INTRODUCTION
1. INTRODUCTION

Legumes have been under cultivation throughout the world since remote past. They provide invaluable food for man and fodder for animals. For predominantly vegetarian populations in India, legumes occupy an important position among food crops as sources of pulses, vegetables, oils, etc. Besides, they help improve soil fertility through bacterial nodules which are formed on their roots. As much as 200 pounds of nitrogen per acre can be fixed by these bacteria.

The grain legumes ('pulses') are important sources of protein (20-30%), carbohydrate (about 60%), minerals and certain vitamins. Their carbohydrate contributes as many calories per unit weight as cereals. On an average 100g of pulse provides 345 Kcals, 24g protein, 140 mg calcium, 8 mg iron, 300 mg phosphorus, 0.5 mg thiamine, 0.3 mg riboflavin and 2.0 mg nicotinic acid. Thus pulses have an important role in correcting the widespread malnutrition in this country. Today, even non-vegetarians are shifting to pulses due to the high cost of animal protein which has become a luxury item. The importance of grain legumes in the world farming systems, as well as in human nutrition, has been emphasized in recent years (Anon, 1975). Hence, in the national nutritional uplift programme, more attention is being given to a balanced cereal-pulse diet.
India has the distinction of being world's largest producer of grain legumes occupying an area of 22-23 million hectares with an average yield of 10-13 million tonnes of grains annually but unfortunately the country has not been able to achieve self-sufficiency in pulse requirement. It is partly because of large human population which is increasing at an alarming rate. According to the latest economic survey, the per capita availability per day has declined from a peak of 70g achieved in 1956 to 33g in 1988. Another reason of shortage of pulses is their low production which is insufficient relative to the needs of human nutrition, particularly in the developing countries, where the "green revolution" has occurred only in the cereal production. This has necessitated substantial imports of pulses. There are several factors responsible for the reduction in yields of grain legumes, diseases being very prominent among them. The different constraints are briefly discussed here under:

1. Agroecological constraints:

In India the legumes farm resources have gone down due to lack of irrigation facilities and uncertain and erratic rainfalls, which create a formidable barrier for timely planting of the crops and desired plant stand. Another barrier in pulse production is the poor availability of soil nutrients, phosphorus in particular and zinc to some extent.
The marginal and sub-marginal land holdings occupied by pulses are generally poor in soil fertility and moisture retention capacity which result in poor yields.

2. Management/Institutional constraints:
   (a) Seed production: Inadequate availability of seeds of improved varieties of pulses continues to be a stumbling block for increased pulse production.
   (b) Research Technology: Despite the fact that India is the chief pulse producing country in the world, the inflow of research information from laboratory to farmers at village level is utterly miserable. Pulse technology can not be successfully polarised unless extension support is there and farmers are trained fully. The technology gap between research institutes and farmers is very wide. Moreover their attention on pulse programme is very limited.
   (c) Area Expansion: One of the factors responsible for the depletion in the area is the low rainfall which has changed cultivable land into non-fertile land.
   (d) Production of microbiological culture: It has been estimated that yields of pulses cannot be raised without substantial use of efficient Rhizobium cultures. Unfortunately, however, these cultures are insufficiently produced.
   (e) Socio-economic constraints: Pulses have only subsidiary status in the total farming system perhaps because of several prevalent notions and blind beliefs which determine farmers'
response, such as: (i) cereals are the staple food (ii) pulses are not major cash crops, hence may not be able to provide a good resource base, (iii) instability in the production of pulses due to number of diseases and insect pests (iv) high damage rate in storage (v) highly fluctuating post-harvest prices and (vi) other associated problems at local level.

3. Biological constraints:

Amongst the factors responsible for reducing yields, diseases figure very prominently. Grain legumes suffer from a large number of diseases caused by fungi, viruses, bacteria, nematodes, etc. Nene (1988) in a recent publication has claimed that he was not aware of any location, either from the literature surveyed by him or from his travels in many countries, where these crops do not suffer losses from at least two diseases. Different grain legumes suffer from a wide range of diseases such as wilts, root rots, downy and powdery mildews, leaf spots and blights, rusts, mosaics and/or stunted growth resulting from attack by root-knot or cyst nematodes (Nene, 1988). Economic losses caused by nematodes in the crops range from slight, perhaps less than 1 per cent, to total loss (Sasser, 1989). In a recent worldwide survey, Sasser & Freckman (1987) have estimated annual yield loss of 10.7% for the 20 life-sustaining crops (LSC) that stand between man and starvation (Wittwer, 1981), and
14.0% for other 20 economically important crops having food or export value, the overall average being 12.3%. While comparing these losses in the developing and the developed countries, they found it to be 12.6% and 7.0% respectively for LSC, and 16.5% and 10.5% respectively for the 20 crops not considered to be life sustaining; the overall average for the 40 crops being 14.6% and 8.8% respectively. Among leguminous crops, chickpea, fieldbean, peanut, pigeonpea and soybean considered to be LSC, the estimated annual yield losses on world basis were 13.7, 10.9, 12.0, 13.2 and 10.6 per cent respectively, while in the other category the estimated loss was 15.1% for cowpea.

Prognosis:

The much needed improvement in pulse production in the country can be achieved by adopting suitable farm practices coupled with proper supply of certified seeds of high yielding and resistant varieties, rhizobium cultures, pesticides, etc. However, crop protection measures cannot be successfully carried out until there is proper understanding of various diseases and the ecological relationships of the casual organisms. A review of literature on the last aspect with respect to the interactions of plant-parasitic nematodes and pathogenic fungi, which is also the topic of the present thesis, has been given in the next chapter.