Soil is a complex and dynamic environment in which the biological activities are mostly governed by microorganisms. The beneficial effects of soil microorganisms are manifold and range from nitrogen fixining and organic matter deposition to the breakdown of metabolic byproducts and enhancing the availability of sulphates, phosphates, nitrates and essential metals (Bridge and Spooner, 2001).

The root system is important for plant fitness because it provides anchorage, contributes to water use efficiency, and facilitates the acquisition of mineral nutrients from the soil (Lopez-Bucio *et al.*, 2005a)

Rhizosphere microbial communities can significantly influence phytopathogens development (Nehl *et. al*., 1997; Glick, 1995), nutrient acquisition (Lynch, 1990), heavy metal resistance (Bradly *et.al.*, 1981) and ecological fitness of the plant. Qualitative as well as quantitative distribution of fungi in the rhizosphere and non-rhizosphere soil has been discussed in detail (Harley and Waid, 1955; Parkinson and Waid, 1960; Burges and Raw, 1976).

Fungi represent a very important component of the ecosystem, along with the other microbes of the biomass (Harrison *et al.*, 1994). Fungi are important component of the soil microbiota typically constituting more of the soil biomass than bacteria, depending on soil depth and nutrient conditions (Ainsworth and Bisby, 1995). They perform ecological services that strongly impact the quality of human life and have enormous potential for providing economic benefits (Diana, 1994). It is estimated that there are 1.5 million fungal species on earth of which only about 70,000 have been described up to now (Hawksworth and Rossman, 1997).

A mycorrhiza is a symbiotic association between fungus and the roots of a plant (Kirk *et al.,* 2001), where in this association the fungus may colonize the roots of host plant either intracellularly or extracellularly.

Azcon *et al.,* (1995) reported that inoculation of VAM fungi greatly increased shoot and root biomass and leaf area in micropropagated *Annona* plants. Bagyaraj (1984) generalized that modern high input agricultural practices are detrimental to AM fungi, while the low input sustainable agriculture methods enhance the population of AM fungi in the soil.

Hayman (1981) reported that the mycorrhizal association in groundnut improved growth and nutrition of plants. More than 100% increase in the dry matter yield and P uptake of groundnut plants inoculated with mycorrhizal fungi compared to non-inoculated control.

Arbuscular mycorrizal fungi are the most frequent in plants growing on mineral soils. The populations of AM fungi is greatest in plant communities with high diversity such as tropical rainforests and temperate grasslands, where they have many potential host plants and can take advantage of their ability to colonize a broad host range. There is a lower incidence of mycorrhizal colonization in very arid or nutrient rich soils. Mycorrhizas have not been observed in aquatic habitats; however, waterlogged soils have been shown to have colonization in some species (Smith and Read, 2002). In costal soils infection of AM has been influenced by soil temperature and moisture content of the soil (Mohankumar *et al.,* 1988a).

Literature survey showed that the work has also been carried out on colonization of AMF and its effects on growth performance of some tree species by various workers such as *Tectona grandis* L.f. by Rajan *et al.,* (2009) on *Eucalyptus* spp. and *Acacia* sp. by Malajczuk *et al.,* (1981) on *Acacia leucocephala* and *Moringa concanensis* by Pawar and Vyas (2002) ;

on *Carica papaya* L. by Kennedy and Rangarajan (2001); on *Casuarina equisetifolia* J.R. and G. Forst, (Rajeshwari *et al.,* 2001).

Jain and Gupta (2002) reported effect of rhizosphere fungi on nodule number, shoot and root length of *Vigna mungo*. Inoculation of AM fungi and *Rhizobium* increases the percentage of chlorophyll content in the leaves of *Arachis hypogea* L (Charitha and Reddy, 2004). AM fungi have the effect on control of disease infection in plants and it has been successfully shown in plants viz. tomato for nematode infection (Suresh *et al.,* 1985).

