INTRODUCTION

Soybean (Glycine max (L.) Merrill) is an ancient crop with hundreds of food, feed and industrial uses. Today, soybeans are grown to some extent in most parts of the world and are a primary source of protein and vegetable oil. Forty percent of the world's edible vegetable oil comes from soybean, which is used in margarine, salad oil and cooking oils. Each year, soybean products become more important in formulating new, low-cost nutritionally balanced high protein foods and beverages for human consumption. As soybean acreage has expanded throughout the world, diseases have increased in number and severity. More than hundreds of pathogens are known to affect soybeans; about 35 are economically important. One or more diseases can generally be found in fields wherever soybeans are grown. Fusarium root rot occurs in most soybean growing areas of the world and is considered potentially destructive in the tropics and sub-tropics.

Fusarium graminearum Schwabe has been reported to be pathogenic and causes root rot of soybean in India (Agarwal and Sarbhoy, 1978). The disease usually develops on seedlings and young plants. Older plants generally are less susceptible than younger ones. When the disease is severe, seedling emergence is slow and poor, and affected seedlings are stunted and weak. Infection is generally confined to the roots and lower stem. Cotyledons of diseased seedlings are chlorotic and later becomes necrotic. The lower part of the tap root system may be destroyed (Plate I, Figs. A & B). The pathogen is usually confined to the cortex, but vascular elements are invaded in advance stages of disease. When soil moisture is low, infected seedlings or plants may wilt and in some instances, plants in an entire field may be wilted.

One of the problems related to soybean is that most of the available cultivars are highly susceptible, while a very few are resistasnt to root rot disease. This differential behaviour of soybean cultivars to _F.graminearum_ aroused interest and hence it was considered worthwhile to study the mechanisms underlying this differential disease resistance.

Disease resistance in plants depends on multiple defence mechanisms which include preformed defence barriers such as cuticle, the cell wall, or constitutive antimicrobial compounds as well as defence triggered by the invaders. Phytoalexin production is one of the most extensively studied inducible defence responses. The speed, magnitude and site of phytoalexin accumulation following penetration by microorganisms determine disease resistance in a number of plant-microbe interactions (Bhattacharyya and Ward, 1986; Ebel and Grisebach, 1988; Rouxel _et al._, 1989; Elgersma and Liem, 1989; Nemestothy and Guest, 1990; Chakraborty _et.al_, 1994). Evidence that glyceollin, the pterocarpan phytoalexin from soybeans occurs in several isomeric forms was provided by Keen _et.al_(1971) for preparations obtained from soybean hypocotyls inoculated with the pathogen _Phytophthora megasperma_ f.sp. _glycinea_. Subsequently the structures of four isomers (Glyceollin I-IV) were established by Burden and Bailey(1975) and Lyne _et.al_ (1976). Of these, glyceollin IV has been isolated in minor amounts only, from cotyledons treated with $CuCl_2$(Lyne and Mulheirn, 1978), and no evidence that it may play a significant role in the resistant response has been provided. Glyceollin I-III are all inhibitory to mycelial growth and zoospore germination of _P. megasperma_ f.sp. _glycinea_ (Bhattacharyya and Ward, 1985) and have been demonstrated to accumulate in significant amounts in soybean tissues (Kaplan _et.al_, 1980 ; Moesta and Grisebach, 1981 ; Purkayastha _et.al_, 1981; Keen _et.al_, 1981; Purakayastha and Ghosh, 1983 ; Hahn _et.al_, 1985 ; Long _et.al_, 1985 ; Bhattacharyya and Ward, 1986; Chakraborty _et.al_, 1989).

The complexities of the interactions that affect the selection of parasites and allow their establishment and survival among host cells is manifest in the frequency and variability of cell surface antigens. Some intriguing research work suggest that antigenic similarities between host and pathogen may be a prerequisite for compatible reactions, or, in other words, successful establishment of the pathogen in its host depends upon some kind of molecular similarities between the two partners (DeVay and Adler, 1976; Chakraborty and Purkayastha, 1983; Heide and Smedegaard-Peterson, 1985; Alba and DeVay, 1985; Mohan, 1988; Chakraborty, 1988; Purkayastha, 1989; Protsenko and Ladyzhenskaya, 1989; Linfield, 1993; Chakraborty and Saha, 1994). There is evidence that tolerance of parasite by the host increases with increasing antigenic similarity, whereas resistance of the host is characterised by an increasing disparity of antigenic determinants(Alba et.al, 1983; Chakraborty and Purkayastha, 1987; Purkayastha and Banerjee, 1990; Purkayastha and Pradhan, 1994). It is surprising that no work has been reported so far in the above directions involving soybean and F.graminearum.

The basic objectives of the present investigation are (a) to determine the level of glyceollin in F.graminearum infected resistant and susceptible soybean cultivars; (b) to study whether disease reactions could be altered in susceptible cultivar by extraneous supply of some selective chemicals (phytoalexin inducers); (c) to evaluate the glyceollin level in susceptible cultivar after induction of disease resistance ; (d) to estimate host parasite proteins and to analyse their protein pattern; (e) to determine serological relationship between F.graminearum and soybean cultivars; and (f) to determine the cell or tissue location of major cross-reactive antigens in soybean roots.

Before going into the details of the present work, a brief review in conformity with this study has been presented in the following pages.

Plate-I Fig:(A) Healthy (left) and *F.graminearum* infected (right) Soybean plants (Cv.Soymax) ; **(B)** Uprooted Soybean plants (Cv.Soymax),healthy (left) and infected with *F.graminearum*(right)

Plate- 1