CHAPTER I
INTRODUCTION

Linseed or flax (*Linum usitatissimum* L.) is one of the most important oil seed crops of India. On global level, India, with about two million hectares under linseed cultivation, accounts for 25 percent of total world acreage and ranks first in area, fourth in production and eighth in productivity. During past three decades cultivated area of linseed in this country increased from 1.4 to 2.02 million hectares resulting in a production jump from 0.367 to 0.514 million metric tons. This increase in area and production which is approximately 44 and 29 percent is not quite satisfying as the productivity level of the crops is still very poor in our country.

The average productivity of linseed in India is only 258 kgs per hectare which is very low as compared to the average yields of other countries like Newzealand (2,000 kgs /ha) and Mexico (1,537 kgs /ha). An analysis for the poor yield levels in this country reveals, besides others, limited genetic acceleration to be a major cause for this lapse. There has been a definite dearth of systematic genetic improvement programmes in the past. The limited efforts by some breeders resulted in the identification of certain land varieties which over the period of time have fallen susceptible to the prevalent diseases and pests. There is, therefore, an acute necessity of initiating systematic breeding programmes based on set principles of
genetics for affecting a quantum jump in this important oil seed crop.

Economic importance of linseed is very well known as linseed oil is extensively used as a technical oil and in manufacturing paints, varnishes, lubricants, oil cloth, linoleum and similar other products. Discoveries of the use of linseed oil in cementing of roads by Walsh (1965) and in antibiotics (Anon, 1968) have increased the importance of Linseed in recent years. It is also used as cooking medium in some parts of India but due to presence of unsaturated fatty acids in high quantity do not render it good for human consumption. The oil content in the existing cultivars varies from around 35 to 48 percent. As already achieved in other oil seed crops there is every likelihood of increasing oil content in this crop as well by formulating systematic breeding programmes.

It is a common belief that geographically distant forms are genetically diverse also an hybridization among them offers a very wide spectrum of variability which could be exploited inthe early generations by practicing selection in the desired direction. Scanty and inconclusive information is available regarding genetic behaviour of the hybrids resulting from the crosses of exotic introductions and local biotypes. The present study will, therefore, go a long way in providing this vital and long felt information.
No systematic breeding programme aimed at genetic amelioration of a crop species can be formulated unless sufficient information is available about inheritance of certain key characters of agronomic importance. In this crop there is a great dearth of such information on gene action, combining ability, heterosis and genetics of grain yield and its components in indigenous and exotic materials. It is with this objective in mind that the present study was undertaken.

Several sophisticated biometrical approaches have been developed and used by several workers for genetic evaluation of the genotypes. Some of them are, 'Line X tester' (Kempthorne, 1957), 'partial diallel' (Kempthorne and Curnow, 1961) and 'diallel cross' (Jinks and Hayman, 1953; Hayman, 1954, 1957, 1958, 1960; Jinks, 1954, 1955 and Gardner and Eberhart, 1966) techniques. Among these, diallel cross technique is the most effective tool with proven merits for ascertaining the systematic genetic architecture of economic traits within a considerable short period and with early generation materials. The diallel cross techniques involves $V_r$, $W_r$ graphic approach of Jinks and Hayman (1953) component analysis of Hayman (1954) and combining ability analysis of Griffing (1956b). These techniques were used for gathering information on some basic aspects of genetics in linseed. Furthermore, elite segregants obtained through distant hybridization could be evaluated and advanced for varietal improvement.
The present investigation entitled, 'A study of combining ability of some yield components in Linseed (*Linum usitatissimum* L.)' through diallel analysis technique was, therefore, taken up with the following objectives:

(i) To estimate components of genetic variance,
(ii) To estimate variances of general and specific combining ability,
(iii) To estimate general and specific combining ability effects,
(iv) To estimate economic heterosis in *F₁* hybrids and inbreeding depreciation incurred in *F₂*,
(v) To estimate the heritability and excepted genetic gain in respect of attributes under study and,
(vi) To work out association among the characters under study at genotypic level.