Nematode infection has also been reduced in arbuscular mycorrhiza inoculated plants of *Piper nigrum* L. (Sivaprasad *et al.,* 1990). Fusarium wilt disease severity in *Albizia procera* Benth. and *Dalbergia sissoo* Roxb. was significantly reduced when inoculated with mycorrhizal fungi (Chakravarty and Mishra, 1986). In case of papaya plants having arbuscular mycorrhizae showed drought resistance (Shivaputra *et al*, 2004).

In the experiments carried out by Edwards *et al.,* in 1998, plants grown in the presence of *Glomus mossae* had a significantly higher shoot dry weight than those grown in the absence of *G. mossae.* Colonization and the activity of *G. mossae* was unaltered in the presence of *Pseudomonas fluroscence* Migula isolated and presence of *G. mossae* increased the population of *P. fluroscence* in the rhizosphere.

Dodd *et al.,* (1996) in their investigations aimed at using morphological and molecular characters to study inter- and intraspecific variation within isolates of *G. mossae* and *Glomus coronatum* from different parts of the world. Morphological evaluations of various possible taxonomic characters including spore colour, size sporocarp architecture and hyphal attactment morphology, showed that only spore colour discriminate the two groups.

In 1982, Scheneck and Smith studied that there was considerable variation in the plant response to various combinations of temperature and fungus species, with both growth stimulatory and growth repressive and effects occurring. The use of AM fungi in ecological restoration projects have been shown by Jeffries *et al.,* (2003) to enable host plant establishment on degraded soil and improve soil quality and health (phytoremediation).

With the establishment of the facts that AM fungi has the role in phosphate solubilisation in the rhizosphere and thereby providing the host plant the solubilised form of the phosphorus has led to think regarding the means and ways to mass multiply the different strains of AM fungi. Mass multiplication methods at bioreactor (Jolicoeur *et al.,* 1999) and *invitro* (Gryndler *et al.,* 1998; Pawlowska et al., 1999; Gadkar and Adholeya, 2000) level apart from conventional way at pot level have been standardized (Gaur and Adholeya, 2000) along with the selection of suitable host (Singh and Pandya, 1995). The post harvest storage management of these AM fungi cultures has also been worked out (Mohankumar and Mahadevan, 1988b; Sreenivasa and Kulkarni, 1993).

Jakobsen *et al.,* (1992) indicated that the efficiency of phosphorus uptake by VAM fungus is strongly affected by its spatial distribution of hypahe in the soil and possibly also by differences in capacity for uptake by unit length of hyphae. Pearson and Jakobsen (1993) strongly indicated that the P uptake by root cells is influenced by the presence of mycorrhizal fungi and this effect varies from species to species.

According to Jensen (1982), AM fungi are universally associated with the crop plants. They helps the host in the uptake of Phosphorus and other minerals. The growth increase may be controlled more by available soil P than by endophytic species (Clarke and Mosse, 1981). Grant *et al.,* (2005) indicated that as the phosphorus availability levels in the soil increases,

the amount of phosphorus also increases in the plant tissues and carbon drain on the plant by the AMF symbiosis become non-beneficial to the plants.

In 2002, Panwar and Vyas reported the use of AM fungi as a biological approach towards conservation of endangered plants in Thar desert of India. The efficiency of eight AM species, *Acaulospora mellea, Gigaspora margarita, Gigaspora gigantean, Glomus deserticola, Glomus fasciculatum, Sclerocystis rubiformis, Scutellospora calospora* collected from the rhizosphereic soils of *Moringa concanensis*, was evaluated for nutrient uptake and enhancement of acid phosphatase, nitrate reductase, peroxidase and polyphenol oxidase activities in this endangered tree of the Thar desert.

George *et al.,* (1995) showed that AM symbiosis increases the phosphorus and micronutrient uptake and growth of their plant host. Uptake of micronutrients is enhanced by the same mechanisms that operate for P, Cu and Zn have consistently been shown to be increased by VAM fungal colonization was indicated by Menge *et al.,* (1978).

