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Evaluation of new fungicidal formulation for controlling the rice sheath bilght disease

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Six new fungicides were evaluated against sheath blight in rice variety 'Swarnamasuri'. Of these new formulations, opal (opus) was evaluated at one dosage rate (3.0 ml L^{-1}), rizolex was evaluated at three dosage rates (1, 1.5 and 2 g L^{-1}), while the other four new formulations, *viz.*, amister (0.75 and 1 ml L^{-1}), RIL 010 (0.75 and 1.5 ml L^{-1}), RIL 011 (0.5 and 1 ml L^{-1}) and flusilazole (0.4 and 0.6 ml L^{-1}) were evaluated at two dosage rates, each. Validamycin (rhizocin 3L and sheathmar 3L) was included as standard check fungicide and evaluated at 2.5 ml L^{-1} of water. The disease was moderate and the severity had gone up to 44.2 per cent in the artificially inoculated untreated plots. Amister 25 SC @ 1.0 ml L^{-1} (30.6 %) and RIL-010/FI 25 SC @ 0.75 ml L^{-1} (30.1 %) had shown a high degree of efficacy in reducing the disease severity over all the test formulations and were superior over the standard check fungicides. Among the fungicidal treatments, amister 25 SC @ 1.0 ml L^{-1} (5090 kg $plot^{-1}$) and RIL-010/FI 25 SC L@ 0.75 ml $^{-1}$(5340 kg $plot^{-1}$) & @ 0.75 ml L^{-1}(5350 kg $plot^{-1}$) showed higher grain yield as compared to other treatments and significantly (P=0.05) increased grain yield over the standard check fungicides. Among six new fungicides, amister and RIL-010 indicated most promising results in reducing the sheath blight incidence as well as in increasing the grain yield of paddy.

Key words : *Rhizoctonia solani*, sheath blight of rice, new fungicides, chemical control

INTRODUCTION

Sheath blight disease incited by *Rhizoctonia solani* Kuhn. the imperfect stage of *Thanetophorous cucumeris* (Frank) Donk, has been first recorded as minor disease of rice in West Bengal (Roy, 1949 ; Amin *et al.*, 1974). Later the disase has been referred as major ones in West Bengal, probably second only to blast in its crop damage potential (Sharma and Mukharjee, 1978 ; Biswas, 2000). In early sown crop vertical spread of sheath blight lesion has been observed upto 46-65% of the plant height whereas in case of late sown crop the vertical spread of the lesion has been recorded upto 21-30% of the plant height in *kharif* season under Terai agro-ecological region of West Bengal (Chowdhury, 2003). Yield losses due to this disease is reported to range from 5.2-50% depending on environmental conditions, crop stages at which the disease appears, cultivation practices and cultivars (Rajan, 1987 ; Sharma and Teng, 1996). The application of high doses of nitrogen fertilizer (Roy, 1978), close plant spacing (Kanniyan and Prasad, 1983), wide spread cultivation of high yielding varieties and weather conditions like low light, cloudy days and high relative humidity (Dath, 1990) favour the disease development. The use of resistant varieties, though very effective over a period, which are not easily available always, and even where available, they may succumb soon to a newly emerged virulent race of the pathogen. So, one has to depend on chemical control quite often. The paper reports on the evaluation of six new fungicidal formulation at different doses provided by Directorate of Rice Research, Hyderabad under All India Co-ordinated Rice Improvement Programme, against sheath blight pathogen of rice and the test variety has been Swarnamasuri, a popular local cultivar.

MATERIALS AND METHODS

The experiment was conducted during *kharif* season (2003) in the experimental farm of Uttar Banga

Krishi Viswavidyalaya. Six new fungicides at different doses [amistar 25 SC (@ 0.75 & 1.0 ml L^{-1}), RIL-010/F1 25 SC (@ 0.75 & 1.5 ml L^{-1}) RIL-011/F1 50 SC (@ 0.5 & 1.0 ml L^{-1}), Flusilazole 40 EC (@ 0.4 & 0.6 ml L^{-1}), opal 7.5 EC (@ 3.0 ml L^{-1}), rizolex 50 WP (@ 1.0, 1.5 & 2.0 g L^{-1}) were evaluated. Validamycin (rhizocin 3L and sheathmar 3L) was included as standard check fungicide along with two validamycin standard check fungicides comprised fifteen treatments including check (control).

The experiment was conducted following Randomized Block Design with three replications adopting a net plot size of 5 × 2 m and a spacing of 15 × 15 m. 'Swaramasuri', a local susceptible high yielding variety, was used for planting in the present evaluation. The test variety was sown on 22nd June and transplanted, a month later. Fertilizers were used as per the recommendation for local practices (N : P : K 120 : 40 : 40) of the test variety. The adequate supply of nitrogen was ensured through split application as basal and top dressing to predispose the crop to the disease.

