TEXTILE TOPICS

INTERNATIONAL TEXTILE CENTER

TEXAS TECH UNIVERSITY • LUBBOCK, TEXAS / USA

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WE HAVE A NEW NAME!

On December 16, 1993, the Board of Regents of Texas Tech University approved a new name for the International Center for Textile Research and Development. We are now officially designated as the **International Textile Center**. This action was requested because of encouragement given by many industry leaders, customers, clients and friends. The shorter name is much more "user friendly" and it encompasses not only research and development, but teaching and other educational activities carried out as an integral part of Texas Tech University.

The acronym for the International Textile Center is the **ITC**, and we will use it most of the time in our written communications. A new logo has also been developed and is shown for the first time on this issue of *Textile Topics*. The red double T is a well known, official symbol for Texas Tech University. Our use of it serves to emphasize our existence within the University, while also highlighting textiles as our reason for existing.

TEXAS INTERNATIONAL COTTON SCHOOL SCHEDULED FOR APRIL

In partnership with the Lubbock Cotton Exchange, the ITC will again host the Texas International Cotton School during April 4-15, 1994. The school provides an intensive short course in all facets of the international cotton/textile industry. Students will obtain an integrated understanding of issues surrounding cotton breeding, production, ginning, processing and marketing. The facilities of the ITC are at the disposal of those who attend, enabling hands-on instruction about the classing, testing, preparation, and processing of cotton. Knowledge of latest developments in the handling and processing of naturally colored and organic cottons is also afforded to students because of the ITC's research leadership in these areas.

Sponsorship by the Lubbock Cotton Exchange assures exposure to all the major US cotton merchants, including the opportunity to visit their facilities and discuss their operations. The giant producer marketing cooperative, Plains Cotton Cooperative Association, also participates and allows the students to visit and inspect its trend-setting denim manufacturing facility – The American Cotton Growers Mill – located near Lubbock. Also available as part of the school are the experts and facilities of the Texas A&M Research and Extension Center, which has the largest state cotton breeding program in the United States, and of the USDA ginning laboratory. Taken as a whole, the location in Lubbock affords an infrastructure that allows hands-on study of the modern cotton industry from the farm through the textile mill – something that does not exist in one place anywhere else in the world.

The students will also benefit from the explanations and predictions of international experts in the areas of fiber/textile testing, supply and demand, futures markets, and world prices for different types of cotton. Acquaintances will be made that will be beneficial for many years to come.

So far there have been nine sessions of the Texas International Cotton School and it has been attended by 161 students from 37 different countries.

Details about the upcoming school and how to enroll may be obtained by contacting Ms. Mandy Howell, Lubbock Cotton Exchange, 1517 Texas Avenue, Lubbock, Texas 79401; telephone 806-763-4646; fax 806-763-8647.

COTTON FIBER PROPERTIES GREATLY CHANGED ON THE TEXAS HIGH PLAINS

There has been a remarkable improvement in the quality characteristics of cotton produced on the Texas High Plains during recent years. Fundamental causes have been (1) the development and adoption of improved plant varieties and (2) improved growing and harvesting practices. The 1993 crop was further benefited by good weather during critical parts of the season, resulting in a crop that is both historically large and of unusually high quality.

Selected cotton classification results are summarized in Exhibit 1, covering the 1991 through 1993 crop years. These results come from the two USDA classing offices that handle cotton produced on the Texas High Plains; i.e., from the Lubbock and Lamesa

Exhibit1: Selected USDA Cotton Clasification Results for Texas High Plains, 1991-1993 Crop years 1/

	Crop Years		
	1991	1992	1993p
Strength (g/tex)			
<25	23.9 %	12.1 %	2.3 %
25-26	28.9 %	22.5 %	9.2 %
27-28	31.0 %	38.1 %	26.3 %
29-30	14.0 %	23.8 %	40.0 %
>30	2.1 %	3.5 %	22.0 %
Avg. Strength	26.3	27.2	29.0
Staple (in)			
<30	2.5 %	0.6 %	0.2 %
30-31	24.7 %	8.7 %	4.6 %
32-33	52.9 %	39.5 %	39.4 %
34-35	19.2 %	44.7 %	48.9 %
>35	0.7 %	6.5 %	7.0 %
Avg. Staple	32.3	33.4	33.7
Micronaire			
<3.5	45.2 %	57.3 %	8.4 %
3.5-3.6	16.0 %	15.4 %	6.5 %
3.7-4.2	34.4 %	24.7 %	39.1 %
4.3-4.9	4.4 %	2.4 %	44.2 %
>4.9	*	0.1 %	1.7 %
Avg. Micronaire	3.5	3.3	4.1

1/ Consists of cotton classed at the Lubbock and Lamesa offices. For 1993 crop year, includes samples classed through January 6, 1994.

