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INFLUENCE OF COTTON QUALITY IN BLENDS

In most cases the reports on various research projects we give in *Textile Topics* indicate we are involved in spinning 100% cotton only. As a result, we are occasionally asked whether we include man-made fibers in any of our research. The answer is yes, we do, although most of our work with man-made fibers is done for fiber producers who do not wish to publish the results. However, a program completed recently that we can publicize included polyester, and we think it may be of interest to report a portion of that study in this issue of *Textile Topics*. The project we refer to was rather extensive, and the entire report is too large to reproduce here.

The primary objective of the investigation was to assess the requirements of cotton in blends with polyester when producing a relatively fine yarn on a rotor spinning machine. The program included four different types of polyester and seven different cottons. The portion of the program that we are presenting includes only one of the polyesters blended with two different cottons. Our purpose in doing this is to show the influence of the two cottons on yarn quality. The polyester used was a 1.25 denier, 1½ inch fiber. Physical properties of the two cottons and yarn testing results are given in the table on the following page.

It will be seen that Cotton A was quite short, having a length of only 0.91 inches. This cotton had a strength of 20.6 grams/tex and a micronaire of 4.07. Cotton B was somewhat longer, stronger and finer. It had a length of 1 inch, a strength of 24.1 grams/tex, and a micronaire of 3.05. It can be readily seen from the testing results that Cotton B produced a stronger yarn, when measured by count-strength-product or single yarn tenacity. This is shown in Graphs 1 and 2. It will be noted that when only 33% cotton was used in the blend, there was not as much difference in the strengths of the yarns as there was when the percentage was increased to 67%. Also, the data show that non-uniformity was lower when using Cotton B.

In the program from which these results were taken, it was necessary to process each cotton and each of the four polyesters separately through carding. Subsequently, blending was done at the first process of drawing. After finisher drawing, the sliver was taken to a Schlafhorst Autocoro rotor spinning machine where the yarns were spun. Please note that the twist multipliers used for the 67% cotton blend were greater than those for the 33% blend. An increase in twist was necessary as a higher percentage of cotton was used. Other than this, the only variable was in the quality of the two cottons.

It is obvious that better yarn can be expected from better quality cotton, even when blended with polyester. The influence of the cotton quality is accentuated when a greater percentage of cotton is used in the blend. The yarn quality resulting from the use of Cotton A would likely be unacceptable to many spinners. (We have learned in our research, and have reported on several occasions, that the desirable cotton to be used when rotor spinning -- in 100% form or in blends -- should have good length and strength and should be fine but mature. Our research continues to show this to be true.)

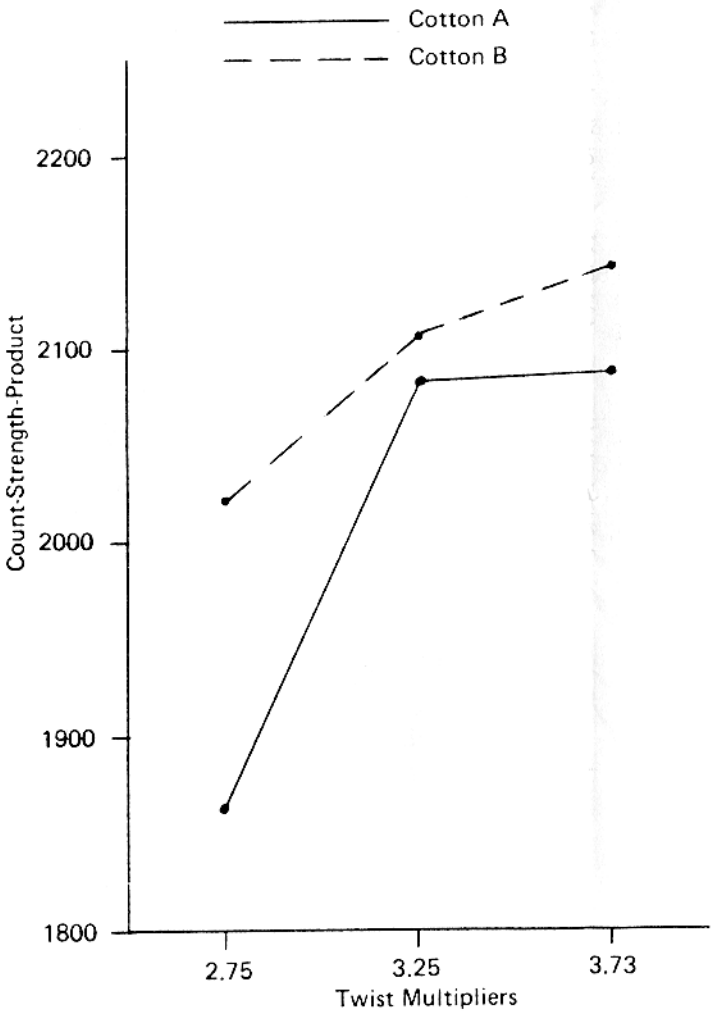
The program from which this information was taken was sponsored by the Natural Fibers and Food Protein Commission of Texas. It was supervised at the Textile Research Center by John B. Price, with assistance from a number of technicians.