Wani and Lee (1995) reported for studying AM fungi colonization the best sampling time is flowering stage up to maturity and in field conditions inclusion of appropriate crop in crop rotations or intercropping can increase the native population of AM fungi in soil which is often objective of the artificial inoculation. Tian *et al.,* (2009) studied different AM species showing different distributions among the three plant communities and the results indicate that both biotic and abiotic factors were important in determining the AMF communities, with biotic factors possibly the more important.

Braunberger *et al.,* (1996) indicated that the development and function of mycorrhizas after late summer and early autumn rains may be limited by the occurrence and predominance of propagules of different AM fungi. In 2008, Mikkelsen *et al.,* showed ability of AM fungal mycelia to anastomose in soil for the formation of large plant-interlinking functional

networks, long distance nutrient transport and retention of nutrients in readily plant – available pools.

In nature the Mycorrhizal condition is the rule and non- mycorrhizal condition is the exception according to Gerdemann (1969). The association of AM fungi is found with most of the vascular plant communities examined so far except members belonging to families Brassicaceae, Chenopodiaceae, Caryophyllaceae, Cyperaceae, Araceae, Asteraceae, Poaceae, Onagraceae, Polygonaceae and Portulacaceae (Hirrel *et al.*, 1978; Berch, 1988). In recent times it has been reported that few members of Chenopodiaceae (Kruchkelmann, 1973; Ross and Harper, 1973; Williams *et.al.*, 1974), Cyperaceae (Mejstrik, 1972) and Cruciferae (Kruchkelmann, 1973; Ross and Harper, 1973) may have AM association.

Rhizosphere soil and roots were sampled for root colonization, AMF identification and spore counts Moreira *et al.*, (2006). They found that percent root colonization and spore numbers were inversely related to each other in all ecosystems. Guar and Adholeya (2000) reported that plants with sand particle sizes of 0.50-0.78mm has higher root fresh weights, spore production and percentage mycorrhizal colonization than with other particle sizes.

Dalal and Hippalgaonkar (1995) reported that the spore density was found more in rainy season as compared to winter and was high in soils collected under water stress in summer. Allelochemicals induced in mycorrhizal plants play an important role in disease resistance (Inderjit and Mukherji, 2006). Graham *et al.*,(1981) found that reduced root exudation limited the growth of pathogen in the rhizosphere and there by, its ability to cause disease.

Vyas (1990) on the basis of his observation reported that distribution of endomycorrhizal fungi in soybean and chick pea such as *Glomus monosporum, G. fasciculatum, G. epigaeum, G. constrictum* and *Acaulospora morrowae* were associated with

soybean and chick pea. *Glomus monosporum, G. fasciculatum* occurred in 40% and 25% of samples and 50% and 25% of samples in soybean and chickpea respectively. *G. epigaeum* occurred in 25% of samples in soybean and 30% samples in chickpea. *Glomus mossae* and *G. constrictum* were found to be associated with all cultivars of soybean.

Singh and Mishra (1995) reported that in two paddy varieties plant biomass is increased when these are associated with AM fungi, the mean shoot and root dry weights of was significantly higher than those of the non-mycorrhizal plants. They observed that the increasing soil phosphate levels reduced the percentage of root infection in both the varieties at all the host stages examined.

Ammani and Rao (1996) reported effect of eight varieties of upland rice in sterilized soil in pot culture with inocula of *Acaulospora spinosa* and *A. scrobiculata*. All the eight varieties showed a positive response to inoculation with the AM fungi in terms colonization of roots, formation of vesicles and spores, plant biomass and grain yield. Three of the eight varieties showed a greater response than the others. The traditional variety, *Mettasannalu* gave the least response. *A. spinosa* was found to be more effective than *A. scrobiculata* on all the varieties.

In 1988, Khan *et. al.*, studied mycorrhizal status of some Bangladesh soils and the effect of indigenous AM fungi on the growth of rice plants. Mycorrhizal infection greatly improved the growth and nutrient (nitrogen, phosphorus and zinc) content of rice.

