The Influence of Surface Electrolyte and Moisture Content on the Frictional Behavior of Cotton Fiber

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Cotton processing efficiency is dependent on the degree of friction between fibers and their processing environment as the fibers are subjected to the various pieces of equipment involved in converting fiber to yarn. This frictional behavior is a function of both fiber morphology and fiber surface characteristics. In this study, fiber surface electrolyte content and the moisture associated with the fiber were investigated to determine their potential role in the conversion of fiber to yarn. A single cultivar of cotton grown in Georgia during the 2003 crop year was treated with different electrolyte solutions at various concentrations, and then the frictional behavior of the cottons was examined using the Rotorring measurement. Results indicated that a coating of electrolyte on the surface of the cotton fiber may lead to either an increase or a decrease in fiber friction. The more hygroscopic electrolytes in general were responsible for increases in fiber-to-metal friction. Fiber-to-fiber friction was increased by all surface electrolyte treatments, which lead to the conclusion that the electrolyte content in conjunction with surface moisture confers anti-electrostatic properties that increases the coherence between individual fibers. Knowledge of this property will aid in predicting the processing performance of cotton fiber and the possibility of adjusting that performance through the application of electrolyte solutions to the fiber.

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