TEXTILE TOPICS

INTERNATIONAL TEXTILE CENTER

TEXAS TECH UNIVERSITY • LUBBOCK, TEXAS / USA

Volume 22, No. 3 Spring 1994

PROCESSING PERFORMANCE OF 1993 TEXAS COTTON CROP EVALUATED

The 1993 cotton crop marked the fourteenth consecutive year that the ITC has systematically sampled, tested, processed and evaluated the performance of Texas growths. A sample of sixteen representative cotton bales was selected in collaboration with the production and marketing sectors of the Texas cotton industry. It included the dominant Texas varieties from each of the Texas areas served by eight different USDA Cotton Marketing Service Offices. These offices are located at Abilene, Altus (Oklahoma), Corpus Christi, El Paso, Harlingen, Lamesa, Lubbock and Waco. All bales were identified by their ginning location as well as by the USDA Marketing Service Area. **The complete report on this study is available from the ITC on request; please specify the Texas Cotton Quality Evaluation: Crop of 1993.**

Fiber samples from each of the sixteen bales were tested using individual instruments, high-volume instruments (HVIs), the IIC/Shirley FMT II, the Peyer Texlab AL-101, and the Zellweger Uster AFIS. This year, in order to test for stickiness of the cotton, fiber samples were processed through a Hollingsworth card for the specific purpose of determining the degree of sticking on the crush rolls.

The sequence of machinery used for processing the fibers into yarns are shown in Exhibit 1. The exhibit reflects the fact that **some of the cotton varieties were processed both with and without combing.** Combing was included in the 1993 crop study for the first time, in order to document its impact on spinning performance and yarn quality. There is increased interest in combing of Texas cottons, primarily in textile manufacturing firms outside the United States which are making ring-spun yarns.

This article focuses on results of combed versus non-combed cotton yarns and on the cotton varieties chosen for this comparative analysis. Six of the longer staple Texas varieties were chosen; i.e., HS-200, DPL 50, DPL 51, DPL 5415, DPL 90, and Acala 1517-88. Actual percentages of comber noils removed from each of these were 12.6%,15.5%, 15.0%, 15.7%, 12.0% and 13.9%, respectively. Both carded and combed slivers of each variety were spun into yarns of size Ne 30/1. The Schlafhorst Autocoro SE-9 was used for rotor spinning and the Saco Lowell SF-3H was used for ring spinning, according to the spinning specifications summarized in Exhibit 2.

Yarn quality was measured in terms of **count-strength product** (CSP) (Exhibit 3), **single yarn strength** as measured by the Uster Tensorapid (Exhibit 4), **elongation** (Exhibit 5), **non-uniformity (CV%)** (Exhibit 6), and **neps** (Exhibit 7). Major impacts of combing on these yarn properties are the following:

