

HETEROSIS AND COMBINING ABILITY FOR AGRONOMIC AND FIBER QUALITY TRAITS IN INTRA-AND INTERSPECIFIC CROSSES OF COTTON BY

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ABSTRACT

Seven cotton genotypes involving three Upland (*G. hirsutum*, L.) varieties, namely; Deltapine, Tamcot C.E and Australian 6100 and four varieties of *G. barbadense*, L. viz., Giza 70, Giza 83, Giza 89 and Sea Island were crossed in 2003 season in a half-diallel mating system, excluding reciprocals. The seven parents and their 21 F₁s were evaluated in 2004 for 13 agronomic and fiber traits.

The results indicated that mean squares due to parents and crosses were highly significant denoting the presence of reasonable degrees of variability for all, 13 traits studied. Some crosses between *G. hirsutum* x *G. barbadense* varieties exhibited good performance, for instance Tamcot C. E x Giza 83 produced essentially the same yield as Tamcot C. E and possessed higher yield, early maturing, equal fiber strength, longer and finer fibers than the Egyptian long-staple cv. Giza 83, thus can be used for hybrid cotton production. Significant desirable positive or negative better parent heterosis was observed in some F₁s for the majority of traits.

General combining ability (GCA) was significant for all traits, except for boll weight, seed index, No. loculi/boll and micronaire value. Specific combining ability (SCA) was significant for all traits, except for seed cotton yield and some of its components, micronaire value and yellowness. The GCA/SCA ratio exceeded unity for 11 characters indicating predominance of additive and additive x additive types of gene action in the inheritance of these traits, while the ratio was less than unity for seed index and lint% revealing more importance of non-additive. Based on GCA effects, each of the 7 parents proved to be good general combiner for some traits. Some F₁ combinations were characterized by significant SCA effects and involved at least one parent as good general combiner in all traits, therefore it could be useful in a pedigree program for varietal improvement purposes.

Key words: *G. hirsutum*, *G. barbadense*, Diallel, Heterosis, Combining ability, Yield components, Fiber quality

INTRODUCTION

The frequent crossing between Egyptian cotton cultivars followed by rigid selections resulted in exhausting the genetic variability and narrowing the genetic base, hence reducing the chances for further effective selection. It is imperative for this reason to use other genotypes belonging to barbadense species such as Sea Island or genotypes belonging to the American *hirsutum* species for intra and interspecific crossing with

Egyptian cultivars hoping to generate new recombinants amenable to effective selection in a program for pedigree breeding. However, for "hybrid cotton breeding" heterotic effects in interspecific cotton hybrids between *G. barbadense*, L x *G. hirsutum*, L offer possibility for achieving progress in cotton production, this is because data on previous experiments investigating interspecific hybrids indicated an overall tendency for F₁s to possess