

Evaluation of bioefficacy of botanicals and biopesticides against Sheath blight disease of rice

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To adopt plant (botanicals) or microbial (biopesticides) products as part of biological measure in the integrated disease management (IDM), evaluation of bioefficacy of those products is necessary. It was found that product of *Pseudomonas fluorescense* (Floreszen-P) was observed as best in reducing disease severity (43.5 %) and increasing yield (1369 kg ha⁻¹) followed by one botanical product (Defender) (DS 54.4% and yield 1079 kg ha⁻¹). Though both biopesticide (Floreszen-P) and botanicals (Defender) were not as good as chemical (Carbendazim) but much better than untreated check plot (DS 76.5% and yield 739.5 kg ha⁻¹).

Key words: Rice, Sheath blight disease, bioefficacy, botanicals, biopesticides

INTRODUCTION

Sheath blight caused by *Rhizoctonia solani* Kuhn. is one of the major disease of rice (Biswas, 2000) in almost all the rice ecosystem of all agro climatic zone of West Bengal (Reddy, 1993; Biswas, 2000). Its incidence has been increased many fold due to intensive rice ecosystem, high levels of N fertilization, wide cultivation of susceptible cultivar like 'Swarna' etc. Yield loss due to this disease ranges from 30% - 40% depending upon environmental condition, attack on crop stage, cultivars etc. (Ou, 1985). Several commercial and new generation fungicides are reported to be effective in reducing the disease (Bag, 2009; Bag *et al.*, 2009; Bag and Biswas, 2010). But persistent, injudicious use of chemical has toxic effect on non target organisms and cause undesirable changes in the environment and continuous use of same fungicides leads to resistance of the pathogen (Sengupta, 2004). Large scale and long term use of resistant cultivar is likely to result in significant shifts in the virulence characteristics of pathogens, culminating in resistance breakdown. Thus adoption of plant (botanicals) or microbial (biopesticides) products as part of biological measures in the integrated disease management (IDM) has significant role. Thus present effort has been given for evaluation of new commercially available botanicals and biopesticides

against Sheath blight of rice under West Bengal situation.

MATERIALS AND METHODS

The trial was conducted at Rice Research Station, Chinsurah during *Kharif* 2006 and 2007. The experimental design was Randomized block design (RBD) with three replications and six treatments including untreated check as one treatment. Swarna (MTU-7029), a high yielding widely cultivated variety, was selected for the experiment. Standard agronomic practices were followed except the fertilizer dose (N:P₂O₅:K₂O @ 120:50:30 kg ha⁻¹).

All the plants except border ones were artificially inoculated by 'straw-bit' method during active tillering stage. Six treatments include, two botanicals viz., Biofer (organic, plant lipids, bioproducts made from natural plant molecules containing triterpene C30, 6 isoprene), Defender (natural plant derived product from *Cinnamomum zylanicum*); two biopesticides viz., Floreszen-P (bacterial product from *Pseudomonas fluorescens*), Trichozen-T (fungal product from *Trichoderma viride*); alongwith one check fungicide (Carbendazim) and untreated check.

First fungicidal spray was done just after the initial appearance of the disease and second spray was done 10 days after first spray except Trichozen-T

which was mixed with soil after final land preparation. Transplanting was done seven (7) days after final land preparation. The control plot was sprayed with plain water. Precautions were taken to prevent drifting of spray particles from target plot to other plots during spraying.

Statistics was applied on ARCSIN transformed values of disease incidence (%) data.

The grain yields were recorded on plot basis and were converted to kg ha⁻¹ for statistical analysis, because as per Marchetti and Bollich (1991), there is a strong correlation between symptom severity and yield reduction.

RESULTS AND DISCUSSION

Analysis of data (Table 1) revealed that all the treatments increased grain yield and reduced disease severity as compared to control (untreated) plot. Disease pressure was on higher note as was evident from the PDI value of control (untreated) plot (76.5%).

the biopesticide (Floreszen-P) and botanical (Defender) had shown much better result in compare to untreated check plot (control). Disease severity was reduced by 43.1% and 28.9% respectively in Floreszen-P and Defender treated plot over control (76.5%). Yield was also increased by 85.1% and 45.9% respectively in Floreszen-P and Defender treated plot over control (739.5 kg ha⁻¹).

Application of Floreszen-P and Defender was found effective in reducing other rice diseases such as Leaf blast, Brown spot, Sheath rot, False smut etc. (Anonymous, 2007, 2008).

Floreszen-P and Defender were found best (after Carbendazim) in managing Sheath blight disease in other AICRIP centre. During 2007 this same trial was conducted in 15 different AICRIP centres and average yield were 3851, 3854, 4251 and 3089 kg ha⁻¹ respectively in Floreszen-P, Defender, Bavistin treated and control (untreated) plot (Anonymous, 2008).

Table 1 : Performance of botanicals and biopesticides against Sheath blight disease of rice during *Kharif*, 2006 & 2007.

Name of fungicides	Doses litre ⁻¹ of water	Disease severity (%)			Yield (Kg/ha)		
		2006	2007	Pooled	2006	2007	Pooled
Biofer	1.5 ml	48.7 (44.2)	64.3 (53.3)	56.5 (48.7)	1142	869	1005.5
Defender	2.5 ml	50.7 (45.4)	58.0 (49.6)	54.4 (47.5)	1038	1120	1079.0
Floreszen-P	2.5 g	41.4 (40.0)	45.6 (42.4)	43.5 (41.3)	1478	1260	1369.0
Tricozen -T	*5 kg ha ⁻¹	52.0 (46.1)	56.1 (48.5)	54.1 (47.4)	961	987	974.0
Carbendazim 50WP	1.0 g	32.3 (34.6)	45.5 (42.5)	38.9 (38.6)	1682	1380	1531.0
Check (Untreated)	-	75.6 (60.4)	77.3 (61.5)	76.5 (61.0)	776	703	739.5
CD (0.05)		2.81	2.56	0.61	209.9	15.91	1.49
CV(%)		4.4	4.0	0.7	11.5	10.0	0.07

*Figure in parenthesis indicate ARC SIN transformed value

The Floreszen-P was observed as best among all biopesticide and botanicals in reducing disease severity (43.5%) and increasing yield (1369 kg ha⁻¹); Kazempour (2004) reported that *Pseudomonas fluorescens* have excellent potential to be used as biocontrol agents of *R. solani* in rice at the field conditions. Whereas among two botanicals Defender was best (DS 54.4% and yield 1079 kg ha⁻¹); Though the chemical (Carbendazim) performed better than Floreszen-P and Defender in reducing disease (32.6%) and increasing yield (2823.5 kg ha⁻¹); both

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