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Comparative Efficacy of Certain Bio-Agents and Chemicals in the Management of Sheath Blight of Paddy

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ABSTRACT

Paddy is the most widely cultivated food crop in the world. Sheath blight disease of rice caused by Rhizoctonia solaniis a major production constraint in all rice producing areas of the world. The annual losses due to sheath blight of rice are estimated to be 25 per cent under optimum conditions of disease development. The experiment was conducted in central research farm of Department of Plant Pathology SHIATS, Allahabad during Kharif season in the year of 2014. For present study seven treatments including control were evaluated for management of sheath blight of rice which were Trichodermaharizanum (Seed treatment) + Trichoderma varied (Foliar spray), T. viride (ST) + Psudomonas fluorescens (FS), P. fluorescens (ST) + T. viride (FS), P. fluorescens (ST) + T. harizanum (FS), T. viride (ST) + T. harizanum (FS) , carbendazim (ST) + propiconazole (FS) and Control. Observations recorded on 90 DAT pertaining to mean per cent disease severity reveal that it was lowest with carbendazim (ST) + propiconazole (FS) 17.55, followed by T. viride (ST) + T. harizanum (FS) 18.96, P. fluorescens (ST) + T. harizanum (FS) 19.77, T. viride (ST) + P. fluorescens (FS) 21.18,P. fluorescens (ST) + T. viride (FS) 22.00, T. harizanum (ST) + T. viride (FS) 22.29,and control 29.10.

Key words: *Bio-agents, fungicides. Oryza sativa L., Pseudomonas fluorescens, Rhizoctonia solani, Trichoderma viride, Trichoderm aharizanum*

INTRODUCTION

Rice (*Oryza sativa* L.) belongs to the grass family oryzae, and is one of the leading food crop in the world and is consumed by 50% of the world population. In India it is cultivated on an area of 53.2 million hectares with a total production of 99.9 million tons .The area under rice has increased from 31.29 million hectares in 1953-54 to 53.2 million hectares (125.73 million hectares of food grains) in 2010. Whereas the rice productivity increased from 902kg/ha to 2240kg/ha during the above period. The area under rice accounts for 33.85 percent of India's food crop and 42.79 per cent of its cereal crop areas during 2010.

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Paddy suffers from many diseases caused by fungi, bacteria, viruses, phytoplasma, nematodes and other non parasitic disorder. Sheath blight disease of rice develops before the flag stage, there may be upto 20% loss in grain yield. Depending on disease severity, various reports have given the losses at 5 to 16 %. In a study in Punjab, reported that yield reduced 32.3% by due to sheath blight in rice when diseased area of top 3 leaves is 54.3%. Plant having all leaves affected yield less than 50% of the healthy plants[4]. The loss is closely correlated with the number of hills affected in a field. Losses may be 20-50% when all the sheath in a stool are affected. Keeping in view the disease and losses caused by pathogen, the proposed present study was carried out with the following objective:

To evaluate the comparative efficacy of different fungicides and bio-agents against sheath blight of rice.

MATERIAL AND METHODS

The experiment was conducted in the research experimentation field, Department of Plant Pathology, SHIATS Allahabad during *kharif* season in the year2014-2015.

The pathogen *Rhizoctonia solani* was isolated from infected plant of sheath blight of rice. For isolation and growth pathogen PDA medium was used. Then petri-plates was incubated at 25°C. After 3 days, a whitish colony growth was observed and identification of the pathogen was confirmed by observing the morphological features of colony, spore characteristic

The pathogen *R. solani* multiplied on Typha stem bits[3] was inoculated to the plants at maximum tillering stage between the leaf sheath and the culm.

For present study seven treatments including control were evaluated for management of sheath blight of rice which were *Trichoderma harizanum* (Seed treatment) + *Trichoderma viride* (Foliar spray), *T. viride* (ST) + *Psudomonas fluorescens* (FS), *P. fluorescens* (ST) + *T. viride* (FS), *P. fluorescens* (ST) + *T. harizanum* (FS), *T. viride* (ST) + *T. harizanum* (FS) , carbendazim (ST) + propiconazole (FS) and Control.

Disease severity was calculated by given formula-

$$\text{Disease severity (\%)} = \frac{\text{Sum of all disease rating}}{\text{Total no of sheath} \times \text{Maximum rating}} \times 100$$

RESULT AND DISCUSSION

The results obtained in the present study are given below:

Effect of carbendazim (ST) + propiconazoleon disease severity of rice at 60, 75 and 90 DAT

Disease severity of rice was taken firstly at 60 DAS, followed by 75 and 90 DAS.

