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Effectiveness of practiced management options to control sheath blight disease of rice

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Abstract

Severity of the infection of sheath blight disease can be very devastating problem to the farmer for rice cultivation. Some of these consequences are major yield losses. The objective to identify sustainable management options for sheath blight disease. Field experiments were conducted with cultivated variety Swarna during three consecutive kharif seasons belong to the area of Rajshahi zone at three locations (Paba, Baraigram, Patnitala). Two management systems viz. Floating debris with Folicur and Folicur with ½ MOP were used in three locations to compare their effectiveness against rice sheath blight disease. The highest fertile tiller hill^{-1} was recorded at Paba location using Floating debris with Folicur. Maximum disease incidence was recorded at Patnitala location and minimum disease incidence was found at Baraigram. Between two management Floating debris with Folicur was better than Folicur with ½ MOP to reduces the disease incidence at all locations. The highest yield was found at Paba location using Floating debris with Folicur. Between two management systems, Floating debris with Folicur was better than Folicur with ½ MOP (Muriate of potash) to increase yield. Considering the efficiency and eco-friendly it would be considered that Floating debris with Folicur was effective management for sheath blight disease of rice.

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Introduction

Sheath blight is a fungal disease caused by *Rhizoctonia solani.* Infected leaves senesce or dry out and die more rapidly. Young tillers can also be destroyed. As a result, the leaf area of the canopy can significantly be reduced by the disease. This reduction in leaf area, along with the diseased-induced senescence of leaves and young infected tillers are the primary causes of yield reduction (Rice Knowledge Bank).

R. solani frequently exists as thread-like growth on plants or in culture, and is considered a soil borne pathogen. *R. solani* is best known to cause various plant diseases such as collar rot, root rot, damping off and wire stem. *R. solani* attacks its hosts when they are in their juvenile stages of development such as seeds and seedlings, which are typically found in the soil. It makes sense then that this saprophytic pathogen would live and survive in the soil and attack the part of its hosts that reside there. The pathogen is known to cause serious plant losses by attacking primarily the roots and lower stems of plants. Although it has a wide range of hosts, its main targets are herbaceous plants. *R. solani* would be considered a basidiomycete fungus if the teleomorph stage were more abundant. The disease cycle of *R. solani* is important in regards to management and control of the pathogen. (Parmeter, 1970).

There are various environmental conditions that put the plant at higher risk of infection due to *Rhizoctonia*, the pathogen prefers warmer wet climates for infection and growth. Post-emergent damping off is a further delay in attack of *R. solani*. The seedling is most susceptible to disease in its juvenile stage. (Cubeta and Vilgalys, 2011). Disease damage to rice can greatly impair productivity and sometimes destroy a crop. Several diseases have found, but significantly yield losses have only been associated with sheath blight.

Sheath blight is considered to be an important disease next to rice blast. Rice sheath blight is an increasing concern for rice production.

Sheath blight is the most destructive disease in rice growers face. Crop losses may range from slight to heavy each year, depending on weather, the plant growth stage when infection occurs, the extent of infection and rice varieties grown. The severity of sheath blight has increased in recent and rice years due to increase use of highly susceptible varieties a lack of crop rotation thicker stands and use of higher nitrogen (N) rates and earlier planting dates. Especially in intensified production systems.

Considering the above facts the present research work is designed to manage the sheath blight disease eco-friendly by using two management systems. To attain this aim the present study was accomplish to identify sustainable management options for sheath blight disease and reduce sheath blight severity to improve grain yield of rice.

Materials and methods

Removal of floating debris

The leftovers of crop residues of previous crop weeds floating garbage are called floating debris (F.D.). During land preparation of rice field these substance carried the inoculum of *R. solani* in sclerotia form. The inoculum affect the rice plant after transplant. Ploughed the land twice, 15 days before final land preparation. Maintained the standing water at 2-3 cm level for about 3-7 days, or until floating debris were soft. Examples of floating debris: small dead snails, weed seeds, floating sclerotia, live inoculum with previous crop residues, ratoon or volunteer rice, grass weeds, pupae of different rice insects. Ploughed the field and level the land for collection of floating debris. Collected the floating debris after final land preparation by sweeping fine mesh cloth.

Folicure

Folicur offers an effective and reliable solution against a wide spectrum of diseases in many crops by protective, curative and eradicative action. Application of Folicur results in greening effect on the crop foliage. Folicur with ½ of the MOP was applied during 2nd top dress of urea.

The first split of urea was applied at 15 days after transplanting (DAT), the second one at active tillering stage at 25 DAT and the third one at panicle initiation stage.

