

Studies on Efficacy of Bioagents and Chemicals in the Management of Grain Discoloration Disease of Paddy in the Coastal Plains of Odisha

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Abstract Studies were conducted to study the efficacy of seven different treatments in reducing grain discoloration disease of paddy in the variety Lalat in the year 2010-11 and 2011-12. The treatments were followed as such i.e. T₁ = Control, T₂ = Seed treatment + Soil application + Foliar spray with *Trichoderma viride*, T₃ = Seed treatment + Soil application + Foliar spray with *Pseudomonas fluorescens*, T₄ = Seed treatment with *T. viride* + Foliar spray with Companion, T₅ = Seed treatment with *T. viride* + Foliar spray with Carbendazim, T₆ = Seed treatment with *T. viride* + Foliar spray with Mancozeb, Seed treatment with *T. viride* + Foliar spray with Propiconazole. Maximum yield (32.67 q/ha) was obtained with the treatment where seed treatment was done with *T. viride* and foliar spray with Mancozeb followed by seed treatment with *T. viride* and foliar spray with Propiconazole (30.82 q/ha). Similarly, grain discoloration was minimum in both the treatments (18.92% and 18.90% respectively). Among all the treatments the yield was

minimum (20.27 q/ha) with maximum discolored grain (22.38%) in T₁ (where neither seed treatment and nor foliar treatment was adopted).

Keywords Management, Bio-agents, Grain discoloration Paddy.

Introduction

Rice (*Oryza sativa* L.) is the most widely cultivated food crop in the world. It is the staple food grain for the people most of the countries of the world including humid and sub-humid regions Asia. In Maharashtra the productivity of rice is low (1.8 t/ha) as compared to national average (2.41 t/ha) (Anonymous 2014).

This crop is affected by a number of pathogens, i.e. *Pyricularia grisea*, *Helminthosporium oryzae*, *Xanthomonas oryzae*pv. *Oryzicola*, *Rhizoctonia solani*, *Sarocladium oryzae*, *Fusarium monilliforme*, *Ustilaginoidea virens*, *Neovossia indica* among them grain discoloration is one of the most important and emerging disease. The fungi responsible for grain discoloration are *Fusarium monilliforme*, *F. pallidoroseum*, *Helminthosporium sativum*, *Curvularia lunata*, *Trichoconis padwickii*. Grain discoloration reduces quality, discolor the grain and marketability. In Maharashtra the productivity of rice is low (1.8 t/

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ha) as compared to national average (2.41 t/ha). In this state there was report on great damage due to grain discoloration (Anonymous 2014). Humid weather during grain development is the considering factor for this disease. The pathogens are seed borne and air borne in nature. Both factors are to be taken into consideration while managing the disease. In this context both seed treatment and soil treatments were practised to study their effect on grain discoloration. In management both bioagents and fungicides were included (Gholve et al. 2018, Prathuangwong et al. 2012, Sharma 2013). The bioagents are quite effective as fungicides. These can be used in seed treatment, soil treatment also be applied in spraying. Field trials were conducted in the Regional Research Station Coastal Zone of Orissa University of Agriculture and Technology, Bhubaneswar to study the efficacy of seven different treatments in reducing grain discoloration disease of paddy in the variety Lalat in the year 2010-11 and 2011-12.

Materials and Methods

Field trials were carried out in Central Farm, Orissa University of Agriculture and Technology Bhubaneswar, Odisha in *kharif* season with eight treatments and three replications in the year 2010-2011 and 210 in the variety Lalat of paddy crop. In the plots the fertilizers (NPK) were added @ 90:20:20. The crop was grown under rain fed condition with 20 cm × 10 cm spacing and plot size was 5 m × 4.0 m. The treatments were practised as follows. T₁ = Control, T₂ = Seed treatment + Soil application + Foliar spray with *Trichoderma viride*. T₃ = Seed treatment + Soil application + Foliar spray with *Pseudomonas fluorescens*, T₄ = Seed treatment with *T. viride* + Foliar spray with Companion, T₅ = Seed treatment with *T. viride* + Foliar spray with carbendazim, T₆ = Seed treatment with *T. viride* + Foliar spray with Mancozeb, Seed treatment with *T. viride* +Foliar spray with Propiconazole.

Seed treatment was practised in every treatment as per the schedule before sowing of the seed. Foliar spraying with required fungicide was done at the time of flag leaf initiation stage. After harvest the yield was recorded in each treatment and grain discoloration (%) was calculated.

Table 1. Effect of different treatments on yield of the paddy crop (q/ha).

