

Intensity of Common Root Rot on Wheat Genotypes¹

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ABSTRACT

Common root rot of wheat caused by *Bipolaris sorokiniana* (Sacc. in Sorok.) has been an emerging problem in Nepal. This study was conducted to determine the level of resistance in promising wheat genotypes. Thirty wheat genotypes were tested under natural epiphytotic condition for the intensity of infection on subcrown internode and crown root. None of the wheat varieties were found immune common root rot. However, genotype BL 2246, BL 2203, CHAM-4 and BL 2262 had low level of infection denoting resistant character. Most of the genotypes had moderate level of root rot index that ranged from 20-35 percent. Genotypes BL 2302, BL 1724 had more than 50 percent root rot index. The resistant genotypes have to be further tested under artificial and sick plot condition for confirmation of the above result.

Key words: *Bipolaris sorokiniana*, common root rot, dry land root rot, wheat

INTRODUCTION

Wheat (*Triticum aestivum* L.) is the third staple food crop of Nepal. It is suffering from many diseases including common root rot caused by *Bipolaris sorokiniana* (Sacc. in sorok.). *B. sorokiniana* causes spot blotch, common root rot, black point and seedling blight on wheat (Duveiller and Gilchrist 1993). *B. sorokiniana* is the dominant pathogen among many other root rot causing fungi of wheat (Dubin and Bimb 1991). Root rot is a inconspicuous disease that reduces seedling vigour and impair the functioning of roots and crowns resulting in stand loss, reduce yield and quality reductions (Duczek et al 1985). Root rot and seedling blight are more common in the tropical environments (Perscott 1984, Nsarellah and Mergoum 1997). For every one percent increase in root rot intensity, there is a yield loss of 46 kg per hectare (Statler and Darlington 1972). The average yield loss due to root rot problem in South Asia is about 14 percent (Saari 1997). Chemical method of

controlling the disease is not practical and economical in our condition. In European countries, various cultivars have been identified as having mature plant resistance but no commercial cultivars had high level of resistance to common root rot (Mathre 1982). In tropical areas, the inoculum level of the pathogen is very high as compared to temperate areas. So, functional level of resistance in temperate areas might not be useful in the tropical areas. In Nepal, various wheat genotypes have been developed with a good level of spot blotch resistance and high yielding capacity. However, the assessment of level of resistance on those varieties against root rot has been still lacking. Therefore, this study was carried out to identify the level of resistance in different wheat genotypes against common root rot.

MATERIALS AND METHODS

Thirty wheat genotypes were planted under natural epiphytotic condition at IAAS, Rampur, Nepal during 2000-01 wheat seasons. Plot size for each experimental plot was 2- × 1.5-m. Seed was planted in six rows at 0.25 m apart. The experiment was conducted in the Randomized

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complete block design with three replications. Fertilizers dose was 120:60:40 kg N:P₂O₅:K₂O ha⁻¹. Five plants were randomly selected in each plot and uprooted at soft dough stage. The root of each genotype was washed in running tap water. The root rot was scored on 0-3 scale,

Where,

- 0 = healthy, creamy white, no discoloration of sub crown internode and crown roots,
 1 = light brown discoloration of sub crown internode and crown roots,
 2 = brown discoloration of sub crown internode and crown roots,
 3 = dark brown to black discoloration of sub crown internode and crown roots and /or roots mostly decayed.

The original data were subjected to logarithmic transformation. The score was transformed to root rot index by using the formula (Tinline et al 1975).

Root rot index

$$= \frac{\sum (\text{Category value} \times \text{Number of roots in category})}{\text{Number of roots rated} \times \text{Maximum rating}} \times 100$$

RESULTS AND DISCUSSION

Root rot index was low for all tested wheat genotypes. However, there were significant differences among genotypes for root rot index (Table 1). The damage caused by root rot pathogen depends on the amount of inoculum present in the soil and seed, cultural practices and climatic factors (Statler and Darlington 1972). Wheat genotypes were grown under natural epiphytotic condition in Wheat-Dhaincha-Fallow rotation system. So, the survival of the pathogen in the soil was minimum. Wheat genotypes BL 2302 (51.1%), BL 1724 (51.1%), BL 2295 (46.66%) and Annapurna-4 (46.66%) had comparatively high level of root rot index. Genotypes showing more than 50 percent root rot index were considered susceptible. Genotypes BL 2246 (15.55%), BL 2203 (17.77), CHAM -4 (19.99) and BL 2262 (20%) had low root rot index and were grouped as resistant. CHAM-4

belongs to synthetic wheat and the other have Ning and Suzhoe in their pedigree. Genotype Crock, which has *Aegilops squarrosa* in its pedigree showed intermediate level of root rot resistance. However, genotypes with *Aegilops squarrosa* were reported to possess high level of resistance (Conner 1989). Most of the tested genotypes had intermediate level of root rot index, which ranged from 20 to 35 percent.

Result indicated that none of the genotypes was immune to common root rot infection in the study. All wheat genotypes tested have various levels of root rot severity. Genotypes with low level of root rot index may be grown in disease prone area and/or crossing program, however, further confirmation in a sick plot with optimum level of inoculum before recommendation.

Table 1. Root rot severity of 30 wheat genotypes caused by *B. sorokiniana* in the field condition during 2001 at Rampur, Nepal

SN	Genotype	Root rot severity, %
1	RR 21	39.997 a-f [†]
2	UP 262	42.220 a-d
3	Nepal 297	28.883 c-h
4	Bhrikuti	35.553 b-g
5	Rohini	24.443 d-h
6	Annapurna-4	46.660 a-c
7	BL 1473	39.997 a-e
8	BL 1724	51.107 ab
9	NL 781	28.887 c-i
10	BL 1868	37.773 a-f
11	BL 1905	31.110 c-h
12	BL 1923	35.550 b-g
13	BL 2246	15.553 h
14	BL 2254	35.553 b-g
15	BL 2262	20.000 f-h
16	BL 2279	46.663 a-c
17	BL 2201	24.440 e-h
18	BL 2295	46.663 a-c
19	BL 2299	28.887 c-h
20	BL 2302	51.107 a
21	BL 2304	38.443 a-f
22	BL 2203	17.777 gh
23	CHIL/WUH.3	24.443 e-h
24	RL 6043/4*NAC	24.440 e-h
25	CHAM -4/VENAC "S"	19.997 f-h
26	NL 724	28.883 c-h
27	PAVON 76	31.107 c-h
28	CHIRYA -3	24.440 e-h
29	G 162	24.330 e-h
30	CROC1/Ae.Squa 9205//	24.440 e-h
	CV, %	35.62

[†] Means in a column followed by the same letter do not differ significantly at P = 0.05 according to Duncan's multiple range test.

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