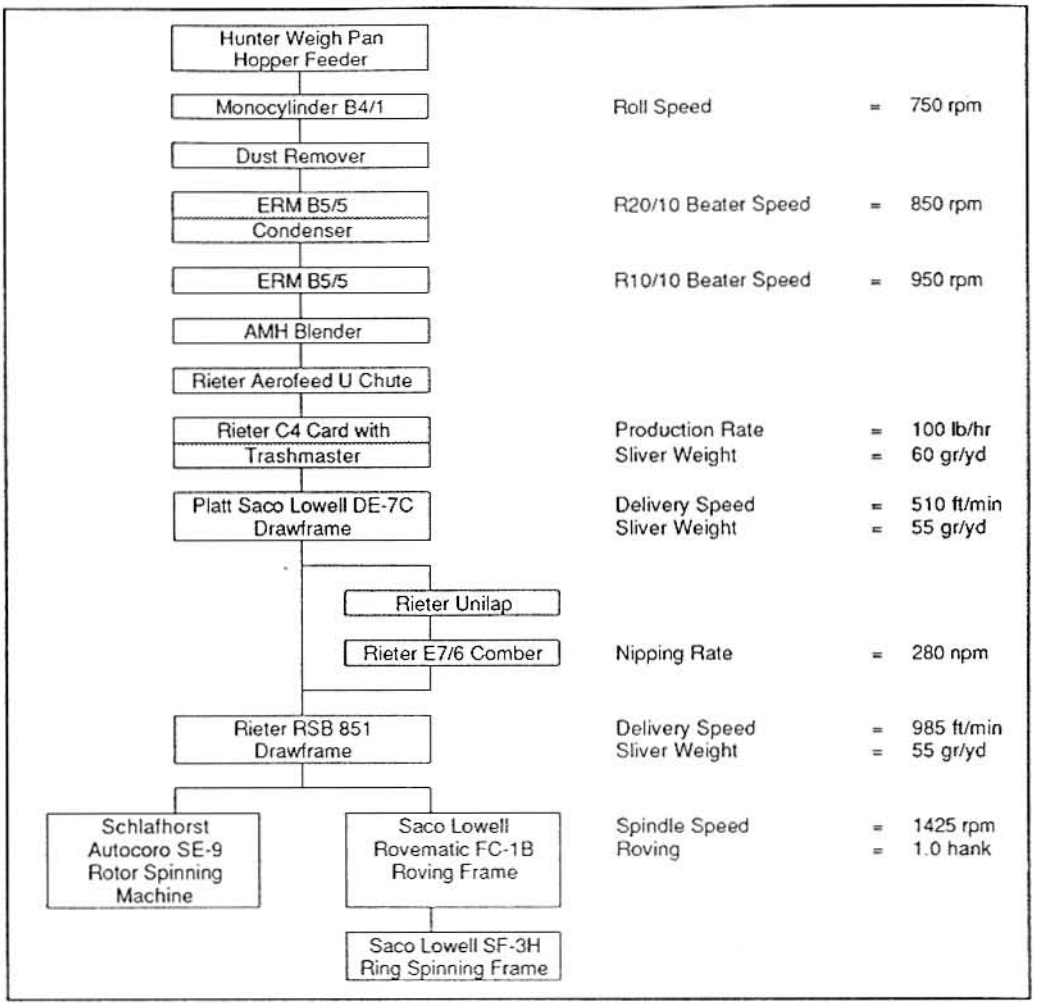
- The CSP by the skein method increased significantly for ring-spun yarns, but only marginally for rotor-spun yarns (Exhibit 3). The same conclusion applies to single yarn strength (Exhibit 4).
- Elongation showed small improvement for both rotor and ring spinning (Exhibit 5). For rotor-spun yarns, however, the improvement was negligible.
- The non-uniformity (CV%) of rotor-spun yarns was unaffected, but it was greatly reduced for ring-spun yarns (Exhibit 6). It is noteworthy that combing was needed to make the non-uniformity measurements for ring-spun yarns compare favorably with those for rotor-spun yarns.
- Neps were decreased in number for both types of spinning; the impact was marginal for rotor spinning but was dramatic for ring spinning (Exhibit 7).

Taken together, these results indicate that combing may be beneficial to mills producing ring-spun yarns, but is probably not worthwhile for those using rotor spinning technology.

Regarding the alternative cotton varieties examined, the following conclusions may be drawn:

- For CSP and tenacity of the yarns, the DPL 90 from the El Paso area performed best (Exhibits 3 & 4). Coming a close second was the HS-200 from the Lubbock area. The DPL 51 from the Harlingen area and the Acala 1517-88 from the El Paso area were somewhat below the HS-200. The DPL 50 and the DPL 5415 from the Corpus Christi area exhibited the least strength among these six varieties.
- For yarn elongation, HS-200 was the highest and

Exhibit 1: Outline of Mechanical Processes for Texas Cotton Quality Evaluation, Crop of 1993



DPL 90 was the lowest, with the others falling in between these two (Exhibit 5).

- The least uniform yarns were from the HS-200 and the DPL 90 (Exhibit 6). These were followed in order by Acala 1517-88, DPL 51, DPL 5415, and DPL 50.
- The smallest number of yarn neps were associated with Acala 1517-88, although the HS-200, the DPL 51 and the DPL 90 were comparable (Exhibit 7). The DPL 50 had by far the largest number of neps, while DPL 5415 had an intermediate number.

These results indicate that the HS-200 and DPL 90 varieties provide the best overall performance for spinning medium-count yarns, whether carded or combed and whether rotor or ring spinning is used.

