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INSTRUMENTS FOR COTTON FIBER TESTING The recent emphasis on cotton evaluation by electronic instruments has raised the question of how results from the newer high volume systems (HVI) compare with those from established instruments, such as the Fibrograph and Stelometer that have been used for many years. In an attempt to answer this question, the Textile Research Center undertook an extensive program for the Natural Fibers & Food Protein Commission of Texas (NFFPC). The study included 38 bales of cotton grown in various areas of Texas. Thorough fiber testing was conducted and then standard processing was employed prior to open-end and ring spinning. Half of the cotton used in this research came from the 1980 crop and the remainder from 1981.

The report of this study required 58 pages in the 1982 Annual Progress Report to NFFPC, and obviously it is not possible to carry it in its entirety in *Textile Topics*. However, we are reproducing a part of it that deals with the correlation of fiber testing results obtained from HVI with those from individual instruments and the relationship between fiber properties and yarn strength. The following excerpts are from the full report written by John B. Price, head of TRC's open-end spinning research.

"The correlations between assessments of similar properties measured on the different instruments are shown [Table II] for the three sets of data [1980 crop, 1981 crop, pooled data]. Correlation was understandably best between the Fibronaire instruments for the determination of micronaire value. Fiber lengths (upper-half mean and 2.5% span) correlated well. Strengths and uniformity ratios correlated relatively poorly. These relationships, showing the regression equation for the pooled data, are plotted in Graphs 1 through 4. The scatter of the individual points about the line for the two crop years is not homogeneous for the length and the strength relationships. This would suggest differences in calibration between crop years for either or both categories of instrument.

"A close relationship existed between the readings from the two Fibronaire instruments, and their relationships with the Fineness/Maturity test results were also similar [see Table I]. However, the standard deviation about regression was better using high volume instrument data rather than individual instrument data in six cases out of nine. In spite of this, there is a great similarity between HVI and individual instrument data in the regression coefficients of the pooled-data equations.

"Although the correlation between either maturity or fineness and micronaire was good, a further improvement in correlation was obtained by using both fineness and maturity, as might be expected. The improvement in correlation, however, was statistically significant only for pooled data, probably due to the increased sample size. Equations utilizing both maturity and fineness accounted for 90% or more of the variation in micronaire value within the sample.

"Examination of [multiple linear regression] equations incorporating maturity or fineness suggests that there is no consistent reduction in the standard error about regression by their use in place of micronaire value. Even when both maturity and fineness were present in the data for analysis, one of these properties was selected to the exclusion of the other.

"The regression coefficients for micronaire, maturity or fineness were always negative. This implies that cottons of low micronaire value are the most suitable for spinning. Additionally, fine, immature cottons give yarns of higher strength.

"[When HVI data were used], fiber length was always selected as the first entry into equations for yarn strength. Fiber strength was of secondary importance but appeared in all equations, whereas micronaire value appeared only in the equations for the finest (N_e 22) rotor-spun yarn.

"[When using individual instrument data], fiber strength was consistently the most important yarn strength-determining factor. Length entered relationships with ring-spun yarn strength, together with uniformity ratio. In the rotor-spun yarn equations, length was present only in the equation for the finest yarn (N_e 22). Micronaire value appeared in equations for finer yarns, as might be anticipated from simple theoretical consideration. The errors about regression from these equations were consistently lower than those obtained with comparable equations using high volume instrument data.

"Conclusions [for this portion of the study were:]

1. In common with analyses performed on each crop sample, length was the fiber property which made the greatest contribution to the explanation of yarn strength *when high volume instrument data were used.*
2. Fiber strength was the most important yarn strength-correlating factor *when individual instrument data were used.*
3. Correlations between yarn strength and individual instrument properties were consistently superior to those obtained from high volume instruments, when similar numbers of analogous fiber properties were used to derive the multiple regression equations.
4. The grades of leaf, grayness and yellowness did not make consistent, significant contributions in equations relating yarn strength to fiber properties.
5. Micronaire value tended to appear in equations for finer yarns. Replacement of micronaire value by either fineness or maturity, or both, did not give consistent improvement in correlation with the equations."

Table I gives some of the fiber properties obtained from a high volume system and from individual instruments, while Table II presents the correlations between fiber properties measured by the different methods. Graphs 1 through 4 show the data in such a manner that the correlation between testing methods can readily be seen. It should be noted that all data were pooled to determine the correlation between HVI and individual instruments for the different fiber tests.

We have attempted to cover a large report by offering a small portion of it. If this has raised additional questions, we will be pleased to furnish more information on this subject. A copy of the complete report is available on request. We would like to express our appreciation to the Natural Fibers & Food Protein Commission of Texas for granting permission to reprint this portion of its 1982 Annual Progress Report.

