

**HERITABILITY OF SINGLE INSTRUMENT AND
AFIS FIBER TRAITS IN A *GOSSYPIUM BARBADENSE* CROSS**

**Richard Percy
SDA-ARS, WCRL
Phoenix, AZ
Mauricio Ulloa
USDA-ARS, WICSRU
Shafter, CA**

Abstract

Although fiber quality of cotton is strongly influenced by the environment, harvesting practices, and processing, the ultimate determining factor of fiber quality is the plant's genetic potential. Efforts to genetically improve fiber quality may be positively or negatively impacted by the instrumentation and measurements used in selection and breeding. In the present investigation we have estimated the heritability of fiber properties in the *Gossypium barbadense* cross population 89590/PS-6 as measured by various single instruments and by the Advanced Fiber Information System (AFIS). Heritability was estimated by parent-offspring regression of 200 individual F_2 plants and their replicated F_3 progeny. Progeny testing was conducted at Maricopa, AZ and West Side, CA in 2001. Of the various fiber length measurements made, the 2.5% SL measurement of the fibrograph had the highest heritability ($b = 0.27$, $b' = 0.40$). Heritabilities of mean fiber length by weight (L(w)) and by number (L(n)), and upper quartile length, measured by AFIS, were low or non-significant ($b = 0.01-0.11$, $b' = 0.01-0.17$). Fiber length uniformity, calculated from fibrograph measurements, appeared to be more heritable ($b = 0.23$, $b' = 0.40$) than the AFIS uniformity measurements: mean fiber length by weight coefficient of variation, L(w) CV, ($b = 0.10$, $b' = 0.24$), mean fiber length by number coefficient of variation, L(n) CV, ($b = 0.16$, $b' = 0.33$), short fiber content by weight, SFC(w), ($b = 0.06$, $b' = 0.17$), and short fiber content by number, SFC(n), ($b = 0.11$, $b' = 0.25$). Similarly, the fibronaire measurement, micronaire, appeared to be more heritable ($b = 0.65$, $b' = 0.69$) than the AFIS measurements of fineness and maturity: fineness ($b = 0.33$, $b' = 0.48$), immature fiber content ($b = 0.22$, $b' = 0.39$), and maturity ($b = 0.20$, $b' = 0.40$). Fiber strength, measured by stelometer, displayed a relatively low heritability ($b = 0.24$, $b' = 0.35$) in the 89590/PS-6 population. Fiber elongation was non-heritable ($b = 0.05$, $b' = 0.09$). Two AFIS fiber traits currently receiving much attention, short fiber content and nep numbers, displayed very low and no heritability, respectively. These results were in general agreement with results from two upland populations previously reported by May and Jividen in 1999. Both of the above traits produced relatively high phenotypic correlations with the AFIS maturity and fineness traits, fineness, IFC, and maturity; suggesting the possibility of improvement through indirect selection.