INTRODUCTION
CHAPTER - I

INTRODUCTION

Chickpea (Cicer arietinum L.) belongs to genus Cicer, tribe Cicereae, family Fabaceae, and sub family Papilionaceae. It originated in South Eastern Turkey (Ladizinsky, 1975). The name Cicer is of Latin origin, derived from the greek word 'Kikun' meaning force or strength. Duschak (1871) traced the origin of the work to the Hebrew 'kirkes' where 'Kikar' means sound. The word arietinum is also Latin, translated from the Greek 'Krios' another name for both ram and Chickpea, an allusion to the shape of the seed which resembles the head of a ram (Aries) (Van der Maesen, 1987).

Chickpea known by the common names bengal gram, gram, homes, garbenzobean is traditionally grown in parts of the world covering Asia, Africa, Europe and North and South America but bulk of it is produced and consumed in South Asia and increasingly, the Middle East and some Mediterranean countries.

There are wide variations in the agroclimatic conditions under which chickpea is grown around the world. It grows between 20°N and 40°N in the Northern hemisphere. It is also cultivated on small scale between 10°N and 20°N in India and Ethiopia at relatively higher elevations. These environments differ in photoperiod, temperature and precipitation.
It is a crop that is environment friendly and sustains soil productivity. The benefits of the crop thus extend beyond the income to the farmers and the farming systems. The area occupied by the crop is 15% of the total pulse area but in some countries e.g. India and Pakistan it is the most important pulse crop and the area occupied could well be around 50% of the total pulse area (Dar, 2003).

India ranks first in the world in chickpea covering an area of 6.31 million hectare with production of 5.08 million tones (Anonymous, 2002).

Chickpea has been well recognized as a valuable source of protein particularly in the developing countries where majority of the population depends on the low priced food for meeting the dietary requirements. Its magnitude of significance is more among Indians due to their reliance on vegetarian diet besides limited buying capacity of more than 200-250 million (27%) people living below the poverty line. Like other pulses, supplementation of chickpea with cereal based diets is considered to be one of the possible solutions to the problems associated with protein energy malnutrition (PEN). The daily per capita availability of 14g chickpea is a source of approximately 2.3% (56 kcal) energy and 4.7% (2.7g) protein to Indian population besides being a major source of calcium and Iron (10-12%) (Sikarwar, 2004).

In addition to being an important item of food and animal feed, chickpea also plays an important role in sustaining soil productivity by fixing up to 141 kg nitrogen per hectare. The amount of biological nitrogen fixed by chickpea is, however, highly influenced by crop management practices. In Chhattisgarh, chickpea cultivation is limited to 1.76 lakh hectare with the annual production of
1.05 lakh tones and average productivity of 590 kg per hectare (Anonymous 2000). In the current five year plan (2002-03 to 2006-07) the area under chickpea has been projected to 5.44 lakh hectare with the production of 4.08 lakh tones and the average productivity of 750 kg per hectare.

The success of any plant improvement programme lies in the extent, nature and careful management of the variability present in different agronomic traits of the population. So, it is necessary to estimate the genetic variability in chickpea for various economic traits, which could help in the development of selection criteria for high seed yield. Heritability and genetic advance are two important selection parameters, of which the former is used to estimate the expected genetic advance through selection.

Seed yield in chickpea is a complex trait and is the final product of yield components. The knowledge of extent of relationship between yield and its components and their interrelationship is of great importance in the selection programme. A correlation study provides an opportunity to study the magnitude and direction of association of yield with its components and also among various components. Direct and indirect effects of different yield components have immense utility in selecting suitable plant type.

The productivity of chickpea is much low as compared to cereal crops due to varied reasons. Among the factors determining the desired yield of chickpea, use of quality seeds and yield stability of genotypes over environments are most important. The study of genotype environment interaction provides useful information to identify stable genotypes over a range of environments.
The growth and development of any individual plant proceed at a speed and extent pre-determined by the genetic constitution. The eventual expression of the pattern, however, is modified by many interlocking environmental complexes which the individual plant inhabits. Vigorous seed germinate rapidly and uniformly after planting and the emerged seedlings have the ability to grow vigorously under wide range of field conditions.

The concept of seed vigour has evolved through attempts of seed technologists to distinguish between seeds having the potential to produce strong, healthy seedlings and those with weekend performance potential as a result of deterioration, injury or other causes. Vigour has been defined as that condition of active good health and natural robustness in seeds which, upon planting permits germination to proceed rapidly under a wide range of environmental conditions. It has also been defined as the potential for rapid uniform germination and fast seedling growth under general field conditions. It is an important seed attribute of agriculture significance.

Seed vigour and vigour tests can be important for crop performance in several ways. First, vigour tests can alert the grower for a possible rapid loss between germination testing and sowing, which can arise through problems in production, handling and storage. Second, vigour tests can clearly identify lots vulnerable to less than optimum soil conditions and in crop failure at emergence. Conversely, high vigour lots can be identified for use in sub optimal conditions even without the aid of chemical seed treatments of fungicides and insecticides. Third, vigorous seed lots can be selected for special uses such as the production of
synchronised emergence and consequently uniform seedlings for use in mechanized crop production systems. Finally, vigour tests can provide discerning ways of evaluating physiological seed treatments to enhance performance leading to the attractive prospects of devising methods of making bad seeds good. Research methods of detecting difference in seed vigour have been continued over the past many years although, techniques of vigour testing have not attracted required attention in chickpea crop.

Various aspects of vigour associated with yielding ability of chickpea genotypes under rainfed and irrigated conditions may be of immense importance to seed industry and in applied breeding programmes. Therefore, in the present investigation, comparative study of different chickpea genotypes having bold and medium seeds, with a number of methods to test seed/seedling vigour including physiological tests was made with the following objectives.

1. To study genetic variability for seed vigour parameters and yield traits in medium and bold seeded chickpea under rainfed and irrigated conditions.

2. To find out the correlation between seed vigour with yield traits in medium and bold seeded chickpea under rainfed and irrigated conditions.

3. To study the relative contribution of seed vigour and yield traits towards maximization of seed yield in chickpea.

4. To select the genotype of higher vigour under laboratory condition for higher seed yield under field conditions.
(5) To work out the selection criteria as an aid to plant breeder for high seed yield under rainfed and irrigated conditions based on relationship between different components of seed vigour for medium and bold seeded chickpea separately.