

# Antagonistic Effect of *Trichoderma viride* against Pathogenic Fungi *Fusarium oxysporum f sp lycopersici* (FOL) and on *Alternaria alternata*

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**Abstract:** The study was conducted to know the Antagonistic effect of *T. viride* on *F. oxysporum f sp lycopersici* (FOL) and *Alternaria alternata*. A 7 days old culture of *T. viride* and pathogenic fungi placed aseptically at periphery of the Petri plate containing the PDA medium. And control was also maintained, after 5 and 6 days of incubation period the experimental results showed 90.4 % inhibition in the growth of FOL and 93 % inhibition in the growth of *A. alternata* in comparison with the control.

**Keywords:** Antagonistic activity, Bio-control, *Trichoderma*

## 1. Introduction

*T. viride* is a bio-control agent for management of soil born diseases (Singh, K. R., 2010). *T. viride* is the potential antagonistic fungus which prevents the crops from diseases viz. Root rots, wilts, brown rot, damping off, charcoal rot and other soil borne diseases in crops. *T. viride* is able to suppress more than 60 species of pathogens (Pythium, Botritis, Phoma, Sclerotinia, Fusarium, Ascochyta, Alternaria and others) on different plants like Vegetables, cereals, pulses, oilseeds, Flower crops, spices and various ornamentals etc.

The biological control is the best alternative especially against soil borne pathogens. Biological control of pathogens, i.e., the total or partial destruction of pathogen populations by other organisms, occurs routinely in nature. Among the various antagonists used for the management of plant diseases, *Trichoderma* spp. plays a vital role. Recently, it was suggested that, trichoderma affects induced systemic resistance mechanism in plants against pathogens (Haggag and Amin, 2001, Prasad *et al.*, 2002 and Jayalakshmi *et al.*, 2009).

*T. viride* secretes cellulose and chitinase enzymes which react with cell wall of the disease causative pathogenic fungi or bacteria and dissolve the same. *Trichoderma* utilize the protoplasm as a source of food and multiply its spores. By this method the spores of the pathogenic fungi are destroyed. In the process of development *Trichoderma* synthesizes a variety of antibiotics (gliotoxin, viridine, trichodermin and others). They destroy the cell walls of phytopathogenic fungi and produce biologically active substances, which stimulate plant growth and development. *T. viride* also induce plants to "turn on" their native defense mechanisms offers the likelihood that these strains will control pathogens other than fungi. *T. viride* possess innate resistance to most agricultural chemicals, including fungicides.

Biological control is the total and partial destruction of pathogen populations by other organisms. Baker and Cook (1974) defined biological control "as the reduction of inoculums density or disease producing activities of a

pathogen or parasite in its active or dormant state, by one or more organisms, accomplished naturally or through manipulation of the environmental, host or antagonist, or by mass introduction of one or more antagonists".

The present study was conducted to know the Bio-control activity (BCA) of *T. viride* against *Fusarium wilt* and *Alternaria* leaf spot diseases of solanaceous crops. Through the isolation and identification of FOL and *A. alternata* by dual culture technique.

## 2. Materials and Methods

**Isolation of FOL and *A. alternata*:** Sampled rhizosphere soils of a symptomatic *Solanum* (sect. *Lycopersicon*) and isolated FOL and *A. alternata*. 1 gm soil suspension was prepared in 9 ml distilled water and mixed properly, Allowed to settling down and performed serial dilution. 1 ml of suspension was taken from supernatant of last three aliquots and poured on PDA respectively later Petri plates incubated at room temperature for seven days. Further colonies characters observed on Petri plate and identified as FOL and *A. alternata* based on its Morphological characters further it has sub cultured and maintained as pure culture on petriplates and on slants containing PDA. The colony morphology was studied by microscopic observation.

**Morphological characterization of *T. viride*:** Fungal species *T. viride* was brought from GKVK, Bangalore and sub cultured on petriplates containing PDA. Further it was incubated at 26°C for 5 days, later a loopful of inoculum from sub cultured plates of *T. viride* were transferred to Potato Dextrose Agar (PDA) slants and maintained as pure culture. Green conidia forming fungal bodies were selected and microscopic observation was identified to be *T. viride* (Plate 1).

### Antagonistic activity of *T. viride* on FOL and on *A. alternata*

The *Trichoderma* isolates were evaluated *in vitro* for their potential to control the FOL and *A. alternata*. FOL and *A. alternata* is a soil borne pathogenic fungus common in soil

and that causes Fusarium wilt a deadly vascular wilting syndrome and leaf spot in most of the plants.

