

ABSTRACT

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The objectives of this study were to estimate heterosis, combining ability, types of gene action and heritability for earliness, yield and yield components, fiber traits and yarn properties in a half diallel cross of cotton. Seven parental varieties, namely; Pima S₇, Tamcot C.E., Sea Island, Giza 86, Giza 70, Giza 83 and Giza 77 were crossed in a diallel fashion, excluding reciprocals, to produce 21 F₁ hybrids. The parents along with their F₁ hybrids were evaluated in 2001 season for 29 characteristics including earliness, yield attributes, fiber and yarn traits.

The results indicated that mean squares due to entries and crosses were highly significant, indicating that parental genotypes as well as their F₁ crosses exhibited reasonable degrees of variability for all studied traits. Parents vs. crosses mean squares as an indication to average heterosis overall hybrids was significant and pronounced for all traits, except for days to first flower, lint % and fiber stiffness, showing that heterosis effects were not pronounced for the three traits. Significant desirable negative or desirable positive heterosis relative to better parents were observed in some F₁'s of all studied traits.

Specific combining ability (SCA) was highly significant for all traits and also general combining ability (GCA) was highly significant, except for yarn appearance, revealing the important role of both additive and non-additive gene effects in the inheritance of these characters except for yarn appearance where non-additive was the important.

The GCA/SCA ratio was greater than unity for 25 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 fiber elongation, yarn appearance, nep count per 120 yr and c.v.% revealing more importance of non-additive.

Based on GCA effects, each of the 7 parents proved to be good general combiner for some traits. Tamcot, for instance, was good combiner for earliness and yield attributes; Pima S₇ for boll number, fiber strength and length; Sea Island for strength and fineness; Giza 86 for lint %; Giza 70 for fiber strength and fineness, Giza 83 for fiber-to-seed attachment force and Giza 77 for fiber strength, length and yarn strength.

Some F₁ combinations were characterized by high SCA effects and involved at least one parent as good general combiner in all traits, therefore could be useful for varietal improvement purposes in terms of the probability of isolating desirable transgressive segregants for these traits.

Heritability values in narrow sense were high (over 50%) for earliness traits, seed cotton and lint yields per plant and per plot; fiber-to-seed attachment, fiber strength, micronaire value, fiber nep count and lea strength, indicating effective selection for these traits in early segregation generations, while either low or moderate values were recorded for the rest of traits. All heritabilities in broad sense were very high (over 68%) for all studied traits, and were always higher than their respective narrow sense values, showing that non-additive effects had a role in the inheritance of all traits.

Key words: Cotton, Heterosis, Combining ability, Gene action, Heritability, Yield, Fiber, Yarn

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