* Less than 0.5%.

SOURCE: USDA, AMS.

offices. Data for the 1993 crop year are preliminary, since they are based on samples classed through January 6, 1994. As of that date, however, these two offices had classed almost 3.2 million bales, or about 97% of the expected total. Therefore, the 1993 results in Exhibit 1 cannot change significantly. (The Texas High Plains crop of about 3.3 million bales accounts for 20% of total US production in 1993.)

Exhibit 1 shows that the average fiber strength of this crop has increased from 26.3 to 29.0 g/tex between 1991 and 1993, an increase of about 10%. The average staple length has increased 4.3% over the same period. Both of these fiber properties are greatly affected by plant variety selection, and they increased in 1992 despite the fact that it was an unfaborable growing season. Micronaire is quite sensitive to growing conditions, however, and it decreased from an average of 3.5 in 1991 to an average of 3.3 in 1992. For the 1993 crop micronaire has averaged 4.1, reflecting the fact that the cotton had favorable conditions for reaching an advanced stage of maturity.

A quick inspection of the frequency distributionsshown in Exhibit 1 reveals that, for the 1993 crop in the Texas High Plains: 62% of the cotton has fiber strength of 29 g/tex or higher; 56% has a staple length of 1-1/16 inch or longer; and 90% falls in the preferred micronaire range of 3.5 - 4.9.

FACTORS AFFECTING FABRIC LINTING INVESTIGATED

There are recurring problems with the shedding of lint by special-purpose fabrics, such as those used to make surgical towels for hospitals. In order to better understand the effects of certain factors on linting, we selected five different growths of US cotton that we had in stock: four Upland growths plus American Pima. All of the cottons were grown in the 1992 crop year and the fiber properties are representative of the norm for each growth. Alternative processing techniques were then used to make an all-cotton fabric with the same woven construction as a particular medical towel that had been sent to us for analysis.

Yarn and Fabric Construction

The *warp yarn* for all constructions was combed and ring-spun from California Acala (a long staple, Upland type of cotton). The yarn count was Ne 20/1 and the twist multiplier (TM) was 3.60. It was slashed, using a PVA warp wize, onto a Draper 50-inch X3 beam.

The *filling yarn* was spun from all five cottons mentioned above into a yarn count of Ne 8/1, using both carded and combed fibers and both ring and open-end (rotor) spinning systems. For ring spinning, a 3.54 TM and a spindle speed of 7,000 rpm was used. For rotor spinning, a TM of 4.01 and a rotor speed of 55,000 rpm was used.

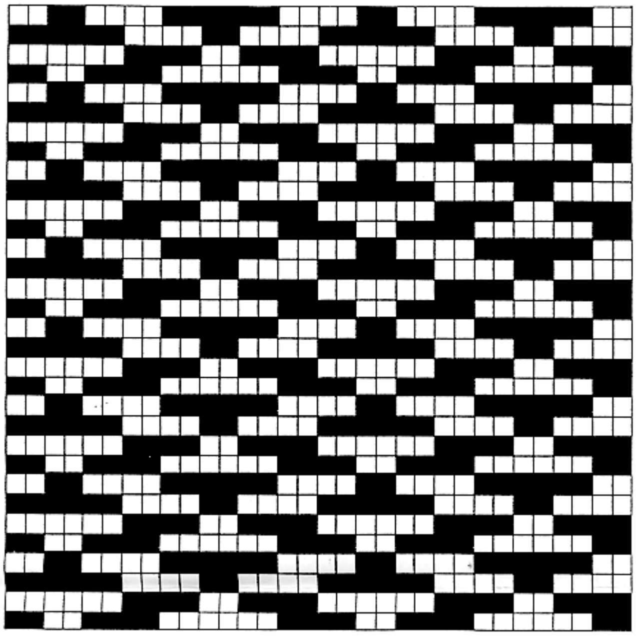
The toweling fabric was woven according to a 70 x 46-50 inch construction. The weave pattern, shown in Exhibit 2, was designed to put the filling yarn predominately on the exterior surface, in order to increase absorbency of the towel.

