SHORT COMMUNICATION

BIOCONTROL EFFICACY OF VARIOUS *TRICHODERMA* SPECIES AGAINST FUNGAL PATHOGEN *ALTERNARIA SOLANI*, CAUSING EARLY BLIGHT OF TOMATO UNDER *INVITRO* CONDITIONS

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Abstract: Tomato (*Solanum lycopersicum*) is the most popular vegetable crop grown worldwide and it ranks second most important solanaceous vegetable after potato (Pritesh & Subramanian, 2011). The production of tomato limited by foliar disease early blight which is generally associated with an air borne pathogen Alternaria species. The management of disease is challenging task as the chemical control through fungicides leading to the hazardous effect on human health and environment. The biocontrol potential of various *Trichoderma* specieswas tested under laboratory conditions to test the efficacy of various *Trichoderma* species such as *Trichodermaviride, T. harzianum, T. virens, T. hamatam* and *T. aureoviride* against Alternaria pathogen. The dual culture technique was followed to evaluate the efficiency of biocontrol agents. The observations were recorded up to 7 days after inoculation. The results showed that all the *Trichoderma* agents have significantly reduced the pathogen growth but comparatively among all the *Trichoderma* species, the *T. viride* has showed highest perecent inhibition of mycelial growth *i,e.,* 85% followed by *T. harzianum* (77%), *T. virens* (75%), *T. hamatam* (68%). Whereas *T. aureoviride* has showed less percent inhibition of mycelial growth which is 60% at 7 DAI compared to control.

Keywords: Early blight, Alternaria, Biocontrol, *Trichoderma*

INTRODUCTION

Early blight emerged as one of the most destructive foliar diseases. The fungal biocontrol agents such as *Trichoderma*sps. Tested for their antagonistic activity against Alternaria. The use of biological control agents has been recognized as a viable option to synthetic chemicals in plant disease control and is currently being advocated worldwide (Ganeshan and Kumar, 2005).

The beneficial microbes can act as potential biocontrol organismsby directly interfering with the growth of the pathogen. The efficient utilisation of fungal and bacterial bioagents can reduce the use ofnon-judicious chemical fungicides there by protecting the environmental from pollution effect. The biocontrol potential of various *Trichoderma* specieswas tested under laboratory conditions to test the efficacy of various *Trichoderma* species such as *Trichodermaviride, T. harzianum, T. virens, T. hamatam* and *T. aureoviride* against Alternaria pathogen. The dual culture technique was followed to evaluate the efficiency of biocontrol agents. The observations were recorded up to 7 days after inoculation.

MATERIALS AND METHODS

The experiments were conducted at laboratory in the department of plant pathology, JNKVV. The fungal isolates were tested for their antagonistic potential against the *Alternaria* by dual culture method (Dhingra and Sinclair, 1995). Mycelial disc of the pathogen from seven-day old culture grown on PDA was placed on one side of the plate and the mycelial disc (5 mm) of antagonistic fungi were placed on other side of the plate, four cm away from the pathogen and incubated. Three replications were maintained for each isolate. The pathogen grown as monoculture served as control. The plates were observed daily after 24 h. of inoculation of antagonists till the pathogen grew and covered the plate kept as control. The percent inhibition of the pathogen was calculated using the formula suggested by Vincent (1927).

The observations were recorded 7 days after inoculation using formula

PIOC= C-T/CX100

Where,

I = Percentage of growth inhibition of pathogen.
C = Radial growth of the pathogen in control.
T = Radial growth of the pathogen in treatment

RESULTS AND DISCUSSION

The results showed that all the *Trichoderma* agents have significantly inhibited the radial growth of the pathogen Alternaria compared to control but comparatively among all the *Trichoderma* species, the *T. viride* has showed highest percent inhibition of mycelial growth *i,e.,* 85% followed by *T. harzianum* (77%), *T. virens* (75%), *T. hamatam* (68%). Whereas *T. aureoviride* has showed less percent inhibition of mycelial growth which is 60% at 7 DAI compared to control (Table 1) that and it was clear that the mycelial strands of *Trichodermaviride* have

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overgrown the pathogen in the petriplate (Plate 2).

