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Efficacy of New Combination Fungicide Azoxystrobin 11% + Tebuconazole 18. 3% SC against Rice Sheath Blight Pathogen

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Abstract

Sheath blight is one of the most wide spread and important fungal disease of rice world-wide. The disease is more pronounced in delta soils of Andhra Pradesh where rice-rice cropping system is predominant. A new combination fungicide having Azoxystrobin 11% + tebuconazole 18.3% SC (Custodia) was tested at different doses against sheath blight of rice on variety, Swarna (MTU-7029) under field conditions during *kharif* 2014 & 2015. The pooled data revealed that Azoxystrobin 11% + tebuconazole 18.3% SC @ 2.0 ml/l, 1.5 ml/l and 1.0 ml/l was found effective against sheath blight recorded least disease incidence of 6.22%, 6.27%, 7.98% and disease severity 7.97%, 7.57%, 8.53%, respectively as against 90.86% and 57.97% in control. The standard fungicide Validamycin 3% L @ 2.0 ml/l was also found effective showing disease incidence and severity of 21.14% and 25.85%, respectively. The other fungicides viz., Azoxystrobin 23% SC @ 1.0 ml/l and Tebuconazole 25.9% EC @ 1.5 ml/l were also found effective showing sheath blight incidence and severity of 6.46 & 23.65% and 7.96% & 25.55%, respectively. Azoxystrobin 11% + tebuconazole 18.3% SC (Custodia) @ 1.5 ml/l could be useful for the management of sheath blight of rice.

Key words: Rice, sheath blight, Azoxystrobin 11% + tebuconazole 18.3% SC, Custodia

Introduction

Sheath blight of rice caused by Rhizoctonia solani Kuhn is a serious threat in rice growing areas. A modest estimation of losses due to sheath blight disease alone in India has been up to 54.3% (Rajan, 1987; Roy, 1993). Sheath blight disease of rice occurs in all rice production areas worldwide (Ou, 1985; Teng *et al.,* 1990; Savary *et al.,* 2000, 2006). The disease is particularly important in intensive rice production systems; it may be good to day, especially affecting crops with high attainable yields (Savary and Mew, 1996). Yield losses of 5-10% have been estimated for tropical lowland rice in Asia (Savary *et al.,* 2000). The pathogen has a wide host range and can infect plants belonging to more than 32 plant families and 188 genera (Gangopadyay and Chakrabarti 1982). Chemical control of the sheath blight disease is a success story at field level in majority of the cases (Kandhari *et al.,* 2003). Fungicides with multifaceted effects on the sclerotial germination, mycelia growth inhibition and in hampering the disease spread will have an ideal inhibitory effect on the pathogen as well as disease spread. Most of the fungicides like benomyl, carbendazim, chloroneb, captafol, mancozeb, zineb, edifenphos, iprobenphos, thiophanate, carboxin etc. have been found effective for the control of the disease under field conditions (Dash and Panda, 1984; Kannaiyan and Prasad, 1984; Singh and Sinha, 2004). Out of these benomyl, carbendazim, edifenphos and iprobenphos were the most effective chemicals (Roy, 1993). Several new molecules are available in the market and farmers are going for 3-4 sprays for the control of sheath blight under field conditions. Keeping in view, the advent of new fungicides, the present investigation was undertaken to assess the efficacy of new and commercially available fungicides at different doses against *R. solani* under field conditions.

Materials Methods

During *kharif* 2014 and 2015 seasons, a combination fungicide molecule Azoxystrobin 11% + Tebuconazole 18.3% SC, Azoxystrobin 23% SC, Tebuconazole 25.9% EC were tested at different concentrations against sheath blight on variety, Swarna (MTU-7029) in field. In total, there were seven treatments and four replications. A standard fungicide Validamycin 3% L was used for comparison along with control (water only). A pure culture of a virulent isolate of *Rhizoctonia solani* was multiplied on typha leaf bits. The inoculation with *R. solani* was

carried out at maximum tillering stage (Bhaktavatsalam *et al.,* 1978). These colonized typha bits were placed between the tillers of rice plant, 5-10 cm above the water level. Twenty days after inoculation, sheath blight was assessed by Standard Evaluation System (SES) for rice (IRRI, 1996).

Results and Discussion

All the fungicides assessed were found effective against sheath blight in comparison to control. The test fungicide Azoxystrobin 11% + tebuconazole 18.3% SC (Custodia) was found highly effective against rice sheath blight disease at all the three concentrations tested. There were significant differences among the treatments with respect to sheath blight incidence. Lowest disease incidence was recorded with Azoxystrobin 11% + tebuconazole 18.3% SC @ 2.0 ml (6.22%) followed by 1.5 ml/l (6.27%). The other concentration of test fungicide i.e 1.0 ml (7.98%) per litre also recorded significantly low disease incidence and significantly different from the standard recommended fungicide, Validamycin 3% L @ 2.0 ml/l (21.14%). Azoxystrobin 23% SC @ 1.0 ml/l (6.46%) and Tebuconazole 25.9% EC @ 1.5 ml/l (23.65%) were also recorded significantly lower sheath blight incidence when compared to untreated control where the disease incidence was 90.86%.

With respect to sheath blight severity, all the three concentrations of test fungicide were significantly different from the untreated check in which the severity was 57.97 per cent. Lowest disease severity was recorded in the test fungicide, Azoxystrobin 11% + tebuconazole 18.3% SC when sprayed @ 1.5 ml (7.57%) closely followed by 2.0 ml (7.97%) and 1.0 ml/l (8.53%) of the test fungicide and significantly different from the standard recommended fungicide (25.85%). The other fungicides Azoxystrobin 23% SC @ 1.0 ml/l (7.96%) and Tebuconazole 25.9% EC @ 1.5 ml/l (25.55%) were also recorded significantly low sheath blight severity.

