HVI MEASUREMENTS OF SHORT FIBER CONTENT

H. H. Ramey, Jr.
USDA-AMS
Memphis, TN

Abstract

A Short Fiber (SF) content measurement developed by Zellweger Uster for High Volume Instrument (HVI) systems is being evaluated. The software program was installed in 10 HVI lines in the USDA-AMS Quality Assurance unit and SF was measured on all checklot samples, beginning September 19, 1997. For 83,547 samples processed through December 16, 1997, the reproducibility within plus or minus 1.0 was 77.0 percent. The SF measurement is highly correlated with other length measurements. There are differences in results levels among the 10 lines being used. Means of bringing all lines to a common results level is being addressed.

Introduction

The High Volume Instrument (HVI) systems currently being used in the classification of cotton samples for marketing purposes make seven fiber property measurements. These are fiber length, fiber length uniformity index (UI), fiber strength, micronaire reading, percent area of trash, reflectance (Rd), and yellowness (+b). Additional measurements of fiber properties are proposed from time to time.

Measurements of the HVI classification system must meet six criteria (Ramey 1997). The measurement must be meaningful. It must have sufficient speed to be compatible with the current HVI systems. The measurement must be reliable. It must be reproducible. There must be a procedure for calibrating many systems to a common level. Finally, the measurement must be economically feasible.

Textile manufacturers have asked for a short fiber (SF) content measurement for HVI systems (Behery 1993). A SF measurement recently developed for HVI systems by Zellweger Uster is being evaluated.

The speed of the new SF measurement is adequate because it is made on the same beard and at the same time that the length and UI measurements are made. Preliminary evaluations have shown that the SF measurement is as reliable as most of the other HVI measurements. Reproducibility of the SF measurement is being evaluated and is the subject of this paper.

Materials and Methods

Samples were 1997 crop checklot samples. These are samples that after being graded in a classing office are randomly taken for retest in the USDA-AMS Quality Assurance unit in Memphis (West 1995). About one percent of the samples being classed in an office each day are taken as checklot samples and are sent overnight for the retest. The samples tested in Quality Assurance each day are representative of the quality of cotton classed in the offices the preceding day.

The Zellweger Uster SF measurement is a software program which calculates SF from the scan of the fiber beard made during length measurement. The SF program was installed in ten Zellweger Uster HVI lines in the Quality Assurance unit. SF measurements have been made on all checklot samples beginning September 19, 1997.

Each check lot sample is tested on two HVI lines and the average is used for the value of the sample. Reproducibility was calculated by using the test data from individual lines. SF results from tests of samples on Line A were compared to the results from tests of the same samples on Line B. The percentage of the time that the SF results of the second test were within plus or minus 1.0 percentage point from the SF results of the first test were determined. This percentage is the reproducibility of the test.

Results and Discussion

For 83,547 samples tested from September 19, 1997 through December 18, 1997, 77.0 percent of the duplicated tests were within the 1.0 percentage point tolerance.

Table 1 contains the average length, uniformity index, short fiber content, and reproducibility for 22,514 samples from five production areas tested from November 19 through December 18, 1997. Reproducibility of SF increases as UI increases. Also, reproducibility tends to be higher for the longer staple cottons and lower for the shorter staple cottons. These tendencies indicate that SF is not an independent measurement but is dependent on other properties of the length distribution of the sample.

Fiber length in Table 1 ranges from 1.06 inches in the Southwest to 1.14 inches in the San Joaquin Valley. The short fiber content ranges from 7.9 to 5.8 percent across the same range in fiber length. These data illustrate that short fiber content is less for the longer staple cottons than for the shorter staple cottons. This partially follows from the definition of SF as fiber shorter than one-half inch.

For classing offices averages, the simple correlation of length and SF is r = - 0.973 and for UI and SF is r = - 0.904. However if mean length is determined from length and UI and the correlation between mean length and SF calculated,

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 2:1513-1514 (1998)
National Cotton Council, Memphis TN

it is r = - 0.994. These relationships also indicate that SF is not independent of other length measures.

The SF for each UI within a length was determined for representative days during the season. Table 2 contains the SF for the respective UI within each of four length increments of the checklot samples processed on December 2, 1997. It is very obvious that SF decreases when UI increases, which confirms a previous report (Ramey and Beaton 1989). Additionally, within a given UI, the SF decreases as the length increases. These data further indicate that SF is not independent of the other length measures. Thus, the SF measure cannot stand on its own but must be evaluated in relation to fiber length.

There were differences in levels of SF results among the lines. Efforts are being made to bring the SF results of all lines to a common test level.

References

Behery, H. M. 1993. Short fiber content and uniformity index in cotton. ICAC Review Articles on Cotton Production Research No. 4, CAB International, Oxon, UK, 40 pp.

Ramey, H. H., Jr. 1997. Additional fiber measurements being evaluated. Proceedings Tenth EFS System Conference (In press).

Ramey, H. H. and P. G. Beaton. 1989. Relationships between short fiber content and HVI fiber length uniformity. Textile Research Journal 59:101-108.

West, D. G. 1995. Cotton division quality control program. Proceedings Beltwide Cotton Conferences. 1216-1218.

Table 1. Fiber length, length uniformity, short fiber content, and reproducibility, within ± 1.0, of the short fiber content measurement, averaged by production areas, for the 22,514 checklot samples tested from November 19 through December 8, 1997.

Area	Length	UI	SF	Reproducibility
Southeast	1.085	80.88	7.38	71.9
Mid-south	1.121	81.60	6.38	76.2
Southwest	1.060	80.83	7.87	70.1
Desert SW	1.103	80.39	7.24	68.8
San Joaquin	1.140	82.22	5.83	82.4

Table 2. Average short fiber content for the respective uniformity indices (UI) of four lengths of checklot samples processed on December 2, 1997.

	Length (in 100s inch)			
UI	1.03	1.06	1.09	1.12
78	10.7			
79	9.5	8.9	8.1	
80	8.8	8.3	7.6	7.0
81	8.5	7.8	7.2	6.6
82	7.9	7.3	6.9	6.3
83		7.0	6.4	6.1
84			5.9	5.6