Exhibit 2: Spinning Specifications for Rotor and Ring Spinning of Ne 30/1 Yarns

(a) Rotor Spinning	
Rotor Type	T 231 D
Rotor Speed (rpm)	100,000
Twist Multiplier	4.80
Opening Roller Type	B 174 DN
Opening Roller Speed (rpm)	7,500
Navel	KN4 + 1.5
Torque Stop	TS 37
(b) Ring Spinning	
Ring Diameter (in)	2
Spindle Speed (rpm)	10,000
Twist Multiplier	4.00

Exhibit 3: Count-Strength-Product for Texas Cottons, Carded and Combed (N_e 30/1)

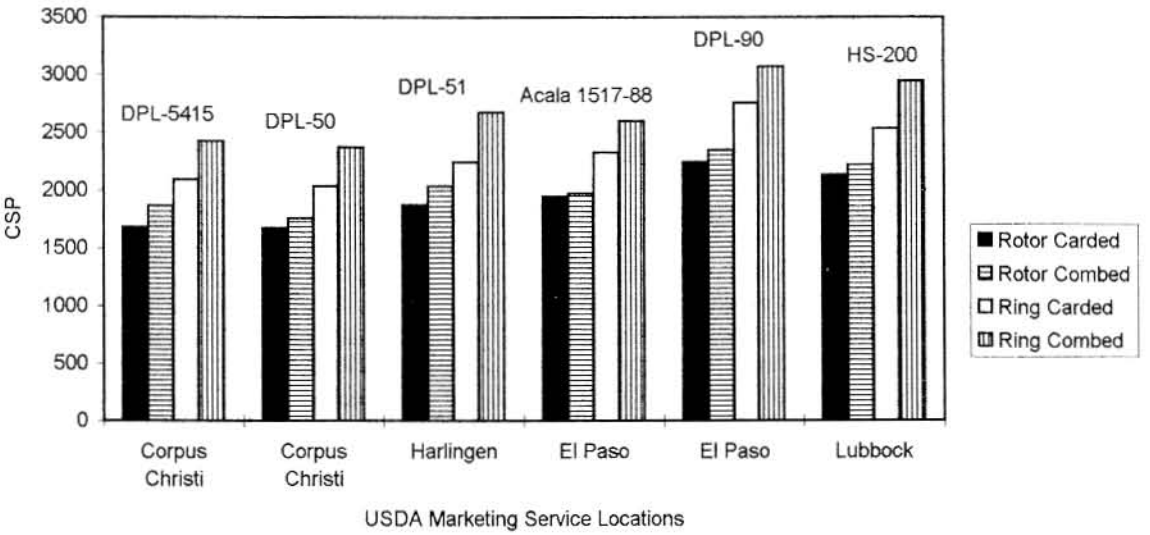


Exhibit 4: Tenacity for Texas Cottons, Carded and Combed (N_e 30/1)

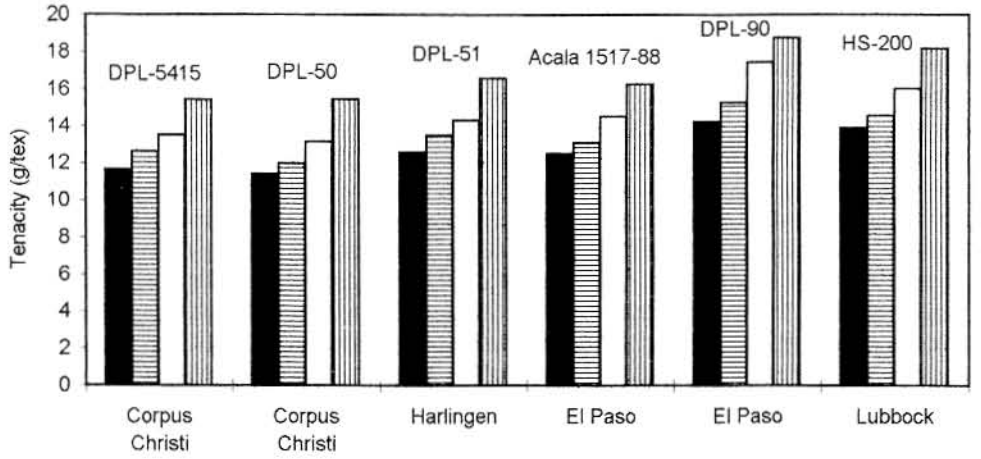


Exhibit 5: Elongation for Texas Cottons, Carded and Combed (N_e 30/1)