Data analysis

The collected data was analyzed statistically by using the computer package SPSS Statistics V22 and Microsoft office, Excel 2010. The main differences among the treatments were adjudged by Duncan's Multiple Range Test (Gomez and Gomez, 1984).

Results and discussion

Fertile tiler hill^{-1}

Effect of three locations on fertile tiller hill^{-1} of Swarna rice using F.D.+Folicur and Folicur+ Fertilizer Means of locations subsets are displayed in Table 1. Among the three locations, highest fertile tiler hill^{-1} (17.300) was found at Paba location and lowest fertile tiler hill^{-1} (13.500) was observed at Baraigram location. There was significant difference was observed between Paba and Baraigram locations but there was no significance difference between Paba and Patnitala location and Baraigram and Patnitala locations.

Influence of disease management on fertile tiller hill^{-1} and their interaction with locations are presented in Fig. 1. The highest fertile tiller hill^{-1} (17.80) was recorded at Paba location using Floating debris with Folicur and the lowest fertile tiller hill^{-1} (13.00) at Baraigram location using Folicur with ½ MOP (Muriate of potash). Between the two management systems, Floating debris with Folicur was better than Folicur with ½ MOP to produce maximum number of fertile tiller hill^{-1}.

Highest fertile tiller hill^{-1} was observed at Paba due to favorable environmental condition as like average temperature was 37.7˚C, average rain fall was 1240 mm and humidity about 75% that was desirable for producing maximum height. Fertile tiller hill^{-1} is an important attribute in case of cereal crops specially rice. The yield of rice largely depend on this trait. The results of present study showed significant variation between fertile tiller hill^{-1} and treatment.

Table 1. Effect of three locations on fertile tiller hill^{-1} of Swarna rice using F.D+Folicur and Folicur +Fertilizer. Means of in three locations subsets are displayed.

Location	Mean±Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
Paba	17.300±0.636 a	15.951	18.649
Baraigram	13.500±1.423 b	10.483	16.517
Patnitala	15.700±0.636 ab	14.351	17.049

*In a column, data are the mean values with standard error having different letters among three locations differ significantly as per DMRT.

Disease incidence

Impact of disease incidence (%) using two management (Floating debris with Folicur and Folicur with ½ MOP) was grown in three locations are prestented in Fig. 2. Maximum disease incidence was recorded at Patnitala location and minimum disease incidence was found at Baraigram. Between two management Floating debris with Folicur was better than Folicur with ½ MOP to reduces the disease incidence at all locations. Influence of rainless days on disease incidence (%) using two management also compared. Maximum rainless days was recorded at Patnitala location and minimum rainless days was recorded at Baraigram. The disease incidence increases with the increase of days of rainless at all locations.

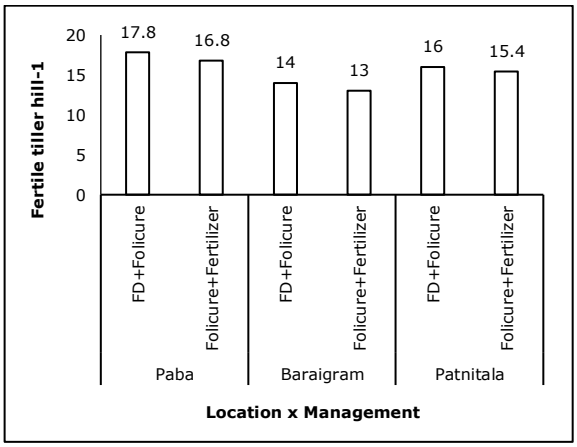

Fig. 1. Effect of sheath blight management of fertile tiller hill^{-1} of Swarna rice grown in three locations.

The first management application should be made shortly after symptoms are observed (usually early internode elongation) and a second, 10-14 days later (before heading). The requirement for critical timing of management application may hinder its usage. Biological control approach is thus being investigated (Mew and Rosales, 1986; Vasantha Devi *et al*., 1989; Gnanamanickam *et al*., 1992).

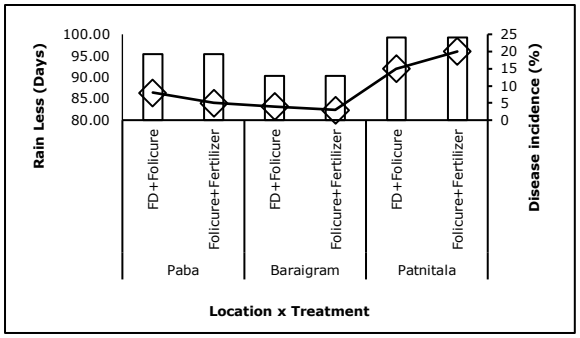

Fig. 2. Effect of sheath blight management of grain panicle^{-1} of Swarna rice grown in three locations.

