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MANAGEMENT OF *Bipolaris oryzae* ON HYBRID RICE SEEDS TREATED WITH VITAFLO 200FF

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Abstract

Seeds of hybrid rice varieties, *viz.*, Heera-1, Heera-2, Heera-5 and BRRI dhan-29 were collected from 15 different locations of Mymensingh district in Bangladesh. Management of *Bipolaris oryzae* was studied in June 2014 to July 2015 at Seed Pathology Centre, Bangladesh Agricultural University and Seed Pathology Laboratory of Supreme Seed Company Limited. Solar heat, Soaking in water, washing, Provax 200WP, Vitaflo 200FF, Bavistin, IPM bio pesticide and BAU fungicide treatments were used for management of *Bipolaris oryzae*. The data collected from the experiments were analyzed for test of significance and compared the treatment means by using DMRT at 5% level of probability following the Statistical tool for Agricultural Research (STAR) 2.1 program. Highest control was recorded by Vitaflo200FF (0%) which was significantly different followed by provax (0-2%), BAU fungicide (2-3%) and IPM bio pesticide (2-3%). Incidence of *B. oryzae* was recorded 12-16% after seed washing, 14 -18% after solar heat, 18 - 20% after seed soaking and no effect when seed treatment with Bavistin. Vitaflo 200 FF was excellent in controlling seed-borne *B. oryzae* in hybrid rice seed and consequently the germination percentage was high.

Key words: Hybrid rice, *Bipolaris oryzae*, Treatment, Vitaflo 200FF.

Introduction

Shifting the yield frontier in rice, one of the best options available to plant breeders is hybrid rice. Hybrids offer to break through the yield ceiling of semi-dwarf rice began in 1964. China is the first country to commercially exploit heterosis in rice. The discovery of Cytoplasmic male sterile (CMS) in rice (Athwal and Virmani, 1972) suggested that breeding could develop a commercially viable F_1 hybrid. The most promising hybrids yielded 20-30% (Lin and Yuan, 1980) higher than the best conventional rice varieties. Hybrid rice technology could offer considerable opportunity for increasing yield. Therefore, cultivation of hybrid varieties of rice is an attractive alternative to modern inbred varieties expected level to go beyond the present yield ceiling in the developing countries like Bangladesh.

In Bangladesh, brown spot pathogen *Bipolaris oryzae* is predominant (Mia *et al*., 2004). The pathogen is responsible for germination failure, rotting of seeds, roots and coleoptiles, poor germination and poor seedling vigour (Mia and Nahar 2001, Naeem *et al*. 2001, Malavolta *et al*. 2002). The diseases are severe where plants grown under stress conditions causing appreciable yield loss (Kamal and Mia 2009). It can be a serious disease causing a considerable yield loss. Where, it affects the quality and the number of grains per panicle and reduces the kernel weight (Mew and Gonzales 2002). As *B. oryzae* is a seed borne pathogen in nature, besides management of the diseases through cultural practices, field chemical control and chemical, seed treatment has been considered commonly in controlling *B. oryzae* and other seed-borne fungi in rice (Dharam and Neergaard 1970, Kauraw 1986; Rao and Ranganathajah 1988; Ahmed *et al*. 2000; Parisi *et al*. 2001).Therefore, the experiment was carried out to determine suitable management strategy against *Bipolaris oryzae* of hybrid rice seeds.