TABLE I

Characteristics of Fiber Properties Distributions of 1980 and 1981 Crop Sample
(38 Cottons)

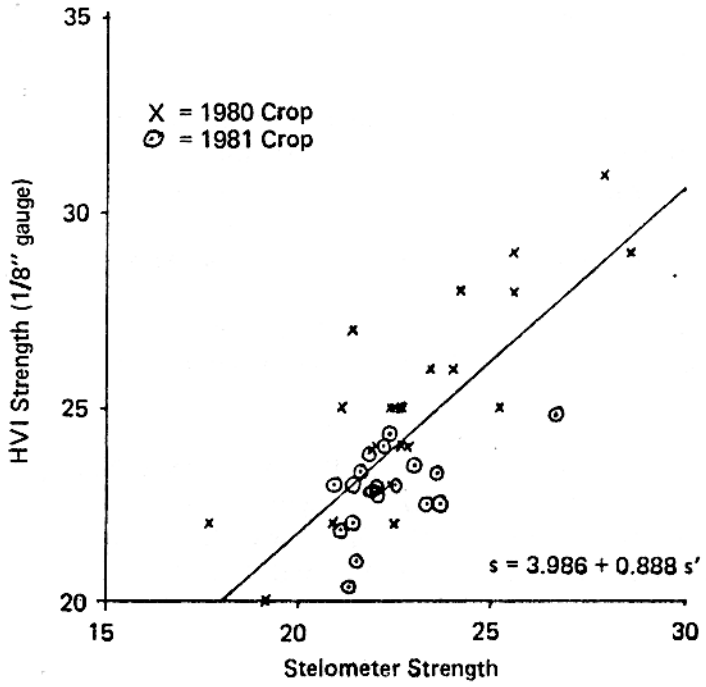
Fiber Property	Mean	S.D.	CV (%)	Range
High Volume Instrument Data				
Strength (1/8" gauge - g/tex)	24.05	2.29	9.52	20 - 31
UHM Length (inches)	0.9805	0.066	6.77	0.83 - 1.11
Uniformity Ratio (%)	79.53	2.51	3.16	75 - 85
Micronaire	3.905	0.637	16.31	2.6 - 5.0
Individual Instrument Data				
Stelometer Strength (g/tex)	22.60	1.88	8.33	17.7 - 27.9
2.5% Span Length (inches)	0.9826	0.076	7.77	0.81 - 1.11
Uniformity Ratio	43.03	2.39	5.55	37 - 47
Micronaire	3.911	0.677	17.31	2.9 - 5.0
FMT Data*				
Maturity (percent)	72.26	8.97	12.41	52 - 91
Fineness (mtex)	177.39	32.26	18.19	130 - 255

*IIC/Shirley Fineness/Maturity Tester

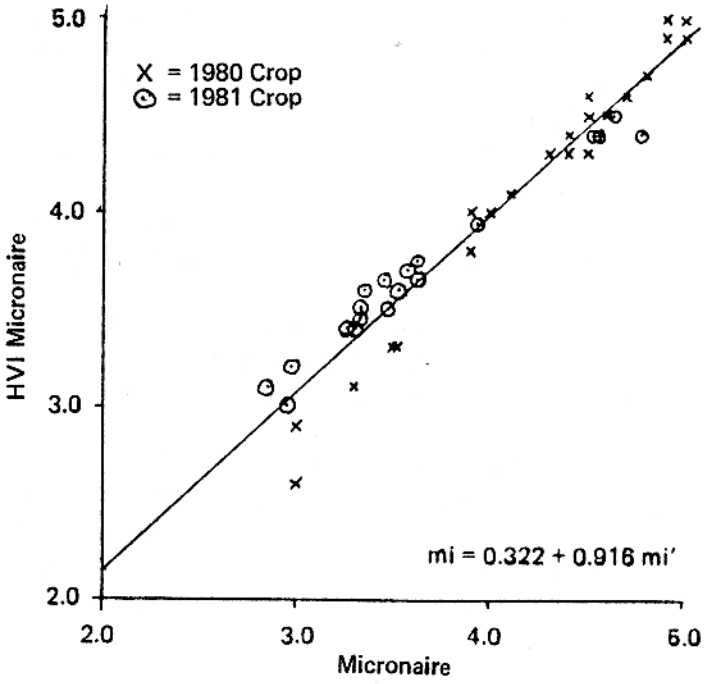
TABLE II

Correlation Between Fiber Properties Measured on HVI and Individual Instruments
(Source — Picker Lap Samples)