Treatments	Yield in the year 2010	Yield in the year 2011	Mean yield	Increase in yield (%) over control
T ₁ Control	15.5	35.04	20.27	-
T ₂ = Seed treatment + Soil application + Foliar spray with <i>Trichoderma viride</i> ,	20.0	33.96	26.98	33.10
T ₃ = Seed treatment + Soil application + Foliar spray with <i>Pseudomonas fluorescens</i>	19.67	36.51	28.08	38.53
T ₄ = Seed treatment with <i>T. viride</i> + Foliar spray with Companion	17.75	38.73	28.24	39.32
T ₅ + Seed treatment with <i>T. viride</i> + Foliar spray with Carbendazim	21.50	38.68	30.09	43.51
T ₆ = Seed treatment with <i>T. viride</i> + Foliar spray with Mancozeb	26.50	38.84	32.67	61.67
T ₇ = Seed treatment with <i>T. viride</i> + Foliar spray with Propiconazole	18.67	42.97	30.82	42.19
SE (m) ±	2.27	2.66	2.49	
CD	6.66	7.81	7.20	

Results and Discussion

Results revealed that in all the treatments there was incidence of grain discoloration. Maximum yield (32.67 q/ha) was obtained with the treatment where seed treatment was done with *T. viride* and foliar spray with Propiconazole followed by seed treatment with *T. viride* and foliar spray with Mancozeb (30, 82 q/ha) (Table 1). Similarly, grain discoloration was minimum in both the treatments (18.92%,18.90% respectively) (Table 2). It had already been reported that Propiconazole was very effective in reducing grain discoloration followed by bitertanol (0.25%) and carbendazim (0.10%) (Balgude and Gaikwad 2016). In the present trial in carbendazim sprayed crop there was increase of yield (43.51) in the corresponding treatment. The same response was recorded

Table 2. Effect of different treatments on the incidence of grain discoloration (%) in paddy.

Treatments	Grain discoloration (%) in the year 2010	Grain discoloration (%) in the year 2011	Mean	Decrease in discoloration (%) over control
T ₁ = Control	20.7	24.06	22.38	-
T ₂ = Seed treatment + Soil application + Foliar spray with <i>T. viride</i>	19.3	23.33	21.32	4.73
T ₃ = Seed treatment + Soil application + Foliar spray with Companion	20.0	20.90	20.45	8.62
T ₄ = Seed treatment with <i>T. viride</i> + Foliar spray with Carbendazim	19.7	24.36	22.03	1.56
T ₅ = Seed treatment with <i>T. viride</i> + Foliar spray with Companion	19.3	21.20	20.25	9.52
T ₆ = Seed treatment with <i>T. viride</i> + Foliar spray with Mancozeb	18.0	19.83	18.92	15.46
T ₇ = Seed treatment with <i>T. viride</i> + Foliar spray with Propiconazole	18.0	19.80	18.90	15.44
SE (m) ±	0.48	0.07	0.27	
CD	1.40	0.22	0.83	

by Balgude and Gaikwad (2016). There was no significant difference in yield in T₃ (Seed treatment + Soil application + Foliar spray with *Pseudomonas fluorescens*) and T₄ (Seed treatment with *T. viride* +

Foliar spray with Companion), i.e. 28.08 and 28.24 respectively. There was record about the potentiality of *Pseudomonas fluorescens* against bacterial leaf blight, blast, brown spot, narrow brown spot., sheath blight and dirty panicle (Ishilam and Ahmed 2017). Similarly, the yield of T₅ (38.09) and T₇ (38.02) were at par. It indicated that there was no significant difference in spraying of Carbendazim with Propiconazole irrespective of application of *Trichoderma viride* as seed treatment against grain discoloration disease of paddy.

References

- Anonymous (2014) India-october crop review and 2014 winter crop prospects by informal economics survey-based crop reporting service. Agriwatch Crop-India, 13-04 Oct 25: 10—16.
- Balgude Y, Gaikwad AP (2016) Integrated management of grain discoloration disease in paddy. J Rice Res 9 (2) : 1—6.
- Gholve VM, Sawade BR, Kalpande, Das IK (2018) Efficacy of new fungicides and bioagents against grain moldfungi. J Mycopathol Res 56 (1) : 41—50.
- Ishilam W, Ahmed M (2017) Identification of different fungi associated with grain discoloration disease of paddy through 5 fungicides. Int J Sci Res 4 (2) : 30—35.
- Prathuangwong S, Chuaboon W, Chatnaparat T, Kladsuwan L, Shoorin M, Kasem S (2012) Induction of disease and drought resistance in rice by *Pseudomonas fluorescens*. Chiang Mai Univ J Nat Sci 11 (1) (Special) : 45—56.
- Sharma KK (2013) Growth promotion of paddy influenced by biological seed treatment using fungal antagonists. Int J Pl Protect 6 (1) : 51—56.