FIBER PROPERTY VARIABILITY IN GREEN LINT COTTON AT THE SEED AND BOLL LEVEL

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Abstract

Colored lint cotton has been grown and used for centuries. Fiber properties have genetic and environmental components. The first level of fiber property variability is at the seed level. White cotton fibers at the micropylar region of a seed are shorter and more mature than fibers in the chalazal region. A comparison of white cotton fiber properties and seed weights revealed that increases in seed weight were accompanied by increases in fiber length and maturity. At the boll level, white lint cotton properties have been mapped by boll location. Fiber property variability was assessed at the seed level in green lint cotton grown in Texas (BC 1995 selection) and in California (BC 1997 selection). Fiber property variability at the boll level was monitored using Texas-grown cotton.

Gossypium hirsutum L. BC-green was grown in plots at the Texas A&M University Agricultural Research and Extension Center in 1997 and 1998. California BC-green was grown in Bakersfield, CA in 1998. First position bolls were selected and seed were categorized by the weight of the seed after fiber was removed (ginned seed weight). Whole boll samples (Texas, 1997, 1998) were composed of fiber from seeds located in the middle of the boll. Fiber samples were analyzed using the Advanced Fiber Information System (AFIS).

Fibers from the micropylar region of green lint cotton seeds were shorter and more mature than fibers from the chalazal region. As ginned seed weight (California, 1998) increased from 128 to 168 mg fiber length increased while fiber circularity (theta) and micronafis (AFIS equivalent of micronaire) did not change. When ginned weight increased from 168 to 177 mg theta increased while length and micronafis did not change. At seed weight category 128 mg length was 24.9 mm, theta was 0.50 and micronafis was 3.9 As ginned seed weight (Texas, 1997) increased form 66 to 104 mg, fiber length did not change while theta and micronafis increased. At seed weight category, 104 mg length was 21.5 mm, theta was 0.43 and micronafis was 3.0. In 1998 when ginned seed weight increased from 60 to 106 mg fiber length, theta and micronafis increased. At seed weight category 106 mg, length was 19.6 mm, theta was 0.44, and micronafis was 3.3. It appears that the close relationship between ginned seed weight and fiber maturity seen in white lint cotton is not manifest to the same degree in green lint cotton.

First position bolls from low node locations were compared to mid node boll locations (Texas 1997, 1998). Although low node bolls (nodes 4-7) in 1997 had longer fiber and fewer short fibers, no differences were seen in theta, micronafis and perimeter. Fiber length for low node bolls was 22.1 mm, theta was 50.4 µm, micronafis was 3.2 and perimeter was 50.4 µm. The 1998 growing season was characterized by very low rainfall amounts. In 1998 there were no differences in fiber properties between low and mid node boll locations. Fiber length was 17.3 mm, theta was 0.42, micronafis was 3.0 and perimeter was 53.5 µm.

The large seed size of the BC-1997 selection revealed that fiber from seed weight category 128 mg reached the maximum micronafis value and that further increases in seed weight did not increase micronafis values. The 1995 selection grown in Texas (1997) attained the maximum micronafis value (3.3) at the 115 mg weight category and further increases in weight did not increase the micronafis value. This feature of fiber development in green lint cotton highlights the need for matching cotton varieties to prevailing growth conditions. Solving the problem of high micronaire values in white lint cotton may involve the selection of varieties which have an acceptable upper micronaire limit.

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