Observation recorded on 60 DAT

Perusal of data in table no 4.1 and fig no 4.1 to mean disease severity was lowest in carbendazim (ST) + propiconazole (FS) ($10.96T_6$), followed by *Trichoderma viride* (ST) + *T. harzianum* (FS) ($11.25T_5$), *Pseudomonas fluorescens* (ST) + *T. harzianum* (FS) ($12.07T_4$), *T. viride*(ST) + *P. fluorescens* (FS) ($12.36T_2$), *P. fluorescens* (ST) + *T. viride* (FS) ($12.59T_3$), *T. harzianum* (ST) + *T. viride* (FS) ($13.03T_1$), Control (13.92).

Observation recorded on 75 DAT

Perusal of data in table no 4.1 and fig no 4.1 to mean disease severity was lowest in carbendazim (ST) + propiconazole (FS) ($14.44T_6$), followed by *T. viride* (ST) + *T. harzianum* (FS) ($14.88T_5$), *P. fluorescens* (ST) + *T. harzianum* (FS) ($16.00T_4$), *T. viride* (ST) + *P. fluorescens* (FS) ($17.03T_2$), *P. fluorescens* (ST) + *T. viride* (FS) ($17.56T_3$), *T. harzianum* (ST) + *T. viride* (FS) ($18.37T_1$), Control (23.18).

Observation recorded on 90 DAT

Perusal of data in table no 4.1 and fig no 4.1 to mean disease severity was lowest in carbendazim (ST) + propiconazole (FS) ($17.55T_6$), followed by *T. viride* (ST) + *T. harzianum* (FS) ($18.96T_5$), *P. fluorescens* (ST) + *T. harzianum* (FS) ($19.77T_4$), *T. viride* (ST) + *P. fluorescens* (FS) ($21.18T_2$), *P. fluorescens* (ST) + *T. viride* (FS) ($22.00T_3$), *T. harzianum* (ST) + *T. viride* (FS) ($22.29T_1$), Control (29.10).

Similar finding on sheath blight of paddy has been reported by Biswas evaluated a field experiment was conducted in West Bengal, India, during the 1999 and 2000 *kharif* (wet) season to evaluate the relative efficacy of new fungicidal formulation against the sheath blight of rice caused by *Rhizoctonia soloni.* Treatment comprised: 0.20% hexaconazole, epoxyconazole +carbendazim, tebuconazole, (0.15 and 0.20%) iprodione + carbendazim, propiconazole + difenoconazole (0.05 and 0.15%), pencycuron(0.12 and 0.15%) and validamycin.

Table 1: Effect of bio-agents and chemicals on disease severity (%) of rice at 60, 75 and 90 DAT

Treatments	Treatments details	Disease severity %		
		60 DAT	**75 DAT**	**90 DAT**
T_0	Control	13.92	23.18	29.10
T_1	*T. harzianum* (ST) +*T. viride* (FS)	13.03[a]	18.37[a]	22.29[a]
T_2	*T. viride* (ST) + *P.fluorescens*(FS)	12.36[bc]	17.03[b]	21.18[b]
T_3	*P. fluorescens*(ST) + *T. viride*(FS)	12.59[ab]	17.56[ab]	22.00[ab]
T_4	*P. fluorescens*(ST) + *T. harzianum*(FS)	12.07[c]	16.00	19.77[c]
T_5	*T. viride* (ST) + *T. harzianum*(FS)	11.25[d]	14.88[c]	18.96[c]
T_6	Carbendazim (ST) +propiconazole(FS)	10.96[d]	14.44[c]	17.55
SEd (±)		0.227	0.450	0.424
CD (0.05)		0.481	0.954	0.899

Data are average of three replicates. Values in the same column followed with similar letters are not significantly different (p=0.05).

CONCLUSION

Based on the result, it was observed thatcarbendazim (ST) + propiconazole (FS) was found superior among all the treatments in giving the maximum yield, *T. viride* (ST) + *Pseudomonas fluorescens* (FS) for number of tiller, and highest shoot length (cm) of rice was recorded with *P. fluorescens* (ST) + *T. viride* (FS). However, the present study was limited to one season only, therefore to substantiate the present findings more trials over a period of seasons is needed to come out with sound recommendations.

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