Yield (t ha^{-1})

Differences among the three locations as per DMRT are presented in Table 2. Among the three locations, highest yield (5.147 t/ha) was found at Paba and the lowest yield (5.050 t/ha) was observed at Baraigram. There was no significant difference among three locations.

Table 2. Effect of three locations on yield (t/ha) of Swarna rice using F.D+Folicur and Folicur+ Fertilizer Means of in three locations subsets are displayed.

Location	Mean±Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
Paba	5.147±0.126 a	4.880	5.414
Baraigram	5.050±0.281 a	4.453	5.647
Patnitala	5.104±0.126 a	4.837	5.371

*In a column, data are the mean values with standard error having different letters among three locations differ significantly as per DMRT.

Influence of management on yield and their interaction with location are presented in Fig. 3. The result showed that highest yield was recorded at Paba (5.334 t/ha) location using Floating debris with Folicur and lowest at Paba (4.960 t/ha) location using Folicur with ½ MOP.

Between two management systems, Floating debris with Folicur was better than Folicur with ½ MOP (Muriate of potash) to increase yield.

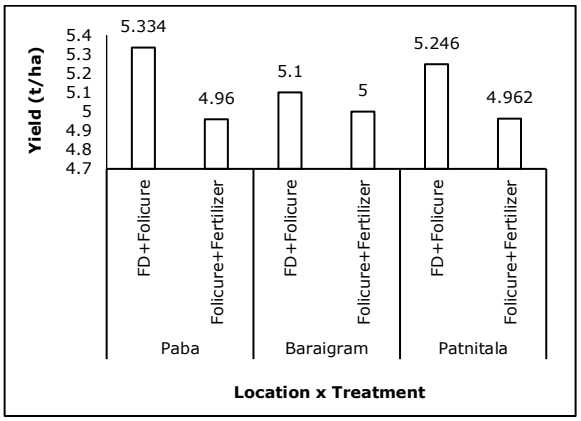

Fig. 3. Management systems of sheath blight on yield of Swarna rice grown in three locations.

Yield was the most important factor for crop production. From the observation it was revealed that the effectiveness of management systems on application of Floating debris with Folicur and Folicur with ½ MOP (Muriate of potash) to influence of rice yield. Yield loss in rice due to sheath blight disease was dependent on the degree of resistant in rice varieties (Marchetii and Bollich, 1991). Fungicide application may not be economically feasible and the timing of application appears to be important (Lee and Rush, 1983). Considering the efficiency and eco-friendly it would be considered that Floating debris with Folicur was effective to management sheath blight disease of rice.

References

Cubeta MA, Vilgalys R. 2011. Population Biology of the *Rhizoctonia Solani* Complex. Population Genetics of Soilborne Fungal Plant Pathogens **87**, 480-84.

Farmando PC. 2006**.** Agriculture, pesticides, food security and food safety. Environmental Science and Policy **9**, 685-692.

Gnanamanickam SS, Candole BL, Mew TW. 1992. Influence of soil factors and cultural practice on biological control of sheath blight of rice with antagonistic bacteria. Plant and Soil **144**, 67-75.

Lee EN, Rush MC. 1983. Rice sheath blight: A major rice disease. Plant Disease **67**, 829-832.

Marchetti MA, Bollich CN. 1991. Quantification of the relationship between sheath blight severity and yield loss in rice. Plant Disease **75**, 773-775.

Mew TW, Rosales AM. 1986. Bacterization of rice plants for control of sheath blight caused by *Rhizoctonia solani*. Phytopathology **76**, 1260-1264.

Pareja L, Fernandz AR, Cesio V, Heinzen H. 2011**.** Analytical methods for pesticides residues in rice. TrAC trends in Analytical Chemistry **30**, 270-291.

Parmeter JR. 1970. *Rhizoctonia Solani*, Biology and Pathology. London, UK: University of California, 1970. Print., University of California Biology and Pathology.

Sparks A, Castilla NP, Vera Cruz CM. Sheath blight. Rice Knowledge Bank, IRRI.

Vasantha DTV, Malar Vizhi R, Sakthivel N, Gnanamanickam SS. 1989. Biological control of sheath-blight of rlce in India with antagonistic bacteria. Plant and Soil **119**, 325-330.