CHAPTER- I
INTRODUCTION

Chickpea (*Cicer arietinum* L.) popularly known as gram/Bengal gram/homes/chhola/garbenzo bean is one of the first grain legumes to be domesticated by humans in old world (Van der Maesen, 1972). The genus *Cicer* belongs to the sub-family *Papilionaceae* of the family *Leguminaceae*. (Bentham and Hooker, 1972). The genus consists of 39 known species distributed mainly in Central and Western Asia of which two species *viz.*, *Cicer arietinum* (2n=16) and *C. soongaricum* (2n=16) are cultivated in India. The origin of the crop is considered in Western Asia from where it spread in India and other parts of the world.

Nutrition point of view, chickpea seeds contain 17.7 per cent protein, 0.49 per cent lysine, 0.11 per cent methionine (Katiyar, 1982). In addition to this, it also carries 56.6 % carbohydrates, ash, calcium, phosphorus, iron, and vitamin B in considerable amount (Thakur, 1980). Madhya Pradesh is the single largest producer in the country, accounting for over 40% of total production of chickpea. In India, chickpea is cultivated in about 9.93 m ha with total production of 9.53 m ton and with productivity 960 kg/ha. In Gujarat, area, production and productivity are 2.47 m ha, 309.80 lakh ton, and 1251 kg/ha respectively (Singh, 2014).

Pulses are basic ingredient in the diet of vast majority of Indian population as comparatively higher amount of quality protein in its seeds provides a perfect mix of high biological value when supplemented with cereals. Importance of pulses is relatively more in our country as its contribution in nutrient supply is far more in Indian diet than that in Asia and world as a whole (Ali, 2002). Chickpea is used as dal in split form and whole fried or boiled seeds are also eaten. Husk and bits of dal are used as nutritious feed for animals. Green immature chickpea is also used as vegetable and its flour is a major ingredient in snacks and sweets in India. Chickpea can also be used as green fodder. Straw is an excellent fodder for animals.

The decreasing per capita availability of pulses in the country has been a serious concern. To overcome this problem, the scientist now will have to focus especially on the development of varieties resistant to important disease like blight,
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*Fusarium* wilt, root rot and pest like *Helicoverpa armigera*, drought resistant varieties will be great value in the drier and more marginal areas of peninsular India.

A major limitation in the improvement of chickpea is the restricted genetic variability available for most agronomic characters. At present genes are readily be transformed *C. reticulatum* into chickpea. But useful genes present in other species of the genus *Cicer* cannot be utilized due to incompatibility barriers. It may be hoped that through the development of new techniques such as embryo rescue and somatic hybridization, the desirable genes from other *Cicer* species could be introgressed to the cultivated chickpea, *Cicer arietinum* (Altaf and Ahmed, 1990)

The basic rationale in any crop improvement programme is to increase the yield potential of the crop. Seed yield is a complex and polygenic trait, and in order to study it properly, different factors affecting the seed yield must be considered and evaluated with regard to their contribution to seed yield. For a particular crop, information on the nature and magnitude of variability present in the population due to genetic and non-genetic cause is an important pre-requisite for commencing any systematic breeding programme.

Availability of sufficient genetic variability is very important in a crop improvement programme. For successful breeding programme, amount of genetic variability present in the experimental material is a basic requirement. Therefore, it is essential for a plant breeder to measure the variability with the help of parameter like phenotypic coefficient of variation, genotypic coefficient of variation, heritability and genetic advance. Hence, these parameters give the information regarding the availability of genetic variability for different characters in available germplasm. Therefore, the study of genetic variability of seed yield and its component characters among different varieties provides a strong basis for selection of desirable genotype for augmentation of yield and other agronomic characters.

Different components of seed yield very often exhibit varying degree of associations with seed yield as well as among themselves. In order to accumulate optimum combination of seed yield contributing characters in the single genotype, it is essential to know the relationship among themselves. Further, the seed yield is influenced by its various components directly and/or indirectly via other traits that create a complex situation before a breeder for making desirable selection. Therefore,
path coefficient analysis could provide a more realistic picture of the interrelationship, as it partitions the correlation coefficient into direct and indirect effects of variables. Thus, characters association and path analysis provide the information for the isolation of superior accession from gene bank.

Seed yield is governed by polygenic system and is highly influenced by the fluctuations in the environments. Hence, selection of plants based on directly on seed yield would not be very much reliable in many cases. Selection based on suitable selection index has been found to be superior to direct selection for yield. An application of discriminant function analysis developed by Fisher (1936) and first applied by Smith (1936) gives information on proportionate weightage that should be given to a particular yield component. Thus selection indices help breeder to discriminate desirable genotypes on the basis of phenotypic performance.

Keeping all the above facts in view, the present study was, therefore, planned with the following objectives:

1) To estimate the genetic variability, heritability and genetic advance for different quantitative characters.
2) To estimate the genotypic and phenotypic correlation between seed yield and yield contributing characters.
3) To determine the direct and indirect effects of different characters on seed yield per plant using path coefficient analysis.
4) To find out the selection indices using seed yield and its component traits.