Microorganisms growing on the plant roots can influence plant growth positively or negatively (Liljeroth and Baath, 1988). In this respect, the soil microflora can be manipulated and protected to improve the bio-physico-chemical characteristics and regulates decomposition process in the soil (Rezacova *et al.*, 2007). The rhizosphere mycoflora affect

the health of the plants in many ways hence, it becomes necessary that there is adequate information on the rhizosphere mycoflora of crops (Odunfa, 1979).

Fungi are fundamental for soil ecosystem functioning (Warcup, 1950). Especially in forest and agricultural soils; they play a key role in many essential processes such as organic matter decomposition and elemental release by mineralization (Christensen *et al.*, 1989).

The enhancing effect of AM fungi on other crop plants has been studied by different workers from time to time. The effect of AM fungi in acid soils (Potty and Indira, 1990), soils with low available phosphate (Haymann and Mossae, 1972; Ross and William, 1973; Khan 1975; Mosse *et al.,* 1976; Swaminathan and Verma, 1977; Bagyaraj and Manujunath, 1980; Koide and Roger, 1985; Manjunath and Bagyaraj, 1980), rice crops (Khan *et al.,* 1988), microelements absorption (Arines *et al.,* 1989), enhancing biomass (Saif and Khan, 1977; Gaunt, 1978; Hall, 1978; Kough *et al.,* 1986; Sasa *et al.,* 1993; Wang *et al.,* 1989: Hooker *et al.,* 1922a; Sheoran *et al.,* 1992; Rocha *et.al*., 1993; Azcon *et al.,* 1995; Clark and Zeto, 1996; Sitaramaiah and Khanna, 1977), enhancing productivity (Khan, 1974; Mosse, 1976; Riazi *et al.,* 1977; Sukahda, 1978; Bagyaraj, 1989; Bryla *et al.,* 1990; Neeraj *et al.,* 1991; Singh and Tilak, 1990; Sulochana and Manoharachary, 1990; Allsopp and Stock, 1992; Edathil *et al.,* 1996; Selvaraj *et al.,* 1996; Clark *et al.,* 1999 ), minimal usage of fertilizers (Roncadori, 1971; Babu *et al*., 1988; Gisela and Honrubia, 1993; Bagyaraj, 1989; Chandraghatgi and Sreenivasa, 1955).

Saif and Khan (1977) observed effect of AM fungi on barley plant. They investigated that mycorrizal plants removed more phosphate from the soil and had greater dry matter. Yield was increased four fold by the fungus, but weight of individual grain was not affected. Number of tillers and ears per plant was more i.e. double in mycorrhizal plants as compared to non- mycorrhizal plants.

Swaminathan and Verma (1977) reported symbiotic effect of AM fungi on the phosphorus nutrition in potatoes. In an unfertile soil, mycorrhizal plants observed 8 times more phosphorus and showed greater growth than non-mycorrhizal ones. Gaunt (1978) compared growth of onion and tomato plants inoculated with the mycorrhizal fungus through seed and soil. Plants treated with the fungus grew better than the uninoculated ones. There were no significant differences between the two methods of mycorrhizal inoculation. Sukhada (1978) reported response of *Lycopersicon esculantum* Mill. to inoculation with the AM fungus *Glomus fasciculatum* and bacterium *Azotobacter vinelandii* singly and in combination in the field. *G. fasciculatum* as well as *A. vinelandii* significantly increased leaf area, shoot dry weight, nitrogen content, phosphorus content and yield in respect to uninoculated control. While AM fungal treatment alone brought about substantial increase in growth, nitrogen content, phosphorus content and yield.

Bagyraj and Manjunath (1980) reported that the three crop plants i.e. cotton, cow pea and finger millet inoculated with AM fungus (*Glomus fasciculatum*) in an unsterile Indian soil low in available phosphorus significantly increased their biomass.

Arshi and Roy (2008) studied the effect of vermicompost and endomycorrhizae on growth performance of *Gliricidia sepium* and observed maximum growth in shoot height, number of branches and number of leaves.