Results are in agreement with Ajaya bhai *et al.* (2018) who conducted studies on biocontrol agents and tested antagonistic potential of *T. viride*, *T. harzianum*, *T. fasciculatum*, *Bacillus subtilis* and *P. fuorescens* against *A. alternata* through dual culture technique. and found*T.viride*to be most efficient bioagent which showed highest mycelial growth inhibition (84.55%) followed by *T. harzianum* (80.90%) *T. fasciculatum* (71.35%), *P. fuorescens* (37.64%) and *B. subtillis* (33.71%) and concluded that all the bio-agents found to be superior in restricting the mycelia growth of the pathogen *A. alternata* over the control.

Similarly, Singh *et al.*, (2018) also proved efficacy of *Trichoderma* by testing different bio-control agents, among which *Trichodermaharzianum* showed maximum mycelial inhibition (80.37%) followed by *T. viride* and *T. koningii* @71.48 and 77.41 % respectively. Least mycelial growth inhibition was noticed by *T. hamatum* (27.41%) after 7 days of inoculation.

Table 1. *Invitro* antagonistic activity of rhizosphere antagonists against Fusarium oxysporum at 168 hrs. of inoculation

S/NO.	*Trichoderma*sps.	Radial Growth of Alternaria (mm)	PIOC (%)
1	*T.harzianum*	18.30	77.12
2	*T.viride*	12.00	85.00
3	*T.hamatum*	25.00	68.75
4	*T. virens*	19.30	75.87
5	*T.aureoviride*	32.00	60.00
6	Control	80.00	0.00
CD at 5%		0.194	
SEM ±		0.062	

*Mean of three replications PIOC=Per cent Inhibition Over Control

Plate 1. Different bio control agents used against Alternaria

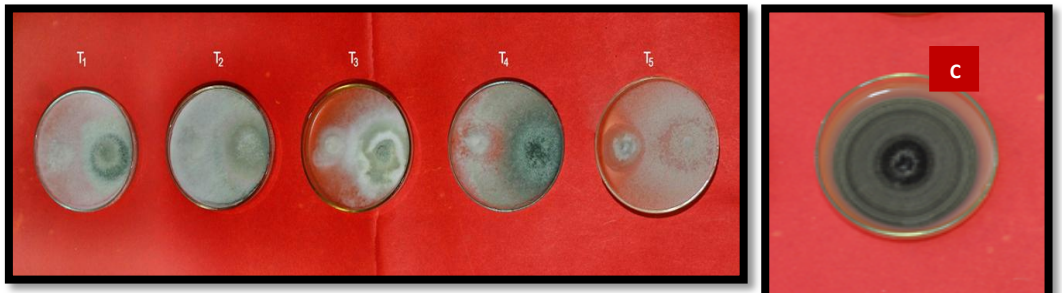

Plate 2. *Invitro* efficacy of *Trichodermaharzianum* (T1), T.*viride* (T2), T.*hamatum*(T3), T.*virens*(T4) and T. *aureoviride*(T5) against Alternaria after 7 days of inoculation, C= Control

REFERENCES

Ajayabhai, C.D., Kedar Nath, Tabis Bekriwala and MabhuBala (2018). Management of alternaria leaf blight of groundnut caused by *Alternaria alternata*.*Indian Phytopathology*,**71** (4): 543-548.
Google Scholar

Singh, V.P., Khan, R.U. and Pathak, Devesh. (2018). In vitro evaluation of fungicides, bio-control agents and plant extracts against early blight of tomato caused by Alternaria solani (Ellis and Martin) Jones and Grout. *Internat. J. Plant Protec.*, **11**(1): 102-108.
Google Scholar

Ganeshan, G. and Kumar, M. (2005). Pseudomonas fluorescens, a potential bacterial antagonist to control plant diseases. *J. Plant Interact.*,**1**(3):123-134.
Google Scholar

Dhingra, O.D. and Sinclair, J.B. (1995).Basic plant pathology methods. Second edition, *Lewis Publishers, CRC Press, USA*, 400-450pp.
Google Scholar

Vincent, J.M. (1927). Distortion of fungal hyphae in presence of certain inhibitors. *Nature*,**150**: 850-856.
Google Scholar