The study was conducted to know the Antagonistic effect of *T. viride* on *FLO* also on *A. alternata*. A 7 days old culture of *T. viride* and pathogenic fungi discs was cutted separately with the help of sterilized cork bores (5 mm), further the culture discs of pathogen and bio agent transferred aseptically at periphery of the Petri plate containing the PDA medium. And control was also maintained by inoculating

$$\text{Percent inhibition} = \frac{\text{Radial growth in Control (C)} - \text{Radial growth in the treatment (T)}}{\text{Radial growth in control (C)}} \times 100 \%$$

### 3. Results and Discussion

Pathogenic fungi *FOL* and *A. alternata* is a soil borne pathogenic fungus common in soil and that causes Fusarium wilt a deadly vascular wilting syndrome and leaf blight in most of the plants. Mycelia of *FOL* are delicate white to pink. Microscopic observation of *FOL* fungus showed chlamydospores which produced on Chlamydophores in terminally in pairs also in chains form (Plate 2). Microscopic observation of *A. alternata* showed light brown colour muriform shape conidia (Plate 3).

#### Antagonistic activity of *T. viride* on *FOL*

The study was conducted to know the Antagonistic effect of *T. viride* on *FOL*. A 7 days old culture of *T. viride* and pathogenic fungi discs were used to perform dual culture technique. The experimental results showed 72.60 % inhibition in the growth of *FOL* (Plate. 4).

R1 = Radial growth of pathogen towards opposite side in control plate

with culture disc of the pathogen alone in the Petri plates containing PDA. Later the cultured plates were transferred to an incubator and incubated at  $25 \pm 1^\circ\text{C}$ . After incubation observation was taken periodically for growth of the pathogen and antagonist in Petri plates and measured the colony growth (diameter) in each Petri plate. Further the percent inhibition of growth of the pathogen calculated by using percent inhibition formula.  $(R1-R2/R1*100)$  when the bio agent forms inhibition zone.

R2 = Radius of the radial growth of the pathogen towards the opponent antagonistic in test plate

RI = 7.3cm

R2 = 2 cm

Percent inhibition =  $R1-R2/R1*100=72.60\%$

#### Antagonistic activity of *T. viride* on *A. alternata*

*T. viride* was evaluated for its antifungal activity against *Alternaria alternata*. Dual culture technique is performed by using a 7 days old culture of *T. viride* and pathogenic fungi *Alternaria alternata*. The experimental results showed 21.42 % inhibition in the growth of *A. alternata* in comparison with the control (Plate. 5).

R1 = Radial growth of pathogen towards opposite side in control plate

R2 = Radius of the radial growth of the pathogen towards the opponent antagonistic in test plate

RI = 7 cm

R2 = 5.50cm

Percent inhibition= $R1-R2/R1*100= 21.42\%$

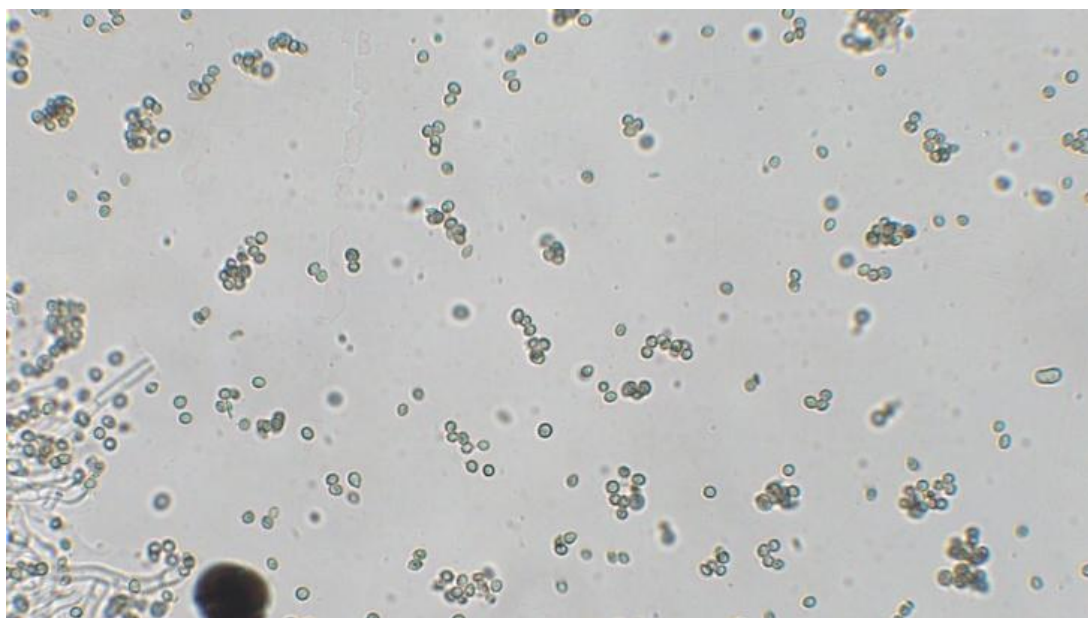
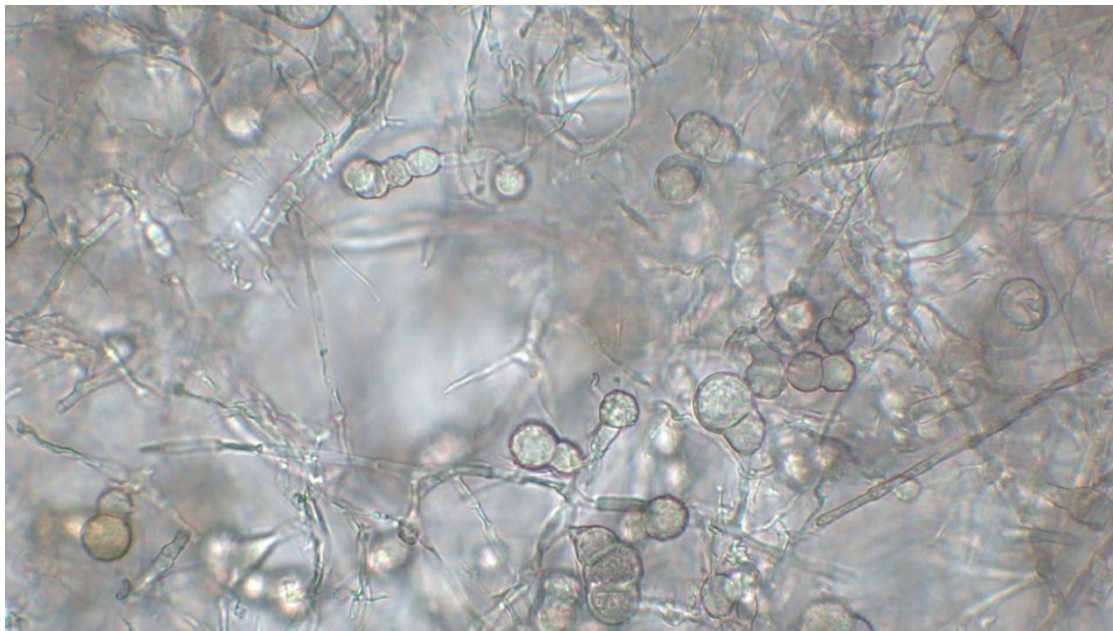


