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EFFECT OF DIFFERENT CARBON SOURCES ON THE ANTAGONISTIC POTENTIAL OF *TRICHODERMA VIRIDE* (WILD AND MUTANTS)

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ABSTRACT

Antagonistic potentiality of *Trichoderma viride* was analyzed against *Pythium aphanidermatum* causing rhizome rot of turmeric, by employing dual culture technique. Different carbon sources such as Fructose, Galactose, Dextrose, Maltose, Starch, Glucose and Sucrose were incorporated into Czapek Dox agar culture medium at the concentration of 3% for evaluation of their effect on antagonistic activity of *Trichoderma viride* wild (Tv_w) and mutants (Tv_{UV-40} and Tv_{SA-56}). Sucrose was found to be the most favorable carbon source in all *Trichoderma viride* strains (Tv_w, Tv_{UV-40} and Tv_{SA-56}) with showed inhibition in the growth of *Pythium aphanidermatum* to the extent of 64.6, 68.8 and 69.4 % respectively. Whereas, lowest antagonistic activity was recorded with Galactose in case of Tv_w (57.7 %) and Tv_{SA-56} (55.5 %) strains, whereas Tv_{UV-40} showed enhanced antagonistic potential (61.1%).

Key words: Trichoderma viride, Antagonistic potential, Biocontrol, Pythium aphanidermatum

Introduction:

Turmeric (*Curcuma longa* L.) is an herbaceous, aromatic, perennial plant belonging to family Zingiberaceae. Turmeric rhizome rot is one of the disease caused due to the infection of fungal pathogen, *Pythium aphanidermatum* (Edson) Fitz. It results in great yield loss reaching to about 50 % under field condition (Nirmal, 1992) and about 50 60 % storage conditions (Rajlakshmi et al., 2016).

Recent research is being focused on eco-friendly management of fungal pathogens by using various biological control agents (bio-agent). Among these *Trichoderma* species are most commonly used bio-agent. It is capable of controlling wide range of fungal phyto-pathogens (Ozbay and Newman, 2004; Hajieghrari et al., 2008). For enhanced antagonistic activity of this fungus, its mutagenesis was employed by various researchers (Nakkeeran et al., 2005 Singh et al., 2016; Elakkiya and Muralikrishnan, 2014).

Different nutrient sources are required for proper growth and antagonistic potential of *Trichoderma* species. Carbon sources are one among them. Present investigation was undertaken to study the effect of different carbon sources on antagonistic potential of *Trichoderma viride* wild (Tv_w) and mutants (Tv_{UV-40} and Tv_{SA-56})

Material and Methods:

Pythium aphanidermatum (Edson) Fitzp. was isolated from diseased rhizomes of turmeric, collected from different districts of Maharashtra state by inoculating infected rhizomes on Czapek Dox agar culture medium. Pure culture was obtained by hyphal tip technique (Tutte, 1969). *Pythium aphanidermatum* was identified following Niterrink and van der. (1981).

Trichoderma species was isolated from turmeric rhizospheres of different districts of Maharashtra state. For isolation of

Trichoderma viride from soil, methods outlined by Warcup, (1950) and Serial dilution technique (Aneja, 2005) were used. *Trichoderma viride* was identified following Bissette's (1991) key of *Trichoderma* genus.

Mycelial suspension of seven days old culture of *Trichoderma viride* was exposed to UV light for 5-30 min. Out of 48 mutants obtained, due to Uv treatment, Tv_{UV-40} exhibited highest antagonistic activity against *Pythium aphanidermatum.* Therefore, it is used for further analysis (Kamble and Kamble, 2020) Similarly the mycelial suspension was treated with Sodium azide solution (1.00 to 0.01 ppm), at the time interval of 5 and 10 minutes. Total 112 mutants were obtained, among which Tv_{SA-56} was selected using the similar criteria.

Various sources of carbohydrate (Fructose, Galactose, Dextrose, Maltose Starch, Glucose and Sucrose) were incorporated into Czapek Dox agar (CDA) culture medium. By putting CDA medium in petri-plates, antagonistic activity of *Trichoderma viride* wild (Tv_w) and its mutants (Tv_{UV-40} and Tv_{SA-56}) were tested against *Pythium aphanidermatum* by using duel culture method as described by Morton and Stroube (1955) Per cent inhibition in the growth of *P. aphanidermatum* was calculated by using the formula given by Vincet (1947):

Results and Discussion

Table 1 : Effect of different Carbon sources on the antagonistic activity of *Trichoderma viride* (wild and mutants)

Carbon Source	Tv_w		Tv_{UV-40}		Tv_{SA-56}	
	Length (mm)	Inhibition percent (%)	Length (mm)	Inhibition percent (%)	Length (mm)	Inhibition percent (%)
Fructose	36.0	60.0	35.0	61.1	37.0	58.8
Galactose	38.0	57.7	34.0	62.2	40.0	55.5
Dextrose	35.5	60.5	32.5	63.8	34.0	62.2
Maltose	33.5	62.7	32.5	63.8	37.0	58.8
Starch	31.0	65.5	31.0	65.5	34.0	62.2
Glucose	31.0	65.5	33.0	63.3	40.0	55.5
Sucrose	30.0	66.6	28.0	68.8	27.0	69.4
Control	00	00	00	00	00	00

The results obtained revealed that Sucrose was the most favorable carbon source, and highest antagonistic activity was recorded when it was used as a source of Carbon in the growth medium, and showed 64.6, 68.8 and 69.4 % inhibition. *T. viride* mutants were found to be most beneficial which antagonistic activity in all carbon sources (Table 1).

Among the mutants, Tv_{SA-56} was more antagonistic as compared to $Tv_{UV-40.}$ Galactose recorded lowest antagonistic activity in case of *Trichoderma viride* wild Tv_w (57.7%) and Tv_{SA-56} (55.5%), while in case of $Tv_{UV-40.}$ fructose showed least antagonistic activity.

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