DIRECTIONAL SELECTION FOR AVERAGE WEIGHT OF FIBERS PER SEED O. Lloyd May Department of Crop & Soil Sciences The University of Georgia Tifton, GA

Abstract

Stagnation of U.S. cotton yields has prompted investigation of alternate selection criteria to further enhance yields. The simplest yield model in cotton contains the variables weight of fibers per seed and number of seeds per unit area. These traits are indirectly manipulated when breeders select for lint fraction in segregating populations, but experiments reporting results of directly manipulating basic yield components other than lint fraction are lacking. This study was conducted to better understand how yield and yield components respond when the average weight of fibers per seed is manipulated. Two cycles of directional mass selection were conducted in a single cross population created by mating a non-commercial breeding line obtained from the Australian Cotton Research Institute (ACRI94216) and a germplasm line (MD84-1) bred by Bill Meredith of the USDA-ARS. ACRI94216 is the higher average weight of fiber per seed parent, while MD84-1 has somewhat smaller seed and lesser fiber per seed. Directional selection was initiated among F2 plants in 2000 and continued among F3 plants in 2001. Following a seed increase of high and low selects in 2002, replicated trials were conducted at Plains and Tifton, GA in 2003. Trials consisted of 2-row plots, 40 feet long, spaced 36 inches. Parents and 15 high and 15 low selected entries were included in three replicate, randomized complete block designs. Before machine harvest, 10 plants per plot were cut at ground level and removed for 'box-mapping' over the winter. ANOVA over locations revealed differences among entries for seed-cotton yield. The contrast of parents vs selects was not significant. High weight of fibers per seed selects yielded more than the low selected population within and over locations. This finding was not expected, especially since the high selected population had larger seed, in contrast to the general trend among many of today's popular cultivars to produce smaller and more numerous seed per unit area. These data combined with results of the box mapping will provide all yield components, HVI by fruiting site, plus fruit distribution to design a selection strategy that can be applied in main stream breeding.