Reaction of Some Wheat Varieties to *Bipolaris sorokiniana*

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Abstract
The experiment was conducted at Seed Pathology Laboratory, Sher-e-Bangla Agricultural University, Dhaka, Bangladesh to study the reaction of some wheat varieties to *Bipolaris sorokiniana* in vitro. The wheat seeds of varieties Sonalika, Kanchan, Barkat, Shatabdi, Aghrani, Pavon-76, Akbar, Gourab, Sourav and Protiva were collected from Bangladesh Agricultural Research Institute (BARI), Gazipur. In blotter test maximum germination (92%) was recorded in the variety Shatabdi, Sourab and Agrani, and minimum (72%) was recorded in Sonalika. Maximum (37%) incidence of seed borne *B. sorokiniana* was recorded in Sonalika and minimum (12%) in Shatabdi. The highest number of conidia seed^{-1} (320) was recorded in Sonalika and minimum number (100) was recorded in Shatabdi. Larger Lesion (11.67 mm) was found in Sonalika, Sourav and Kanchan. No lesion (infection) was recorded in Shatabdi, Akbar, Pavon-76 and Protiva where roots were inoculated with *B. sorokiniana*. Maximum percentage of leaf segment disease (96.67%) was recorded in Sonalika. No lesion was found on the leaf of the variety Shatabdi when the leaves were inoculated with *B. sorokiniana in vitro*.

1. Introduction

Bipolaris sorokiniana (Teleomorph *Cochliobolus sativus*) is a highly virulent pathogen of wheat in temperate regions of the world. It causes leaf blotch, leaf spot, leaf blight, foot rot, seedling blight, discolored grain, black pointed grain and impaired grain filling. The leaf blight disease is considered to be a threat to wheat cultivation all over the world (Gilchrist, 1985). In Bangladesh, the disease is also considered to be a highly devastating disease of wheat (Hossain and Azad, 1992). The yield loss in wheat due to leaf blight/blotch disease in the country has been reported to be 20% in Sonalika, whereas 14% and 8% in Akbar and Kanchan, respectively (Razzaque and Hossain, 1991). In farmer's field, the yield loss is estimated to be 14.97% (Alam et al., 1995), whereas 29% yield reduction was estimated during 1991-1992 in Kanchan (Alam et al., 1994). In case of severe attack it may result even 100% yield loss (Hossain and Azad, 1994). The most expectable method for controlling the disease is cultivation of resistant variety, but not a single wheat cultivar in the country is found to be resistant or free from the disease (Hossain and Azad, 1992). Searching resistant genotype to a particular disease is a continuous process because the variety resistant today may become susceptible later on to the disease due to the arrival of new virulent race or pathotype. Selection of a resistant genotype is prerequisite to incorporate it in a breeding program. The present research work was conducted to evaluate reaction of some wheat varieties against *B. sorokiniana*, the causal agent of leaf blight and root rot of wheat.

2. Materials and Methods

The experiment was conducted at Seed Pathology Laboratory of the Department of Plant Pathology, Sher-e-Bangla Agricultural University, Dhaka, Bangladesh. Seeds of wheat varieties Sonalika, Kanchan, Barkat, Shatabdi, Aghrani, Pavon-76, Akbar, Gourav, Sourav and Protiva were collected from Bangladesh Agricultural Research Institute (BARI), Gazipur. After collection, the seeds were kept in a plastic container and were stored in normal room temperature.

2.1. Blotter test

The blotter method (ISTA, 1996) was used for seed health study. Four hundred seeds were randomly taken from the seed samples under each treatment. Twenty five seeds were placed on three layers of moist blotter paper contained in each of 9 cm diameter glass petridishes. The petridishes were then placed in incubation chamber under NUV (12/12 h) at 24°C. After 7 days of incubation data on germination was recorded. Then incubated seeds were examined under stereo binocular microscope for the detection of *B. sorokiniana* infecting seeds.

