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Fungitoxicity of a new formulation of Carbendazim (Pearl 50 SC) against *Drechslera oryzae* causing brown spot of rice

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Fungitoxicity of a new formulaion of Carbendazim i.e. Pearl 50 SC was evaluated in field condition against *Drechslera oryzae* casing brown spot of rice . Two post infection of spray of carbendazim 50 SC@ 500ml/ha was adjudged the best in two consecutive seasons as compared to untreated control. The new formulation was not phytotoxic to the rice plants.

Key words : Carbendazim 50SC; brown spot; rice

INTRODUCTION

Brown spot of rice caused by *Drechslera oryzae* occurs in almost all the rice growing countries of the world. The first report on the disease in India was made by Sundararaman from Madras in 1919. The disease is more of an indicator of nutritional and physiological disorder rather than a pathological one (Singh and Singh 2000). It has been the cause of the famous Bengal Famine of 1942-43 and under favourable conditions it can cause an yield loss of 40-90 %. (Ou ,1980).An optimum temperature of 21-26 °C and relative humidity of 92.5 % or higher favours the disease development (Chattopadhyay and Das Gupta ,1965). Several strategies including soil amendments, seed treatment, breeding for resistance (Ganguly and Padmanabhan 1959, Padmanabhan *et al.*1966) etc. have been tried out (Ou ,1980), but the best results have been obtained by chemical fungicides. Several fungicides like zineb, aureofungin, ediphenphos, copper oxychloride, benlate, organo-tin compounds, trieyelazole-Manzate combination etc. have been reported to control the disease. (Thirumalachar, 1967; Singh *et al.* 1974; Vishwanathan and Narayanaswamy, 1996). Herbicide like Stam F-34 and phenolic antioxidants are also kown to reduce the disease intensity (Sen and Kaiser, 1972; Shabana *et al.,* 2008). In the present investigation, a new formulation Carbendazim 50 Suspension Concentrate , branded as Pearl 50 SC has been used for the management of the disease.

MATERIALS AND METHODS

The trial was conducted for two seasons, *Rabi*, 2007 – 08 and *Kharif,* 2008 – 09 at the experimental farm of University of Calcutta at Baruipur. 24 Pargana (south), West Bengal. The experiment was laid out in Randomized Complete Block Design (RCBD) with seven treatments. Pearl 50 SC @ 400 ml/ha, 500 ml/ha, 750 ml/ha and 1000 ml/ha along with 2 check fungicides, Manzate 75 WP @ 2000g/ha and Carbendazim 50 WP @ 600 g/ha and an untreated control comprised the seven treatments. Each treatment was replicated four times. The test variety used was IET 1444, which is susceptible to the disease. Thirty day old seedlings were transplanted and plot size for each replication was 15 m^2 (3 m x 5 m). The spacing followed was 15 cm x 15 cm. Each plot was artificially inoculated with a spore suspension following the protocol of Padmanabhan and Ganguly (1954) with some modifications. Standard agronomic practices were followed to raise the crop. Two sprays of each treatment were given with the appearance of the disease symptoms, at ten days interval. Precautions were taken to prevent drifting of the particles at the time of spray. The control plot was sprayed with water to maintain the uniformity of the trial. Fifty plants from each replication except border rows were scored randomly using the Standard Evaluation Scale (SES) (Anon. 1996) ten days after the last spray. The Per cent Disease Index (PDI) was calculated using the formula.

$$PDI = \frac{\text{Sum of all numerical ratings}}{\text{Number of observations}} X \frac{100}{\text{maximum disease rating}}$$

The yield per plot was converted to tones/acre and statistical analysis was done thereafter.

RESULT AND DISCUSSION

The results obtained after two seasons clearly shows that all the treatments reduced disease intensity as well as increased the yield over control (Tables 1 & 2). During *Rabi* 2007-08, all the doses of Pearl 50 SC reduced the disease with the maximum dose of 1000 ml/ha manifesting the minimum PDI i.e 12.70 which corresponds to 51.89 % decrease of disease over control . The doses of 500 ml /ha and 750 ml / ha also had almost similar control, having a PDI value of 12.88 and 12.68 respectively. The comparative formulation i.e. cabendazim 50 NP also recorded a competitive PDI of 12.93, thereby decreasing the disease by 51.02 % over control. A similar trend was observed in *Kharif,* 2008-09, where Pearl 50 SC @ 500 ml/ha yielded the best result with PDI of 11.2 corresponding to a decrease in disease of 61.6% over control. This was followed by Pearl 50 SC @ 750 ml / ha and 1000 ml/ha which manifested a disease reduction of 61.30% and 60.68% respectively over untreated check. Carbendazim 50 NP was marginally less efficacious than the suspension concentrate formulation with a PDI of 11.60 and a disease reduction of 60.06% over control. In both the seasons, Manzate 75 NP, used as check fungicide , was not at par with carbendazim formulations exhibiting only 38.87% and 42.56% decrease in brown spot of rice as compared to control.

