INTRODUCTION

Maize (*Zea mays* L.) occupies an important place in world agricultural. This statement gets support by very fact that maize has surpassed both wheat and rice with regard to total production on global basis. Maize ranking first in production is the third most cultivated cereal crop after wheat and rice globally. Global annual production of maize is 602 million metric tones with productivity of 4343 kg per ha, from an area of 138 million hectare. (Anonymous, 2002) The United States of America, the People's Republic of China, Brazil and Mexico are the world’s leading producers of maize, with more than 75 per cent of world's total production In India, maize is grown in almost all the states except Kerala. It ranks fourth in area (6.66 million ha) next to rice, wheat and sorghum and third in production, (13.16 million tones) with productivity (2.08 tones/ha. (Anonymous, 2002). During last few years, there has been a progressive escalation in the demand of maize, due to new vistas of its use for value added products such as glucose, sorbitol, dextrose, starch based products and oil, fast food products and various snack items launched recently in domestic and international markets. Approximately 35 per cent of the maize produced in India is consumed directly as human food, 30-35 per cent goes for poultry, piggery and fish meal, 10-12 per cent in wet-milling industry i.e. for traditional requirements like Dalia and Sattu and rest for industrial use (IFPRI, 2000).

Considering the importance of maize in the country for food and industrial uses, the National Commission on Agriculture has put a target of 24 million tones. To achieve this level of production, it is imperative to step up productivity from
the existing national average of 2.018 tones/ha to a level of 2.4 tones/ha and also an increase in the area under the crop from six to nine million hectares (IFPRI, 2000).

Since the possibility of increasing maize area is rather impossible, increasing the productivity appears to be the only right approach, which can be possible by providing seed of improved cultivars, better agronomic practices and protection against diseases and pests. Maize crop suffers from a large number of diseases and pests, which are responsible for lowering productivity vis-à-vis production.

Charcoal rot is one of the major diseases of maize, which is caused by the fungus Macrophomina phaseolina (Tassi) Goid. (syns. M. phaseolina (Maucl.) Ashby, Rhizoctonia bataticola (Taub.) Briton-Jones, Sclerotium bataticola Taub., and Botryodiplodia phaseoli (Maucl.) Thrium, a soil borne plant pathogen belonging to the phylum Deuteromycetes.

The pathogen is seed and soil born and is very difficult to manage by chemical treatment alone, as it does not give protection throughout the crop growth period (Campbell, 1994). Moreover, the variability in the pathogen also provides hurdle for durable resistance in the crop. Therefore, the thrust area for research could be explored by finding out the possible variability in the pathogen and based on such variability the representative group to be used for developing durable resistance in the maize plant appropriate different breeding programmes.

Breeding for resistance for this disease has not shown a very encouraging result. Most of the commercially grown cultivars have shown a high level of susceptibility in disease prone maize growing areas of India, particularly after post-flowering stage of crop growth. In recent years, this disease has
gained considerable importance because of its role in reducing grain yield and spoilage of fodder quality.

Satisfactory control of the disease lies in breeding disease resistant varieties. The variability in pathogen considerably complicates the screening of host for locating resistant material to counter the pathogen. Without a clear knowledge of strains present in a particular cropping ecosystem, it becomes very difficult to select resistant varieties for those areas. Thus, progress of breeding programme depends on up-to-date knowledge of existence of physiological races or pathotypes in the pathogen. The variability in the pathogen could be identified using different conventional parameters as also by modern parameters like genetic variability at the DNA level. Till recent past the variability in the pathogen has been identified based on the morphological and cultural characters, differential reactions and enzymatic patterns of various isolates.

The current trend to study genetic variability amongst fungal species is to use DNA markers and to correlate with the pathogenic variability. Polymerase chain reaction (PCR) has revolutionized the development of molecular markers. Molecular techniques are more neutral than the morphological and virulence parameters since they are usually not exposed to selection pressure of the host. Variability studies in Indian maize isolates of *M. phaseolina* based on DNA polymorphism has so far not been carried out. Therefore, a need was felt to substantiate biological pathotyping with DNA polymorphism based variability studies *vis-à-vis* pathogenic variability. The virulence analysis and RAPDs of *M. phaseolina* isolates established from different geographical regions of India would help in obtaining a clear and lucid variability spectrum of this
important pathogen. This understanding is a first step, which might lead to development of effective disease management strategies through area location specific breeding programmes. Keeping above perspectives in view, the present investigation has been undertaken with the following objectives:

1. To study variation of the isolates based on morphological characters.
2. To study the pathogenic variation of the different isolates of the pathogen.
3. To study the genetic variation of the isolates of the pathogen by molecular techniques, such as RAPD analysis.