All the fungicidal treatments were significantly different from the check plot with respect to grain yield. Highest grain yield was obtained in Azoxystrobin 11% + tebuconazole 18.3% SC @ 2.0 ml (6940 kg/ha) followed by Azoxystrobin 11% + tebuconazole 18.3% SC @ 1.5 ml (6891 kg/ha) (Table 1).

Table 1: Efficacy of Azoxystrobin 11% + tebuconazole 18.3% SC in the management of rice sheath blight disease

S. No	Treatments	Dose/l	Disease incidence (%)			Disease severity (%)			Yield (Kg/ha)		
			2014	2015	Pooled	2014	2015	Pooled	2014	2015	Pooled
T1	Azoxystrobin 11% + tebuconazole 18.3% SC (Custodia)	1.0 ml	13.67 (21.50)	2.29 (7.96)	7.98 (16.24)	13.06 (21.09)	4.00 (10.88)	8.53 (16.86)	7561	6046	6803
T2	Azoxystrobin 11% + tebuconazole 18.3% SC	1.5 ml	11.53 (19.61)	1.02 (4.88)	6.27 (14.28)	13.11 (20.98)	2.02 (6.86)	7.57 (15.68)	7576	6205	6891
T3	Azoxystrobin 11% + tebuconazole 18.3% SC	2.0 ml	11.15 (18.42)	1.30 (5.64)	6.22 (13.84)	12.67 (19.88)	3.26 (8.96)	7.97 (15.98)	7803	6078	6940
T4	Azoxystrobin 23% SC (Mirador)	1.0 ml	11.06 (19.07)	1.86 (6.64)	6.46 (14.51)	11.82 (19.81)	4.10 (9.86)	7.96 (16.15)	7929	5782	6855
T5	Tebuconazole 25.9% EC	1.5 ml	34.25 (35.59)	13.06 (21.08)	23.65 (28.92)	31.85 (34.32)	19.26 (26.0)	25.55 (30.35)	7139	4920	6030
T6	Validamycin 3% L	2.0 ml	24.66 (29.74)	17.63 (24.77)	21.14 (27.34)	24.65 (29.69)	27.05 (31.22)	25.85 (30.47)	7390	5499	6444
T7	Control (Untreated)	-	100 (90.0)	81.72 (65.10)	90.86 (72.72)	60.78 (51.29)	55.15 (47.98)	57.97 (49.62)	6162	3917	5040
		CV	*Sig 14.22	*Sig 18.68	*Sig 13.49	*Sig 16.77	*Sig 23.87	*Sig 13.78	*NS	*Sig 14.38	*Sig 7.02
		SEm+/-	2.38	1.82	1.81	2.36	2.42	1.72		394.92	225.74
		CD(0.05)	7.06	5.39	5.38	7.01	7.18	5.12		1172.8	670.43

*Mean of four replications

Figures in the parentheses are arc sine transformed values.

Although, biological control of sheath blight has received more attention recently, control strategies of this devastating disease on rice still has been centered on the use of chemicals. In the present studies new fungicide molecules have been used to contain sheath blight of rice. In the present studies, a new combination fungicide Azoxystrobin 11% + tebuconazole 18.3% SC at three doses was found best among the fungicides tested showing a disease severity of 7.57%, 7.97% and 8.53% in comparison to 57.97% in check. These data were in accordance with Phelp and Soto (1993) and Jones *et al*. (1987). Efficacy of propiconazole + difenconazole 30% EC was followed by contaf (hexaconazole) that was also found very effective by other workers in reducing the disease (Surulirajan and Khandari, 2003; Suryadai and Kadir, 1989). Singh and Sinha (2004) reported that contaf was effective for decreasing the disease severity, increasing the grain yield and 1000 grain weight as 23.5%, 60.9%, 34.2 g/plant and 29.3g respectively as against 74.7%, 95.6%, 24.4g/plant and 25.5 in control. Carbendazim was found very effective in present studies as well as by other workers. Thangasamy and Rangaswamy (1989) studied the efficacy of carbendazim and mancozeb in the control of this disease by applying them at different stages of crop growth like panicle initiation (65 days of sowing) or 80 days of sowing and found them effective in controlling the disease development. This combination (with Saaf) in present study was also found effective. Krishnam Raju *et al*. (2008) reported the efficacy of hexaconazole 5% EC @ 2.0 ml/l, propiconazole 25% EC @ 1.0 ml/l and tebuconazole 25% EC @ 1.5 ml/l against sheath blight of rice. Azoxysrobin (IUPAC Name: Methyl (2E)-2-(2-{[6-(2-cyanophenoxy) pyrimidin-4-yl] oxy} phenyl)-3-methoxyacrylate). Azoxystrobin binds very tightly to the Qo site of Complex III of the mitochondrial electron transport chain, thereby ultimately preventing the generation of ATP. Tebuconazole (IUPAC Name: (RS)-1-(4-chlorophenyl)-4, 4-dimethyl-3-(1H, 1,2,4, triazole-1-4l methyl) pentan-3-ol). Tebuconazole is a triazole fungicide used in agriculture to treat plant pathogenic fungi. Tebuconazole is dimethylase inhibitor (DMI)-interferes in process of building the structure of fungal cell wall. Finally it inhibits the reproduction and further growth of fungus. Tebuconazole has a mode of action that is a systemic action (as well as preventive, curative, eradicative action). It acts as a sterol inhibiting fungicide (preventing spores). The study revealed that Azoxystrobin 11% + tebuconazole 18.3% SC @ 1.5 ml/l was found highly effective against rice sheath blight disease.

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