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Evaluation of wheat cultivars for resistance against foliar blight *Drechslera sorokiniana* (Sacc) Shoemaker

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Abstract

Foliar blight disease caused by *Drechslera sorokiniana* (Sacc) Shoemaker is most important disease of wheat in North Eastern plain zones (NEPZ) representing warm and humid climate in India. It is also increasing in North Western plains zones (NWPZ), due to climate changes and causes considerable losses in susceptible varieties. A field study was conducted during Rabi, 2018-19 and 2019-20 crop seasons at Wheat pathological Main experiment station at student's instructional farm, P. G. College Ghazipur and Laboratory of Dept. of Plant Pathology to test the resistance of 50 Cultivars against *Drechslera sorokiniana* (Sacc) Shoemaker under artificial epiphytotic conditions. Each cultivar was sown in last week of November in single row of one meter length. Pure culture of *Drechslera sorokiniana* (Sacc) Shoemaker was inoculated on cultivars by using cleaned sprayer, at evening. Disease data was recorded using double digit scale based on per cent blighted area on flag leaf and one leaf just below. Out of 50 Cultivars, no any cultivars found immune, 11 cultivars were found resistant, 19 were moderately resistant, 13 were moderately susceptible and 7 were found susceptible against spot blotch disease of wheat.

Keywords: Susceptible, humid, blighted, moderately and artificial

Introduction

Wheat (*Triticum* spp.) have 16 species under the genus *Triticum*. In India, three species of wheat are cultivated; *T. aestivum* L. (Bread wheat) which is hexaploid with $2n=42$, *T. durum* Desf. (Macroni or Durum wheat) and *T. dicoccum* Schrank. (Emmer wheat) which are tetraploids with $2n=28$ (Gupta, 2004). In India, nearly 88 per cent of wheat area is under bread wheat, 11 per cent under macaroni wheat and less than 1 per cent under emmer wheat. It provides edible grain which forms staple food for a large number of people across the world. Wheat is believed to have originated in South-Western part of Asia. Some of the earliest remains of the crop were found in Syria, Jordan and Turkey (Feldman, 2001). Wheat is also described as "The shuffle of life" or "King of cereals". Even today, it occupies primary position among all the cereal crops for being the staple food and for providing subsistence to mankind. It supplies essential nutrients, particularly amino acids as compared to any other cereal crop. It has attained a premier position in the world for its unique consumable protein i.e., gluten, which is vital for bread making properties of wheat flour, along with the straw which is a major source of nutritious feed for large population of cattle.

Cereals play a pivotal role to satisfy the global food demand of growing population, particularly in developing nations where cereal-based production system is the only predominant source of nutrition and calorie intake. The nutrient-rich cereal is grown in diversified environments; and globally wheat occupies around 216.95 million hectares (mha) holding the position of highest of protein in least developed countries and middle-income nations and in terms of calories and dietary intake. The crop is cultivated mostly in winter and spring seasons around the world; it being grown in winter in cold countries like Europe, USA, Australia, Russian acreage among all crops with an annual production covering around 764.11 metric tonnes (mt) last year (Feldman, 2001). Moreover, it provides almost half of all calories in the region of North Africa and West and Central Asia. Being next to rice, wheat constitutes one of the key sources Federation, etc., while in spring in countries of Asia and in some parts of the USA. In India, production of Wheat during 2019-20 is estimated at record 107.18 million tonnes. It is higher by 3.58 million tonnes as compared to wheat production during 2018-19 and is higher by 11.02 million tonnes than the average wheat production of 96.16 million tones as per the recent 3 th Advance Estimates from Directorate of Economics and Statistics (DES), Ministry of Agriculture and Farmers Welfare (MoA&FW), India (2020).

