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## *In vitro* evaluation of bio control agents against *Pyricularia grisea* (Sacc.) causing rice Blast

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### Abstract

Five different biocontrol agents viz., *Trichoderma viride*, *Trichoderma harzianum*, *Trichoderma harzianum* (TNAU), *Trichoderma koningii* and *Pseudomonas fluorescens* evaluated against *Pyricularia grisea* *in vitro*. Among the five different biocontrol agents, maximum growth inhibition observed with *P. fluorescens* (63.7%) followed by *Trichoderma koningii* (52.2%), *Trichoderma viride* (47.1%), *Trichoderma harzianum* (TNAU) (42.4%). The lowest growth inhibition was observed with *Trichoderma harzianum* (29.23%). Among the *Trichoderma* isolates, *Trichoderma koningii* (52.2%) and *Trichoderma viride* (47.1%) were found better with significant difference in mycelial growth inhibition of *Pyricularia grisea*.

**Keywords:** *Pyricularia grisea*, growth inhibition, dual culture, biocontrol agents

### Introduction

India is the largest rice growing country accounting for about one third of the world acreage under the crop. (Anonymous, 2016) [2]. Rice suffers from many diseases caused by fungi, bacteria, viruses, phytoplasma, nematodes and other non-parasitic disorders. Among the fungal diseases, blast is considered as a major threat to rice production. Losses due to the blast disease may range up to 90 per cent depending upon the component of the plant infected. *Pyricularia grisea* infects above ground parts of the plant, but neck blast and the panicle blast are the most damaging phases of the disease and have been shown to significantly reduce yield, grain weight and milling quality (Ghose *et al.*, 1960) [4]. In view of this present investigation was taken up to study the efficacy of various biocontrol agents against growth inhibition of *Pyricularia grisea* causing rice blast

### Material and Methods

#### Efficacy of bio control agents against *P. grisea* *in vitro*

In order to find the antagonistic effect of different bio control organisms, viz., *Trichoderma viride*, *T. koningi*, *T. harzianum*, *T. harzianum* (TNAU) and *Pseudomonas fluorescens* against growth of *Pyricularia grisea* *in vitro*, dual culture studies were employed (Mortan and Straube, 1955) [8].

Autoclaved PDA was poured aseptically into sterilized Petri dishes and allowed to solidify. Mycelial discs of 5 mm diameter from the edge of actively growing culture of *Pyricularia grisea* and bio control organisms were separately cut with help of sterilized cork borer and the two discs were individually placed on the periphery about 1 cm from the edge of the Petri dishes (9 cm diameter) on opposite sides. Four replications were maintained for each interaction. The Petri dishes containing potato dextrose agar inoculated with *Pyricularia grisea* (mono culture) alone served as control. All the Petri dishes were incubated at (27±1 °C) for fifteen days. At the end of incubation, the colony diameter of the *Pyricularia grisea* was measured and the per cent inhibition of *Pyricularia grisea* was calculated by adopting the following formula given by Vincent (1927) [9].

$$\text{Percent Growth Inhibition} = \frac{\text{Radial growth of } P. \text{ grisea} - \text{Radial growth of } P. \text{ grisea in monoculture dual culture}}{\text{Radial growth of } P. \text{ grisea in monoculture}}$$

### Results and Discussion

All the antagonistic agents tested were found to inhibit growth of *Pyricularia grisea* *in vitro* in dual culture compared to monoculture check plate.

The highest inhibition of the growth of *Pyricularia grisea* was observed when dual cultured with *P. fluorescens* (63.7%) followed by *T. koningii* (52.2%), *T. viride* (47.1%), *T. harzianum*

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(TNAU) (42.4%). The lowest growth inhibition was observed with *T. harzianum* (29.23%). Among the *Trichoderma* isolates, *T. koningii* (52.2%) and *T. viride* (47.1%) were found better with insignificant difference between them.

Among the antagonists, the maximum inhibition of *P. grisea* was observed in *T. virens* (67%). Differential inhibition was observed in *T. viride* (61%), *T. harzianum* (44%), and *B. subtilis* (11%). Contrarily, no inhibition was observed in *P. fluorescens*. The present study is in confirmatory with the observations made by Watanabe (1985) [10], Arumugam *et al.*, (2013) [3] and Ali and Nadarajah (2014) [1]. Gouramanis (1997) [6] observed that the *T. harzianum* inhibit 70-88 per cent of mycelial growth and conidial germination of *P. oryzae*.

Gnanamanickam and Mew (1992) [5] reported least inhibition by *P. fluorescens* and *B. subtilis* as against higher inhibition

by *Trichoderma* spp. In the present study all the species of *Trichoderma* tested showed more hyphal inhibition compared to bacterial antagonists. This might be due to the production of antibiotics, which are detrimental to the growth of *P. oryzae*. (Karthikeyan and Gnanamanickam, 2008) [7] and also may be due to higher competitive ability of *Trichoderma* sp.

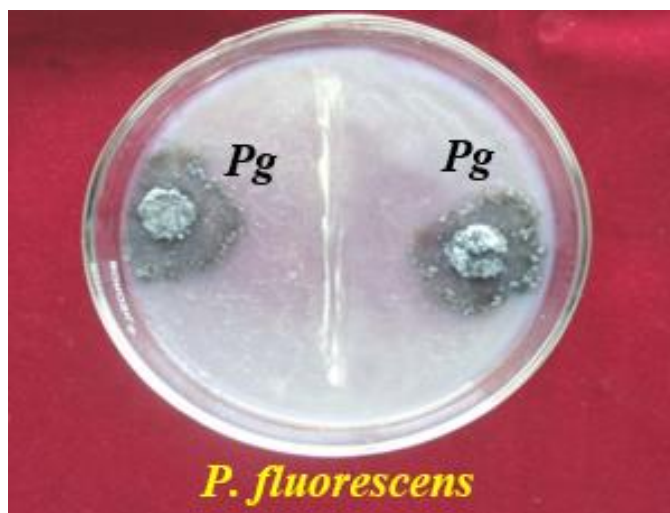
Biological control is a potential non-chemical, effective and eco-friendly means for plant disease management. In the present investigation the efficacy of bio control agents against *P. grisea* was assessed by the dual culture technique. Based on the data as *P. fluorescens* and *T. viride* (most commonly used *Trichoderma* sp. as biocontrol agent) were found highly effective and hence commercial formulations of these two biocontrol agents obtained from the Biological Control Laboratory, AP state Department of Agriculture were utilized for further *in vivo* selection.

**Table 1:** *In vitro* efficacy of different bio control agents on radial growth of

Sl. No	Biocontrol agents	Colony diameter of <i>P. grisea</i> (mm)	Percent Growth Inhibition (%)*
1	<i>Trichoderma viride</i>	42.90	47.1 (43.3)
2	<i>Trichoderma koningii</i>	37.85	52.2 (46.2)
3	<i>Pseudomonas fluorescens</i>	26.30	63.7 (52.9)
4	<i>Trichoderma harzianum</i> (TNAU)	47.65	42.4 (40.6)
5	<i>Trichoderma harzianum</i>	60.70	29.3 (32.8)
6	Control	90.00	0.0 (0.0)
	S. Em ±		0.70
	CD (P=0.05)		4.6
	CV (%)		3.85



**Plate 1:** *In vitro* efficacy of different biocontrol agents on radial growth of *Pyricularia grisea*



**Plate 2:** *In vitro* efficacy of *P. fluorescens* on radial growth of *Pyricularia grisea*

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