Bhatia *et al.*, (1998) showed biomass production and changes in soil productivity during long term, cultivation of *Prosopis julifera* (Sw.) DC. inoculated with vesicular arbuscular mycorrhiza and *Rhizobium* species.

Manjunath and Bagyaraj (1986) observed response of black gram (*Vigna mungo*), chick pea (*Cicer arietinum*) and mung bean (*Vigna radiata*) to inoculation with mycorrhizal fungus *Glomus fasciculatum* with and without added phosphate (22kg per hectare) in a

phosphate deficient unsterilized soil. Inoculation with a *G. fasciculatum* increased the dry weight and phosphorus content of the shoot and root significantly.

Sulochana and Manoharachary (1990) reported in sesame out of eight AM fungi used, *Gigaspora margarita* followed by *Glomus fasciculatum* were found to be the most beneficial in relation to plant height, number of leaves and dry matter production.

Neeraj *e .al.,* (1990) reported that *Glomus* sp. and *Gigaspora* sp., used as a source of inocula on *Cyamposis tetragonoloba* var. Pusa Navbahar, for shoot production the best response was obtained with *Glomus fasciculatum* followed by *G. mossae*. The total dry weight of leaves increased with *G. fasciculatum* and thus they concluded that *G. fasciculatum* seems to be most suitable AM fungal species for *C. tetragonoloba.*

Champawat and Pathak (1993) reported shoot and root dry weight, phosphorus and nitrogen uptake was significantly greater in mycorrhizal plants than non-mycorrhizal control. The experiments performed in phosphorus deficient soil suggested that inoculation of pearl millet with AM fungi could be extremely useful in plants growth and nutrient uptake.

Druege and Schoenbeck (1993) studied the effect of arbuscular mycorrhizal fungi infection on transpiration, photosynthesis and growth of *Linum usitatissimum* L. (Flax) in relation to cytokinin levels. Their results lead to the conclusion that enhanced internal cyokinin levels were responsible for improved photosynthesis and growth of mycorrhizal roots in flax.

Gisela and Honrubia (1993) investigated that *Lygum spartum* L. inoculated with *G. fasciculatum* at several fertilization rates of phosphate as 0, 30, 60 and 90 mg of phosphate per kilogram of soil produced a significant growth improvement, especially at low fertility

levels. The maximum yield was obtained in mycorrhizal plants growing in soil with 60 mg per kg of added phosphate.

Bethlenfalvay and Barea (1994) concluded that AM fungi effects on plants and soil determine if AM fungi mediate a relationship between changes in seed yield and soil aggregation. Their result suggested carbon allocation between the plant (measured as seed yield) and the soil (measured as the formation of water soluble aggregates) were influenced by AM fungus. The soil appeared to gain carbon at the expense of carbon lost by the plant. Mycorrhizal fungi thus seems to affect to biologically controlled aspects of sustainable agriculture, plant production and soil quality.

Champawat (1988) observed that plants treated with three mycorrhizal fungi viz. *Glomus fasciculatum, G. constrictum* and *Gigaspora calospora* in *Arachis hypogea* enhanced root and shoot dry weight and significantly, over non-mycorrhizal plants. *G. constrictum* was significantly superior over *G. fasciculatum* and *G. calospora* in enhancing growth, nutrient uptake and root colonization. Increased root and shoot growth was recorded in mycorrhizal plants and the same was absent in non-mycorrhizal controls.

Investigations by Van der Heijden *et al.,* (2006) showed that AMF play a key role in grassland by improving plant nutrition and soil structure and by regulating the make-up of the plant community.

Ojha *et al.,* (2008) showed that different growth parameters like height of the plant, fresh and dry weight of the roots and shoots were observed to be significantly high in *G. fasciculatum* treated plants compared to the respective controls. Kandasamy *et al.,* (1985) noticed 23,22 and 87% higher plant height, dry weight and shoot P content of the chilli seedlings respectively, inoculated with a mixture of *Glomus fasciculatum* and *Glomus mossae* over un inoculated chilli seedlings. Mohandas (1987) recorded significantly higher leaf area,

shoot dry weight, nitrogen and phosphorus contents and yield of " Pusa Ruby" variety of tomato with the inoculation of *Glomus fasciculatum* than the control.

