
Ring Diameter (inches)	2	2	2	2
Front Roll Speed (rpm)	220	181	220	181
Front Roll Diameter (inches)	1	1	1	1

Two yarns were spun from each cotton, N_e 6/1 and 22/1. When studying the yarn quality and spinning performance, it will be noted that in many cases the barky cotton produced stronger yarn and spun as well as or better than the cotton without bark. The exception to this was Lot 6, which had a high non-lint content and contained considerable bark. Also, while the USDA staple length assigned to this lot was 1-1/32 inches, the HVI system found the length to be only 0.98 inch.

In Test A, the yarns spun from both lots were generally satisfactory. The count-strength-product and single yarn tenacity were approximately the same, regardless of the barky classification given to Lot 3. As for spinning performance, the cotton without bark resulted in fewer broken ends when spinning 6/1, but the barky cotton spun better when producing 22/1. The ends down per thousand spindle hours for all yarns in this test was generally satisfactory, although the number of broken ends for the 22/1 spun from the no-bark cotton was higher than most spinners would prefer.

In Tests B and C, yarn quality and spinning performance of the barky and no-bark cottons were quite similar. In general, yarn strengths were approximately the same regardless of whether bark was present, and

TEST C

Fiber Data				
	Lot 5 (No Bark)		Lot 7 (Barky)	
USDA Length (inches)	1-1/32		1-1/32	
USDA Grade	M Lt Spt (32)		SLM Lt Spt (42)	
USDA Micronaire	4.3		4.4	
1983 Loan Rate	52.95 cents/lb		49.45 cents/lb	
MCI High Volume Testing Results (TRC)				
Length (inches)	1.01		1.02	
Length Uniformity (%)	81.0		82.0	
Micronaire	4.4		4.5	
Strength (g/tex)	25.1		25.0	
Elongation (%)	6.8		6.9	
Yarn Data				
Spinning System	Ring		Ring	
Nominal Yarn Number (N_e)	6/1	22/1	6/1	22/1
Nominal Twist Multiplier	3.50	3.75	3.50	3.75
Actual Yarn Number (N_e)	6.43	21.71	6.14	22.02
CV% of Yarn Number	2.2	2.1	1.6	1.9
Skein Strength (lbs)	342	94	374	91
CV% of Strength	4.0	4.8	3.4	6.2
Count-Strength-Product	2199	2041	2296	2004
CV% of CSP	2.2	4.3	2.7	4.7
Single Yarn Tenacity (g/tex)	12.43	12.97	13.04	12.87
Mean Strength (g)	1152	355	1240	352
CV% of Break	9.2	11.2	8.1	9.5
Elongation (%)	7.5	6.1	7.7	5.8
Uster Non-Uniformity (CV%)	15.99	20.62	15.17	20.29
Thin Places/1,000 yds	21	318	10	288
Thick Places/1,000 yds	71	948	67	861
Neps/1,000 yds	22	416	14	208
ASTM Yarn Grade	D+	C	C+	B
Spinning Ends Down/1,000 Sp. Hrs	5.55	40.07	15.69	29.38
Spindle Speed (rpm)	6,000	10,000	6,000	10,000
Ring Diameter (inches)	2	2	2	2
Front Roll Speed (rpm)	220	181	220	181
Front Roll Diameter (inches)	1	1	1	1

the spinning performance as measured in ends down per thousand spindle hours followed the trend established in Test A. In all three tests, the 22/1 yarn spun from the barky cotton had fewer ends down than that from the cotton without bark. At this point, we are not quite sure why the barky cotton spun better at 22/1, but it would seem that most any textile company using the barky cottons in Lots 2, 3, and 7 would be satisfied with the yarn strengths and spinning performances demonstrated in these tests.

Test D, which consisted of Lots 8 and 6, resulted in the strongest yarns produced in Phase I, in spite of having the highest percentages of non-lint. Additionally, the spinning performances of both the 6/1 yarns, and the 22/1 without bark, were entirely satisfactory. The spinning of 22/1 from the barky lot, however, was something else. It appears that the shorter fiber length, a high non-lint content, and the presence of bark combined to give an excessive number of ends down, which was plainly unacceptable.

