USE OF HVI AND AFIS DATA FROM MULTI-YEAR RBTN TRIAL DATA TO PREDICT SPINNING PERFORMANCE

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Abstract

As previously reported on at the 2007, 2008, and 2009 Beltwide Conferences, the quality score index (QS), was developed using four fiber properties provided from high volume instrument (HVI) testing. The reason for development of QS is two-fold: 1) approximately 75% of US grown cotton is being exported to international buyers, and 2) breeders need one easy to calculate fiber quality number, rather than four or more, to make discard decisions in their programs. Most international buyers demand longer staple length, less variation in micronaire, increased length uniformity, and acceptable strength. QS allows cotton breeders to easily and quickly select strains in a breeding program using the fiber quality properties discussed above. A second quality index reported on in the project was the USTER generated Spinning Consistency Index, or SCI. Specific coefficients of SCI can be found on their company website, but two HVI variables utilized in their index not in QS are Rd and +b. The objective of this project was to: 1) model spinning performance using HVI [QS and SCI], 2) compare predict ability of the developed models, and 3) determine consistency of the models over year, varieties, and locations.

Data used in developing this model came from the Regional Testing Network Trial and included testing years 2006, 2007, and 2008. Three or four varieties were grown at 8-10 locations per year. Seed cotton from all replications was combined so that enough fiber was available to generate a lint sample sufficient for spinning. All samples were ginned in a similar manner on the University of Georgia MicroGin in Tifton, Georgia. Lint samples were then analyzed using HVI and AFIS equipment at Cotton Incorporated in Cary, North Carolina. Yarn samples (Ne 22/1) were produced and analyzed at Cotton Incorporated also. Data was analyzed using StepWise Model Building from SAS.

Yarn traits commonly measured in spinning performance are strength, evenness, and entanglements. Yarn strength is often times reported in skein strength and reported as adjusted break factor. A second yarn strength parameter is single yarn breaks (reported as RKM). Evenness is measured by thin and thick places and entanglements reported in neps produced. The current data set indicated all five yarn parameters were poorly predicted with currently used QS and SCI indices, with R^2 values regression values ranging for a low of 0.001 to a high of 0.13. However, using statistical techniques to increase the R^2 values in which different weighting coefficients could be used in the QS and SCI formulas, R^2 values increased from a low of 0.35 to a high of .70. This suggest that different coefficients used in the formulas to calculate both QS and SCI would result in a much better predictive value for yarn spinning performance. Fiber quality traits provided by AFIS would provide the greatest predictive value as R^2 values ranged from 0.45 for thick places to a high of 0.77 for both adjusted break factor and neps. In checking for consistency of fit for the various models, HVI Model X Year interaction was observed less often for the five yarn traits as compared to HVI Model x Location and HVI Model x Variety interactions for the same five traits.