

**ENVIRONMENTAL AND GENOTYPE
EFFECTS ON FIBER CARBOHYDRATE
CONCENTRATION AND QUALITY**

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the carbohydrates, particularly starch, complicates understanding any genotype-fiber carbohydrate association with fiber quality. Weaker fiber strength produced under low light growth conditions may be associated with reduced fiber starch concentrations at 14 DPA and lower sucrose concentrations at 21 DPA.

Abstract

Improved fiber quality has given US cotton (*Gossypium hirsutum* L.) producers a competitive edge in the world cotton markets. However, cotton grown under lower light conditions has been shown to exhibit reductions in the quality of the lint produced. Under these conditions, the full genetic potential for these improved fiber qualities is often not attained. Intuitively, one might assume that reduced photosynthate production is the underlying cause of this phenomenon, but, considering the number of cellular processes affected by light that have been identified, there may be more that is involved. The objectives of this study was to determine how the carbohydrate (starch, glucose, fructose, and sucrose) concentrations of the fiber at various stage of development were altered by varying the light level during boll development for three genotypes differing in fiber quality.

Field studies were conducted at Stoneville, MS during the 1995, 1996, and 1997 growing seasons using three genotypes ('Acala Maxxa', 'MD 51 ne', and 'SureGrow 125', and two levels of light intensity (incident and 70% of incident) during boll development. The cotton was planted on 27 April in 1995, 25 April in 1996, and on 2 May in 1997. First position white blooms were tagged with jeweler's tags and these tagged fruit and their subtending leaves were later collected at 0, 14, 21, and 35 days post anthesis (DPA). The collected fruit was separated into fiber and ovules. Carbohydrate concentrations (starch, glucose, fructose, and sucrose) were determined on the fiber, ovule, and leaf fractions for each harvest date.

Very little starch was detected in the fibers and what was found decreased in concentration as the fiber matured and reached later developmental stages. Fiber starch concentrations at 14 DPA was 56% lower in plants grown under reduced light conditions in 1995 when compared those grown at normal incident light conditions. Fibers contain relatively little sucrose early in the morning, but nevertheless, the concentration of sucrose in 21 DPA fibers was reduced 11% and 51% when grown under the shade conditions in 1995 and 1996, respectively. Glucose and fructose were the predominate fiber carbohydrates, but these weren't consistently altered by varying the light intensity. Detection of strong genotype X environment interactions for