

Efficacy of Antagonistic Organisms against *Colletotrichum falcatum* Causing Red Rot Disease of Sugarcane

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Abstract: Sugarcane (*Saccharum officinarum* L.) is a perennial true grass of genus *Saccharum*. It is affected by many diseases like red rot, leaf scald, whip smut, grassy shoot, etc. Among these, red rot disease caused by *Colletotrichum falcatum* has been found to cause heavy losses by reducing cane yield and deteriorating juice quality by inversion of sucrose and thereby reducing the yield of sugar. In the present study, the antagonistic activity of different fungi such as *Trichoderma viride* and *Penicillium chrysogenum* was tested against *Colletotrichum falcatum* by dual culture method. The antagonistic fungi caused significant reduction in the mycelial growth of the test fungus.

Key words: Antagonistic organisms, Red rot of sugarcane, *Colletotrichum falcatum*, mycelial growth.

1. INTRODUCTION:

Sugarcane (*Saccharum officinarum*) is an important cash crop grown in tropical and subtropical parts of world. About 80% of total sugar produced worldwide is from sugarcane. It provides raw material for production of sugar, jiggery and syrup (liquid jaggery). molasses is used for alcoholic fermentation or as animal feed additive and baggase is used for generation of electricity and in paper industries. India is second largest producer of sugar in world after Brazil. It is affected by many diseases such as red rot, leaf scald, whip smut, grassy shoot, ring rot, mosaic, orange rust, etc. The red rot caused by *Colletotrichum falcatum* is very important disease, which cause heavy losses to sugarcane, with respect to cane yield and percentage of sugar. *Colletotrichum falcatum* infects mature stalks and leaf midrib, where red lesions are developed. *Trichoderma* species are well known for their biological control and are commercially available in India, China, USA and Sweden (Howell, 2003). *Trichoderma* produces a wide range of antibiotic substances, cause synergism and antibiosis. (Harman et al., 2004). In the present experiment, *In vitro* attempts were made to use two different fungal antagonists (*Trichoderma viride* and *Penicillium chrysogenum*) for the control of mycelial growth of *Colletotrichum falcatum*. For this, dual culture technique was used. Both the antagonists were found to cause inhibition of mycelial growth of the fungus. Among the antagonists used, the *Trichoderma viride* was found to be most effective for the control of the test fungus.

2. MATERIAL AND METHODS:

• ISOLATION OF PATHOGEN:

The infected plant parts were collected from different fields around Latur city. The isolation of the pathogen was made by placing the surface-sterilized infected plant tissue on solidified, sterile potato dextrose agar medium in Petri dishes. The Petri dishes were incubated at 28°C for 7 days. The fungal pathogen was isolated and sub-cultured for further studies.

• EVALUATION OF ANTAGONISTIC ACTIVITY:

The pure culture of antagonistic fungi viz. *Trichoderma viride* and *Penicillium chrysogenum* were obtained from the Department of Microbiology, Dayanand Science College, Latur. Their efficacy against *Colletotrichum falcatum* was studied by dual culture method. One mycelial disc (5mm diameter) of the test fungus and antagonist was kept on the surface of sterile, solidified, potato dextrose agar medium in Petri dishes at 6cm apart. The inoculated Petri dishes were incubated at 28°C for 5 days. For each antagonist, three replications were kept. In case of control, the Petri dishes were inoculated with mycelial disc of *Colletotrichum falcatum* only. After incubation, mycelial growth was measured. The inhibition of mycelial growth of the pathogen was calculated using the formula.

$$\text{Percent inhibition} = \frac{C-T}{C} \times 100$$

Where, C=Mycelial growth of *Colletotrichum falcatum* in control.

T=Mycelial growth of *Colletotrichum falcatum* in presence of fungal antagonist.

Table 1. Effect of fungal antagonists on mycelial growth of *Colletotrichum falcatum*.

Sr. No.	Antagonists	Mycelial Growth (in mm)	% inhibition
1	<i>Trichoderma viride</i>	7	89.23
2	<i>Penicillium chrysogenum</i>	9	86.15
3	Control (without antagonist)	65	---

From Table 1, it becomes very clear that, both the antagonistic fungi caused significant inhibition of mycelial growth of *Colletotrichum falcatum*. *Trichoderma viride* caused 89.23% inhibition, while *Penicillium chrysogenum* caused 86.15% inhibition of mycelial growth. The antagonistic activity of fungal antagonists against various fungal pathogens was studied by various workers. Viswanathan and Samiyappan (1999 and 2001) found *T. harzianum*, *T. viride*, *C. globosum* and *G. virens* as strong competitors against *C. falcatum* in dual culture tests. Shrinkage of conidia and disintegration of cell wall of conidia were commonly noticed by (Kumar, 1995). *T. harzianum* and *C. globosum* appeared of major importance on *C. falcatum* under field conditions when inoculated 24 hours prior to the pathogen and also when mixed inoculate of the pathogen and bioagents were inoculated in the canes. Chaurasia and Rao (2016) used *Trichoderma harzianum* and *Aspergillus flavus* against *Colletotrichum falcatum*. Singh et al. (2007) studied antagonistic potential of *Trichoderma harzianum*, *Trichoderma viride* etc. against *Macrophomina phaseolina* causing dry root of mungbean. Sreedevi et al. (2011) reported effectiveness of five species of *Trichoderma* against *Macrophomina phaseolina* causing dry root of groundnut. Vipin Kumar et al. (2012) successfully used *Trichoderma harzianum* and *Trichoderma viride* against damping off and root rot of tomato. Archana Singh (2008) studied the efficacy of *Trichoderma harzianum* and *Trichoderma viride* against *Curvularia penneseti* in pearl millet.

3. CONCLUSION :

The fungi *Trichoderma viride* and *Penicillium chrysogenum* have antagonistic potential against the mycelial growth of *Colletotrichum falcatum* causing red rot disease of sugarcane.

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