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In Vitro Evaluation Of Trichoderma Species Against Colletotrichum Falcatum Causing Red Rot Of Sugarcane

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Abstract: Red rot caused by Colletotrchum falcatum is one of the most important diseases of Sugarcane. In the present investigation, inhibitory effects of different Trichoderma species were observed in lab condition. It was found that all five Trichoderma species were efficient in mycelia growth inhibition of Colletotrichum falcatum. Trichoderma harzianum gave best result in dual culture with growth inhibition of 84.4% against whereas T. koningii showed minimum growth inhibition of 76.2%.

Keywords: Colletotrichum, Trichoderma, inhibition

1. INTRODUCTION

Soil biodiversity plays a very important role in the sustainability of agriculture systems and it also indicates the level of health of soil, particularly while considering the richness of microorganisms which are involved in plant disease control. The use of microbial diversity to manage disease of crop plants falls into the category of biological control. Researchers are therefore attempting to enhance the effectiveness of antagonists in the cropping field, thus increasing suppressive ness. Biocontrol of plant diseases by other microorganisms is found to be a more effective and environmentally beneficial substitute to the harmful chemical fungicides (Shalini and Kotasthane, 2007, ChitraMani & Kumar, P. (2020); Sharma, M., & Kumar, P. (2020); Chand, J., & Kumar, P. (2020); Naik, M., & Kumar, P. (2020); Kumar, P., & Naik, M. (2020); Kumar, P., & Dwivedi, P. (2020); Devi, P., & Kumar, P. (2020); Kumari, P., & Kumar, P. (2020); Kaur, S., & Kumar, P. (2020); Devi, P., & Kumar, P. (2020); Sharma, K., & Kumar, P. (2020); Kumar, S. B. P. (2020); Devi, P., & Kumar, P. (2020); Chand, J., & Kumar, P. (2020). Trichoderma species are best known to contain antifungal activity against plant diseases since 1930s (Hjeljord and Tronsmo, 1998). Their different species and isolates are available commercially (Freeman et al., 2004). T. harzianum solely or in mixture with different Trichoderma species or adjuvant, has been useful in management of several diseases like damping-off in radish, maize and soybean (Lifshitz et al., 1985) and tomato grey mould disease (Migheli et al., 1994). Sugarcane is one of the important commercial crops playing major role in agriculture and industrial economy of the country.

2. MATERIAL AND METHODS

Five different species presented in **Table 1** were assessed for comparative efficacy against Colletotrichum falcatum by dual culture method. Nine mm diameter disc of test fungus and the antagonistic fungi were cut and were kept opposite to each other at a distance of 5 mm from the edge of Petri dish. Same disc of test fungus was placed on another petri plate containing PDA, which served as Untreated (Control). Individual treatment was duplicated 3 times and incubated at 25 ± 2^{0}C. Per cent growth inhibition of test pathogen was found out by using given below formula (Vincent, 1947 and Behzad et al., 2008).

$$\text{Inhibition \%} = \frac{\text{CONTROL}-\text{TREATED}}{\text{CONTROL}} \text{ X } 100$$

Where, C = Mycelial growth of the test Pathogen in controlled plate (mm)
T = Mycelial growth of the test Pathogen in treatment (mm)

Table1. List of Trichoderma species used against Colletotrichum falcatum

Treatment	Name of Bio agent /Botanical
T1	Trichoderma viride
T2	Trichoderma hamatum
T3	Trichoderma harzianum
T4	Trichoderma koningii
T5	Trichoderma virens

3. RESULT AND DISCUSSION

Effect of five different species (Table 2) were evaluated under in vitro condition. Trichoderma isolates were cultured along with Colletotrichum falcatum in petriplates for a week and it was found that all the species of Trichoderma reduced themycelial growth of Colletotrichum falcatum. Trichoderma harzianum gave best result in dual culture with minimum radial growth of 14.5mm and maximum growth inhibition of 84.4% followed by T.hamatum with radial growth of 15mm and growth inhibition of 83.3mm, T.viride with 82.2mm growth inhibition, T.virens with 77.2% growth inhibition whereas T. koningii showed minimunm growth inhibition of 76.2% with maximum mycelial growth of 21.5mm. Singh et al. (2004) observed inhibitory activity of different Trichoderma isolates against Colletotrichum falcatum. Webster and Lomas (1964) reported that Trichoderma viride produces gliotoxin and viridin which easily inhibit the growth of pathogens (Kumar, P. (2019); Kumar, D., Rameshwar, S. D., & Kumar, P. (2019); Dey, S. R., & Kumar, P. (2019); Kumar et al. (2019); Dey, S. R., & Kumar, P. (2019); Kumar, P., & Pathak, S. (2018); Kumar, P., & Dwivedi, P. (2018); Kumar, P., & Pathak, S. (2018); Kumar et al.,2018; Kumar, P., & Hemantaranjan, A. (2017); Dwivedi, P., & Prasann, K. (2016). Kumar, P. (2014); Kumar, P. (2013); Kumar et al. (2013); Prasann, K. (2012); Kumar et al. (2011); Kumar et al. (2014).

Table2. Effect of different species of Trichoderma on the growth of Collectotrichum falcatum

S.No.	Trichoderma species	Colony diameter(mm)	Percent growth inhibition (%)
1.	T.harzianum	14.5	84.4
2.	T.koningii	21.5	76.2
3.	T.hamatum	15	83.3
4.	T.viride	16	82.2
5.	T.virens	20.5	77.2

	Control	90	00

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