

**AN INVESTIGATION ON FIBER LENGTH
COMPARISONS OF COTTONS BY USE OF
NUMBER AND WEIGHT BASED STATISTICS**
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ABSTRACT

Fiber length is one of the most important physical properties of cotton. It is quite often used to determine cotton quality. For example, in commerce, a premium is paid for cottons with higher fiber length. In textile processing, it may be necessary to compare fiber lengths before and after certain operations, or before and after changing parameters to determine the effect of the processing changes on fiber breakage.

The commonly used statistical characteristics of cotton fiber length distribution include the mean fiber length (ML), the upper quartile length (UQL), and the short fiber content (SFC). These statistics may be number based or weight based. The weight fraction forms the length distribution by weight. These weight based statistics have been used in the Array method and in HVI calculation. The AFIS (Advanced Fiber Information System) measures lengths of single fibers, and reports both length and weight based fiber lengths. The theoretical analysis in this investigation showed that the number based and the weight based statistics may generate rank of opposite order in some cases.

To show this experimentally, the number based and weight based statistics were obtained for 50 different cottons using AFIS tests, and compared for their rank orders. The results of the comparison verified the theoretical assumption. An R value as defined in this paper was used to identify the case when an opposite rank occurred. This new finding is considered highly useful for fiber selection, fiber processing and fiber quality research in that it demonstrates that both number and weight based statistics should be obtained in any accurate fiber length evaluation or study in which the fiber length is of a significant factor.