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EVALUATION OF DIFFERENT FUNGICIDES AGAINST SHEATH BLIGHT DISEASE OF RICE CAUSED BY *RHIZOCTONIA SOLANI KÜHN* IN BIHAR

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ABSTRACT

Sheath blight of rice caused by *Rhizoctonia solani Kühn* is one of the most devastating diseases in Bihar. Due to widespread cultivation of susceptible variety Rajendra Mahsuri 1, the disease has spread in large scale and sometimes causes severe damage. Spraying fungicides is the most common practice to manage the disease. In the present investigation, different concentrations of four fungicides were tested against the sheath blight of rice. The minimum disease percent disease incidence and disease severity were found in treatment Hexaconazole 75 WG @0.13g/lt of water *i.e.* 8.3 and 15.7 respectively. The maximum grain yield(6066 kg/ha) was also found in in treatment Hexaconazole 75 WG @0.13g/lt of water. Hexaconazole 75 WG fungicide could be used for the management of sheath blight of rice and increasing the yield of rice.

Key words : *Fungicides, Rhizoctonia solani, sheath blight.*

Sheath blight disease caused by the soil borne necrotrophic fungal pathogen *Rhizoctonia solani* Kühn (teleomorph: *Thanatephorus cucumeris*) is one of the most destructive rice (*Oryza sativa* L.) disease. The disease was first reported from Japan by Miyake in 1910. Since then, the disease has been observed in almost all rice growing areas of the world. In India, this disease was first reported from Gurdaspur in Punjab by Paracer and Chahal (1963) and in Uttar Pradesh by Kohli (1966). A modest estimation of losses due to sheath blight of rice in India has been reported to be up to 54.3 % (Chahal *et al.* 2003). In present days, attempts to control rice sheath blight have been directed to the cultural practices, use of resistant cultivars and fungicides, to some extent biological methods. No resistant cultivar is available for field /laboratory condition (Amante *et al.* 1990) and the present intensive rice cultivation practices offer a favourable condition for disease development. Also there is considerable pressure from environmental scientists to decrease emphasis on chemical control. Breeding for disease resistance, though most practical and feasible method, it could not be a final solution because the potential variability of most pathogens will not permit any currently successful variety to remain resistant for an indefinite period. Moreover, sources of resistance identified in one region does not showed same degree of resistance in other regions due to existence of different level of virulence pattern in the region of the pathogen. Variability is determining factor in breaking the static mechanism of the host and effective successful pathogenesis. Foliar sprays of various fungicides have already been reported (Arunyanant *et al.*, 1986). Repeated use of same fungicides in the same field or plot sometimes become less or not effective, may be due to development of resistance recombinant of the sheath blight pathogen. Therefore, an attempt was made to evaluate different fungicides for the management of sheath blight of rice in Bihar

MATERIAL AND METHODS

Field trials were conducted at Agricultural Research Institute, Patna during Kharif 2009 seasons to evaluate the efficacy of a different fungicide formulation having Hexaconazole 75 WG, Metominostrobin 20 SC, Hexaconazole 5 SC, and Propiconazole 25 EC. The trials were laid in a randomized block design with eight treatments and three replications. Popular rice variety, Rajendra Mahsuri-1 which is highly susceptible to sheath blight disease was grown during kharif season of 2009. A spacing of 15x15 cm was adopted in a gross plot size of 20 sqm. The two different concentration of Hexaconazole 75 WG *i.e.* 0.11g and 0.13g per liter of water, three different concentration of Metominostrobin 20 SC *i.e.* 0.5, 1.0 and 2.0 ml per liter of water, and one concentration of Hexaconazole 5 SC *i.e.* 2.0 ml per liter of water, and Propiconazole 25 EC *i.e.* 1.0 ml per liter of water were taken. A check plot was also maintained. The details of the different fungicides and their concentration are given in Table-1. A pure culture of a virulent isolate of Rhizoctonia solani was multiplied on

typha leaf bits (Bhaktavatsalam *et al.* 1978). Inoculation with *R. solani* was carried out at maximum tillering stage and colonized typha bits were placed between the tillers of rice plant, 5-10 cm above the water level. The data on the disease incidence and subsequent spread were collected from the date of first incidence of the disease till 30 days after second spray. The per cent disease incidence and severity was calculated from the data collected from 25 hills in each replication in each treatment as per the standard evaluation system for rice (IRRI, 2002). The disease incidence was calculated by following formula :

$$\text{Disease Incidence (\%)} = \frac{\text{Number of affected hills}}{\text{Total number of hills}} \quad 100$$

