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Biological Control of Root-Rot of Eggplant Caused by *Macrophomina phaseolina*

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Abstract: The efficacy of four fungal bioagents viz., *Trichoderma hamatum*, *T. harzianum*,*T. polysporum* and *T. viride* were evaluated *in vitro* condition against the Eggplant root - rot pathogen, *Macrophomina phaseolina*. Among the bioagents, *T. harzianum* produced the maximum inhibition zone of 18.20 per cent compared to the minimum of 7.30 per cent by *T. hamatum*. Soil application of talc - based formulation of *T. harzianum*, *T. polysporum* and *T. viride* effectively controlled the root- rot of Egg-plant under field condition.

Key words: Biological control % Eggplant % *Macrophomina phaseolina* % *Trichoderma* species % *In vitro* condition % Field condition

INTRODUCTION

Egg - plant (*Solanum melongena* L.) an important of the popular vegetable worldwide. It is affected by several diseases, which do not let the plants to grow and yield to a best of genetic potential. Among various pathogens, fungi constitute an important group as they inflict damage to crop plant at different stages [1]. Among the fungal diseases, the root - rot caused by *Macrophomina* remains to be a challenging task in terms of management, since it is soil - borne in nature. It is distributed worldwide and is prevalent in arid, sub - tropical and tropical climate, especially in the areas with low rainfall and high temperature [2].

Various disease management methods have been implemented to combat and eradicate pathogenic fungi. These include cultural, regulatory, physical, chemical and biological methods. All these methods are effective only when employed well in advance as precautionary measure [3, 4]. Once a disease has appeared, these methods become impractical / ineffective. In that situation, chemical control offers a good choice to grower to control the disease. Chemical pesticides have been in use since long and they provide quick, effective and economic management of plant diseases. However, in recent past, it has been realised that use of chemical in agriculture is not as beneficial as it was visualised. Chemical pose serious health hazards to an applicator as well as to a consumer of the treated material. In addition to target organism, pesticides also kill various beneficial organisms. Their toxic forms persist in soil and contaminate the whole environment [5]. Increasing awareness of humankind toward the ecosystem and environment has made a marked shift from synthetic materials to bio - products. Fungi constitute a major group of bioagents against various kinds of pests. A good number of fungi such as *Trichoderma*, *Gliocladium* can suppress the parasitism of *Fusarium* sp., *Rhizoctonia* sp., *Sclerotium* sp. [6-13].

The present investigation is, however, design in a way to investigate comparative efficacy of some species of a common *Trichoderma* against *M. phaseolina* on Egg plant.

MATERIALS AND METHODS

The pathogen and bioagents used in the present study were obtained from the Division of Mycology and Plant pathology, IARI, New Delhi, India. One - week old culture of pathogen and bioagents maintained on PDA slants at 28±2°C were used for the present study. Antagonistic activity of these bioagents was determined by Dual Culture Technique [14]. Each treatment was replicated four times and incubated at 28±2°C. Per cent growth of both antagonists, pathogen and zone of inhibition as recorded after 8 days of incubation.

Preparation of Commercial Formulation of Bioagents: The commercial formulation of *Trichoderma* species was prepared as per the procedure described by Jeyarajan and Ramksirhnan, [15], using talc - powder as carrier.

Field Efficacy of Fungal Antagonists: A field trial was conducted in the sick plot at Soltanabad farm, Shiraz, Iran, during April - June, 2007. Eggplant cultivar Hybrid

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susceptible to root - rot disease was procured from an authorised dealer of vegetable seeds at Shiraz, Iran. Talc - based formulation of the antagonists was incorporated to soil @ 2.5 Kg / ha at the time of transplanting the seedling at 20 cm a part in a bed size of 5 × 2 m. An untreated control was also maintained with three replications for each treatment. Observation on root - rot incidence was recorded and analysed statistically using One - way ANOVA followed by Duncan's Multiple range test [16].

RESULTS AND DISCUSSION

All the four bioagents inhibited the growth of *M. phaseolina* (Table, 1). *T. harzianum* exhibited the maximum antagonistic avtivity causing an inhibition zone of 18.20 per cent, followed by *T. polysporum*, *T. viride* and *T. hamatum* causing 13.92, 12.20 and 7.30 per cent, respectively. The inhibitory effect of these fungi against *M. phaseolina* was probably due to competition and / or antibiosis. The antagonistic activity of *T. harzianum* as noticed in the present studies is similar to the finding of [6-8,17,18], who reported effective inhibition of *Fusarium moniliforme*, *Rhizoctonia solani*, *Pythium ultimum* and *Sclerotium rolfsii*, by *T. harzianum*.

Under field conditions, *T. harzianum* recorded the lesser root - rot incidence of 5 per cent and it was on par with the root - rot incidence recorded by *T. viride* and *T. hamatum* (Table, 2).

Table 1: *In vitro* efficacy of bioagents against *Macrophomina phaseolina*

	Growth (per cent)		
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Antagonist	Antagonist	Pathogen	zone (per cent)
Trichoderma hamatum	65.70	22.10	12.20[b]
T. harzianum	68.48	13.32	18.20[a]
T. polysporum	73.33	12.75	13.92[b]
T. viride	70.60	22.10	7.30[c]

Different alphabets in column represent insignificant difference at $p < 0.05$ employing DMRT[16]

Table 2: Field evaluation of bioagents against *Macrophomina phaseolina* on Egg - plant

Antagonist	Per cent root-rot Incidence
Trichoderma hamatum	14[c]
T. harzianum	5[a]
T.polysporum	8.50[b]
T. viride	10[b]

Different alphabets in column represent insignificant difference at $p < 0.05$ employing DMRT[16]

On the base of present study the bioagents of fungi, it can be exploited for future plant disease management programs.

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