SUMMARY

Six Egyptian cotton cultivars namely ; Giza 45, Giza 70, Giza 66 , Giza 67 , Giza 69 , Giza 75, were crossed in a diallel pattern and evaluated for heterosis, combining ability and genotypic variation . Analysis of genetic component controlling the variables, seed cotton yield, boll weight, lint percent, seed and lint indices, micronaire reading, hair weight, staple and mean length and yarn strength was also conducted . The six parents and their 15 F_1's plus their corresponding F_2's were included in a randomized complete blocks experiment .

1. The analysis of variance revealed significant differences among genotypes for all variables studied in F_1 and F_2 generations .
2. Estimates of mid-parent heterosis were significant for seed cotton yield, lint percent, hair weight and mean length . Meanwhile the average BP heterosis (useful heterosis for plant breeder)was significant and positive for seed cotton yield . Moreover, positive but insignificant BP heterosis was obtained for fiber fineness (hair weight) and fiber length (mean length), while the remaining traits showed no heterotic effects over the average BP heterosis . A considerable number of hybrids exhibited significant MP heterosis, when , only a few displayed significant BP heterosis . The parental cultivars Giza 67 and Giza 70 were represented in most cases which sh showed BP heterosis for yield .

3. The reciprocal crosses which exhibited true heterosis, almost showed heterotic effects, however, in some cases it did not reach the significant level . Thus, the heterotic effects are real.

4. Mean inbreeding depression effects showed insignificant effects for all traits except for fiber length (mean length) which gave highly significant value . The individual F_2 means were almost close to the mean of their MP and F_1 performance for all traits . This suggested that additive and dominance effects are more important than those for epistasis in this material .

5. Highly significant or significant estimates were calculated for GCA and SCA mean squares in the F_2 generation, while the values of SCA mean squares were inconsistent in the F_1 generation.

6. The GCA/SCA ratio of variance components indicated that additive genetic variance was aproximately of greater importance for all traits.

7. The magnitude of GCA effects corresponded closely with the rank of the parental means for all traits . This indicates that selection of parents used in breeding to improve these traits should be based largely on the phenotypic performance of the parents and also suggests the presence of a considerable additive effects.

8. The reciprocal effects are significant for seed index , lint index and all fiber property traits in both F_1 and F_2 generations . They are lower in magnitude compared to GCA and SCA . Meanwhile, the F_1 hybrids almost showed significant effects indicating that heterosis in most traits is real . However, the results may indicate the possibility of reciprocal effects in Egyptian cotton and the traits expression in the F_1 hybrid may be the function of both genotype and cytoplasm . Therefore, the studies point out to the need for including reciprocal crosses in such biometrical studies .

9. Relatively high level of heterosis and SCA effects observed for seed cotton yield and fiber fineness(hair weight) in certain crosses suggested that some potential useful combinations were present . It seems that for this material, breeding procedures used should be that maximize both additive and dominance genetic variance .

10. Estimates of D component were greater than H_1 for lint percent, lint index and hair weight in F_1 generation . This suggests that additive genetic variance is more important for these traits in this material than dominance genetic variance . On the other hand, for the other remaining traits the dominance genetic variance is more important . Moreover, the estimator h^2 also indicated that the parents

the corresponding parental means averaged over blocks , were calculated for boll weight, lint percent and lint index in the F_1 and seed cotton yield and micronaire reading in the F_2 . This indicates that the dominant a alleles are positive in direction, i.e., operating in the direction of heavier bolls, higher lint percent, lint index, seed cotton yield and micronaire reading . Moreover, the positive coefficient calculated for hair weight may indicate that dominant alleles are negative in direction and operating in the direction of finer fibers .

16. High narrow-sense heritability estimates were calculated for hair weight, lint percent and lint index, whereas , reliable values were obtained for boll weight and micronaire reading and relatively lower values were estimated for the remaining traits, in the F_1 generation . The heritability values calculated in the F_2 were medium to low for the traits studied .

17. These results indicated that an effecting breeding method within this material for improving seed cotton yield and its related variables along with higher fiber quality would be that leeding towarde the production of varieties rather than hybrids . However, the information obtained in regard to H and degree of dominance suggests that substantial potential exists for obtaining improvements in yield, components of yield and fiber properties in this material, through the use of breeding program utilizing F_1 hybrids.