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Short Communication

Integrated management of leaf and neck blast disease of rice caused by *Pyricularia oryzae*

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An investigation was carried out at two locations during *Kharif* 2007 - 2008, to evaluate the efficacy of fungicides, bio-agent and botanicals for the management of rice blast caused by *Pyricularia oryzae* Cavara, on highly susceptible cv. Pankhali. All the spray treatments proved effective and reduce leaf and neck blast intensity and significantly increased the yield parameters. Among the treatments, tricyclazole proved significantly superior over rest of the treatments for all the attributes, viz., leaf blast, neck blast, grain, straw yield and 1000 grain wt. at both the locations and in pooled analysis. The next effective treatment was *Pseudomonas fluorescens* but it was at par with iprobenfos.

Key words: Blast, *Pyricularia oryzae* Cav, fungicides, bio-agent, botanicals.

INTRODUCTION

Blast of rice caused by *Pyricularia oryzae* Cav. (*Magnaporthe grisea* Sacc.) is one of the most destructive disease (Ou, 1985) and it accounts for 30 to 100% yield losses in all rice growing areas of the country (Padmanabhan, 1965). In South Gujarat (Ahwa-Dangs and in hilly area of Dharmpur and Vansada), it is a major disease of rice and occurs every year on high yielding improved susceptible varieties during kharif (Anonymous, 1984-2007).

The blast of rice causes huge losses of quality and quantity of harvest. The various chemicals, antagonists and botanicals were recommended in different area to control the blast. Hence, the present investigation was undertaken.

MATERIALS AND METHODS

An experiment was conducted at two locations using Randomized Block Design (RBD) with three replication in Kharif 2007 - 2008 at Krishi Vigyan Kendra, Waghai Rajendrapur and Hill Millet Research Station, Rambhas farm (Ahwa-Dangs) of Navsari Agricultural University, Waghai, on highly susceptible cv. Pankhali. It was transplanted in 2.00 x 2.25 m net plots with 20 x 15 cm spacing. The fertilizers and other recommended cultivation practices were followed to raise good crop. The fungicides *viz*., tricyclazole (Beam 75WP 1 g lit^{-1}), iprobenfos (Kitazin 48EC 1 ml lit^{-1}), mancozeb (Dithane M-45 75WP 2.5 g lit^{-1}), bio-agent *Pseudomonas fluorescens* (Sudocel 0.5WP 2 x 10^8 cfu g^{-1}) and botanicals viz., neem and tulsi leaves extracts (10%) were sprayed after appearance of disease, two spray at boot leaf stage and third at flowering stage. The incidence of leaf and neck blast were recorded

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Table 1. Integrated management of rice leaf and neck blast diseases.

S/ No.	Treatments	Leaf blast intensity (%)			Neck blast intensity (%)		
		Waghai	Rambhas	Pooled	Waghai	Rambhas	Pooled
1	Tricyclazole (Beam 75WP) 1 g l^{-1}	8.64* (16.99)**	10.49 (18.77)	9.56 (17.88)	22.96* (28.54)**	25.55 (30.28)	24.25 (29.41)
2	Iprobenfos (Kitazin 48EC) 1 ml l^{-1}	14.44 (22.30)	17.90 (24.95)	16.17 (23.62)	40.24 (39.34)	38.64 (38.40)	39.44 (38.87)
3	Mancozeb (Dithane M-45 75WP) 2.5 g l^{-1}	19.50 (26.17)	22.71 (28.42)	21.11 (27.29)	43.33 (41.14)	45.80 (42.56)	44.56 (41.85)
4	*Pseudomonas fluorescens* 2x10^8 CFU/g	13.58 (21.54)	16.66 (24.05)	15.12 (22.79)	38.51 (38.33)	36.41 (37.09)	37.46 (37.71)
5	*Azadirachta indica* (Neem leaf extract) 10%	25.67 (30.38)	28.64 (32.31)	27.16 (31.35)	45.55 (42.42)	48.76 (44.27)	47.15 (43.35)
6	*Ocimum sanctum* (Tulsi leaf extract) 10%	38.82 (38.49)	45.55 (42.43)	42.19 (40.46)	59.38 (50.41)	60.61 (51.12)	59.99 (50.76)
7	Control (No spray)	46.54 (42.99)	52.46 (46.39)	49.50 (44.69)	63.35 (52.74)	66.79 (54.80)	65.07 (53.77)
	CD *(P=0.05)*	4.28	3.93	2.49	4.82	4.79	2.98
	CV (%)	8.47	7.12	7.77	6.48	6.31	6.39

* Figures those outside are original values, ** Figures in parenthesis are angular transformed values.

from 30 hills/plot randomly selected and labelled. These labelled plants were observed for disease intensity using Standard Evaluation System for Rice, IRRI (1988) at 10 days interval till harvest. The percent disease intensity was worked out by using the formula:

$$PDI = \frac{\text{Sum of numerical ratings}}{\text{No. of hills observed x Maximum ratings (9)}} \times 100$$

The grain and straw yield/plot and 1000 grain weight were record and statistically analyzed.