For each sample to be tested, approximately 15 yards of fabric were produced on a Draper X3 shuttle loom, running at 200 picks per minute. Each sample was then desized, bleached, and dyed with a reactive blue dye.

Testing Procedures

Each sample was cut, examined, and assigned a "lint grade" of 1 through 4, according to the amount of shedding of lint that occurred. The grades were as follows:1 = excessive; 2 = substantial; 3 = moderate; 4 = slight.

Exhibit 2: Weave pattern used for Surgical Towels



The method used for grading was the following: Press six clean adhesive tape strips onto each fabric sample, peel them off, put them onto a white sheet of paper to facilitate observation of the blue lint collected, then assign a lint grade to each strip. The six numerical grades were then averaged to get the final lint grade used for each sample.

In order to get an indication of the effect of washing on towel linting, different cuts of each sample were washed and tumble dried a total of five times. Then the same testing technique was used to assign lint grades to the washed samples.

Exhibit 3: Data from study of Cotton Surgical Towels

GROWTHS [a/]	COTTON FIBER DATA			TREATMENTS		YARN	FABRIC LINT GRADES [d/]	
	Length (in.)	Micro-naire	Strength (g/tex)	Spinning [b/]	Combing [c/]	STRENGTH (CSP)	Unwashed	Washed [e/]
SE	1.12	4.2	25	O	N	2186	3.0	2.5
				O	Y	2362	4.0	2.0
				R	N	2373	1.3	1.0
				R	Y	2740	1.0	1.0
MS	1.12	4.5	29	O	N	2384	2.8	3.0
				O	Y	2538	3.4	3.0
				R	N	2665	1.0	1.0
				R	Y	2948	2.0	2.0
TX	1.03	3.7	25	O	N	2246	2.8	2.3
				O	Y	2322	3.0	2.3
				R	N	2417	1.0	1.0
				R	Y	2749	1.6	1.0
CA	1.15	4.0	32	O	N	2919	3.0	2.7
				O	Y	3130	4.0	3.3
				R	N	3374	1.5	1.8
				R	Y	3783	2.0	2.8
PI	1.28	3.9	34	O	N	3190	3.7	4.0
				O	Y	3398	4.0	4.0
				R	N	3831	2.0	1.5
				R	Y	4118	2.8	2.7

[a/] Southeast Upland = SE; Midsouth Upland = MS; Texas Upland = TX; California Upland = CA; Pima = PI
[b/] Open-End Rotor = O; Ring = R [c/] No = N; Yes = Y
[d/] Excessive = 1; Substantial = 2; Moderate = 3; Slight = 4 [e/] After being washed and tumble dried 5 times

DATA AND RESULTS

Pertinent data from the study are summarized in Exhibit 3 at left below. The five growths are shown along with HVI measurements of staple length, micronaire and strength. Two categories of treatments were stipulated in the yarn formation process: (1) ring versus rotor spinning and (2) combed versus carded. Therefore, the combinations of these categories resulted in four distinct spinning treatments, as shown in the fifth and sixth columns of Exhibit 3. In combination with the five growths of cotton, a total of 20 distinct fabric samples were produced.

The yarn strength expressed as count-strength product (CSP), associated with each growth and each treatment, is also given in Exhibit 3. Results conform very well to expectations: the count-strength product is increased by ring spinning and by combing; Pima cotton yields the highest CSP; and California cotton yields a higher CSP than the other Upland growths.