Regardng yield , Pearl 50 SC @ 500 ml / ha manifested the best result in both the seasons, having an yield of 2.86 tonnes / acre and 2.98 tonnes / acre which was 45.17 % and 47.52 % higher than control respectively (Table 2, Fig1)The other two doses i.e. 750 ml/Ha and 1000 ml/ha also provided an appreciable yield of rice as compared to control.However, carbendazim 50 NP yielded much less than its suspension concentration counterpart having an yield increase of 13.7% and 33.66%, respectively , in the two consecutive seasons, The results of two seasons , also revealed that , except Pearl 50 SC @ 400 ml/ha, all the other doses viz , 500 ml /ha, 750 ml/ha and 100 ml/ha had almost a similar control on the disease as is evident by their PDI values. Hence Pearl 500 ml/ha. may be standarized against brown spot of rice, so as to have an ecofriendly approach of disease management with this biorational fungicide .The relative efficacy of carbendazim in the control of various diseases is well known (Srivastav and Mishra,2008; Hesse and Hiepko, 1974) and the new formulation of suspension concentrate has an edge over the

Table 1 : Effect of different treatment of Carbendazim 50 SC (Pearl 5OSC) in reducing the disease severity

		Rabi, 2007-08		Kharif, 2008-09	
Treatment	Dose	PDI*	Per cent decrease of disease over control	PDI	Per cent decrease of disease over control
T1:Carbendazim 50 SC (Pearl 50 SC)	400 ml/ ha	19.0	28.03	21.60	26.02
T2: Carbendazim 50 SC (Pearl 50 SC)	500 ml/ha	12.88	51.21	11.20	61.60
T3 :Carbendazim 50 SC (Pearl 50 SC)	750 ml/ha	12.68	51.96	11.30	61.30
T4: Carbendazim 50 SC (Pearl 50 SC)	1000 ml/ha	12.70	51.89	11.48	60.68
T5:Manzate75WP (Manzate 75w)	2000 gm/ha	16.40	37.87	16.80	42.56
T6 Carbendazim 50 WP (Bavistin 50 WP)	600 gm/ha	12.93	51.02	11.60	60.06
T7 : Control	-	26.4		- -	
SE		1.058		1.387	
CD (5%)		2.996		4.129	

*mean of four replication

Table 2 : Effect of different treatment of Carbendazim 50 SC (Pearl50 SC) on yield of Rice

Treatment	Dose	*Rabi*, 2007-08		*Kharif*, 2008-09	
		Yield*(tons/ Acre)	Per cent increase of disease over control	Yield*(tons/ Acre)	Per cent increase of disease over control
T1:Carbendazim 50 SC (Pearl 50 SC)	400 ml/ha	2.01	2.03	2.06	1.94
T2: Carbendazim 50 SC (Pearl 50 SC)	500 ml/ha	2.86	45.17	2.98	47.52
T3 :Carbendazim 50 SC (Pearl 50 SC)	750 ml/ha	2.38	20.81	2.88	42.57
T4: Carbendazim 50 SC (Pearl 50 SC)	1000 ml/ha	2.68	36.04	2.68	32.67
T5:Manzate75WP (Manzate 75w)	2000 gm/ha	2.04	3.55	2.14	5.94
T6 Carbendazim 50 WP (Bavistin 50 WP)	600 gm/ha	2.24	13.7	2.70	33.66
T7 : Control	-	1.97	-	-	
SE		0.82		0.91	
CD (5%)		0.16		0.24	

*Mean of four replication

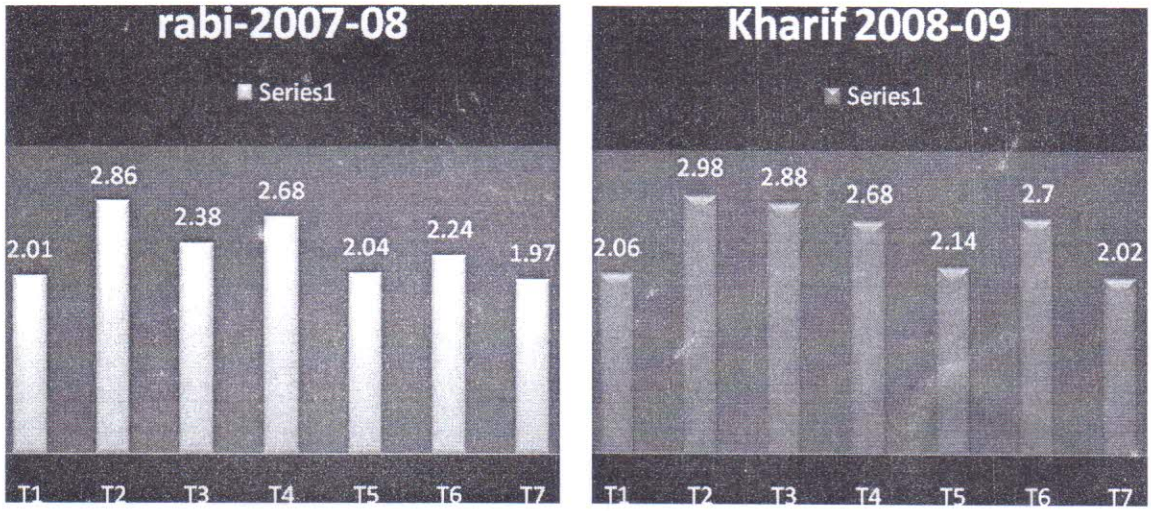

Fig. 1 : Effect of different treatment of Carbendazim 50 SC (Pearl50 SC) on yield of rice

wettable powder formulation due to its better solubility,suspensibility, stability and coverage. Due to its superior rainfasteness , need for stickers may also be negated. Moreover, Pearl 50SC does not exhibit any phytotoxic symptom in the form of vein clearing , leaf injury, wilting, necrosis, epinasty, and hyponasty and hence is safe for the plant.

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