2003 BELTWIDE COTTON CONFERENCES, NASHVILLE, TN – JANUARY 6-10

IMAGE ANALYSIS OF THE CROSS-SECTIONS OF COTTON FIBERS ON A REFERENCE SET OF COTTONS

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Abstract

The Image analysis of the cross section of cotton fibers constitutes an excellent reference method for maturity and fineness measurements. However, this technique is too slow to be of practical use in commercial operations. Therefore, in collaboration with Cotton Incorporated, it was decided to create cotton standards. Such standards should have a low level of variability and be prepared in quantities large enough to be used during at least a decade. The primary goal is to have cottons of known values to calibrate high-speed instruments (e.g., dual compression testers, AFIS, etc.).

Previous results obtained on 7 bales showed that examining 4,000 fibers per bale should give us a good estimate of fiber Perimeter and Theta. Our goal is to collect data on 100 bales representing a range of perimeters and theta. This year, thirty-four bales representing a range of micronaire and geographical origins were selected. From each bale 70 pounds of lint were taken and processed into card web following the ICCS protocol for the creation of cotton standards. During the card web formation samples were taken for cross section analysis. The method developed by Devron Thibodeaux (SRRC New-Orleans) was then used to prepare the sub-samples and the software developed by Bugao Xu (UT Austin) was used to analyze the cross sections.

The image analysis measurements performed on each cross section were: Perimeter, Area and Theta. For each bale evaluated the confidence intervals for Perimeter, Area and Theta are excellent. It confirms that with an adequate sampling method measuring 4,000 cross-sections per bale is sufficient. The coefficients of variations between sub-samples (at least 500 cross-sections/sub-sample) within a bale are quite good (2.1% and 2.6% respectively for Perimeter and Theta).

For the set of 34 bales tested:

- There is no relationship between Perimeter and Area,
- There is relationship between Area and Theta,
- There is a strong negative correlation between Perimeter and Theta (R^2 = 0.756***), with the finer cottons tending to be more mature than the coarser cottons.

Acknowledgments

This project was supported by Cotton incorporated and the Texas Food and Fibers Commission.