2002 BELTWIDE COTTON CONFERENCES, ATLANTA, GA – JANUARY 8-12

ENVIRONMENT-GENOTYPE INTERACTIONS MODULATING COTTON FIBER PROCESSING SUCCESS

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Abstract

Eight Upland cotton [*Gossypium hirsutum*] genotypes were grown in a two-year planting date study in South Carolina. The genotypes were: Deltapine 20, 50, 90, and 5690; Coker 315; Paymaster 145; and one F2 and one F3 cross between Coker 315 and Paymaster 145. All genotypes, with the exception of the hybrids and Paymaster 145, belong to the same Deltapine 2 genetic cluster. Harvest dates were staggered so that growing season was the same length within a given year. Therefore, each genotype was produced in six different growth environments, that is, eight genotypes x four blocks x three planting dates x two years. Patterns and amounts of rainfall and heat unit accumulations differed significantly among planting dates and between years.

Genotypic fiber properties were quantified before the fiber from each genotype was spun into yarn and made into undyed knit fabrics. Yarn evenness and strength properties were quantified, and the relationships among genotype, growth environment, and yarn properties were examined. Genotype modulated fiber length and diameter; but genotype and environment were both significant factors in fiber maturity. Growth environment was correlated with yarn evenness and elongation; genotype was more important than environment in determining yarn strength.

Fiber length and maturity properties used commercially to predict success in cotton fiber processing were not closely related to yarn properties. Closer correlations were among the thermal growth environment, fiber maturity, and the spinning properties of the yarn. The inherent variability of cotton fiber limits the utility of 'point-source' fiber properties because processing success depends on bulk properties that are more closely related to 'bulk' environmental factors modulating growth of the crop as a whole. Simple, cost-free temperature records can be used to predict crop quality and processing success before harvest, thereby providing information that is critical for both producers and processors.

References

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