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Relative efficacy of some botanicals against sheath blight disease of rice

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Field experiment was conducted during *kharif* (wet) 1999 to 2001 evaluate the relative efficacy of six botanical formulations against the development of sheath blight disease of rice and compared with the standard check fungicide (Propiconazole 25 EC (I ha^{-1}). Botanicals tested were achook (5 I ha^{-1}), neemazal T/S (3 1 ha^{-1}), neemgold (20 I ha^{-1}), spictaf (4.5 I ha^{-1}), tricure (5 I ha^{-1}) and wanis (5 I ha^{-1}). Swarna, a high yielding cultivar but highly susceptible to sheath blight was tested under artificial disease pressure in irrigated ecosystem. Untreated check had 30.4 to 83.3% disease severity. All the botanicals significantly reduced the disease severity over the untreated check. Among the botanicals, spictaf followed by neemazal and achook performed best in reducing the disease severity and also improved the yield. However, no botanical was significantly superior to the check fungicide.

Key Words : Rice, sheath blight, *Rhizoctonia solani,* botanicals, efficacy

INTRODUCTION

Sheath blight caused by *Rhizoctonia solani* Kuhn is one of the most important fungal diseases of rice during the *kharif* (wet) season in West Bengal as well as in almost all rice growing states of India (Reddy and Reddy, 1986 ; Biswas, 2000). Kannaiyan and Prasad (1978) reported 5.2 – 50% loss and according to Rajan (1978) the loss in rice yield may be 16.8 – 48.4% depending on disease severity. There is also strong relationship between symptom severity and yield reduction (Marchetti and Bollich, 1991). There are a few resistant cultivars developed so far. Therefore at the present moment use of fungicides appears to be the only practical solution to its management to achieve full yield potential of the crop. Fungicidal properties of some botanicals are well established. These are also less toxic to plants, systemic in nature and are easily biodegradable. These eco-friendly bio-products are becoming more and more popular. No information is available about experiment conducted with botanical formulations to find out their relative efficacy in management of sheath blight disease. In this paper, an attempt has been made on that line.

MATERIALS AND METHODS

A field experiment was conducted for three consecutive crop seasons (1999, 2000 and 2001) during *kharif* (wet) season at Rice Research Station, Chinsurah (8.62 m MSL), West Bengal under the 'All India Coordinated Rice Improvement Programme' (AICRIP) on rice in a Randomized Complete Block (RCB) design with three replications. During 1999 and 2000, seven treatments comprising five botanicals, viz ; achook, spictaf, neemazal, neemgold and wanis were taken. In addition to the five botanicals, tricure was also included in 2001. Propiconazole (Tilt 25 EC) was included as a standard check fungicide. One untreated check was also maintained. All the botanicals are neem seed kernel extract (NSKE) or neem oil (NO) based EC containing Azadirachtin either 0.03% or 0.15% or 20%. The plot size was 3 m × 1.5 m and a disance of 90 cm was kept between plots and 1 m between blocks (replications). 'Swana' a high yielding cultivar but highly susceptible to sheath blight was taken. Thirty days old seedlings were transplanted in the experimental field in the last week of July with a spacing of 15 cm and 15 cm @ 2 seedlings per hill. Fertiliz-

ers N_2, P_2O_5, K_2O @ 120, 50, 30 kg ha^{-1} were applied and standard agronomic practices were followed to raise the crop.

During maximum (active) tillering stage in mid-September, all the plants (except the border ones) were inoculated with 10 days old highly virulent isolate of the pathogen by the 'straw-bit' method (Rao and Kannaiyan, 1973). The pathogen was isolated from the infected leaf sheaths of the susceptible high yielding cultivar 'Swarna'.

Botanicals were sprayed twice at an interval of about 10 days starting from the initial appearance of the disease after artifical inoculation depending upon disease development and weather conditions. During *Kharif* 2000, 2nd spray was delayed due to torrential rain and stagnation of flood water.

The disease incidence was recorded just before 1st and 2nd sprays. Finally it was recorded 10 days after 2nd spraying of fungicides from ten randomly affected plants in each treatment and the plants were assessed individually using SES 0-9 scale (IRRI, 1996). Disease severity (%) was calculated using this formula :

$$\frac{0(N_0) + 5(N_1) + 10(N_3) + 30(N_5) + 50(N_7) + 100(N_9)}{\text{Total no. of tillers or hills observed}}$$

where $N_0 - N_9$ = no. of tillers/hills, classified as 0 – 9 grades respectively, according to SES (0-9) for rice.

The grain yield recorded on plot basis were converted to kg ha^{-1} for statistical analysis.

RESULTS AND DISCUSSION

Perusal of data (Table 1) revealed that all the botanicals tested significantly reduced the sheath blight disease severity over untreated control. Among the botanicals spictaf followed by neemazal and achook performed well in reducing the disease severity and also improved the yield. During 2000, disease severity was much higher than other two years due to stagnation of flood water for a considerable period, yield was also much reduced for this reason. However, no botanical was significantly superior to the check fungicide (tilt). Neem seed kernel extract (NSKE) at (5%) when used as a component in the intergrated pest management (IPM) in rice replacing the pesticides reduced the severity of blast, brown spot ans sheath rot and increased the

Table 1 : Evaluation of botanical formulations for sheath blight management in *kharif* 1999 to 2001 at Chinsurah, West Bengal.

Treatments	Dose (per litre of water)	1999*		2000*		2001*	
		Disease severity (%)	Grain yield (kg ha^{-1})	Disease severity (%)	Grain yield (kg ha^{-1})	Disease severity (%)	Grain yield (kg ha^{-1})
Achook	5 ml	17.7 (24.9)	4067	66.0 (55.1)	792	12.6 (20.8)	3549
Spictaf	4.5 ml	16.9 (24.3)	4433	62.0 (52.0)	1018	9.7 (18.1)	4630
Neemazal	3 ml	17.2 (24.5)	4300	69.0 (56.5)	802	11.5 (19.8)	3858
Neemgold	20 ml	20.9 (27.2)	4033	71.7 (58.0)	658	10.4 (18.8)	4352
Wanis	5 ml	26.5 (31.0)	3567	75.0 (60.8)	669	13.4 (21.5)	3241
Tricure	5 ml	—	—	—	—	11.8 (20.1)	3704
Tilt	1 ml	13.5 (21.5)	4433	51.7 (46.0)	1358	9.3 (17.8)	4969
Check (Untreated)	—	30.4 (33.4)	3700	83.3 (67.0)	412	35.2 (36.4)	2192
L.S.D. (0.05%)		2.9	271.0	9.8	260.3	1.0	ns
C.V.(%)		6.1	3.8	13.0	23.7	2.6	24.8

Figures in parenthesis indicate angular transformed values and statistics applied to them

ns = not significant ; (—) = not tested in that year

* Average of 3 replications

yield (Mariappan *et al.*, 1993). Hence, it may be suggested that these eco-friendly botanicals may be used for sheath blight as well as other rice diseases also.

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