

**RELATING SINGLE FIBER MEASUREMENTS
TO COTTON STRENGTH, STRUCTURE, AND
MORPHOLOGY**

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Abstract

The overall goal of our research is to examine the relationship between cotton fiber structure/morphology and its strength or performance. More specifically, we have: a) developed a more meaningful relationship between single fiber (MANTIS) strength and bundle tenacity; and b) studied in depth the relationship between fiber strength and the orientation of crystalline microfibrils that constitute the fiber secondary wall. The study was conducted with three different collections of cottons consisting of: a) five genetically related Texas cottons supplied by Dr. John Gannaway; b) ten cottons - five varieties with two reps each considered separately that were grown in the Mississippi delta and supplied by Dr. William Meredith; and c) sixteen cottons including eight Egyptian and eight American from a study at SRRC conducted by Dr. Nadia El-Gawad. The following summarizes the findings of this research: a) dividing MANTIS breaking load (T_b) by the ribbon width (R.W.) squared yields a breaking stress parameter that is highly correlated with stelometer tenacity; b) bundle tenacity shows a fair correlation with X-ray orientation angle; c) the correlation between tenacity and X-ray orientation angle is improved by addition of the fiber perimeter as measured by AFIS; and d) there is a good correlation between fiber modulus obtained both from stelometer and MANTIS and the X-ray orientation angle.