The focus of the study is the fabric lint grades recorded in the last two columns of Exhibit 3. The statistical technique of "analysis of variance" (ANOVA) was used to assess the significance of cause-and-effect for these results, using a 99% confidence level for assigning statistical significance. Most of the formal statistical conclusions may be corroborated by a close visual inspection of the data contained in Exhibit 3. The major conclusions may be summarized as follows:

(1) Significant differences in lint grades are explained by the different *growths.* Exhibit 4 shows the overall averages, for both unwashed and washed fabric, of lint grades for each growth. The towels made from Southeast and Texas cottons averaged near 2.0; those made from Midsouth cotton averaged 2.3; those from California Acala averaged 2.6; and those from Pima averaged 3.1.

(2) *Washing* had widely divergent effects on levels of lint grades. The average lint grade for towels made from Southeast cotton was decreased by 30% after washing; the corresponding decrease was 22% for towels made from Texas cotton (Exhibit 5). But the decrease after washing was only about 2% for towels made from Midsouth cotton and from Pima cotton; furthermore, the average lint grade for towels made from California cotton actually increased slightly after washing.

(3) The *spinning method* had a consistent

Exhibit 4: Overall averages of lint grades, by cotton growths

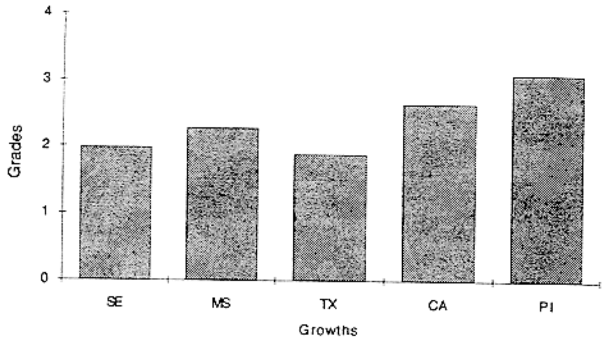


Exhibit 6: Overall averages of lint grades for unwashed towels, by type of spinning

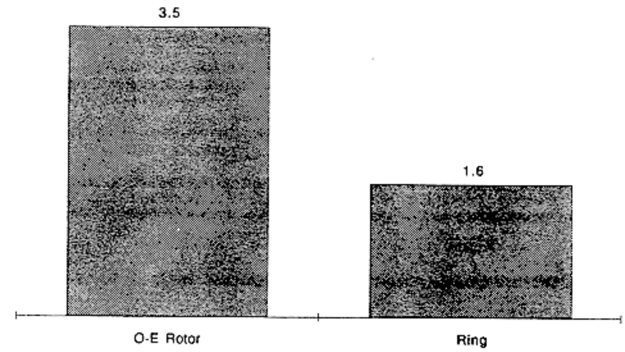


Exhibit 5: Average percentage change in lint grades after washing, by cotton growths

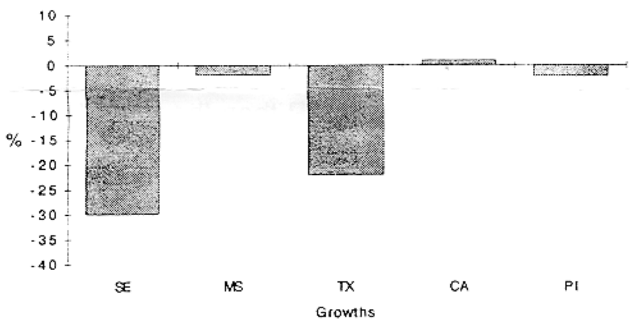
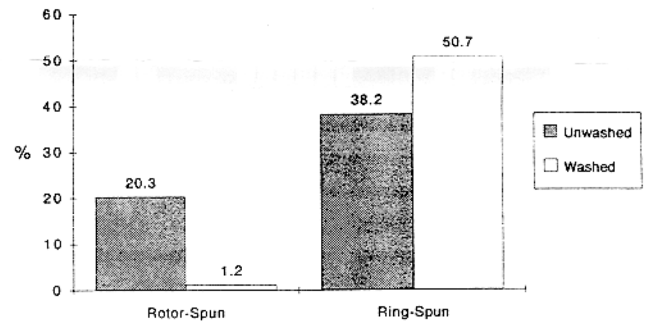


Exhibit 7: Average percentage change in lint grade with combing, rotor vs. ring spinning, before and after washing



and large impact on lint grades; fabrics produced from rotor-spun yarns graded, on the average, about twice as high as those made from ring-spun yarns. Using the unwashed towels for illustration, Exhibit 6 shows the huge difference in overall averages (for both combed and carded fibers) of lint grades with rotor-spun versus ring-spun yarns.

