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Antagonism of Two *Trichoderma* Species against *Alternaria alternata* on *Capsicum frutescens*

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Abstract

Biological management of plant disease is a much popular method of disease control now a days. Being ecofriendly safe and effective disease control agents, biocontrol agents are being used widely by farmers in combating disease and pests. The present investigation deals with comparative antagonistic behavior of two different species of *Trichoderma* viz. *Trichoderma harzianum* and *Trichoderma viride* against *Alternaria alternata*, a common and destructive pathogen of *Capsicum frutescens*. To find out the comparative antagonistic properties of both the species of *Trichodema* against *Alternaria alternata*, culture plate technique was used and the experiment was allowed to run for 10 days. Results indicated that *Trichoderma harzianum* which reduced the growth of *Altrnaria alternata* by 67.07% is more effective in controlling the growth of test pathogen. *Trichoderma viride*, causing a reduction of 66.67% was also found to be a suitable biocontrol agent.

Key words: *Capsicum frutescens*, *Trichoderma*, Biocontrol, *Alternaria alternate*, Antagonism

Introduction

The productivity of vegetables is low in developing countries mainly because of poor genetic stock and diseases. *Capsicum frutescens* is an important vegetable crop in India. It is a winter season crop. Bareilly being situated at foothills of Himalayas, between river Nakatia in north and Ramganga in south, has pleasant tarai climate with a prolonged winter season of 4-5 months. Shimla Chilli is cultivated as a commercial crop throughout the village fields surrounding the city upto the radius of 20 km.*Capsicum frutescens* is highly susceptible to number of fungal diseases. The intensity and extent of host-parasite interaction is markedly affected by environment factors viz. Temperature, relative humidity and rainfall, where they directly or indirectly determine almost all the events of pathogenesis. Life cycles, Survival of pathogens, establishment of infection, host parasite relation, symptoms and development of disease, spread and recurrence of disease are governed entirely by the environmental conditions. Even after the establishment of infection, sudden change in the environment affects the disease process either positively or negatively.

Due to indiscriminate use, chemical control has no longer been effective. Attempts are being made to develop resistant varieties against the destructive pathogens. Biological control is increasing now a days as effective method of controlling different fungal diseases. In present investigation *in vitro* efficacy of *Trichoderma harzianum* and *Trichoderma viride,* against stem rot, leaf blight, fruit rot and seed rot fungus *Alternaria alternata* has been studied.

Materials and Methods

Pathogenic cultures of *Alternaria alternata* from diseased *Capsicum frutescens* plant parts were collected from Bareilly region. Host fungus as well as Two Bio Control agents (BCAs) were grown on Potato dextrose agar (PDA) petri dishes for a week at 28±2℃. Approximately 20 ml PDA was poured into each petri dish. After solidification one disc of *Alternaria alternata* and BCA was placed in the petridishes on the surface of PDA at a distance of 4 cm from each other. Now the dishes were incubated at room temperature and kept under observation for 10 days. Growth was observed after 5^{th}, 7^{th} and 10^{th} day after incubation. Each experiment was conducted with control plates. All results were analyzed statistically.

Result and Discussion

During investigation on shimla chilli *Alternaria alternata* was found to be associated with entire plant parts. It caused disease on stem, leaves, fruits, flower bud and seed. It was found throughout the year in moderate to severe form. Its frequency was maximum from January to May and also from September to December, but was not encountered from June to august significantly.

Results revealed that both species i.e. *Trichoderma harzianum* and *Trichoderma viride* have controlled the pathogen *Alternaria alternata* being mycoparasite on it. This antibiosis was probably due to some diffusible antifungal substance. Hyphae of *Trichoderma* overgrew to the hyphae of *Alternaria alternata*. Result revealed that *T. harzianum* caused 67.07% inhibition of *A. alternata* after 10^{th} day of incubation, while an inhibition of 66.67 was recorded by using *T. viride* on similar lines. It is evident from table-1 that growth inhibition was started after 5^{th} day of incubation and growth inhibition was maximum after 10^{th} day of incubation.Result also indicated that *Trichoderma viride* is more effective in controlling the growth of *A. alternata* than *Trichoderma viride*. present study indicated the power for antagonistic property of *T. harzianum* against *A. alternata*. All results were analysed statistically. All results were significant at 5% level.