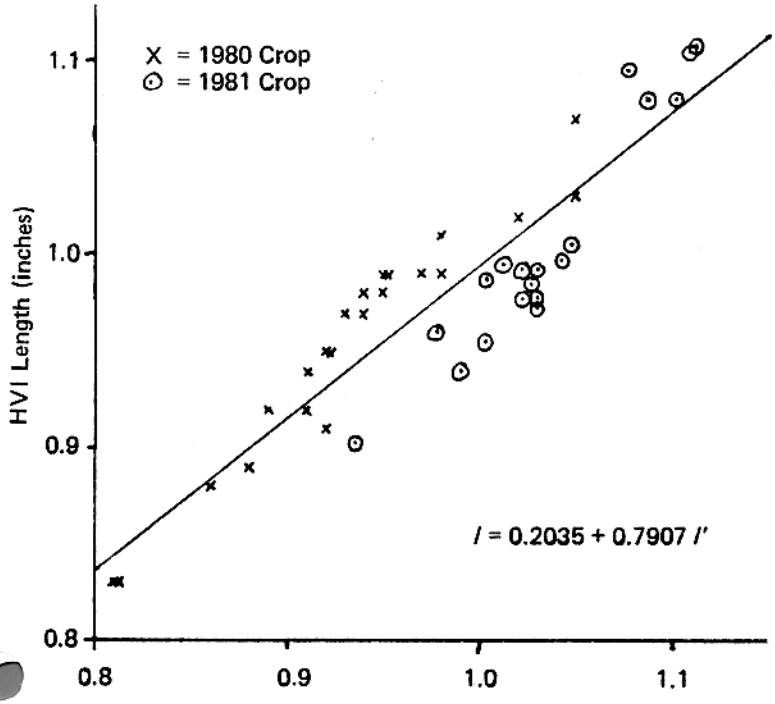
Fiber Property	1980 Crop	1981 Crop	Pooled
Strength	0.8322	0.5244	0.7298
Length	0.9668	0.9558	0.9096
Uniformity Ratio	0.5859	0.8374	0.6780
Micronaire	0.9811	0.9859	0.9737



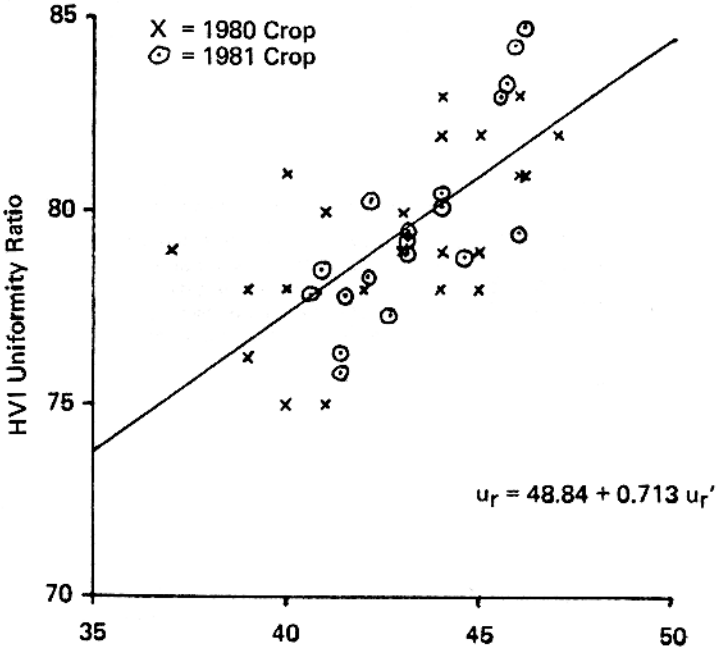
GRAPH 1
Relationship Between Strength Measurements (g/tex)



GRAPH 2
Relationship Between Micronaire Measurements



GRAPH 3
Relationship Between Length Measurements



GRAPH 4
Relationship Between Uniformity Ratios

AWARDS FOR TEXTILE ENGINEERING STUDENTS Two students in Texas Tech University's Department of Textile Engineering have recently been named for special honors. Graduating senior Jane G. Kveton of Abernathy, Texas was selected as one of six outstanding students by the College of Engineering Student Council. The six were picked from more than 4,000 students enrolled in the College's eleven engineering departments. Miss Kveton currently has a 3.36 grade point average and has been an outstanding student in every way.

Twila Braun, a junior from Seminole, Texas is one of twenty students selected to receive an award from the ARCS (Achievement Rewards for College Scientists) Foundation. Recipients for this award are selected each spring from juniors with outstanding records who will be classed as seniors the following fall. Twila was chosen on the basis of her scholarship, currently a 3.93 GPA, and leadership demonstrated in many extracurricular activities. This award entitles Twila to a $1,000 scholarship for her senior year.

We are pleased that Jane and Twila have been selected for these honors. We feel the naming of two Textile Engineering students from among so many in the College is indicative of the Department's quality education and emphasis on scholarship.

VISITORS Visitors to the Textile Research Center during April included Bill Roach, Caprock, NM; Trevor Rhodes, Levi Strauss & Co., San Francisco, CA; Dick Pittman, John D. Hollingsworth on Wheels, Greenville, SC; Maureen Grasso, University of Texas at Austin, Austin, TX; Ray Sammons, Ag Computer Service, Amarillo, TX; Jimmy Pope, Zellweger Uster Corporation, Charlotte, NC; and T. J. Holohan, Bradmill Industries Limited, Sydney, Australia.