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Field Evaluation of Azoxystrobin + Propiconazole against Sheath Blight of Rice

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Abstract Two fungicides viz. Azoxystrobin + Propiconazole were evaluated for their efficacy on *Rhizoctonia solani*, the causal agent of rice sheath blight *in vivo* during two consecutive seasons of *kharif*–2011 and *kharif*–2012. The results revealed that in both the seasons Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE @ 500 ml/ha is as good as 625 ml/ha in controlling sheath blight disease of rice. Though Propiconazole 25% EC @ 500 ml/ha was statistically at par with the combination product but was found to be less economical for the control of sheath blight disease of rice. The treatment of Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE @ 500 ml/ha exhibited the highest cost benefit ratio of 1 : 2.38 followed by Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE @ 625 ml/ha (1 : 2.18) and Propiconazole 25% EC (1 : 2.15).

Keywords Bio-efficacy, Azoxystrobin + Propiconazole, Rice, Sheath blight.

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Introduction

Rice is important staple food crop in India. The intensity of sheath blight disease of rice has increased tremendously over the years in India. Losses due to sheath blight disease generally vary from 30 to 40% and may be even 100% in endemic areas. The reduction in yield due to the disease has been estimated to vary from 5.2 to 50.0% depending on the cultivar, environmental condition, stages at which the plants are infected and level of infection [1, 2]. Major production constraint in many rice growing areas especially in coastal and high humid regions. It is a major production constraint in Punjab, Haryana, Eastern UP, Bihar, West Bengal, Orissa, Assam, Tripura, Coastal AP, Coastal Tamil Nadu, Kerala, parts of Karnataka and Chhattishgarh.

Materials and Methods

Effect of fungicides on sheath blight of rice

Two season (*kharif*–2011 and 2012) field trials on evaluation of Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE was carried out in the experimental field of BCKV, West Bengal, India.

The seedlings of rice Shatabdi (IET–4786) were transplanted in the main experimental field of university. The experimental plots were laid out in random-

Table 1. Cost benefit ratio of different treatments used for control of sheath blight in rice at BCKV, experimental research farm (*kharif*–2012). Market rates: Azoxystrobin 7.5% + Propiconazole 12.5% SE–Rs 1300 / liter, Price of Rice–Rs 1000/q. Azoxystrobin 25% SC–Rs 6750/liter, Labor cost of insecticide application–Rs 275/ha. Propiconazole 25% EC–Rs 1059/liter, Validamycin 3% L–Rs 490/liter.

Sl. No.	Treatments	Dose ai (g/ha)	For-mula-tion (ml/ha)	Cost of inputs (cost of fungicide/ha cost of labor for spraying/ha)	Grain yield (q/ha)	Extra yield over untrea-ted control (yield in treat-ment-yield in untrea-ted control) (q/ha)	Value of addi-tional yield (Rs/ha)	Cost : Benefit ratio
1	Azoxystrobin 7.5%+Propico-nazole 12.5% SE	28.1 + 46.9	375	2362.50	42.14	2.27	2273.33	1 : 0.96
2	Azoxystrobin 7.5%+Propico-nazole 12.5% SE	37.5 + 62.5	500	2850.00	46.64	6.77	6773.33	1 : 2.38
3	Azoxystrobin 7.5%+Propico-nazole 12.5% SE	46.9 + 78.1	625	3337.50	47.14	7.27	7273.33	1 : 2.18
4	Azoxystrobin 23% SC	125	500	11025.00	41.43	1.57	1566.67	1 : 0.14
5	Propico-nazole 25% EC	125	500	2488.50	45.21	5.35	5346.67	1 : 2.15
6	Validamycin 3% L	60	2000	3840.00	44.15	4.29	4286.67	1 : 1.12
7	Untreated control	–	–		39.87	–	–	–

ized block design with three replications of seven treatments in two seasons. No seed treatment was done during the experiments and one month old seedlings were transplanted in the main experiential plots at 15 cm apart and 20 cm row to row. Three sequential sprays of the fungicide were done at 45, 60 and 75 days after transplanting (DAT). There were three application doses of Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE i.e. 375,500 and 625 ml/ha and sole application of Azoxystrobin 23% SC, Propiconazole 25% EC and Validamycin 3% L. The untreated check was kept as control. The observation on sheath blight disease was recorded at the early stage of the plant as it appears at active growth stage of crops. Twenty five (25) randomly selected hills in each replicated plot of the treatments were selected from the middle of the plots to avoid boarder effect and scored as per scale. The sheath blight incidence was scored using 0—9 scale.