Rasal *et. al.,* (1988) observed significant increase in the shoot dry weight and P-uptake when the *Cicer arietinum* var, "Vishwas" plants were inoculated with VA mycorrhizae. AM inoculated plants recorded higher shoot dry weight which was comparable with the un-inoculated plants supplied with recommended level of phosphorus and had significantly higher P-uptake than the fertilized un-inoculated plants.

Baqual *et al.,* (2005) carried out the analysis of Chlorophyll a, b and total chlorophyll content of the leaves of mulberry. The results revealed a significant variation due to the different treatments. Both chlorophyll-a, chlorophyll-b and the total chlorophyll of the leaves were highly influenced due to co-inoculation of mulberry with different microorganisms.

Rajasekaran Nagarajan (2005) concluded that dual inoculation with mycorrhizal fungi and *Rhizobium* species is effective in increasing the chlorophyll content, leading to enhanced growth in legumes.

AMF are particularly important in tropical and sub tropical regions, where the soils are usually of low fertility and mycorrhizae is thought to play a crucial role for the growth, survival and development of plant species thus influencing plant secondary succession and community structure (Janos, 1996). Their benefits may involve better access to soil resources and enhancement of soil aggregation, stability (Rillig and Mummey, 2006) and protection against phytopathogens (Newsham *et al.,* 1995). In addition to their individual plant effects at plant community level, AMF can be mediators of competition influencing plant biodiversity (Van der Heijden *et al.,* 1998) and sustainability of terrestrial ecosystems. The ubiquitous presence of AMF and their taxonomic, genetic and functional diversity are directly related to plant and soil processes (Oehl *et al.,* 2003).Hence, there is an increasing interest in the

assessment of the biodiversity and functions of AMF communities (Lovelock and Ewel, 2005).

The recent developments in the AM taxonomy with help of molecular techniques along with morpho-taxonomy, Arbuscular mycorrhizal fungi are placed in the Class Glomeromycetes of the phylum Glomeromycota consisting four orders namely Archaesporales, Diversisporales, Glomerales, and Paraglomerales with 14 families comprises of about 23 genera namely *Acaulospora*, *Entrophospora*, *Gigaspora*, *Scutellospora*, *Sclerocystis, Glomus, Paraglomus, Claroideoglomus, Ambispora, Archaeospora, Geosiphon, Pacispora, Kuklospora, Racocetra, Centraspora, Diversispora, Fuscutata, Dentiscutata, Quatunica, Redeckera, Octospora, Rhizophagus,* and *Funneliformis*.

Root characters, either morphological or physiological, affect plant uptake of nutrients from soil (Muthukumar *et al.,* 1999). The influence of root morphology on development of "Magnolioid root hypothesis" which predicts that plants with coarse root and with no or few short root hairs develop intense mycorrhizal colonization in natural soil compared to those with fine roots and abundant long root hairs. Peat and Fitter (1993) have indicated significant differences in root characters between mycorrhizal and non-mycorrhizal plant species. Mycorrhizal associations in cotton (*Gossypium hirsutum*) have been studied by various researchers and several studies have shown that AMF can promote cotton nutrient uptake and growth (Rich and Bird 1984; Smith and Roncadori 1986). *Gossypium herbaceum* showed heavy mycorrhizal colonization with almost every cortical cell of the white roots included an arbuscule (Jeffries *et al.,* 1988).

