LENGTH, FINENESS, AND STRENGTH OF COTTON LINT
AS RELATED TO HEREDITY AND ENVIRONMENT

N. I. HANCOCK

COTTON lint is a composite of the fibers, and as such is sampled and measured by the trade. Length is the primary measurement—the chief criterion of quality. Cotton fibers possess other important properties, but until recently no rapid and accurate methods for their measurement had been developed. The inventions by Hertel (1, 3, 4), Hertel and Zervigon (2), Sullivan and Hertel (7), and Pressley (5, 6) have resulted in instruments and methods adequate for measuring rapidly the physical properties of length, fineness, and strength of cotton lint.

The measurement of fineness by the new method has not been reported for cotton varieties; nor has the possible genetic and environmental association of the three properties been discussed. It is the purpose of this paper to show the differences among varieties in their expression of length, fineness, and strength of lint, and to consider the environmental influence upon such expressions.

EXPERIMENTAL METHODS

The measurements reported in this paper were taken on samples of cotton from variety tests in Tennessee. These tests were located at Tiptonville, Lake County, in the delta of the Mississippi River, on sandy loam soil of the Sharkey series; at Jackson, Madison County, on Memphis silt loam; and at Knoxville, Knox County, on Decatur loam.

The growing seasons at these three locations the past two years were about as wide in range as those encountered during the preceding four years. The 1941 season at Knoxville and Tiptonville was an optimum growing season for cotton, whereas at Jackson it was abnormally dry. The 1942 season was a favorable one for the growth of cotton at Jackson and Tiptonville, while at Knoxville it was excessively rainy.

The same varieties were grown at all three locations in a given season. There were five replicates of each variety at each location. A 50-boll sample of seed cotton was picked from each replicate, and, in turn, a sample of lint drawn from each ginned sample.

It would require too much space to describe in detail the instruments which give the measurements on these properties. The fibrograph (1, 2, 3, 4) measures length—it draws a curve, and from this curve the mean length and the upper half mean length are obtained. The upper half mean length is very similar to the classer's length and is the one reported. The arealometer (7) measures fineness—it gives the surface area of the lint in square centimeters per milligram. The Pressley fiber strength tester (5, 6) measures strength—it gives the force in pounds required to break 1 mgm of lint in which a bundle of fibers is approximately 1.18 cm long. Personal bias is largely eliminated by these instruments. All measurements were made in an air-conditioned laboratory, with mean temperature of 70° F, and mean relative humidity of 65%.

EXPERIMENTAL RESULTS

Table 1 reveals large differences in each property among the varieties and within a single variety. For example, in 1941, Stoneville 2B...