Materials and Methods

The experiment was conducted in the Seed Processing and Preservation Centre, Trishal, Mymensingh and Central Laboratory, Uttara, Dhaka of Supreme Seed Company Limited and Seed Pathology Centre, Bangladesh Agricultural University, Mymensingh, Bangladesh. The investigation was conducted during in June 2014 to July 2015. Three Hybrid rice varieties namely Heera-1 (99-5), Heera-2 (HS-273) and Heera-5 (Supreme hybrid-5) were selected for the study. An open pollinated high yielding variety BRRI dhan-29 was also used in this study. Hybrid seed samples, each minimum 5 kg were collected from 15 blocks of each variety from hybrid seed production farms, of Supreme Seed Company Limited. Fifteen samples for BRRI dhan-29 from farmer's field under Mymensingh district. Seed samples were subjected for seed health test following blotter incubation method according to the procedure of the International Rules for Seed Testing (ISTA, 1996). Most of the associated seed-borne fungi were detected by

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observing their growth characters on the incubated seeds on blotter paper following the keys outlined by Mathur and Kongsdal (2003). The culture was incubated at 25± 1 ºC for 3-7 days. Temporary semi-permanent slides were prepared from the fungal colony and observed under compound microscope to identify the fungi (Ellis 1971 and Agarwal *et al*. 1989). The results were presented as percent incidence of individual pathogen.

The percentage frequency of occurrence of various fungi was calculated as follows:

$$\text{Incidence (\%)} = \frac{\text{Nos. of infected seeds X 100}}{\text{Total Nos. of seeds}}$$

Solar heat, Seed Soaking in water, Seed washing, three seed treating fungicides namely Provax 200 WP (Carboxin 37.50% and Thiram 37.50%), Vitaflo (Carboxin 17.5% & Thiram 17.5%) and Bavistin (Carbendazim 50%) BAU-Bio fungicide and IPM Bio Pesticides were tested against *Bipolaris oryzae.*

Statistical analysis

The data collected from the experiments were analyzed for test of significance and compared the treatment means by using Duncan's Multiple Range Test (DMRT) at 5% level of probability following the Statistical tool for Agricultural Research (STAR) 2.1 program.

Results and Discussion

Effect of different treatment on *Bipolaris oryzae* on hybrid rice seed

After Solar heat, Soaking in water, Washing, Provax, Vitaflo, Bavistin, IPM bio pesticide and BAU fungicide, incidence of *B. oryzae* were recorded (Fig. 1). Highest control was recorded by Vitaflo fungicide (0%) which was significantly different followed by provax (0-2%), BAU fungicide (2-3%) and IPM bio pesticide (2-3%). Incidence of *B. oryzae* was recorded 12-16% after Seed washing, 14 -18% after solar heat, 18 -20% after Seed soaking and 18-30%, when seed treatment with Bavistin.

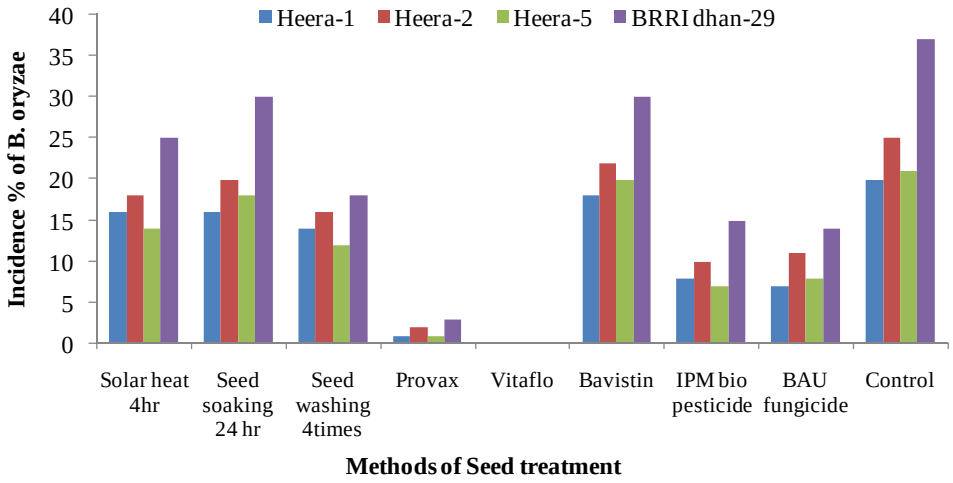

Fig. 1: Effect of different treatment on control of *Bipolaris oryzae* on hybrid rice seed (LSD $_{0.05\%}$ =4.59,3.3, 2.88 and 5.8 for Heera-1, Heera-2, Heera-5 and BRRI dhan-29)