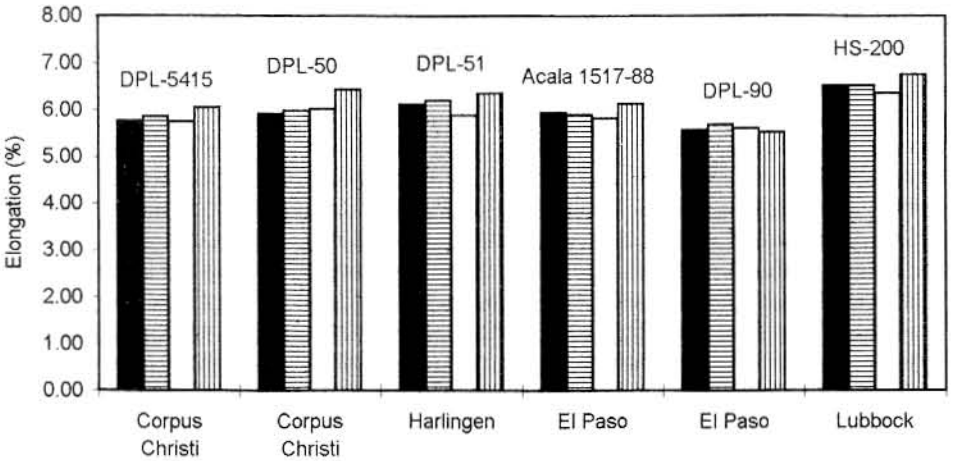


Exhibit 6: Non-Uniformity for Texas Cottons, Carded and Combed (N_e30/1)

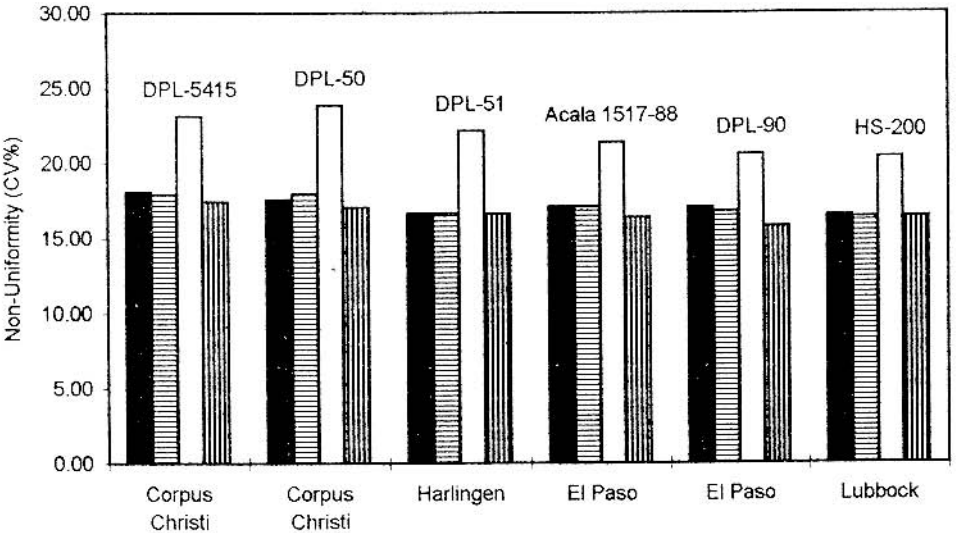
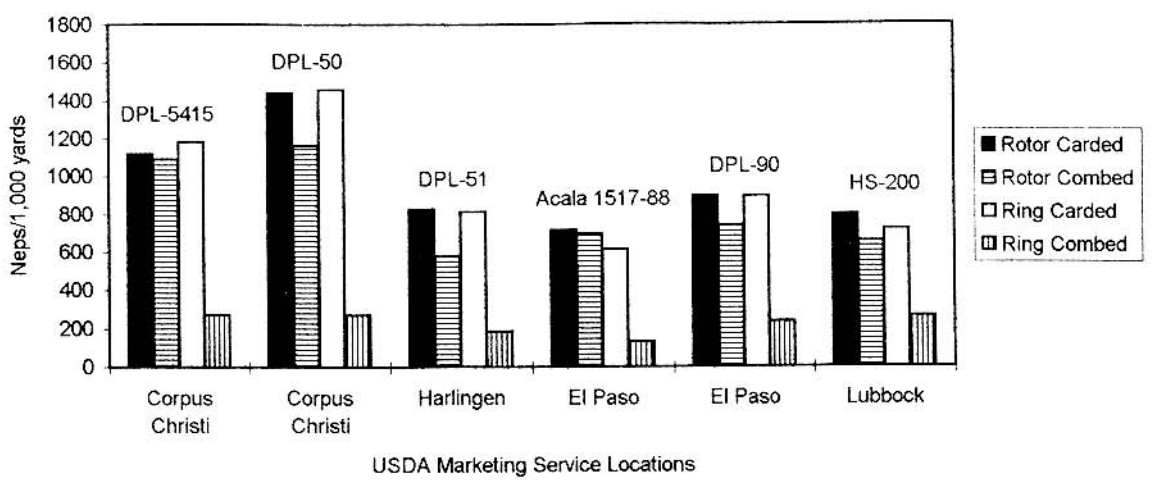