Each hill in a plot was artificially inoculated with aseptically multiplied inoculum. The inoculum was prepared on fresh paddy leaves, chopped into small pieces, which were autoclaved before inoculation with pure culture of *R. solani,* and were covered with polythene sheets to ensure humidity and temperature conducive for fast growth of the fungal mycelium. Two to three pieces of such leaves having profuse growth of fungal mycelium were placed between the tillers of a hill just above the water level at crop canopy closure stage.

The first spray of fungicides to the respective treatments was done just at the appearance of the disease after artificial inoculation. The check (control) plot was sprayed with plain water without any fungicide. Precautions were taken to prevent drifting of spray particles at the time of spraying. Second spray was advocated fifteen days after the first spray.

Five sampling units of one sq. m area were fixed in each plot at random for the observation of disease severity. The disease severity was recorded before each spray and the terminal disease severity was recorded at heading stage. The degree of severity was measured on the basis of the plant tissue affected by the disease and expressed as percentage of the total area. It was precisely done by the precentage of leaf and sheath area of each tiller in a sampled hill covered by the sheath blight lesions. The grain yield of the net plot was recorded at the time of harvest and expressed in kg $plot^{-1}$. Both the data on disease severity as well as grain yield were analyzed. Significant differences were tested among the treatments by critical difference (CD) at the 5.0 per cent probability level.

RESULTS AND DISCUSSION

The initial disease symptoms were observed on 15th September, a week after artificial inoculation. Two fungicidal sprays were given on 23rd September and 8th October, when the disease severity was at 36 and 43 per cent in the check plots. Disease observations were recorded on 22nd September, and on 7th and 25th October and the crop was harvested on 1st December. The data in Table 1 showed the terminal disease severity (recorded at heading stage) as well as grain yield (kg $plot^{-1}$) of different treatments including control.

Table 1 : Evaluation of New Fungicidal Formulation for Rice Sheath Blight Control

Fungicides	Doses per liter of water	Disease severity (%)		Grain Yield* (Kg. ha^{-1})
		T	O*	
Amistar 25 SC	0.75 ml	32.2	28.4	4450
Amistar 25 SC	1.00 ml	30.6	26.0	5090
RIL-010/F1 25 SC	0.75 ml	30.1	25.2	5343
RIL-010/F1 25 SC	1.50 ml	31.7	27.7	5350
RIL-011/F1 50 SC	0.50 ml	34.5	32.1	4480
RIL-011/F1 50 SC	1.00 ml	32.3	28.6	4420
Flusilazole 40 EC	0.40 ml	33.6	30.8	4110
Flusilazole 40 EC	0.60 ml	35.3	33.5	4570
Opal 7.5 EC	3.00 ml	34.1	31.5	3940
Rizolex 50 WP	1.00 g	41.0	43.2	3170
Rizolex 50 WP	1.50 g	34.7	32.4	3740
Rizolex 50 WP	2.00 g	36.7	35.7	4050
Rhizocin 3L	2.50 ml	33.0	29.7	4030
Sheathmar 3L	2.50 ml	32.2	28.5	4460
Check (Unteated)	—	41.6	44.2	2580
CD (0.05)		4.53		510
CV (%)		7.9		7.2

T : Arcsine transformed means : O : Means of original values : * Average of three replications.

The disease was moderate and the severity had gone up to 44.2 per cent in the artificially inoculated

untreated plots (Table 1). All the fungicidal formulations at different doses except rizolex 50 WP @ 1.0 g. L^{-1} (41.0%), were found significantly (P = 0.05) effective against the disease as compared to check (44.2 %). Though the fungicidal treatments showed no significant differences in disease severity among themselves (except rizolex 50 WP @ 1.0 g. L^{-1}), the amister 25 SC @ 1.0 ml L^{-1} (30.6%) and RIL-010/FI 25 SC @ 0.75 ml L^{-1} (30.1 %) had shown a high degree of efficacy in reducing the disease severity over all the test formulations and were superior over the standard check fungicides used in the experiment (Table 1).

All the fungicidal formulations at different doses significantly increased the grain yield (kg $plot^{-1}$) over check plot (2580 kg $plot^{-1}$). Among the fungicidal treatments, amister 25 SC @ 1.0 ml L^{-1} (5090 kg $plot^{-1}$) and RIL-010/FI 25 SC L @ 0.75 ml $^{-1}$ (5340 kg $plot^{-1}$) and @ 0.75 ml L^{-1} (5350 kg $plot^{-1}$) showed higher grain yield as compared to other treatments and significantly (P = 0.05) increased grain yield over the standard check fungicides used in the experiment (Table 1). The similar experiment, conducted at Directorate of Rice Research, Hyderabad, India, amistar and RIL-010 were found highly effective over all other test formulations and the standard check fungicides, both in checking the disease severity and increasing the grain yield (Mishra, 2003) which is in accordance with the present study. Therefore, amistar and RIL-010, the new fungicidal formulation, can effectively and judiciously replace the present standard check fungicides.

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