Photo 1: Growth of *B. oryzae* on hybrid rice seed

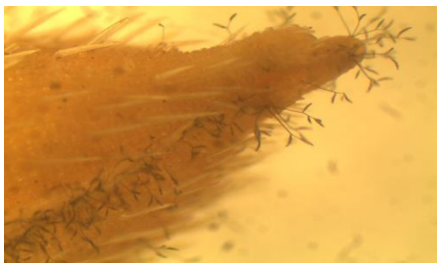

Photo 2: Conidia of *Bipolaris oryzae* under compound microscope (40X)

Photo 3: *Bipolaris oryzae* on hybrid rice seed under stereo microscope (4X)

Effect of different treatment on germination of *Bipolaris oryzae* infected hybrid rice seed

After the seeds were treated with solar heat, soaking, washing, Provax, Vitaflo, Bavistin, IPM bio pesticide and BAU fungicide, mentioned below (Fig. 2). Highest germination (%) was observed with Vitaflo fungicide (88 to 92%) which was significantly different followed by Provax (83 to 92%), BAU fungicide (81 to 84%) and IPM bio pesticide (80 to 84%). Germination 75 to 80% after Seed washing, 72

to 80% after Solar heat, 70 to 78%after Seed soaking in water and 70-78% after seed treatment with Bavistin.

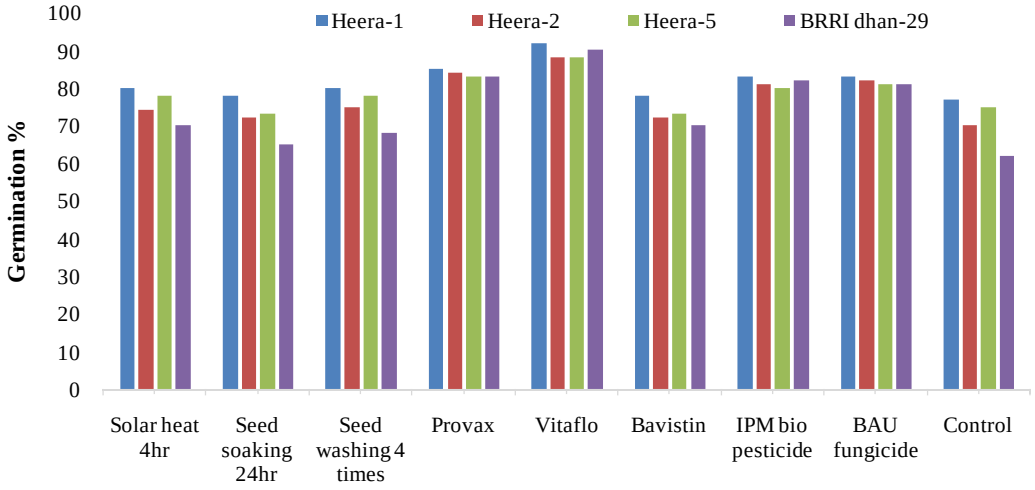

Fig. 2: Effect of different treatment on germination of *B. oryzae* infected rice seed (LSD $_{0.05\%}$ =6.47, 5.72, 5.48 & 6.25 for Heera-1, Heera-2, Heera-5 and BRRI dhan-29)

Photo 4: After Vitaflo treated hybrid rice seed

All the treatments showed influence on control of *B. oryzae* of hybrid rice seeds over control. Sun drying, seed soaking, seed washing, chemical treatment with provax, vitaflo and BAU-Bio fungicide and IPM Bio Pesticides Out of the treatments, Vitaflo resulted excellent effect in controlling seed-borne fungal pathogens and provax, BAU fungicides, IPM bio pesticides and seed washing were also found good for controlling seed-borne pathogens of hybrid rice seeds. Bavistin was not effective against *B. oryzae.*