Exhibit 7: Neps for Texas Cottons, Carded and Combed (N_e 30/1)



EFFECTS OF SCHLAFHORST AUTOCORO OPENING ROLLER SPEED ON YARN QUALITY: RESULTS USING CALIFORNIA ACALA COTTON

With open-end rotor spinning, the opening roller separates the sliver into individual fibers and delivers them to the intake of the fiber channel leading into the rotor. The speed of the opening roller on the Autocoro may range between 6,000 and 10,000 rpm, depending primarily on the fibers used and the size of yarn being spun.

In the past, yarn quality has been sensitive to opening roller speed; generally some intermediate speed has given significantly better results. However, the Schlafhorst B174DN opening roller seems to produce little variation in yarn quality as its speed varies.

To provide further evidence regarding impacts of the speed of the B174DN on yarn quality, a high-quality Upland cotton was used to produce a yarn count that is near the commercial limit for fineness on rotor spinning systems. Specifically, a combed California Acala cotton was rotor spun into a Ne 35/1 yarn using a 4.8 TM. Combing was done on a Rieter 7/6 Comber, resulting in 14.6% of the noils being removed. The major mechanical processing steps involved are shown in Exhibit 8.

The Autocoro used by the ITC is equipped with six fixed pulleys that allow six different opening roller speeds; the minimum is 7,000 rpm and the maximum is 9,300 rpm. Exhibit 9 summarizes the tests run using all six of the opening roller speeds available, while holding all other spinning parameters constant.

The overriding conclusion from all the measurements of yarn properties shown in Exhibit 9 is that **there are no significant differences caused by the alternative opening roller speeds.** While there appears to be a slight tendency for strength to be greater at the slower speeds and for evenness to be better at the faster speeds, the differences are too small to be useful in deciding what the opening roller speed should be.

Bear in mind that these results apply to a clean, high quality cotton that was combed prior to spinning. Cotton with, for example, a higher trash content would be expected to benefit from the additional cleaning afforded by a faster opening roller speed. The implication, though, is that reasons for running the B174DN opening roller much below the maximum speed will likely relate to increasing machine life or reducing power consumption, rather than to concerns about yarn quality.

Exhibit 8: Outline of Mechanical Processing used for Test on Opening Roller Speeds