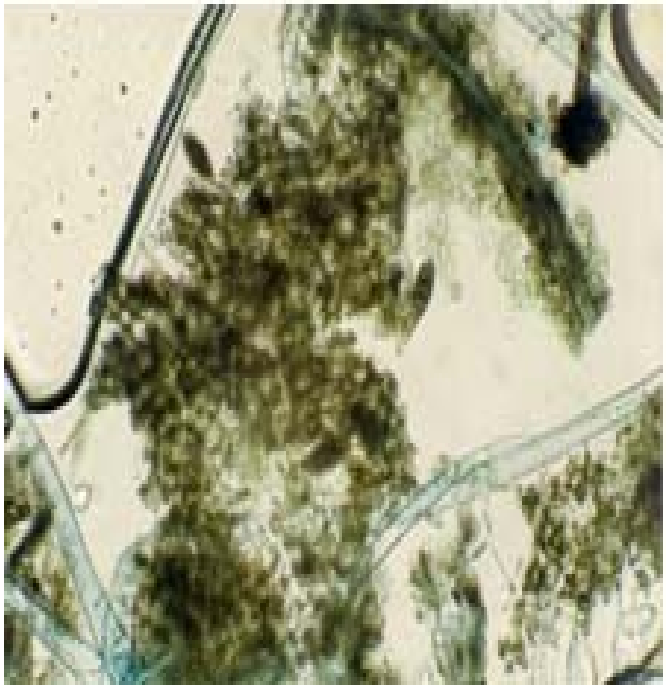

Figure 1-conidia of *Alternaria alternata*

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Table-1: Testing of two biocontrol agents against *Alternaria alternate*

Bio control agents	Colony diameter(cm)		
	5th Day	7th Day	10th Day
Control	5	7.1	8.2
T. harzianum	2.1	2.5	2.7
CD (5%)	0.0302	0.0183	0.0995
Growth inhibition (%)	58.00	64.80	67.07
Control	4.6	6.7	8.1
T. viride	2.4	2.6	2.7
CD (5%)	0.035	0.0541	0.0406
growth inhibition (%)	47.83	61.20	66.67

- Average of three replicates
- Radial growth is taken in cm
- All values are significant at 5% level

Piotrowska and Dorszewski (1996) worked out the relationship between potato pathogens and *Trichoderma* species and *Gliocladium roseum*. *T. viride* and *T. harzianum* also exhibited antagonistic activity. Present observations are in accordance with this work. Patel and Anahosur (2001) studied antagonism of *Trichoderma harzianum* against *Fusarium spp. , Sclerotium rolfsii* and *Macrophomina phaseolina*. Bhavaneswari and Rao (2001) have shown the effect of *Trichodema viride* to post-harvest pathogens on mango. Bunker and Mathur (2001). discussed the Integration of Biocontrol agents and fungicide for suppression of dry root rot of *Capsicum frutescens*. Deshmukh et al. (1994) worked on the effect of *Trichoderma* species and fungicides on fungi sorghum (*Sorghum bicolor*). Dennis and Webster (1971) have shown the antagonistic properties of species grouping *Trichoderma.* Dumas and Boyonoski in 1992 studied Biological control of *Armillaria* by *Trichoderma* species in New Zealand. They found using electron microscopes that certain *Trichoderma* species attacked penetrated and destroyed outer tissue of the *Armillaria* rhizomorphs and, once inside, they killed *Armillaria* hyphae by coiling and direct penetration. Pandey and Hussain (2010) studied the antagonistic profiling of two species of Trichoderma against *Drechslera tetramera* on shimla chilli and study revealed that *Trichoderma viride* and *Trichoderma harzianum* were almost equally effective against *Drechslera tetramera* growth *in* vitro. Pandey and Hussain (2006) studied that *Trichoderma viride* and *Trichoderma harzianum* have shown similar results against *Rhizoctonia* solani.

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