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Original Research Article

Efficacy of Fungicides on Sheath Blight Disease in Jaunpur of Eastern U.P.

Uday Partap Singh[1*], Mahendra[2] and Aruneesh[2]

[1]T.D.P.G. Collage, Jounpur, India
[2]A.N.D.U.A.T., Kumarganj, Ayodhya, India
**Corresponding author*

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A B S T R A C T

Rice sheath blight, caused by the fungal pathogen *Rhizoctonia solani* Kuhn [Sexual stage: *Thanetophorus cucumeris* (Frank) Donk] is one of the major production constraints in rice growing countries of the world. Under conditions favoring disease, up to 50% of grain yield may be lost. Diseases through various biotic or abiotic stresses. Eight treatment combinations viz. T1- Prochloraz 23.5% w/w + Tricyclazole 20% w/w @ 2.0 ml/l, T2- Prochloraz 45EC @ 2ml /l, T3- Tricyclazole 75 WP @ 0.6 g/l, T4- Azoxystrobin 18.2 % w/w + Difenoconazole 11.4% w/w SC @ 1.0 ml/l, T5- Difenoconazole 25 EC @1.0 ml/l, T6- Hexaconazole 5% EC @ 2.0 ml/l. T7- Propiconazole 25% EC @ 1ml/l and untreated check were evaluated against sheath blight of rice on the most popular variety Chintu under 'Chintu' from various parts of different villages in Jaunpurviz. Wazidpur, SaraiKhawajaUrfDarbanipur, Chand Pur, Mainpur, Olandganj, and Muradganj district of Eastern U.P. Among the new fungicides combination Difenoconazole 25 EC @1.0 ml/l was found best in checking the disease severity (21.9%,) and increase the grain yield of rice (95.68%) over check, flowed by T7- Propiconazole 25% EC @ 1ml/l the disease severity (22.1%) and increase the grain yield of rice (84.71%) over check

Introduction

Rice (*Oryza sativa* L.) is the world's most important crop and a primary source of food for more than half of the world's population. More than 90% of the world's rice is grown and consumed in Asia where 60% of the earth's people live (Kole, 2006). Rice is the staple food crops and responsible for the food security for 2/3 population of the world. Rice is an important cereal crop affected by various fungal, bacterial, and viral diseases. Among the fungal diseases sheath blight caused by *Rhizoctonia solani* Kuhn is one of the most widely distributed disease of rice. Its occurrence in India was reported by Paracer and Chahal (1963) [2] from Gurudaspur in the Punjab. It appears throughout the all 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 (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 successfull at field level in majority of the cases (Kandhari *et al.,* 2003). Fungicides with multiple effects on the pathogen like sclerotial germination, mycelial growth inhibition and reduction of the disease spread will be most ideal. Infected plants are usually found in a circular pattern, locally referred to as 'bird's nest' (Hollier *et al.,* 2009). The disease appears at tillering stage on leaf sheath as elliptical or oval to irregular, 1-3 cm long, greenish gray spots with brown margin at or above the water line. Presence of many such spots on the leaf sheath gives the appearance of snake skin. Under favourable conditions, the infection spreads rapidly to the upper plant parts and also to the neighbouring plants by means of normal emergence and expansion of the ears and results in poor filling of the grains. The pathogen is also known to cause panicle infection resulting in production of unfilled or partially filled discoloured seed bearing brownish black spots or black to ashy gray patches (Acharya *et al.,* 2004). It is a major production constraint in profusely tillering and fertilizer responsive high yielding varieties and hybrids under intensive rice production systems. The yield losses ranging from 4-50% have been reported depending on the crop stage at the time of infection, severity of the disease and environmental conditions (Singh *et al.,* 2004; Zheng *et al.,* 2013; Bhunkal *et al.,* 2015b). Although basidiospores produced by *T. cucumeris* on host plant can initiate infection, it is generally considered unimportant in the epidemiology of rice sheath blight. The pathogen survives through sclerotia and mycelia in infected plant debris/straw and also through weed hosts in tropical environments while in temperate regions, primary source of inoculum is sclerotia.