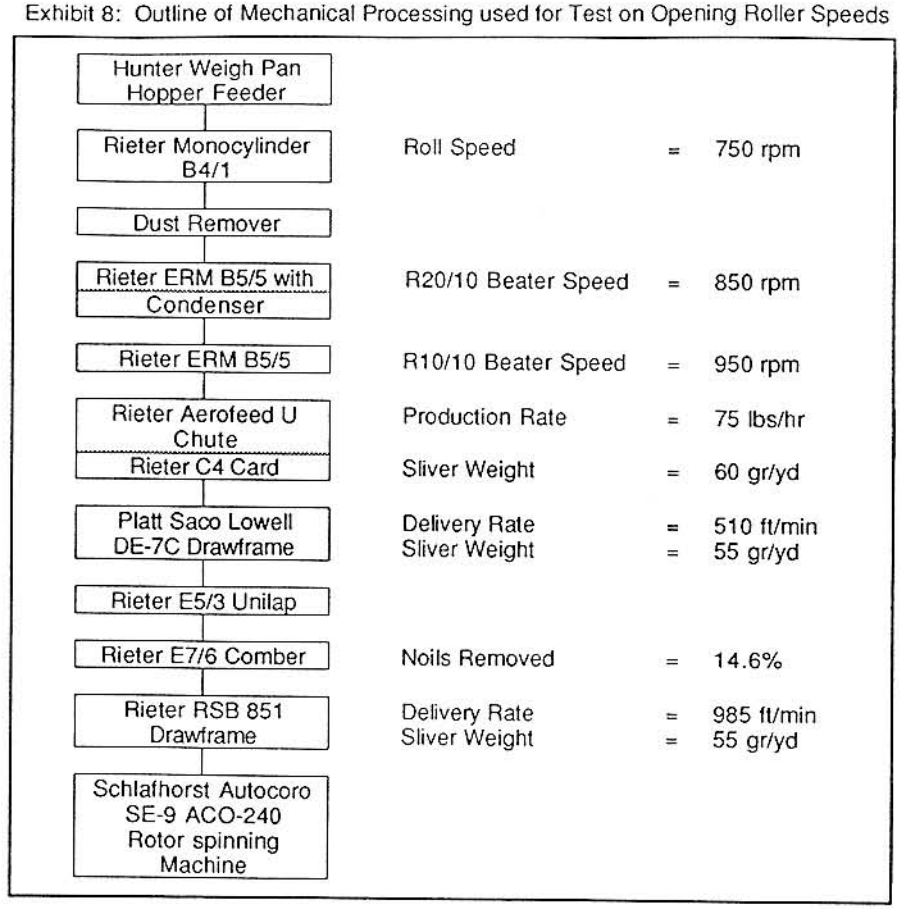


Exhibit 9: Data Relating to Test of Alternative Open-End Opening Roller Speeds

FIBER DATA (Spinlab 900)						
Strength (g/tex)	32.6					
Elongation (%)	6.1					
2.5% Span Length (in)	1.12					
Uniformity Ratio (%)	82.1					
Micronaire	4.2					
Leaf	2					
Reflectance (Rd)	78.4					
Yellowness (+b)	9.6					
SLIVER	55 gr/yd Finisher Drawframe					
Machine	Schlafhorst Autocoro SE-9					
Nominal Yarn Number (Ne)	35/1					
Rotor Type	K 230 D					
Rotor Speed (rpm)	120,000					
Opening Roller Type	B174DN	B174DN	B 174DN	B174DN	B174DN	B174DN
Opening Roller Speed (rpm)	7,000	7,500	7,900	8,300	8,800	9,300
Draft	229.7					
Twist Multiplier	4.8					
Yarn Speed (m/min)	106.9					
Navel	KS + 0 + TT					
Ambient Conditions	72° F/55% RH					
YARN PROPERTIES						
Skein Test:						
Actual Yarn Number	34.48	34.56	34.73	34.51	34.44	34.60
CV% of Count	0.5	0.6	0.5	1.0	0.4	0.6
Count-Strength-Product	2463	2527	2517	2479	2460	2446
CV% of Strength	3.2	2.8	3.1	3.2	2.4	4.6
Single Yarn Tensile Test:						
Tenacity (g/tex)	16.81	16.80	16.52	16.24	16.44	16.20
Mean Strength (g)	288	287	281	278	282	276
CV% of Strength	9.3	8.4	9.7	9.4	7.4	8.8
Elongation (%)	5.67	5.69	5.51	5.53	5.73	5.59
CV% of Elongation	7.6	6.6	8.2	8.1	6.2	7.3
Uster Evenness Test:						
Non-Uniformity (CV%)	15.49	15.42	15.36	15.33	15.26	15.23
Thin Places/1,000 yds	78	72	72	64	61	61
Thick Places/1,000 yds	114	94	93	90	96	91
Neps/1,000 yds	169	122	121	115	150	116

ITC STAFF LOGS INTERNATIONAL EFFORTS

Noteworthy international activities recently done or soon-to-be done by ITC staff include the following:

- M. Dean Ethridge, Director, attended the 22nd International Cotton Conference in Bremen, Germany during the first week in March, as well as the Working Groups on Cotton Quality issues preceding the full Conference. Both the presentations and the spirited discussions were quite worthwhile; the hospitality was exemplary and sincerely appreciated.
- Harvin R. Smith, Assistant Director, was a member of an eight-person team that formed a Texas Trade Mission to France during the week of April 15. The trip was sponsored by the Texas Department of Agriculture (TDA) and was led by TDA Assistant Commissioner for Marketing and Agribusiness Development, Mark M. Ellison.
- Mr. Smith also attended and made multiple presentations at the Cotton Fibre Seminar held in Seville, Spain during the week beginning May 15. It was sponsored by the Agricultural Research and Development Center (CIDA) of the State of Andalusia. Presentations by Mr. Smith dealt with defining and measuring cotton fiber characteristics, with particular emphasis on HVI technology and the evolving US cotton classification system.
- During early June, Mr. Smith will participate in an educational/promotional program about Texas cotton before participants in the Mexican textile industry. The program has been conceived by the Texas Cotton Association (consisting of Texas cotton merchants) and will be guided by the Texas Department of Agriculture.
- Also in June, Dr. Ethridge will consult with the Government of Egypt, in order to help formulate a plan for de-regulating and privatizing that country's textile industry. The project will be based in Cairo and will involve a month of intensive effort.

