THE IMPORTANCE OF FIBER PROPERTIES IN DETERMINING THE STRENGTH OF A WIDE VARIETY OF AMERICAN COTTONS

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Abstract

Thirty-six American cottons of many genotypes were grown by W.R.Meredith at Stoneville, MS in 1995. Fiber Properties were measured by Micronaire, Areolometer, HVI, AFIS, and the 50% X-ray Intensity Angle of the 002 diffraction arc of bundles of cotton fibers. Fiber bundle tenacity was measured by HVI and fiber bundle tenacity and elongation were measured by Stelometer. The 50% X-ray angle was the key fiber measurement for evaluating all other fiber properties. Simple correlation analysis shows that as the 50% X-ray Angle decreases fiber strength and length increase; fiber tensile strain, perimeter, linear density, and fiber maturity ratio decrease. Best results (*highest correlations*) are obtained when Stelometer bundle modulus is used rather than just Stelometer tenacity or HVI tenacity. Thus, Secant Modulus is a more comprehensive measurement of fiber bundle strength than tenacity. When multiple correlation evaluations are made to compare each of the several bundle strength parameters with the 50% X-ray angle and all fiber properties, X-ray angle and all fiber properties except one fiber property - AFIS perimeter- are excluded. The reason for this is statistical col linearity among all of the fiber properties. Thus, the 50% X-ray Angle, though an important measure of fiber properties and strength, can be supplanted by the measurement of AFIS perimeter.

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