While we have found the data generated in this phase of our program quite interesting, we do not have explanations for some of the unexpected results. We anticipate the next three parts of this research will serve to enlighten us somewhat. We can state now, however, that the results obtained so far cause us

TEST D

Fiber Data	Lot 8 (No Bark)		Lot 6 (Barky)	
USDA Length (inches)	1-1/32		1-1/32	
USDA Grade	LM Lt Spt (52)		BG (82)	
USDA Micronaire	4.3		4.3	
1983 Loan Rate	43.75 cents/lb		N/A	
MCI High Volume Testing Results (TRC)				
Length (inches)	0.98		0.98	
Length Uniformity (%)	81.0		82.0	
Micronaire	4.3		4.2	
Strength (g/tex)	26.7		24.9	
Elongation (%)	7.1		6.9	
Yarn Data				
Spinning System	Ring		Ring	
Nominal Yarn Number (N_e)	6/1	22/1	6/1	22/1
Nominal Twist Multiplier	3.50	3.75	3.50	3.75
Actual Yarn Number (N_e)	6.09	21.67	6.18	21.87
CV% of Yarn Number	1.3	1.7	1.2	1.2
Skein Strength (lbs)	388	93	409	105
CV% of Strength	3.0	4.5	4.5	3.9
Count-Strength-Product	2363	2015	2528	2296
CV% of CSP	2.4	3.7	3.7	3.4
Single Yarn Tenacity (g/tex)	13.81	12.87	14.72	14.04
Mean Strength (g)	1336	346	1422	382
CV% of Break	8.4	12.2	9.6	9.1
Elongation (%)	8.7	6.1	8.8	6.4
Uster Non-Uniformity (CV%)	16.22	21.55	14.83	19.86
Thin Places/1,000 yds	32	452	16	227
Thick Places/1,000 yds	81	1045	65	825
Neps/1,000 yds	15	292	39	421
ASTM Yarn Grade	C	C	C	C
Spinning Ends Down/1,000 Sp. Hrs	4.71	31.23	4.96	141.5
Spindle Speed (rpm)	6,000	10,000	6,000	10,000
Ring Diameter (inches)	2	2	2	2
Front Roll Speed (rpm)	220	181	220	181
Front Roll Diameter (inches)	1	1	1	1

to question the reason for discounting the cottons in Lots 2, 3 and 7, even though some degree of bark was present. These three lots produced good quality yarns with relatively few broken ends at spinning.

As we indicated earlier in this report, we are presenting results obtained from ring spinning only. Phase I also included rotor spinning, and a report on that will be carried in the next issue of *Textile Topics*. Further, the yarns spun in this first phase are being woven into fabric which will be bleached and dyed. Results of fabric testing will be reported at a later date.

WHITT HONORED WITH UNIVERSITY AWARD Mrs. Reva E. Whitt, head of the Textile Research Center's materials evaluation laboratory, was recently selected by Texas Tech University as a 1983 recipient of the Top Techsan award. This award is given annually to four full-time, non-faculty employees who have been at the University for at least ten years and have demonstrated outstanding service in their field.

Mrs. Whitt is a native of Steprock, Arkansas, and began her career in fiber testing in 1954 with the

U. S. Testing Company in Memphis, Tennessee. In 1959 she came to Lubbock to direct the fiber testing laboratory at Texas Tech University, which had a staff of three – herself, one full-time technician, and one part-time technician. In 1969 the fiber testing laboratory was incorporated into the Textile Research Center and cotton fiber evaluation was combined with the testing of all other textile materials. Presently Mrs. Whitt supervises a staff of ten technicians.

In addition to the fiber testing performed on individual instruments, the materials evaluation laboratory now includes HVI testing on the Motion Control 3000 System and the Spinlab 800 Series. These two systems have become very important in the past two years and have attracted considerable attention to their operation and the results obtained from them. Other testing under Mrs. Whitt's direction involves yarn uniformity and strength in skeins to develop count-strength-products, single-yarn tenacities, fabric strength and abrasion tests, and research on every type of textile material from fiber to finished fabric.

We congratulate Mrs. Whitt for being selected as a Top Techsan. Her work at TRC has always been outstanding, and we are pleased that the University has recognized this and honored her with this special award.

VISITORS Visitors to the Textile Research Center during September included Daniel K. Frierson, Tom Sutter, Joe Hickman and Eugene F. Robbins, Dixie Yarns, Inc., Chattanooga, TN; Roy Parker, TAES, Corpus Christi, TX; Steve Clarke, Gentex Corporation, Carbondale, PA; H. B. Cooper, John Dobbs and Kara Pearce, California Planting Cotton Seed Distributors, Shafter, CA; Lloyd Dinkins, National Cotton Council, Memphis, TN; Reuben Schwartz, United States International Trade Commission, Washington, DC; A. G. von Mengersen, Namoi Cotton Co-operative Ltd., Wee Waa, NSW, Australia; Danny Bourke, Seed & Grain Sales, Moree, NSW, Australia; Bill J. Naarding, International Institute for Cotton, Hengelo, Holland; L. Benisek, International Wool Secretariat, Ilkley, England; Keith Sanderson, South African Wool and Textile Research Institute, Port Elizabeth, South Africa; A. Subramaniam, Madura Coats, Madurai, India, Matti Ranki, Skopbank, Helsinki, Finland; and P. L. Santalainev, Espoo, Finland.