Plate 1: Microscopic view of *T. viride* mycelium and spores





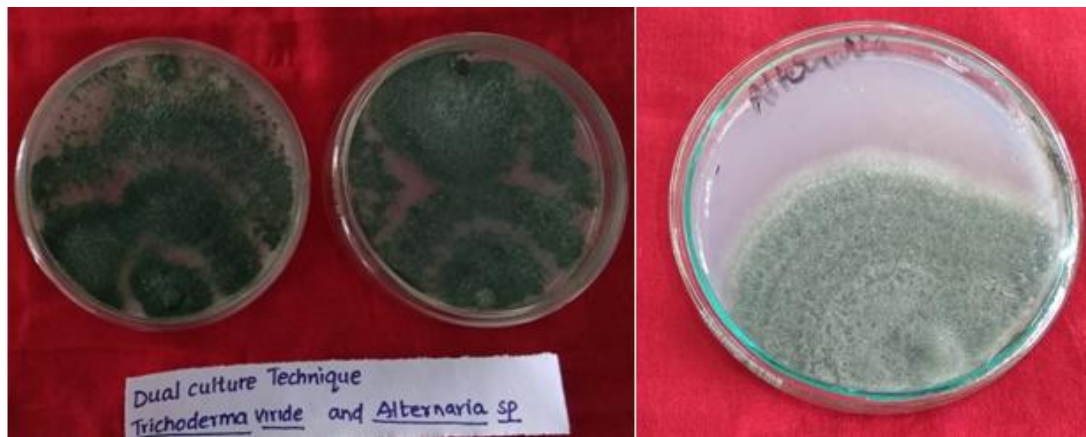
**Plate 2:** Picture showing Chlamydospores formation (*F. oxysporum f sp lycopersici*)



**Plate 3:** Picture showing a muriform *A. alternata*



**Plate 4:** Antagonistic activity of *T. viride* on *F. oxysporum f sp lycopersici*



**Plate 5:** Antagonistic activity of *T. viride* on *A. alternata*

**Table 1:** Dual culture technique: *In vitro* evaluation of microbial bio-agents *T. viride* on Pathogenic fungi *Fusarium oxysporum f sp lycopersici* (FOL) and on *Alternaria alternata*

Treatments	Radial growth of Pathogen (cm)	Per cent Inhibition over control (%)
<i>Trichoderma viride</i> + <i>Fusarium oxysporum f sp lycopersici</i> (FLO)	7.30	72.60
<i>Trichoderma viride</i> + <i>Alternaria alternate</i>	5.50	21.42

#### 4. Conclusion

Antagonistic effect of *T. viride* on *F. oxysporum f sp lycopersici* (FOL) and *Alternaria alternata* showed 90.4 % inhibition in the growth of FOL and 93 % inhibition in the growth of *A. alternata* in comparison with the control.

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