EFFECT OF FRUITING POSITION ON COTTON FIBER FINENESS AND MATURITY

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Abstract

Cotton fiber market value is determined in part by the quality parameter micronaire. This unit-less quantitative trait is dependent on the sample fiber's fineness and maturity, each having specific effects on yarn quality. For example, fiber fineness imposes limits on spin count and elongation, while fiber maturity imparts strength and dye retention. Therefore, the goal of this experiment is to define how cotton fibers, from different fruiting positions, vary for these traits individually. Previous studies have examined the variation in micronaire, as well as yield, and discovered significant variation between fruiting positions. However, these studies speculate that the change in micronaire is caused solely by fineness or maturity alone. By box mapping five genotypes of *Gossypium hirsutum* from two diverse environments, this research seeks to estimate the genotypic and environmental variation present in fiber fineness and fiber maturity. Determining the value for these two traits has been problematic in terms of both cost and sample turnover time. However, new methods of quantifying fiber fineness and maturity have developed outside of cross-sectional image analysis by SEM, maturity ratio by sodium hydroxide swelling, Advanced Fiber Information System, and High Volume Instrumentation. One new method, the CottonScope, uses polarized light microscopy to view 20,000 snippets of fibers suspended in solution. Software quickly analyzes the images by length, cell wall thickness, and fiber perimeter. From these measurements, the CottonScope is able to quantify the distribution in a sample's maturity and give a precise value of fiber fineness. The utility of this new instrument in terms of breeding objectives has yet to be explored. The information gained from this study aims to assist breeders by identifying potential sources of sampling bias in hand picking, estimate sources of variance for the fiber-quality, and determine the value of specific instrumentation for the goal of increasing uniformity of a crop's quality through defining the relationship of fruiting position to fiber fineness and maturity.