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Evaluation of plant-derived commercial products for controlling brown spot of rice

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ABSTRACT

Field experiments were carried out during wet seasons of 2003 and 2004 under irrigated upland ecosystem to evaluate the efficacy of plant-derived commercial products along with the standard check fungicides for controlling the brown spot of rice. Standard fungicides were found to be significantly superior to plant-derived commercial products in reducing the disease severity and increasing productivity during both the years. The plant-derived commercial products were found to be economical, feasible and eco-friendly. The results revealed that Biotos @ 5 ml l^{-1} of water was found significantly effective in controlling the brown spot (21.44%). It was further observed that application of Achook @ 5 ml l^{-1} of water gave better results in increasing the seed weight and grain yield by 17.45% and 29.97% , respectively over control.

Key words: *Rice, plant-derived commercial products, brown spot, control*

Brown spot caused by *Dreschlera oryzae* Breda de Hann is an important disease of rice. Savary *et al.* (2000a, b) reported yield losses up to 5% due to brown spot in rice across all production situations in South and South east Asia. The disease shows enormous yield losses in rainfed upland of Choota-Nagpur plateau region (Variar *et al.*, 1990 and Shukla *et al.*, 1995) and in Eastern India (Widawsky and O' Toole, 1990). In Kymore plateau Madhya Pradesh the productivity of rice is 1.2 t ha^{-1}, which is much below than national average of 2.5 t ha^{-1}. The low productivity in the Kymore plateau region is due to erratic rains, dominance of local land races, imbalance use of fertilizers and brown leaf spot disease of rice which has become a serious menace in irrigated upland ecosystem. Although, chemical fungicides are being used for effective control of brown leaf spot, they are costly and adversely affect the environment. Management of the disease using plant extracts has been reported to be successful (Ahmed Sheikh and Agnihotri, 1977 and Raji, 2004). Keeping these facts in view the present investigation was undertaken to evaluate the plant-derived commercial products for controlling the brown spot of rice under irrigated upland ecosystem.

The field trials were laid out in a randomized block design (RBD) with three replications. The experiment was conducted at the College of Agriculture, Rewa, Madhya Pradesh during wet season of 2003 and 2004. The susceptible variety "*Basmati"* was transplanted in a plot of 5m x 3m size at 15cm x 15cm spacing. Fertilizers were applied @ 80:60:40 kg ha^{-1} of N, P_2O_5 and K_2O respectively. Seven plant-derived commercial products viz. Achook @ 5 ml l^{-1}, Biotos @ 5 ml l^{-1}, Neem Azal T/S @ 3 ml l^{-1}, Neem gold @ 20 ml l^{-1}, Spictaf @ 4.5 ml l^{-1}, Tricure @ 5 ml l^{-1} and Wanis @ 5 ml l^{-1}, along with two standard check fungicides Bavistin 50 WP @ 0.05% and Hinosan 50 EC @ 0.05% were evaluated along with an untreated control. Three sprays of plant-derived commercial products were carried out at ten days interval, starting with the incidence of the disease. Disease incidence was recorded firstly at initial stage before spraying after one week and finally at harvest. Five plants from each plot were randomly selected and from each selected plants, three leaves were selected for recording disease index. The disease incidence was recorded by using 0-9 scale (IRRI, 1996) at weekly interval and percent disease index (PDI) was calculated using the formula.

$$PDI = \frac{\text{Sum of numerical ratings} \times 100}{\text{Total number of leaves observed} \times \text{Maximum disease scale}}$$

Average percent seed weight increase was computed using following formula

$$PISW = \frac{(100 \text{seed weight of treated plot(g)} - 100 \text{ seed weight in control(g))} \times 100}{\text{Yield in control(q ha}^{-1})}$$

Percent increase in yield (PIY) was calculated by the following formula

$$PIY = \frac{\text{yield of treated plot (q ha}^{-1}) - \text{yield in control (q ha}^{-1}) \times 100}{\text{Yield in control (q ha}^{-1})}$$

In all the treatments, the chemical treatment was found more effective than plant-derived commercial products (Table 1). The data of average values for both the years showed that the fungicides Hinosan 50 EC @ 0.05% and Bavistin 50 WP @ 0.05% were found significantly superior in controlling the brown spot to the tune of 28.02% and 26.93% respectively. Among the plant-derived commercial products, Biotos @ 5 ml l^{-1} was found significantly effective in controlling the brown spot (21.44%) followed by Achook @ 5 ml l^{-1} (20.99%) and Tricure @ 5 ml l^{-1}(20.71%) over control of the disease control of the through botanicals, in agreement with the findings of Muralidharan *et al*, 2003; Sinha and Sinha 2004; Madhusudan, 2004; Tripathi *et al*, 2004 and Nagaraju *et al*, 2004.

