ASSESSMENT OF FIBER VARIATIONS AMONG UNDEREDVELOPED MOTE Bt COTTON FIBERS AND DEVELOPED SEED Bt COTTON FIBERS

A.S. Johnson, G.H. Davidonis and J.M. Bradow
USDA, ARS
Southern Regional Research Center
K.B. Hood
Perthshire Farms
Gunnison, MS

Abstract

Variations among fiber quality properties associated with cotton ovule development are of interest to every sector of the cotton production and processing community. Quantitative characterization of these variations may lead to crucial improvements in production practices. Upland cotton (*Gossypium hirsutum L.*, NuCOTN 33B) was field grown in Gunnison, MS., in 1996 under rainfed and irrigated conditions. Cotton was hand-harvested, mote ovules and seeds were weighed with fiber attached and placed into the following weight categories: short-fibered mote categories of <10 mg, 11-20 mg and >20 mg; long-fibered mote categories of <20 mg, 20-39 mg and 40-59 mg; seed categories of 60-99 mg, 100-149 mg and 150-199 mg. Fiber was hand-ginned and three samples from each weight category were analyzed for fiber properties on the Advanced Fiber Information System (AFIS A-2). Statistical comparisons (alpha = 0.05) of each separate category and pooled categories were performed using SAS statistical software. Fiber quality properties from the high and middle weight groups of the developed seeds were the controls.

Fiber property characteristics for short-fibered motes differ significantly from other fiber properties found within a field. Their lower length and higher short fiber content measurements suggest earlier termination of fiber elongation and ovule abortion. The large diameters of the short-fibered motes indicate that fiber elongation may be sacrificed as a result of increased secondary cell wall deposition. This effect on diameter did not correlate with an increase in circularity (Theta), a measure of wall thickness. Circularity values were the same for the short-fibered motes and long-fibered motes [and higher for developed seeds]. Short-fibered mote micronAFIS values were lower than the developed seed values and higher than the long-fibered mote values.

Differences between long-fibered motes and developed seeds in length and short fiber content was seen, except between the long-fibered mote weight category of 40-59 mg and the developed seed weight category of 60-99 mg. This suggests that a developmental transition phase exists and that a fourth type of mote or seed classification must be used when considering these AFIS fiber parameters. Area measurements remained consistently lower for long-fibered motes and suggest a basis for possible classification, especially since there was no difference between the areas for the short-fibered motes and developed seeds. Circularity measurements do not differ for the short or long-fibered mote categories, but areas do. Since the areas of the short-fibered motes and the developed seeds do not differ, it can be postulated that their high micronAFIS values are related to the fineness component and not the secondary cell wall deposition component. This hypothesis appears to hold for long-fibered motes where micronAFIS and area values are lowest and circularity values are consistent with those of short-fibered motes and less than those of developed seeds.

Based on the micronAFIS calculation, short-fibered motes lie within the acceptable micronaire ranges of 3.5 to 4.9, long-fibered motes lie below the acceptable micronaire of 3.5 and developed seeds lie above the acceptable micronaire of 4.9. MicronAFIS averages were 3.9 for pooled rainfed data and 3.8 for irrigated. This suggests that motes are good for bringing down certain micronaire bale averages at the classing office but still contribute to defects at the mill. No significant differences attributed to irrigation were seen between the fiber properties, except a decrease in the diameter and area of long-fibered motes. These findings may help establish a new method for mote determinations and demonstrate the potential for using mote classification as a fiber quality predictor.

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