Score	Description
0	No infection
1	Vertical spread of the disease upto 20% of plant height
3	Vertical spread of the disease upto 21—30% of plant height
5	Vertical spread of the disease upto 31—45% of plant height
7	Vertical spread of the disease upto 46—65% of plant height
9	Vertical spread of the disease more than 66% of plant height

Table 2. Bioefficacy effect of spraying of Azoxytrobin 7.5% + Propiconazole 12.5% w/v SE against sheath blight of rice during *kharif* of 2011 (1st season). The figures in parentheses are Arc sin transformed values.

Treatments	Products	Dose ai (g/ha)	Formulation (ml/ha)	Sheath blight severity of rice: Initial score	Ten days after 1st spraying	Ten days after 2nd spraying	Terminal score (Ten days after 3rd spraying	Grain yield (q/ha)	Grain quality
1	Azoxystrobin 7.5%+Propiconazole 12.5% SE	28.1+46.9	375	2.22 (8.57)	7.11 (15.47)	11.70 (20.01)	12.15 (20.40)	39.81	Shiny grains
2	Azoxystrobin 7.5%+Propiconazole 12.5% SE	37.5+62.5	500	2.67 (9.40)	3.70 (11.10)	4.44 (12.17)	6.22 (14.44)	43.05	Shiny and free of dirty grains
3	Azoxystrobin 7.5%+Propiconazole 12.5% SE	46.9+78.1	625	2.81 (9.66)	3.56 (10.87)	4.00 (11.54)	5.63 (13.73)	44.01	Shiny and free of dirty grains
4	Azoxystrobin 23% SC	125	500	2.22 (8.57)	10.07 (18.51)	12.59 (20.78)	15.41 (23.11)	39.62	Normal
5	Propiconazole 25% EC	125	500	2.37 (8.86)	5.48 (13.54)	7.41 (15.79)	8.15 (16.59)	42.13	Shiny grains
6	Validamycin 3% L	60	2000	2.52 (9.13)	6.22 (14.44)	8.59 (17.05)	10.52 (18.92)	41.95	Free of dirty grains
7	Control	–	–	2.81 (9.66)	15.41 (23.11)	21.33 (27.51)	29.78 (33.07)	37.02	Dull and more dirty and chaffy grains
	CD at 5% level			(NS)	(4.52)	(4.80)	(4.96)	2.49	–

A disease infection index was then calculated according to Wheeler [3] thus:

$$PDI = \frac{\text{Sum of numerical rating}}{\text{Total no. of hills observed} \times \text{Maximum grade}} \times 100$$

The grain yield was recorded from each plot during harvest of the trials conducted in kharif–2011 and *kharif*–2012. The yield was estimated per hectare basis.

Results and Discussion

The results of two seasons trials indicated that Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE @ 500 ml/ha is as good as 625 ml/ha in controlling sheath blight disease of rice. Though Propiconazole 25% EC @ 500 ml/ha was statistically at par with the combination product but was found to be less economical for the control of sheath blight disease of rice. The treatment of Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE @ 500 ml/ha exhibited the highest cost benefit ratio of 1 : 2.38 followed by Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE @ 625 ml/ha (1 : 2.18)

Table 3. Bioefficacy effect of spraying of Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE against sheath blight of rice during *kharif* of 2012 (2nd season). The figures in parentheses are Arc sin transformed values.

Treatments	Products	Dose ai (g/ha)	Formulation (ml/ha)	Sheath blight severity of rice: Initial score	Ten days after 1st spraying	Ten days after 2nd spraying	Terminal score (Ten days after 3rd spraying	Grain yield (q/ha)	Grain quality
1	Azoxystrobin 7.5%+Propiconazole 12.5% SE	28.1+46.9	375	4.00 (11.54)	14.52 (22.40)	15.56 (23.23)	17.63 (24.83)	42.14	Shiny grains
2	Azoxystrobin 7.5%+Propiconazole 12.5% SE	37.5+62.5	500	3.41 (10.64)	6.96 (15.30)	8.30 (16.74)	9.48 (17.93)	46.64	Shiny and free of dirty grains
3	Azoxystrobin 7.5%+Propiconazole 12.5% SE	46.9+78.1	625	2.96 (9.91)	6.52 (14.79)	7.56 (15.95)	8.74 (17.20)	47.14	Shiny and free of dirty grains
4	Azoxystrobin 23% SC	125	500	3.41 (10.64)	15.85 (23.46)	17.63 (24.83)	21.93 (27.92)	41.43	Normal
5	Propiconazole 25% EC	125	500	4.00 (11.54)	8.44 (16.89)	9.63 (18.08)	10.67 (19.06)	45.21	Shiny grains
6	Validamycin 3% L	60	2000	3.70 (11.10)	10.22 (18.65)	13.04 (21.17)	16.30 (23.81)	44.15	Free of dirty grains
7	Control	–	–	3.85 (11.32)	25.78 (30.51)	41.19 (39.92)	56.30 (48.62)	39.87	Dull and more dirty and chaffy grains
	CD at 5% level			(NS)	(5.81)	(5.21)	(5.74)	2.87	–