Disease severity was calculated by the following formula :

$$\text{Disease severity (\%)} = \frac{n(9) + n(1) + n(3) + n(5) + n(7) + n(9)}{t(n)} \quad 100$$

No. of tiller/hill classified as 0-9 grades respectively according SES (0-9) for rice. (Mckinney, 1923)

The disease incidence and severity data were transformed into arc sine values before statistical analysis. The grain yield was recorded from each gross plot and expressed as kg/ha. The data was subjected to statistical scrutiny and the results are furnished. The disease was first noticed in the experimental plots at maximum tillering stage. Two fungicidal sprays were given with 15 days interval starting from the appearance of initial disease symptoms. Symptom of phytotoxicity, if any, were also recorded at 5 and 10 days after the imposition of the fungicides.

RESULTS AND DISCUSSION

The data revealed that all the eight treatments were found effective in decreasing the disease and increasing the grain yield. The present investigation showed that percent disease incidence of the all the treatments were found significantly difference as compared to check. The minimum percent disease incidence was found in treatment Hexaconazole 75 WG @ 0.13 g per liter of water i.e. 8.3 followed by Metominostrobin 20 SC @ 2.0 ml per liter i.e.9.7 and Hexaconazole 75 WG @ 0.11 g per liter of water *i.e.* 10.2. The treatment Hexaconazole 75 WG @ 0.13 g per liter of water was found at par with Metominostrobin 20 SC @ 2.0 ml per liter and significantly different with Hexaconazole 75 WG @ 0.11 g per liter of water. The maximum disease incidence was found in check i.e. 45.3% (Table-2).

Table-1 : Details of the fungicides and their concentration.

Sl. No.	Treatments	Dosage/L of water
T_1	Hexaconazole 75 WG	0.11 g
T_2	Hexaconazole 75 WG	0.13 g
T_3	Metominostrobin 20 SC	0.5 ml
T_4	Metominostrobin 20 SC	1.0 ml
T_5	Metominostrobin 20 SC	2.0 ml
T_6	Hexaconazole 5 SC	2.0 ml
T_7	Propiconazole 25 EC	1.0 ml
T_8	Check	Untreated

With respect to sheath blight severity, all the eight concentrations of test fungicide were significantly different from the untreated check. The maximum severity was recorded in check in which the severity was 78.3 per cent (Table-2). The minimum disease severity was recorded in Hexaconazole 75 WG @ 0.13 g per liter of water i.e. 15.3% followed by Metominostrobin 20 SC @ 2.0 ml per liter i.e.18.3% and Hexaconazole 75 WG @ 0.11 g per liter of water *i.e.* 22.5%. The treatments Metominostrobin 20 SC @ 0.5 ml per liter of water, Metominostrobin 20 SC @ 0.5 ml per liter of water, Hexaconazole 5 SC@ 2.0 ml per liter of water and Propiconazole 25 EC @ 2.0 ml per liter of water also showed the low disease severity i.e. 23.7%, 27.5%, 28.5% and 36.7% respectively.

All the fungicidal treatments were significantly superior from the check plot with respect to grain yield (Table-2). The significant maximum yield was found in Hexaconazole 75 WG @ 0.13 g per liter of water as compared to all other treatments. The maximum grain yield was obtained in Hexaconazole 75 WG @ 0.13 g per liter of water (6066kg/ha) followed by Metominostrobin 20 SC @ 2.0 ml per liter (59.33 kg/ha) and at par with each other. The minimum grain yield was recorded in check i.e. 3766 kg/ha.

This work has confirmed the previous results of Bag (2009). Foliar sprays of various fungicides have already been reported (Arunyanant *et al.,* 1986). Akter *et al.* (2001) reported that six fungicides namely Bavistin 50 WP (Carbendazm),Contaf 5 EC (Hexaconazole), Forastin 50 WP (Carbendizm), Anvil 5 SC (Hexaconazole), Tilt 25 EC (Propiconazole) and

Table-2 : Effect of different fungicides against sheath blight of rice.