2.2. Deep freezing blotter test

Number of conidia of *B. sorokiniana* associated with the seeds of different varieties was detected following the deep freezing blotter method (Limonard, 1968). Two hundred seeds from each variety were examined by placing them on three layered moist filter paper contained in 9 cm diameter glass petridishes. Twenty five seeds were placed in each petridish. Then the petri-plates were incubated for 24 h under NUV (12/12 h) at 24-25°C. After incubation the seeds were kept in refrigerator at -18°C for 6 days. For determination of number of conidia,

ten conical flasks were taken and each was filled with 30 ml sterilized water. Seeds of each variety were taken separately into the water contained in each conical flask very carefully without loss of conidia. Then the volume was made 50 ml with water and one drop of Tween-20 was added in each flask and stirred for 15 minutes with the help of magnetic stirrer. Then the number of conidia sample^{-1} was determined with the help of Haemocytometer with three replicates.

2.3. Root inoculation test

Measurement of lesion size in root was carried out following the method of Aminuzzaman (2004). Wheat seeds of different varieties were allowed to germinate on moist filter paper. When the roots were about 2 cm long, seeds were then transferred to filter paper sheet (25×25 cm^2). Another paper sheet with a poly ethylene sheet layer was placed on top, and the resulting sand which was rolled together with the lower end of the roll was placed in distilled water. Inoculum of *B. sorokiniana* was prepared on Potato Dextrose Agar (PDA) medium, where 5 mm agar disk was used as inoculum. When the roots were about 15 cm long, the paper rolls were then opened, and the fungal inocula were placed on the roots 5 cm below the seed. Ten plants were used for each replication, maintaining three replications treatment^{-1}. The extent of the disease symptoms, indicates by a brown discoloration, was measured on infected roots at 10 days after inoculation.

2.4. Seedling inoculation test

The seeds of different varieties were sown in pots (50 seeds pot^{-1}), where the pot soil contains soil and compost in 4:1 ratio. Seedlings at 3-leaf stage were inoculated with a spore suspension (12×10^3 spore ml^{-1}) of *B. sorokiniana* using a self compressed hand sprayer (Hossain and Azad, 1992). The pots were covered with previously moistened polythylene bags for 24 h in darkness. Then inoculated leaves were cut into pieces (8 cm) and were tested following detached leaf method (Hossain and Schlosser, 1993). The cut pieces were placed on Benzimidazole agar medium (150 mg Benzimidazole 1000 ml^{-1} of 1% water agar) and incubated at 25^{o}C for 5 days. After inoculation on Benzimidazole agar, percent leaf segment diseased was measured.

3. Results and Discussion

Percent seed germination of different wheat varieties varied significantly (Figure 1). Maximum germination (92%) was recorded from the variety Shatabdi, Sourav and Aghrani. The lowest germination (72%) was recorded in the variety Sonalika. Maximum incidence of *B. sorokiniana* (37%) on seed was recorded from the variety Sonalika (Figure 1) which was closely followed by the variety Gourav (34%). The minimum (17%) incidence was recorded in the variety Shatabdi. The seed borne infection of *B. sorokiniana* has a profound influence on wheat seed germination (Bazlur Rashid, 1996). Chaudhary et al. (1984) reported that germination of black pointed wheat seeds in blotter and pot was reduced by 11.60 and 16%, respectively. Zhimin and Lianfa (1998) reported that seed germination

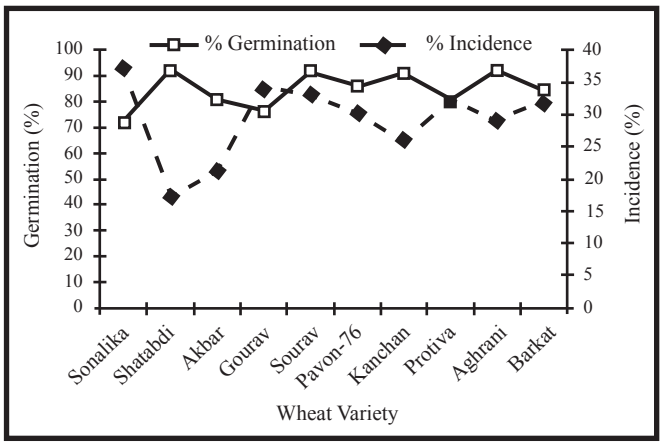

Figure 1: Seed germination and incidence of *Bipolaris sorokiniana* in different wheat varieties estimated by blotter method