The results were confirmed by authors, *viz*., Kauraw (1986), Rao and Ranganathajah (1988), Sachan and Agarwal (1994), Sisterna and Ronco (1994), Rahman *et al.* (2000), Continho *et al.* (2000), and Parisi *et al.* (2001). However, Bavistin was not effective against *B. oryzae* and this result compromised with the finding of Kannaiyan and Radhakrishan (1982), Rao and Ranganathajah (1988). Mia (1993) conducted an experiment on seed treatment to control seed-borne fungi of rice in Bangladesh. Seven fungicides namely, Arasan, Bavistin, Brassicol CGA4910, Dithane M-45, Homai and Vitavax @ 3g/kg were evaluated for their efficacy in controlling seed-borne fungi of rice. Among the fungicides Dithane M-45 was found to be the best in reducing almost all the associated fungi considerably. Vitavax was also found equally effective.

Seed-borne fungi which were associated with the treated and untreated seeds were *Bipolaris oryzae, Trichoconis podwickii, Curvularia lunata, Nigrospora oryzae, Alternatia tenuis, Aspergillus spp. and Penicillium* spp. Singha *et al*., (2000) tested seeds of 28 hybrid rice developed at Regional Agricultural Research Station, Asam, India and found to be infected by *Drechslera oryzae, Curvularia lunata* and

Fusarium spp. Ahmed *et al. (*1989) tested 12 seed samples of rice and found all infected by *Bipolaris oryzae* the cause of brown spot disease. Four fungicides viz. Bavistin, Hirosun, Tilt 280 EC and Dithane M-45 and four plant extracts viz. Biscatali, Onion, Garlic and Neem were evaluated against *B. oryzae*. Dithane M-45 was the best with 100% inhibition of the mycelial growth at 0.3%. Neem and Garlic were effective against *B. oryzae* at 1:1 dilution. In order to improve health and quality of seeds chemicals like Bavistin, Provax and Thiovit were used by different researchers (Dash and Narain 1996, Bhuiyan *et al.* 2013, Subhani *et al.* 2011, Akter *et al*. 2001, Jumayli, 1985). Seed treated with Vitaflo fungicide against *B. oryzae is* more effective and acceptable to farmers for his effectiveness and improving seed color. Besides this Hossain (2011) pointed out that BAU-Bio fungicide unique eco-friendly means and new dimension of plant disease control in Bangladesh.

After the seeds were treated with Solar heat, soaking, washing, Provax, Vitaflo, Bavistin, IPM bio pesticide and BAU fungicide, mentioned below. Highest control was recorded by treated with Vitaflo fungicide (0%) followed by provax (0-2%), BAU fungicide (2-3%) and IPM bio pesticide (2-3%). Seed washing (12-16%) is more effective than solar heat (14 -18%) treatment and Seed soaking (18 -20%). Highest germination (%) was observed with Vitaflo fungicide (88 to 92%) followed by provax (83 to 92%), BAU fungicide (81 to 84%) and IPM bio pesticide (80 to 84%). Seed washing (75 to 80%) is more effective than solar heat (72 to 80%) treatment, Seed soaking in water (70 to 78%) and bavistin (70-78%). Seed treatments specially with fungicides like captan, thiram or mancozeb restrict the growth of mycloflora on the seeds and maintain better seed viability (Gupta 2003).

Conclusions

Vitaflo 200FF resulted excellent effect in controlling of seed-borne *B. oryzae* of hybrid rice. Provax, BAU fungicides and IPM bio pesticides were also found good. Sun drying, Seed soaking and Bavistin was not effective against *B. oryzae.* Highest germination (%) was observed with Vitaflo 200FF (88 to 92%) followed by Provax 200WP (83 to 92%), BAU fungicide (81 to 84%) and IPM bio pesticide (80 to 84%).

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