ITC GRANTED TRADEMARK ON TEXCELLANA

On April 13, 1994, the Secretary of State in Texas officially granted a trademark registration to the ITC for the word Texcellana. The stylized version is recorded as TEX*cel*lana™; TEX for the state of Texas, *cel* for cellulosic cotton fibers, and lana being the Spanish word for wool. This trademark may be licensed for use by the ITC for yarns and products made from yarns that are an intimate blend of Texas cotton and Texas short-shorn wool. The yarn, which is spun on the cotton system, was developed and named at the ITC. It has been produced and sold on a limited commercial scale during recent years. Therefore, it was deemed appropriate to secure a trademark registration in order to foster the process of commercialization.

SHORT COURSE GIVEN FOR TEXAS DEPARTMENT OF CORRECTIONS

Supervisors of the Texas Department of Corrections (TDC) textile mill at Huntsville recently spent some days at the ITC to take a special short course tailored to their specific objectives. Subjects covered included fiber, yarn and fabric testing; blending, carding, drawing and combing of cotton fibers; ring and rotor spinning; fabric constructions; and bleaching, dyeing and finishing. The TDC personnel -- Richard Tatsch, Gene Moore and Earl Stewart -- were both good students and pleasant company. We look forward to continuing to work with them in the future.

DONATIONS

Donations received by the ITC include:

- from Carter Traveler Company, Gastonia, NC – various sizes and finishes of ring travelers;
- from Farmers Compress, Lubbock, TX – four bale sampling knives, steel and rock tools;
- from Sonoco Products Company – four cases of cylindrical tubes.

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 Winter issue of *Textile Topics* include the following:

- Phillip Chandler, SSM Industries, Spring City, TN;
- Steve Verett, Texas Foof & Fiber Commission, Dallas, TX;
- Bill Hartman, Aqua Dynamics, Shiloh, TN;
- Will Brown, MacBeth Corporation, Liberty, SC;
- Sherif Wahba, Instron, Los Alamitos, CA;
- Rick O'Sullivan, Werner International, New York, NY;
- Harvey Campbell, BC Cotton Inc.,Bakersfield, CA;
- Dr. Abdel Fattah M. Mtawie, Water Research Center, Cairo, Egypt;
- Rod Payne, Lubbock International Airport, Lubbock, TX;
- Miguel Angel Otero, editor of Mundo Internacional, Mexico;
- Irina Burgener and production crew, Voice of America, Washington, DC;
- Roger Bolick, Allied Fibers, Petersburg, VA;
- Danny Gilmore, George A. Goulston Chemical Co., Monroe, NC;
- Mark Lange, National Cotton Council of America, Memphis, TN;
- Lori Wright & Rhonda Boyter, Pillowtex, Dallas, TX;
- Kanhu Qi, Faron Pfeiffer and Debbie Minikhiem, Texas A&M Agricultural Research and Experiment Station, San Angelo, TX;
- Terry Townsend, International Cotton Advisory Committee, Washington, DC;
- Jesse Romero, J. Rocha & Co., El Paso, TX;
- James F. Menke, United Filters, Inc., Amarillo, TX;
- Frances Collins, Bramwell Yarns, USA, Midland, TX;
- Hans D. Behrens, Mercanias Internationales, S.A., Guatemala City, Guatemala;
- Stephen Parks, Parks Planting Company, Tiptonville, TN;
- Thirty Texas Tech University Agricultural Economics students with their instructor, Dr. Jim Graves;
- Twenty-two residents of Carillon Retirement Village, Lubbock, TX;
- Eleven students from Estacado High School, Lubbock, TX;
- Sixteen Ralls Junior High School students, Ralls, TX;
- Seven students from Post Christian School, Post, TX;
- Twelve 4-H Club members from Colorado City, TX;
- Ten members of the Roosevelt 4-H Club, Lubbock, TX;
- Eight members of the Big Lake High School FHA Chapter, Big Lake, TX.