decreased with the increase in susceptibility of various black point infections. Present finding is supported by Ali and Fakir (1982). They reported that *B. sorokiniana* is pathogenic to the germinating seeds and seedlings. Khanum et al. (1987) reported that the germination of black point affected seeds was reduced to a great extent as compared to healthy grains. They found 55-96% and 34.50- 71% germination for healthy and diseased wheat grains, respectively.

Number of conidia seed^{-1} estimated by deep freezing blotter method varied significantly on seeds of different variety of wheat (Table 1).

The maximum number of conidia was recoded in the variety Sonalika (320) which was closely followed by variety Kanchan (280). On the other hand, minimum number of conidia seed^{-1} was recorded in variety Shatabdi (100) which was closely followed by the variety Gourav (150). Rashid et al. (1992) tested 103 seed samples by deep freezing blotter method, 8 species of *Bipolaris* were isolated, of which the most common was *B. sorokiniana.* In another study, Hossain (2000) recorded maximum 1900 conidia seed^{-1} in Kanchan variety of wheat.

The lesion length in root differed significantly from one variety to another (Table 1). Lesion length varied from 0 to 11.67 mm. Larger lesion (11.67 mm) was measured in the variety Sonalika, Sourav and Kanchan. No lesion/infection was recorded in the varieties Shatabdi, Akbar, Pavon-76 and Protiva, which was closely followed by the variety Aghrani (5 mm). Significant variation was recorded in respect of percent leaf segment diseased. Maximum percent leaf segment diseased (96.67%) was recorded in the variety Sonalika (Table 1) which was closely followed by the variety Kanchan (76.67%). No lesion was found on the leaf of the variety Shatabdi. Adlakha et al. (1984) tested six hundred and twenty five lines for resistance to *B. sorokiniana*. Leaf lesions on resistant cultivars of wheat were fewer and smaller and sprouted less than lesions on susceptible cultivars. Rashid (1997) tested 34 wheat genotype of local and exotic origin, and found only one genotype resistant to *B. sorokiniana.*

Table 1: Number of conidia of *Bipolaris sorokiniana* seed^{-1}, lesion length in root and percent leaf segment diseased of different wheat varieties in laboratory condition

Variety	Number of conidia seed^{-1}	Lesion length (mm)	% leaf segment diseased
Sonalika	320^{a}	11.67^{a*}	96.67^{a} (72.45)
Shatabdi	100^{f}	0.00^{d}	0.00^{h} (0.00)
Akbar	220^{cd}	0.00^{d}	70.00^{e} (58.7)
Gourab	150^{e}	8.33^{b}	61.30^{d} (51.5)
Sourav	230^{cd}	11.67^{a}	15.00^{f} (22.8)
Pavon-76	220^{cd}	0.00^{d}	5.00^{g} (14.6)
Kanchan	280^{b}	11.67^{a}	76.67^{b} (60.6)
Protiva	210^{d}	0.00^{d}	61.30^{d} (51.5)
Aghrani	250^{bc}	5.00^{c}	75.60^{b} (60.4)
Barkat	210^{d}	5.66^{c}	50.50^{e} (45.3)
LSD (p=0.05)	31.53	0.898	4.858

4. Conclusion

The wheat variety Shatabdi and Pavon-76 were less susceptible to *Bipolaris sorokiniana*, whereas Sonalika, Akbar, and Kanchan were more susceptible. Further research need to be carried out in different agro-ecological zones of the country to find out the suitability for cultivation of Shatabdi and Pavon-76 throughout the country.

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