RESULTS AND DISCUSSION

All the treatments had significantly reduced the percent leaf and neck blast as compared to control at both the locations (Table 1). The bio-efficacy of all the fungicides were all most same in controlling the disease at both the locations and location pooled analysis. Tricyclazole (beam) was found significantly superior than the rest of treatments and recorded minimum (9.56%) leaf blast intensity. The next effective treatment was *Pseudomonas fluorescens* (15.12%) which was statistically at par with iprobenfos (kitazin) (16.17%), followed by mancozeb (dithane M-45) (21.11%), neem leaf extract (27.16%) and tulsi leaf extract (59.99%).

The similar trend was observed in case of controlling neck blast. The tricyclazole recorded significantly lowest (24.25%) neck blast intensity than the rest of treatments. The next best treatment was *P. fluorescens* (37.46%) which was statistically at par with iprobenfos (39.44%), followed by mancozeb (44.56%), neem leaf extract (47.15%) and tulsi leaf extract (59.99%) in location pooled analysis.

The results of grain and straw yield were significant at both location and in location pool analysis (Table 2). Here also trend of yield production was similar due to different treatment was almost same. Significantly highest grain yield (3197 kg/ha) was harvested in tricyclazole which was at par with *P. fluorescens* (3044 kg/ha) and iprobenfos (2805 kg/ha). Grain yield performance of mancozeb (2580 kg/ha) and neem leaf extract (2300 kg/ha) were also superior over control treatment (1805 kg/ha). Treatment of tulsi leaf extract gave numerically higher grain yield (2014 kg/ha) as compared to untreated control but was at par with control treatment in grain yield performance.

The straw yield performance was similar to that of grain yield due to different treatments at both location and in pool analysis. The straw yield was significantly highest (5900 kg/ha) in tricyclazole which was at par with *P. fluorescens* (5583 kg/ha) and iprobenfos (5472 kg/ha). Straw yield performance of mancozeb (5300 kg/ha) and neem leaf extract (5027 kg/ha) were also superior over control treatment (4178 kg/ha). Incase of 1000 grain wt., the effect of treatment was similar to earlier parameters. The tricyclazole was found significantly superior over the rest of treatments as highest (24.52 g) 1000 grain wt. was recorded. The next best was *P. fluorescens* (22.43 g) which was at par with iprobenfos (21.70 g) and mancozeb

Table 2. Effect of fungicides, botanicals and bioagents on grain yield and 1000 grain wt. of rice.

S/No.	Treatments	Grain yield (kg/ha)			Straw yield (kg/ha)			1000-grain wt. (gm)		
		Waghai	Rambhas	Pooled	Waghai	Rambhas	Pooled	Waghai	Rambhas	Pooled
1	Tricyclazole (Beam 75WP) 1 g l^{-1}	3250	3144	3197	5944	5855	5900	24.69	24.36	24.52
2	Iprobenfos (Kitazin 48EC) 1 ml l^{-1}	2894	2717	2805	5500	5444	5472	21.97	21.42	21.70
3	Mancozeb (Dithane M-45 75WP) 2.5 g l^{-1}	2650	2511	2580	5322	5277	5300	20.60	19.76	20.18
4	*Pseudomonas fluorescens* 2x10^{8} CFU/g	3061	3028	3044	5666	5500	5583	22.63	22.24	22.43
5	*Azadirachta indica* (Neem leaf extract) 10%	2350	2250	2300	5077	4978	5027	18.62	18.47	18.55
6	*Ocimum sanctum* (Tulsi leaf extract) 10%	2028	2000	2014	4522	4289	4405	17.65	17.31	17.48
7	Control (No spray)	1855	1755	1805	4278	4078	4178	16.75	16.42	16.58
	CD *(P=0.05)*	387.20	415.36	240.47	535.24	702.58	373.17	2.24	2.15	1.31
	CV (%)	8.42	9.39	8.90	5.80	7.80	6.85	6.19	6.04	6.12

(20.60 g). Treatment of neem and tulsi leaf extract gave numerically higher 1000 grain wt. 18.55 and 17.48 g, respectively, as compared to untreated control (16.58 g) but was at par with control treatment in their performance.

In the present study, tricyclazole was found significantly superior over rest of the treatments for all the attributes viz., leaf blast, neck blast, grain yield, straw yield and 1000 grain wt. at both the location and in pooled data. This may be due to tricyclazole, a melanin biosynthesis inhibiting fungitoxicant, which provide an effective control of rice blast (*P. oryzae* Cav.) by preventing pathogen from entering through the host epidermis and also prevents melanization of appressoria and subsequent formation of infection peg apparatus. The next effective treatment was *P. fluorescens* which was at par with iprobenfos. It may be due to *P. fluorescens* suppress rice blast through salicylic acid accumulation and induction of systemic resistance. While, iprobenfos act as a chitin inhibitor in rice blast pathogen, *P. oryzae* Cav.

The results of our studies are similar to earlier of several workers. Singh and Prasad (2007) reported tricyclazole (beam) as most effective fungicide for the control of rice blast and increase the yield. Similar result was also reported by Prajapati et al. (2004). Effectiveness of iprobenfos (kitazin) in controlling rice blast and increasing grain yield has also been reported by Sharma and Kumar (1992). While, Vidhyasekaran et al. (1997) who reported that when *P. fluorescens* applied as foliar spray, it suppress rice blast in field condition.

Conflict of Interest

The authors have not declared any conflict of interest.

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