In agriculture seeds of many crops are known to carry various types of pathogenic and non-pathogenic fungi which are commonly known as seed mycoflora or seed-borne fungi. It is observed from the literature on seed pathology and seed biodeteioration that due to association of seed borne fungi several abnormalities occurred on the seeds are toxic and poor

in quality for consumption as well as for seed industry (Rathod 2012). The most vital input in a crop production programme is seed, it should be of high quality and pathogen free. Pathogen free sound seeds are preferred for sowing to have desired germination, emergence, health seedlings and plant population (Hanuman *et al.*, 2005; Morel *et. al.*, 2005; Basm *et.al.*, 2000). Fungi form the largest group among such microorganisms causing seed damage, seed rot diseases at later stages of crop growth till maturity. Seed borne fungi may be present in the form of hyphae, conidia, oospores, chlamydospores, sclerotia, microspores, hyalospores and phaeospores (Behura *et al.*, 2000; Bhamaeapravati *et. al.*, 2006). Seed-borne diseases have been found to affect the growth and productivity of crop plants (Kubiak and Korbas, 1999; Weber *et al*., 2001; Dawson and Bateman, 2001).

A seedborne pathogen present externally or internally or associated with the seed as contaminant, may cause seed abortion, seed rot, seed necrosis, reduction or elimination of germination capacity as well as seedling damage resulting in development of disease at later stages of plant growth by systemic or local infection (Khanzada *et al.*, 2002; Bateman and Kwasna, 1999). Seeds provide natural substrate for the growth of associated fungi, they get associated with seed externally on the seed surface, seed coat and internally with the endosperm, cotyledons, plumule, radical, embryo. Some are on the seed surface as contaminant this influences the seed to plant transmission of the pathogen. Seed borne pathogens result in heavy losses in crop yield and seed quality (Sangvikar 2012).

Fungi form a major group of pathogens that can be seed-borne or transmitted through seeds. Fungi are multicellular plants without roots, leaves or chlorophyll. Therefore they must live off other materials including grains. The vegetative parts of fungi produce enzymes that interact with seeds to extract nutrients need for the growth. Fungi reproduce primarily by means of small, light airborne spores that are easily distributes by the wind (Ramesh and Marihal, 2012).

A large number of fungal pathogens are transmitted through seeds and vegetative propagating parts. Some of the fungal pathogens transmitted through seeds and vegetative propagating parts. Metabolic products of seed-borne microorganisms may affect the seed itself or sometimes may have other serious consequences such as toxicity to animals and human beings. Poor storage facilities add substantially to this loss in different parts of the country.

The antagonistic activities of *Trichoderma harzianum* against several pathogenic fungi have been reported by many workers [Henis and Chet, (1975); Backman and Rodrigues-Kabana, (1974); Hadar *et al.,* (1979) and Elad *et al.,* (1981)]. Kakde and Chavan (2011) studied the antagonistic activity of *Trichoderma viride* and *Trichoderma harzianum* against storage fungi and found that growth of *Curvularia lunata, Rhizopus stolonifer, Fusarium oxysporum Macrophomina phaseolina* and *Penicillium chrysogenum* was retarded due to *Trichoderma* species.

The studies on antagonism between *F. oxysporum* f. sp. *ciceri* and the fungal antagonists viz., *T. viride*, *T. harzinaum, T. hamatum* were carried out by applying 'Direct Bit Placement Method' (Brodbent *et al*. 1971).

The increased growth parameter in crop plants by the application of *Trichoderma* might be due to biological control of minor plant pathogen or by the production of growth regulatory metabolites by *Trichoderma* (Widham and Baker, 1986). Sinaga (1986) reported that *Gliocladium* sp. constitute another group of soil fungi investigated for their potential as biocontrol agents against *Rhizoctonia solani, Sclerotium rolfsi* and *F. oxysporum.* Antifungal response of *G. virens* isolate most likely is due to the production of gliotoxin and / or an antibiotic and also the hyper parasitic and antibiotic activity of *G. virens* with eight phytopathogenic fungi including *F. solani* and *R. solani* were confirmed. The action of bioagent on soil borne pathogen has been discussed by Benhamou *et al*. (2000) who stated

that in addition to mycoparasitism, antagonistic process might rely on the dual action of the antibiotics and hydrolytic enzymes.