INTRODUCTION

1. INTRODUCTION

Improvement of cotton yield and seed characters are still the ultimate aim of most breeding programme of Egyptian cotton breeders. Therefore, knowledge of the type and magnitude of genetic variability affecting important economical traits in cotton is essential for the development of efficient selection and breeding procedures. However, in breeding cotton the breeder is limited by the portion of genotypic variance due to additive gene effect, and additive x additive epistatic interaction because these two types of gene effect can only be retained by subsequent inbreeding. There are numerous procedures for selection such as selection index, phenotypic traits selection and recurrent selection.

As to selection index is to select for all traits simultaneously by using some indices of net merit constructed by adding into one figure the credits and penalties given by each individual according to the degree of its superiority or inferiority in promoting each trait. **Smith (1936) and Hazel (1943)** illustrated the procedure for constructing a selection index that gives maximum advance from selection. The following criteria are necessary to construct the index: (a) relative economic values of each trait; (b) their phenotypic and genotypic variances; (c) the phenotypic and genotypic covariances between each pair of traits; and (d) coefficients of phenotypic weights (b's).

Recurrent selection aims to increase the genetic recombinations and desirable gene frequencies in plant population.

The phenotypic and genotypic coefficients of variation are important parameters for plant breeders in breeding programmes, particularly aiming at selecting better types from population (**Meena et al., 2001**). Phenotypic and genotypic correlations among traits of which selection is practiced may have important implications in breeding procedures. Negative genotypic correlations between traits selected for in a breeding program may result in a reduction in the rate of improvement for some of the traits in comparison to the improvement that could be attained if the correlations were positive or non-existent. But, correlations alone do not provide the causal basis of association (**Rowe, 1996**). **Al-Jibouri et al. (1958)** reported that the breeder may be successful in breaking up undesirable linkage, nevertheless the probability of obtaining the most desirable character combinations from one generation of segregation and recombination is still very small if a large number of loci is involved. In such case, the breeder might follow recurrent selection, also a selection index might prove very helpful in this respect.

The present study was carried out to study

1. type of gene action and heritability in both broad and narrow sense for some economic characters, as well as the expected genetic advance for these characters.
2. the phenotypic, genotypic and environmental variances for lint yield and lint components in three different populations of Egyptian cotton.
3. the magnitude of the phenotypic and genotypic correlations between studied characters.

4. the relative effectiveness of within and between different selection procedures-selection index; phenotypic trait selection and recurrent selection-in improving lint yield in the three populations.

5. the correlated response between selected and unselected traits.

6. the effect of selection procedure on genetic variation.

7. the effect of phenotypic selection for seed index on seed oil content in F_4 and S_2 generations.