

## Bio-control of rice sheath blight through antagonists

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### ABSTRACT

*In vitro* assessment of four biocontrol agents revealed promising effect of *Trichoderma viride* (Bangalore isolate) followed by *T. harzianum* (Bangalore isolate) and *T. harzianum* (Bhubaneswar isolate) in inhibiting the mycelial growth and sclerotial production of S8 isolate of *Rhizoctonia solani*. In pot culture experiment on rice variety Tapaswini the bioefficacy of *T. viride* (Bangalore isolate) was observed to be significantly higher followed by *Gliocladium virens* (Bhubaneswar isolate). Among the biogents, Bangalore isolate of *T. viride* was found very effective in restricting the growth and sclerotia production of *R.solani* by 67.94% and 68.62%, respectively as compared to that of the control

**Key words:** rice, sheath blight, bio-control, *Trichoderma*

Sheath blight of rice caused by *Rhizoctonia solani* Kuhn is one of the potentially serious diseases in many rice growing regions and has become more prevalent in many high yielding varieties currently grown in India. The disease generally appears at the maximum tillering stage and affects all plant parts above water line. A modest estimation of losses due to sheath blight in India has been reported up to 54.3% (Roy, 1993). Bio-control agents/antagonists are considered as one of the effective and eco-friendly means of management of diseases in different crops. Several fungi like *Trichoderma viride*, *T. harzianum*, *T. koningii* (Das and Hazarika, 2000;), *Gliocladium virens* (Baby and Manibhusanrao, 1993) are found to be antagonistic against *R. solani*. In the present study four antagonistic fungi namely *Trichoderma viride* (Bangalore and Bhubaneswar isolate), *T. harzianum* (Bangalore and Bhubaneswar isolate), *Paecilomyces lilacinus* (Bangalore and Bhubaneswar isolate) and *Gliocladium virens* (Bhubaneswar isolate) have been tested against the sheath blight fungus, *R. solani* under in vitro condition and pot culture to assess their efficacy.

Antagonistic activity of Bangalore and Bhubaneswar isolate of different bio-control agents namely *Trichoderma viride*, *T. harzianum* and *P. lilacinus* and *G. virens* (Bhubaneswar isolate) on

mycelia growth and sclerotial production of the virulent S8 isolate of *R. solani* were tested on PDA using dual culture technique. (Mathur and Sarbhoy, 1978). Observations were taken on the percent inhibition of linear growth and sclerotial production of the test fungus (Vincent, 1947).

In the pot culture study, the antagonistic effect of biocontrol agents was studied by artificial inoculation on the rice variety 'Tapaswini'. The biogents were allowed to multiply separately in sand maize meal medium for 10 days. These bioagents with the sand maize meal medium were added @ 40 g kg<sup>-1</sup> soil to the pots planted with 'Tapaswini'. The virulent S8 isolate of *R.solani* was subsequently inoculated into the pot soil 7 days after application of bio-agent. Development of disease symptoms were recorded alongwith ascertain the effect of disease/antagonistic myco-parasite on the grain yield.

All the antagonists in the vitro study inhibited the mycelial growth and sclerotial formation of S8 isolate. Among the biogents, Bangalore isolate of *T. viride* was found very effective in restricting the growth and sclerotia production of *R.solani* by 67.94% and 68.62% after 4 days of incubation, respectively as compared to that of the control. The second best biocontrol agent was found to be the Bangalore isolate

of *T. harzianum* in inhibiting the growth and sclerotial production by 66.95% and 66.06%, respectively. Similarly, the sclerotial inhibition due to the above two biocontrol agents were observed to be 46.07% and 59.96%, respectively. The antagonistic effect of the Bangalore and Bhubaneswar isolates of *Paecilomyces lilacinus* tested was observed to be minimum with respect to inhibition of growth by sclerotial production. However, the effect of *Gliocladium virens* was

highest (65.39%) with an increase in grain weight over control by 162.67% with respect to Bangalore isolates of *T. viride* followed by *Gliocladium virens* (Bh). The least effect in reducing lesion length was observed in both Bangalore and Bhubaneswar isolates of *Paecilomyces lilacinus*. However, the bioefficacy of both the Bangalore and Bhubaneswar isolates of *T. viride* and *T. harzianum* was observed to be

**Table 1.** Efficacy of biocontrol agents on growth and sclerotia production of *R.solani* (S<sub>8</sub> isolate)

Bioagents	Average diameter growth of the test fungus after 4 days (in mm)	Growth inhibition over control after 4 days (%)	Average sclerotial production after 4 days (in no.)	Inhibition of sclerotia production over control after 4 days (%)
<i>Trichoderma viride</i> (Ba)	28.85	67.94	23.56	68.62
<i>Trichoderma viride</i> (Bh)	44.67	50.37	40.01	46.07
<i>Trichoderma harzianum</i> (Ba)	29.74	66.95	25.48	66.06
<i>Trichoderma harzianum</i> (Bh)	37.82	57.98	30.06	59.96
<i>Paecilomyces lilacinus</i> (Ba)	45.36	49.60	44.06	41.31
<i>Paecilomyces lilacinus</i> (Bh)	48.53	46.08	43.72	41.76
<i>Gliocladium virens</i> (Bh)	37.87	57.92	39.26	47.70
Control	90.00	-	75.07	-
CD	0.777		0.653	

Ba = Isolate from Project Directorate of Biological Control, Bangalore  
Bh= Isolate form OUAT, Bhubaneswar

observed to be promising in inhibiting the growth and sclerotial production by 57.92% and 47.70%, respectively.

Significant difference in the bioefficacy of the antagonists was observed in minimizing the disease. The reduction in lesion length was observed to be the

**Table 2.** Efficacy of bio-control agents against *R.solani* (S<sub>8</sub> isolate) on rice var. Tapaswini

Bioagents	Lesion length (in cm)	Reduction in lesion length over control (%)	Average grain wt./hill over control (gms)	Increase in grain wt. hill <sup>-1</sup> over control (%)
<i>T. viride</i> (Ba)	2.72	65.39	34.83	162.67
<i>T. viride</i> (Bh)	3.81	51.53	26.97	103.39
<i>T. harzianum</i> (Ba)	4.01	48.98	26.56	97.81
<i>T. harzianum</i> (Bh)	5.99	53.69	28.05	111.54
<i>P. lilacinus</i> (Ba)	5.99	23.79	23.89	79.03
<i>P. lilacinus</i> (Bh)	5.42	31.04	24.85	87.40
<i>G. virens</i> (Bh)	3.58	54.45	30.69	131.45
Control	7.91	-	13.26	-
CD	0.364		0.710	

significantly higher with respect to reduction in lesion length and increase in grain yield.

From the above investigation it can be concluded that the efficacy of biocontrol agents in inhibiting the mycelial growth and sclerotia production of S<sub>8</sub> isolate of *R.solani* manifested the significant effect of *T. viride* (Bangalore isolate) followed by *T. harzianum* (Bangalore isolate) and *T. harzianum* (Bhubaneswar isolate).

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