Summary

The investigation was conducted with two sets of diallel crosses (10 x 10 genotypes of flax and 6 x 6 genotypes of linseed of Linum usitatissimum L.) including parents and crosses without reciprocals to study the nature of genetic control of plant height, base stem thickness, effective tillers, days to flower, stick weight, fibre weight and crude fibre percentage over three years with flax and two years with linseed types in randomized block design.

The additive genetic variance was found to play major role in controlling the plant height, base stem thickness, effective tillers, days to flower, stick weight and fibre weight in both flax and linseed types. The dominance genetic variance was found to play major role in controlling the crude fibre percentage in flax while additive genetic variance was found to play major role in controlling this character in linseed.

The proportion of additive genetic variance to the total genetic variance in flax was larger than that in linseed for plant height. The proportion of additive variances to the total one was of equal order in both types for days to flower and base stem thickness. Such proportion was found to be larger in linseed than in flax for remaining characters. This observation, however, indicates that the magnitude of dominance variance in flax was comparatively greater than in linseed for tiller number, stick weight, fibre weight and crude fibre percentage.

The direction of the expression of dominance for all the traits in linseed was significantly towards negative side. But in flax the direction of the dominance was towards positive side for all the traits except for
days to flower and crude fibre percentage for which direction was significantly towards negative side. Hence expression of dominance in a particular direction in the two types of *Linum* was quite distinct and variable between the two types.

Both additive and dominance variances interacted significantly with years for height, effective tillers and days to flower in flax and additive and dominance variances in linseed for these traits did not interact significantly with years. The additive and dominance variances for stick weight and crude fibre percentage in flax did not significantly interact with the years, while the two genetic variances in linseed for these two traits interacted significantly with years. Neither in flax nor in linseed the fibre weight and base stem thickness did not interact significantly with years excepting the dominance for base stem thickness which interacted with years significantly in linseed. Thus the significant and nonsignificant interaction of particular genetic component showed stability and instability of the component over the years.

The gca effects and their corresponding phenotypic performances of parents for most of the characters had shown strikingly one to one relationship indicating a reasonable success of selection on phenotypic basis. Strategy for improvement through breeding has been discussed.

Study of correlation between different traits of flax and linseed has lead to infer, how due to different types of selection pressure the traits have become correlated or associated. The correlations found between the similar types of traits in flax and linseed showed similarities as well as dissimilarities. Such an exploratory approach revealed that the plant height, a major phenotypic selection index, showed a positive relationship with fibre yield in both the type of *Linum*. 
In view of striking differences between flax and linseed as regards the magnitude of additive and dominance genetic variances, the direction of the expression of dominance, the interaction of additive and dominance components with the annual environmental changes and often opposite types of correlations for same trait between flax and linseed, conclusion has been made that quite obviously phenotypically and genetically flax and linseed differed widely as a result of the distinctness of human pressure of selection commensurate with the different need of flax and linseed types. Presence of greater magnitude of additive variance in linseed than in flax both being autogamously pollinated types indicated that selection was more intense in linseed than flax.

Such a study has enabled to infer as to what would be the breeding strategy for evolving either flax or dual type suitable to Indian conditions.