and Propiconazole 25% EC (1 : 2.15) (Table 1).

Therefore, it is evident from two season trials that combination product of different type of mode of action of constituents, Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE could halt the progress of infection by the sheath blight pathogen. Three sprayings of this product @ 625 and 500 ml/ha at 15 days interval very effectively reduced the progress of sheath blight disease after every spraying which resulted in increased grain yield.

Field trials in 2008 and 2009 conducted by Parsons et al. [4] showed that a newly formulated mixture of Azoxystrobin and Propiconazole called Quilt Xcel™ was highly effective in controlling sheath blight and protecting rice yield and milling quality.

Foliar spray of Azoxystrobin at 125, 250, and 500 g/ha significantly suppressed (> 64%) the development of sheath blight and enhanced yield level (> 60%). For controlling sheath blight disease, the optimum rate of Azoxystrobin was 125 g/ha [5].

Propiconazole at 0.75 ml/l was found to be very effective in reducing the disease intensity (33.01) [6].

Propiconazole applied twice or Propiconazole followed by benomyl significantly reduced disease severity and increased yield [7].

The data revealed that Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE in *kharif*–2011 and *kharif*–2012, improved the grain yield and grain quality. Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE @ 625 ml/ha gave maximum yield of 44.01, and 47.14 q/ha in *kharif*- 2011 and *kharif*-2012 respectively followed by Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE @ 500 ml/ha (43.05 and 46.64 q/ha) (Tables 2 and 3). The lowest grain yield were recorded in untreated control from both season (37.02 and 39.87 q/ha).

Conclusion

Two season trials (*kharif*–2011 and *kharif*–2012) on Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE @ 500 and 625 ml/ha were very effective in controlling sheath blight disease in rice. Three sprayings of Azoxystrobin 7.5% + Propiconazole 12.5% SE at both the dosages of 500 and 625 ml/ha showed similar trend of efficacy against sheath blight disease and significantly improved the grain yield and grain quality of rice.

The application of Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE @ 500 ml/ha recorded best cost benefit ratio among all the treatments in both the seasons.

Therefore, considering the bio efficacy and cost-benefit ratio Azoxystrobin 7.5% + Propiconazole 12.5% w/v SE @ 500 ml/ha is the optimum dose for efficiently controlling sheath blight disease in rice.

References

1. Ou SH (1985) Rice diseases. 2nd edn. CMI, Kew, Surry, England, pp 380.
2. Hori M (1969) On forecasting the damage due to sheath blight of rice plants and the crucial point for judging the necessity of chemical control of the disease. Rev Pl Prot Res 2 : 70—73.
3. Wheeler BEJ (1969) An introduction to plant diseases. John Wiley Publ, London, pp 301.
4. Parsons CE, Robinson JC, Yingling JA, Cartwright RD (2009) Effectiveness of new foliar fungicides to control sheath blight of rice. AAES Res Series 581.
5. Sundravadana S, Alice D, Kuttalam S, Samiyappan R (2007) Azoxystrobin activity on *Rhizoctonia solani* and its efficacy against rice sheath blight. Tunis J Pl Prot 2 : 79—84.
6. Santha Kumari P, Rehumath Niza TJ (2005) Propiconazole–A new fungicide for sheath blight of paddy. Karnataka J Agric Sci 18 : 833—835.
7. Jones RK, Belmar SB, Jeger MJ (1987) Evaluation of Benomyl and Propiconazole for controlling sheath blight of rice caused by *Rhizoctonia solani*. Pl Dis 222 : 225.