OPTIMIZING THE USE OF THE AFIS FOR BREEDERS: EFFECT OF SAMPLE PREPARATION

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Abstract

Because the AFIS has the potential of becoming an instrument of choice for cotton breeders, ways to increase the output of the AFIS were investigated. The current AFIS protocol (5 reps of 3,000 fibers) is not practical in a breeding program (too time consuming, and too expensive). In 2006, we worked on the effect of sample preparation on AFIS fiber length distribution. Blending fibers resulted in almost all cases in a considerable improvement of the repeatability of the measurements allowing a drastic reduction in the number of replications to be performed for a given confidence interval.

From our previous work, one main assumption was that testing one blended sliver per sample (with 10,000 fibers tested) should provide the same level of confidence than five raw cotton slivers with 3,000 fibers per sliver. Therefore, we decided (1) to build a blender that gently draws the lint to remove fiber entanglements while minimizing the fiber breakage (2) to check that 10,000 fibers per sliver could be tested (3) to validate the method on a large set of samples.

The blender was built according to our specifications. It effectively removes fiber entanglements without damaging the fibers allowing testing 10,000 fibers per sliver.

The validation protocol was the following: Two independent tests near Lubbock, one with 48 entries and one with 52 entries. All entries were F3 lines with four field replications. After mechanical harvesting and ginning two types of sample preparation (no preparation and blended) were applied. The non blended samples (raw cotton) were tested with 5 replications of 3,000 fibers on the AFIS while the blended lint was tested with one replication of 10,000 fibers.

From this experiment we concluded that blending fibers prior to AFIS testing results in:

- Less fiber breakage (entanglement removal)
- Better fiber length distribution (same UQL, lower short fiber content, better mean length).
- No adverse effect on nep count.
- Improved maturity and fineness.

In conclusion, the disentanglement of fibers allows testing more fibers per sliver (up to 10,0000 against 3,000 for raw material). Therefore, it reduces the cost of AFIS testing making it affordable for cotton breeders.

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