Materials and Methods

The experiment was carried out at various parts of different villages in Jaunpurviz. Wazidpur, SaraiKhawajaUrfDarbanipur, Chand Pur, Mainpur, Olandganj, and Muradganj district of Eastern U.P. were evaluated against sheath blight of rice on the most popular variety Chintu. Experiment was laid out in one village one replication. Most popular variety used was Chintu and the gross plot size was 50 sq. metres and all packages of practices were followed for conducting the experiment. The sheath blight infected sample was collected from rice field. The pathogen was isolated and characterized on the basis of its morphological and cultural characteristic, Pathogenecity of the pathogen was confirmed by proving the Koch's postulate (1876). The cultures were maintained on slants containing Potato Dextrose Agar medium. To evaluate the efficacy of new molecules/chemicals against sheath blight, were tested. Eight treatment combinations viz. T1- Prochloraz 23.5% w/w + Tricyclazole 20% w/w @ 2.0 ml/l, T2- Prochloraz 45 EC @ 2ml /l, T3- Tricyclazole 75 WP @ 0.6 g/l, T4- Azoxystrobin 18.2 % w/w + Difenoconazole 11.4% w/w SC @ 1.0 ml/l, T5-Difenoconazole 25 EC @1.0 ml/l, T6- Hexaconazole 5% EC @ 2.0 ml/l. T7- Propiconazole 25% EC @ 1ml/l and untreated check. The pathogen was multiplied from pure culture on Autoclaved rice culms bits (5-7cm.). Rice plants were inoculated at tillering stage (35-40 DAT) by placing the inoculums between the tillers just above the water lines. The fungicides were sprayed twice at 15 days interval starting from just appearance of disease symptoms under artificial inoculation. Control plot were sprayed with ordinary water. Disease observations were recorded after 15 days last spray by fixing 5 sampling unit of one square metre in each plot. The disease severity and incidence were recorded in percent and increased in yield (kg/h).

Results and Discussion

There was significant difference among the treatments in sheath blight disease severity and yield. The data on different disease parameters is summarised in table 1. Treated with Difenoconazole 25 EC @1.0 ml/l was found best in checking the disease severity (21.9%,), incidence respectively and the better grain yield 5890 kg/ha was recorded. While severity and incidence of sheath blight had gone to the extent of 51.5, 73.2 respectively in unsprayed plots. In check plots reduced grain yield was recorded (3010 kg/ha).The plot treated with had also shown good response with T7- Propiconazole 25% EC @ 1ml/l the disease severity (22.1%) and 23.0 % disease incidence, along with good grain yield 5560 kg/ha was recorded. In this treatment 84.71 increased grain yield over untreated check was observed. In treatment combinations (Table 1) T4- Azoxystrobin 18.2 % w/w + Difenoconazole 11.4% w/w SC @ 1.0 ml/l, T5-Difenoconazole 25 EC @1.0 ml/l showed good response 25.7% disease severity and 28.1% disease incidence was observed along with 68.07% grain yield advantage over check. In the plot treated with T6- Hexaconazole 5% EC @ 2.0 ml/l28.8% disease severity and 30.2% disease incidence along with 62.45% increase grain yield over check was recorded. The plot treated with T1- Prochloraz 23.5% w/w + Tricyclazole 20% w/w @ 2.0 ml/l 28.1 disease severity and 31.4%, disease incidence, with yield 4763 kg/ha was recorded. The plot treated with T2- Prochloraz 45 EC @ 2ml /l 29.4% disease severity and 32.5%, disease incidence, with yield 4240 kg/ha was recorded.

Table.1 Effect of different fungicides on severity and incidence of sheath blight of rice

Treatments	Dose/l or g	Disease Incidence %	Disease Severity %	Grain Yield kg/ha	Increase in yield over control (%)
T1- Prochloraz 23.5% w/w + tricyclazole 20.0% w/w SE	2 ml	31.4	28.1	4763	58.23
T2- Prochloraz 45% EC	2 ml	32.5	29.4	4240	40.86
T3- Tricyclazole 75% WP	0.6 g	38.8	36.5		
T4- Azoxystrobin 18.2 % w/w + difenoconazole 11.4% W/W SC	1 ml	28.1	25.7	5059	68.07
T5- Difenoconazole 25 EC	1 ml	21.9	20.8	5890	95.68
T6- Hexaconazole 5% EC	2 ml	30.2	28.8	4890	62.45
T7- Propiconazole 25% EC	1 ml	23.0	22.1	5560	84.71
T8- Control		51.5	73.2	3010	-

All these fungicides were found effective in checking in disease severity and incidence over untreated control and increased the grain yield of rice at various extent. Difenoconazole 25 EC was found best in the disease severity (21.9%,) and increase the grain yield of rice (95.68%) over check, flowed by T7- Propiconazole 25% EC @ 1ml/l the disease severity (22.1%,) and increase the grain yield of rice (84.71%)

over check minimization of disease severity may be one of the possible reasons for enhancement of grain yield by the spraying of these fungicides. Singh *et al.,* (2016) [7] also reported the compatibility of different fungicide with insecticide for the management of sheath blight.

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