Sl. No.	Treatments	Dosage/L of water	Disease Incidence (%)	Disease Severity (%)	Yield (kg/ha)
1.	Hexaconazole 75 WG	0.11 g	10.2 (18.61)	22.5 (28.3)	4516.67
2.	Hexaconazole 75 WG	0.13 g	8.3 (16.74)	15.3 (23.01)	6066.67
3.	Metominostrobin 20 SC	0.5 ml	13.6 (21.63)	23.7 (29.11)	5683.33
4.	Metominostrobin 20 SC	1.0 ml	11.2 (19.54)	27.5 (31.61)	5783.50
5.	Metominostrobin 20 SC	2.0 ml	9.7 (18.13)	18.3 (25.31)	5933.33
6.	Hexaconazole 5 SC	2.0 ml	17.3 (24.57)	28.5 (31.61)	4416.70
7.	Propiconazole 25 EC	1.0 ml	26.5 (30.97)	36.7 (37.27)	4016.67
8.	Check	Untreated	45.3 (42.28)	78.3 (62.21)	3766.67
CD (p=0.05)			1.5	2.2	207.1

Thiovit 80 WP (Micronized sulfur) and fertilizer, Muriate of Potash were tested in Gazipur, Bangladesh against sheath blight of rice (cv. Swarna) caused by *R. solani*. Contaf appeared to be the best in reducing the percent relative lesion height, per cent disease index and tiller infection. Tiwari *et al.* (2002) used seven fungicides to control sheath blight of rice and reported that Carbendazim + Epoxiconazole (0.2%), Hexaconazole (0.2%), Epoxiconazole (0.24%) and Propicanzole (0.2%) were significantly more effective in controlling disease severity than other fungicides. Bag (2009) reported that spraying of Hexaconazole 5EC @ 2.0ml per liter of water reduced the disease severity of sheath blight disease of rice and increasing the grain yield. Kandhari (2007) showed that Hexaconazole reduced the average disease severity and increased the grain yield of Pusa Basmati 1.

CONCLUSIONS

Sheath blight, caused by *R. solani Kuhn*., is an important disease of rice occurs in all the rice growing areas of the world and causes more economic yield losses in Bihar. Therefore, for the management of this disease and increasing the yield of rice, Hexaconazole 75 WG @0.13g/lt of water could be used.

REFERENCES

1. Amante, A.D., Pena, R. de la, Sitch, L.A.,m Leung, H. and Mew, T.W. (1990). Sheath blight (ShB) resistance in wild rices, I*nternational Rice Res. Newsletter. 15(3): 5*.
2. Akter, S., Mian, M.S. and Mia, M.A.T. (2001). Chemical control of sheath blight disease (*R. solani*) of rice. *Bangladesh J. Pl. Path.,. 17: 35-38*.
3. Arunyanart, P., Surin A. and Rojanahasadin, W. (1986).Chemical control of sheath blight. *International Rice Res. Newsletter. 11:20*.
4. Bag, M.K. (2009) Efficacy of a new fungicide 'Trifloxystrobin 25% + Tebuconazole 50%'75WG against sheath blight (*Rhizoctonia solani* Kühn) of rice, *Journal of Crop & Weed*, *5(1): 221-223*
5. Chahal, K.S., Sokhi, S. S. and Rattan, G. S. (2003) Investigations on sheath blight of rice in Punjab, *Indian Phytopath. 56: 22-26*.
6. IRRI (2002) Standard Evaluation System in rice, 5th ed. Nov 2002, INGER, Genetic Resources Center, IRRI, PO. Box 932, 1099, Manila, Phillipines, *56 pp*
7. Kandhari, J. (2007) Management of sheath blight of rice through fungicides and botanicals, *Indian Phytopath. 60 (2): 214-217*
8. Paracer, C. S. and Chahal, D. S. (1963) Sheath blight of rice caused by *Rhizoctonia solani Kühn- a new record in India, Current Science, 32: 328-329*.
9. Kohli, C. K. 1966. Pathogenicity and host range studies on paddy sheath blight pathogen (*Rhizoctonia solani Kuhn*) *J. Res. Punjab Agri. Univ. 3. 37- 40*
10. McKinney, H. H. (1923). Influence of soil temperature and moisture on infection of wheat seedlings by *Helminthosporium sativum. Journal of Agricultural Research, 26: 195-217.*
11. Tiwari, R.K.S., Chandravanshi, S.S., Ojha, B.M. and Thakur, B.S. (2002). *In vitro* and *In vivo* efficacy of new fungicides against *R. solani* causing sheath blight disease of rice. *J. Mycol. Pl. Patho.,32:418.*