

ANALYSIS OF COMMONALITY FOR TRAITS OF COTTON FIBER

Reiner H. Kloth
USDA, ARS
Stoneville, MS

Abstract

Indirect selection has the potential to improve quantitative traits. The purpose of this experiment was to determine how the quantitative traits of cotton fiber quality are related, and if this information could be applied to the improvement of cotton fiber. Correlations between traits indicate relationships, but are frequently difficult to interpret. Analysis of commonality, which is analogous to path coefficients and based on analysis of variance, is one method used to make sense of relationships found through correlations. During the summers of 1993 and 1994 cotton was grown in the vicinity of Stoneville, MS. The experimental design was a randomized complete block with two replications. One hundred and seven F_2 -derived lines from the cross Acala 1517-75BR1 X DPL SR-383 were sampled for mature fiber in the F_3 (1993) and F_4 (1994) generations. Eight fiber traits were measured: elongation, fiber maturity, micronaire, perimeter, 2.5% span length, strength, wall thickness, and weight fineness. The analysis of commonality identified perimeter as the only fiber trait that influenced all traits. Perimeter had the greatest effect on micronaire (76.5% of total sum of squares), but also affected (uniquely and in conjunction with other traits) slightly more than 35% of the total sum of squares for models explaining length and strength. Elongation had the least in common with other fiber traits. These results indicate that selection for smaller perimeter would decrease micronaire reading and increase fiber length and strength. However, indirect selection for fiber quality is not practical; micronaire determination is cheaper than perimeter measurement and perimeter's relationship with length and strength were too small to be useful.