(4) *Combing* significantly increased lint grades for the unwashed cotton towels, whether rotor spun or ring spun. However, statistical significance was lost with washing of the towels. This loss in significance after washing was apparently due to the rotor-spun yarns. Exhibit 7 shows that the average advantage to combing for rotor-spun yarns almost disappears when the towels are washed; but the average advantage to combing for ring-spun yarns actually increases when the towels are washed.

CONCLUSIONS

The foremost conclusion from this study was the superiority of rotor spinning for producing higher lint grades. Notwithstanding the relatively weaker yarns from rotor spinning, the yarn structure resulting from this technology clearly yields higher lint grades. Even though the lint grades for towels made with rotor-spun yarns deteriorate relatively more with washing, they still remain substantially above those for towels made with ring spun yarns. The best lint grades for unwashed towels were obtained by rotor spinning of Pima cotton; furthermore, these were the only towels that did not show lower lint gades after being washed.

There appears to be only a short-term benefit from combing the rotor-spun cottons from the Southeast, Midsouth or Texas; i.e., lint grades of the towels cease to be significantly better after they are washed. However, the data suggest that combing the rotor-spun California Acala or Pima could improve lint grades of the towels both before and after washing. If so, it is difficult to explain why only these two longer staple cottons might be benefitted by combing. This is one of many issues that could be addressed through further research.

This project was sponsored by the Texas Food and Fibers Commission and directed by Edwin R. Foster, Head of Mechanical Processing at the ITC.

ZELLWEGER USTER TO UPGRADE INSTRUMENT FOR ITC

The ITC utilizes the Zellweger Uster Model UT-3 yarn evenness tester. We are delighted to learn from Zellweger Uster's office in Charlotte, North Carolina that the company is sending from its factory in Switzerland a UT-3 yarn hairiness tester and a MS-200 measuring head to augment the capabilities of the UT-3. The MS-200 enables handling of heavy-weight carpet slivers, while the UT3-H provides state-of-the-art technology for measuring hairiness of yarns. These generous gifts are sincerely appreciated and will be well utilized.

OTHER DONATIONS

Other donations received by the ITC include:

- from Picanol of America, Greenville, SC – 14 harnesses for our P.A.T. loom.
- from Albright and Wilson Americas, Charleston, SC – the flame-retardant chemical Antiblaze NT F-10;
- from Miles Incorporated Organic Products Division, Pittsburg, PA – Levafix Brilliant Red E-4BA dye.

We wish to express our gratitude to each of these companies for their generosity. Such donations are most helpful in sustaining our commitment to research.

VISITORS

Visitors to the International Textile Center since the Fall issue of *Textile Topics* include the following:

- C. A. Dishman, Dishman International Company, Uvalde, TX;
- Bryan Morris and Charles Swift, Picanol of America, Greenville, SC;
- Bobby Phipps, Micogen Plant Sciences, Goodyear, AZ;
- Early C. Ewings, Benoit, MS;
- Herb Wright, Wright Fibers, Big Spring, TX;
- Ted Wallace, Mississippi State University, Mississippi State, MS;
- Eileen Hallman,Vresies, Santa Susana, CA;
- Joe Buckner and Eddie Raley, TNS Mills, Inc., Greenville, SC;
- Eddie Peeples, TNS Mills, Inc., Lavinia, GA;
- Ed Hudson, Jackson Mills, Wellsford, SC;
- W. D. Caldwell, Louisiana State University, Red River Research, Bossier City, LA;
- Siegfried Prueckel, Schlafhorst Inc., Charlotte, NC;
- Mike Rodriguez, Cotton Incorporated, Raleigh, NC;
- Mike Lewis, Sara Lee Corp., Winston-Salem, NC;
- Craig Brown, National Cotton Council of America, Memphis, TN;
- Julie de la Fouchardiere and Nicolas Henry, Compagnie Cotonniere, Paris, France;
- Gary Wells and Ansel Owen, J. D. Hollingsworth on Wheels, Greenville, SC;
- Roger Bolick, Allied Fibers, Petersburg, VA;
- Steve L. Teaff, West Texas Utilities, Abilene, TX;
- Helmut Deussen, Consultant to Schlafhorst Inc., Charlotte, North Carolina;
- Karl-Josef Brockmanns and Christoph Farber, W. Schlafhorst AG & Co., Monchengladbach, Germany;
- Brenda Patterson and Norma Keys, Cotton Incorporated, Raleigh, NC;
- Waverly B. Watkins, Levi Strauss & Co., Knoxville, TN;
- Hubert Rotschi, Rieter Corporation, Spartanburg, SC;
- Harvey Campbell, B. C. Cottons, Bakersfield, CA;
- Gregory Hall, Novo Nordisk Bioindustrials Inc., Danbury, CT;
- John and Genevieve Schwartz, Alvin Michalewicz and Michael Block, San Angelo, TX;
- J. C. Queiroz, Unicotton, Sao Paulo, Brazil;
- Marcos Machado da Luz, Industria de Linhas Leopoldo Schmalz S/A, Gaspar, SC, Brazil;
- Jose Mario Gomes Ribiero, Dohler S/A, Joinville SC, Brazil;
- Zareh Zarikian S., Grupo Telares Maracay, Caracas, Venezuela;
- Lodovico Jucker, Milano, Italy;
- Jenena Vugrincic, Zagreb, Croatia;
- Jose Angel Perez H. and Ricardo Muniz, Algodonero Zapata S/A, Torreon, Coah., Mexico;
- Mario B. S. Reis, O. M. Correzones, Sao Paulo, Brazil;
- Orlando Zimmermann, Artex S/A, Blumenau SC, Brazil;
- Eduardo Coen, Artex, Curitiba PR, Brazil;
- Hans Ruckriem, Volkart/Conticotton, Sao Paulo, Brazil;
- Claudia Fernandez Gonzalez, Jose Andres Casco Flores and Javier Molins Tomero, Apoyos y Servicios a la Comercializacion Agropecuaria, Mexico City, Mexico;
- David Lennie, Signature, Sydney, Australia;
- MD. Kutubul Alam, Rupantar Ltd., Dhaka, Bangladesh;
- Yehuda (Joe) Kalo and Yadin Cohen, Northern Gin Ltd., Upper Galilee, Israel;
- Jesse Romero and Sandy Gill, J. Rocha & Co., El Paso, TX;
- Twenty-eight participants in the Japanese Junior Ambassadors program, Musashino City, Japan, "sister city" to Lubbock, TX;
- The Textile & Clothing Planning Project, China Textile Instute, Taipei, Taiwan. This group included Shyh-Huang Hsu, Shue-Jeou Su, Chiung-Wing Chen, Yu-Po Chen, Er-Esi Shih, Shig-Chuan Yao,

VISITORS (Continued)

Jong-Fu Wu, Su-Jen Hsu, To-Mei Tung, Jone-Lin Ting, and Nansen Chang.

- Ffifteen members of the local chapter of Achievement Rewards for College Scientists (ARCS);
- Twenty-five representatives of the American Association of Colleges of Agricultural and Renewable Resources;
- Thirty-one cotton growers from the San Angelo, Texas area;
- Fourteen Texas A&M University Agricultural Extension Service Area Specialists from Corpus Christi, TX;
- Thirty-five Agricultural Economics students, College of Agricultural Sciences and Natural Resources, Texas Tech University;
- Twenty-five graduate students from the Department of Plant Sciences, College of Agricultural Sciences and Natural Resources, Texas Tech University;
- Thirteen graduate students from Texas Tech University's College of Human Sciences;
- Ten Home Economics students from South Plains College, Levelland, Texas;
- Six Eastern New Mexico University College of Home Economics students, Portales, NM;
- Ninety-eight students from five area high schools.

IN MEMORIAM: DR. S. ROSE MATIC-LEIGH

We are saddened to report the untimely death of a former colleague and friend, Dr. Slobodana Rose "Boca" Matic-Leigh. She died in an automobile accident on November 22, 1993, in Clemson, SC, where she was on the faculty of Clemson University. She will be fondly remembered and greatly missed by her many friends at the ITC.