TABLE I

FIBER DATA	COTTON A						COTTON B					
Strength (1/8" gg.)(g/tex)	20.60						24.11					
Elongation (%)	5.25						6.58					
2.5% Span Length (in)	0.912						1.005					
Uniformity Ratio (%)	43.9						41.1					
Short Fiber Content (%)	8.9						9.9					
Micronaire	4.07						3.05					
Non-Lint Content (%)	1.5						2.0					
MACHINE SPECIFICATIONS												
Rotor Type	T46						T46					
Rotor Speed (rpm)	60K						60K					
Opening Roller Type	OS21						OS21					
Opening Roller Speed (rpm)	7.0K						7.0K					
Draft	196.7						196.7					
Navel	KK4						KK4					
BLEND (Polyester/Cotton)	67%/33%			33%/67%			67%/33%			33%/67%		
Nominal Yarn Number (N_e)	30/1	30/1	30/1	30/1	30/1	30/1	30/1	30/1	30/1	30/1	30/1	30/1
Twist Multiplier (α_e)	2.75	3.25	3.73	3.25	3.73	4.24	2.75	3.25	3.73	3.25	3.73	4.24
Yarn Speed (yd/min)	110.7	93.6	81.5	93.6	81.5	71.8	110.7	93.6	81.5	93.6	81.5	71.8
YARN PROPERTIES												
Skein Test:												
Actual Yarn No. (N_e)	29.79	29.88	29.78	30.50	30.40	30.30	30.12	30.17	31.57	30.18	29.99	30.01
CV% of Count	1.9	2.1	1.9	1.2	1.7	1.6	1.2	1.8	1.1	1.1	0.8	1.1
Count-Strength-Product	1864	2083	2086	1320	1418	1541	2022	2106	2142	1584	1670	1712
CV% of CSP	3.8	2.5	3.5	3.4	5.9	2.1	3.4	3.6	4.1	2.2	3.1	3.6
Single Yarn Tensile Test:												
Tenacity (g/tex)	13.02	13.55	14.02	9.12	9.67	10.47	13.29	14.14	14.08	10.19	10.97	11.43
Mean Strength (g)	258	268	278	177	188	204	261	277	263	200	216	225
CV% of Strength	9.8	9.3	9.7	10.6	12.5	9.5	9.4	9.5	11.7	9.2	8.4	8.7
Elongation (%)	12.61	13.05	12.94	7.78	7.09	7.96	12.44	12.39	12.16	8.30	7.88	7.95
CV% of Elongation	7.0	7.9	8.7	14.8	18.1	13.9	7.6	8.7	10.2	13.1	11.6	10.0
Spec. Work of Rupture (g/tex)	0.972	1.038	1.075	0.465	0.429	0.446	0.972	1.027	1.006	0.516	0.510	0.523
CV% of Work of Rupture	14.4	14.6	15.9	21.8	19.6	22.0	14.9	16.3	19.9	21.2	18.2	16.8
Initial Modulus (g/tex)	253	258	260	269	270	288	241	261	250	254	270	263
Uster Evenness Test:												
Non-Uniformity (CV%)	16.26	16.02	15.86	18.45	18.83	18.54	14.72	14.91	14.95	16.10	15.80	15.79
Thin Places/1 000 yds	42	42	42	192	163	126	26	17	29	47	42	26
Thick Places/1,000 yds	102	132	98	231	301	299	70	91	77	164	133	169
Neps/1,000 yds	240	248	248	595	654	669	182	212	164	465	485	500
Hairs/100 yds	554	506	480	658	509	433	561	514	466	408	365	295

