

COTTON SEEDLING LEAF AREA AND BIOMASS DEVELOPMENT DIFFER AMONG GENOTYPES

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Abstract

Stand establishment and early vigor are critical to the successful production of cotton. However, there is a lack of information on the genetics and the physiological mechanisms determining early vigor in cotton beyond the point of seedling emergence. Physiological and genetic aspects of resource allocation by cotton plants in the time period between emergence and first bloom need to be addressed and brought into context with seed quality as well as yield production. As an initial step, this project compared and contrasted early vigor among modern cultivars and advanced breeding lines. In addition, the effect of seed source (parent plants grown in Arkansas or Arizona) on seedling vigor were compared. Various traits, including leaf area development and shoot dry weight, were measured on cotton seedlings under field conditions. In both field seasons, seeds produced in AZ had greater shoot dry weight early in development than AR. Advanced breeding lines, regardless of seed source exhibited greater shoot dry weight than commercial seeds. These differences may be attributed to differences in seed weight (AZ seed source averaged 97.3 mg/seed while AR averaged 91.9 mg/seed). As plant development progressed, the differences in seedling biomass between these groups narrowed. Several cultivars had consistently superior or inferior shoot dry weights in both years despite different environmental conditions. Characteristics closely associated with seedling biomass were cotyledon and first leaf area and dry weight, seed dry weight, and relative growth rate. As expected, the associations of cotyledon and first leaf area with traits measured at later harvests were reduced. These data suggest that the area of the cotyledons and the first leaf are important drivers for early growth.