Significant difference in grain yield was observed in all the treatments during both the years. The fungicides and plant-derived commercial products showed significantly higher yield over control. Hinosan 50 EC @ 0.05% and Bavistin 50 WP @ 0.05% recorded the highest average yield, 22.67 q ha^{-1} and 20.83 q ha^{-1} respectively. Although, none of the tested plant derived commercial products was comparable with fungicides Achook @ 5 ml l^{-1} (21.05 q ha^{-1}) followed by Neem Azal T/S @ 3 ml l^{-1} (19.89 q ha^{-1}) and Biotos @ 5 ml l^{-1} (19.48 q ha^{-1}) were found superior and effective over control (16.19). These results are in conformity with the findings of Nagaraju *et al.* (2004), Muralidharan *et al.* (2003) and Madhusudan (2004).

As regard the increase in seed weight, the standard fungicides were found superior than plant-derived commercial products in increasing the seed weight. Among the fungicides, Hinosan 50 EC @ 0.05% recorded maximum increase in the seed weight

Table 1. Effect of plant-derived commercial products on brown spot disease severity, yield and seed weight in rice.

Treatments	Dosage	Disease index (%)				Yield (q ha^{-1})				100 Seed weight (g)			Increase
	ml/g l^{-1} in water	2003	2004	Mean	Disease control (%)	2003	2004	Mean	Increase in yield (%)	2003	2004	Mean	in 100 seed weight (%)
Control		35.6	53.9	44.7		17.50	14.88	16.19		1.66	1.72	1.69	
Achook	5 ml l^{-1}	18.7	41.1	29.9	20.99	22.75	19.34	21.05	29.97	1.97	2.00	1.98	17.45
Biotos	3 ml l^{-1}	18.5	40.7	29.7	21.44	21.05	17.90	19.48	20.30	1.89	1.98	1.93	14.49
Neem Azal T/s	20 ml l^{-1}	20.6	40.6	30.6	19.97	21.50	18.28	19.89	22.85	1.92	1.95	1.93	14.49
Neem Gold	4.5 ml l^{-1}	21.8	40.9	31.3	18.92	20.80	17.68	19.24	18.82	1.85	1.89	1.87	10.65
Spictaf	5 ml l^{-1}	24.0	43.2	33.6	15.56	20.55	17.47	19.01	17.41	1.76	1.88	1.82	7.69
Tricure	5 ml l^{-1}	19.8	40.5	25.1	20.71	19.80	16.83	18.32	13.10	1.62	1.82	1.72	1.77
Wanis	5 ml l^{-1}	22.9	46.9	34.9	13.70	20.48	17.41	18.95	17.00	1.70	1.84	1.77	4.73
Bavistin 50 WP	(0.05%)	13.7	38.4	26.0	26.93	23.60	20.06	20.83	34.81	2.00	2.01	2.00	18.63
Hinosan 50 EC	(0.05%)	15.2	35.4	25.3	28.02	24.50	20.83	22.67	39.99	2.02	2.05	2.03	20.41
SEM±		0.04	0.27			0.93	1.53	0.31		0.01	0.008		
CD (P=0.05)		0.17	0.94			3.25	5.32	1.05		0.04	0.028		
CV (%)		0.32	1.14			7.58	14.66			0.94	0.72		

(20.41%), followed by Bavistin 50 WP @ 0.05% (18.63%). It was observed that among the plant-derived commercial products maximum increase in seed weight was recorded in Achook @ 5 ml l^{-1} (17.45%), followed by Biotos @ 5 ml l^{-1} (14.49%) and it remain on par with Neem Azal T/S @ 3 ml l^{-1} over control.

Thus it may be concluded that plant-derived commercial products may be recommended for the effective management of brown spot of rice as they are economical and eco-friendly.

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