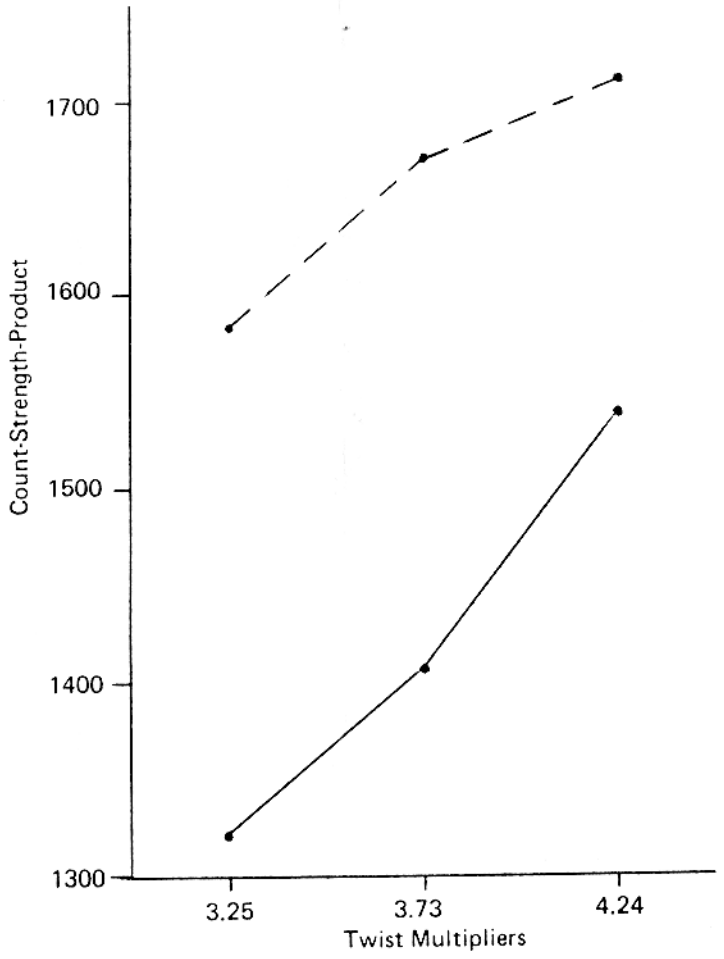
GRAPH 1

67% Polyester/33% Cotton



GRAPH 2

33% Polyester/67% Cotton



TEXTILE SHORT COURSE FOR JOHNSON & JOHNSON During the week of July 7 through 10, the Textile Research Center conducted a short course in Textile Technology for a group of Johnson & Johnson managers and supervisors. The course included studies in fiber properties, testing and quality control, yarn manufacturing, fabric construction, and textile plant engineering. A special section on nonwovens was presented by Dr. R. R. Rhinehart of Texas Tech University's Department of Chemical Engineering. In addition, field trips to the USDA Ginning Laboratory near Lubbock and to the American Cotton Growers' denim plant at Littlefield, Texas were included.

Johnson & Johnson personnel taking the course were Charles King, Brenda Womack, Kim Dueringer, John Labonte, Marilyn Hudson, Jack Morrison, Linda Partridge, Moretta Estes, Oliver Bush, Sam Rubin, Beverly Batey and Loretta Barr. Instructors, in addition to Dr. Rhinehart, were Bobby G. Wyatt, Harvin Smith, Robert Steadman, Richard Combs and Edwin Foster, all TRC staff members.

The Textile Research Center has conducted the short course for Johnson & Johnson for the past six years. We are always pleased to work with industry in programs such as this.

VISITORS Visitors to the Textile Research Center in addition to those listed above included Timothy Calamani and Roger Harper, USDA Southern Regional Research Center, New Orleans, LA; Jim McClure, Pueblo to People, Houston, TX; Manuel Ortiz, Pueblo to People, Guatemala City, Guatemala; Edwin Petrushka, General Dynamics, Fort Worth, TX; Michel Antuszewicz, Filatures de la Madelaine, Rerimont, France; Manfred Schoberl, Textilmaschinenfabrik Dr. Ernst Fehrer AG, Linz, Austria; and Alberto Carzaniga, Cotonificio di Solbiate S.p.A., Olona, Italy.

Also, 33 junior high and high school students participating in the Shake Hands With Your Future program, sponsored by the Department of Continuing Education, visited the Center as part of their activities while at Texas Tech University.