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Materials & Methods

The present investigation entitled “Evaluation of Wheat cultivars for Resistance against Foliar Blight *Drechslera sorokiniana* (Sacc) Shoemaker” was carried out at Wheat pathological Main experiment station at students instructional farm, P. G. College Ghazipur and Laboratory of Dept. of Plant Pathology. This University is located in the Indo-Gangetic Plains (IGPs) of Eastern Uttar Pradesh at latitude 26.47° N, longitude 82.12° and at altitude of 113 meter above the sea level. The experiments were conducted during Rabi season 2018-2019 and 2019-20. The study material comprised 50 (Fifty) cultivars which have diverse genetic background and origin. Mostly wheat genotypes exotic to South Asia/CIMMYT and India were included in this study, because these genotypes were specially used as parents for improving spot blotch resistance. All genotype were evaluated during Rabi season (December to April) 2018-19 and 2019-20 under field condition at Main experiment station at student’s instructional farm, P. G. College Ghazipur and Laboratory of Dept. of Plant Pathology which are identified as a hot spot for the spot blotch disease.

Result & Discussion

Varietal screening

Fifty varieties of wheat were evaluated against *Drechslera sorokiniana* under artificial epiphytic condition. Data on account of foliar disease score at flowering stage, soft dough stage and hard dough stage and AUDPC of different varieties have been presented in Table 1. An examination of summary of data given in clearly indicates that at flowering stage disease score ranged between 0 to 57 during 2018-19 and 1 to 56 during year 2019-20. At soft dough stage it ranged between 2 to 78 and 2 to 67 during first and second year respectively. While at hard dough stage the disease score ranged between 13 to 89 during 2018-19 and the range was same during 2019-20.

Area under disease progressive curve (AUDPC)

The AUDPC calculated for 50 wheat cultivar on the basis of plant disease intensity varied from 52.5 to 1057.0 first year and 101.5 to 976.5 second year showing the fast progress of disease in all cultivar. It was observed that different wheat cultivar expressed varied types of disease response against *Drechslera sorokiniana* (Sacc) Shoemaker under artificial epiphytic conditions in field.

Table 1: Response of wheat cultivar against foliar blight disease caused by *Drechslera. sorokiniana* under artificial disease pressure during 2018-19 & 2019-20

Entry No	Genotypes	Foliar blight score (0-9 dd)							
		2018-19			2019-20			AUDPC	
		Flowering Stage	Soft dough stage	Hard dough stage	Flowering stage	Soft dough stage	Hard dough stage	2018-19	2019-20
1	HD3043	1	2	24	2	12	24	101.5	175
2	PBW644	12	24	46	13	14	45	371	301
3	HD2329	13	24	46	12	24	46	374.5	371
4	VL-832	24	35	57	35	47	58	528.5	654.5
5	VL-804	14	25	36	23	34	45	350	476
6	HS-365	13	24	46	12	13	46	374.5	294
7	HD-2967	13	24	46	23	25	36	374.5	381.5
8	HD3249	12	24	35	12	13	24	332.5	217
9	HD2733	1	12	24	1	12	24	171.5	171.5
10	PBW781	2	13	24	1	3	24	182	108.5
11	DBW257	13	24	35	23	35	36	336	451.5
12	DBW39	2	14	24	1	12	24	189	171.5
13	HD3277	12	24	47	24	25	46	374.5	420
14	PBW-343	13	15	36	12	35	36	276.5	413
15	DBW187	14	25	36	23	26	36	350	388.5
16	HW-741	12	24	35	23	25	36	332.5	381.5
17	HW-2044	12	24	35	12	24	34	332.5	329
18	UP-2338	0	12	24	1	2	24	168	101.5
19	K1317	2	14	25	12	13	24	192.5	217
20	HI1612	0	1	13	1	12	13	52.5	133
21	HD3293	1	2	13	1	12	24	63	171.5
22	HD3171	12	14	26	1	12	35	231	210
23	HD2888	13	24	36	12	13	36	339.5	259
24	DBW252	4	25	36	12	24	36	315	336
25	WH-542	14	46	67	13	24	68	605.5	451.5
26	K8027	13	24	35	12	24	45	336	367.5
27	DBW273	24	35	46	12	14	37	490	269.5
28	HI8713	57	68	89	35	67	89	987	903
29	NDW1158	56	78	89	46	67	79	1053.5	906.5
30	HI8811	56	68	89	56	67	89	983.5	976.5
31	UAS3002	1	35	48	12	25	46	416.5	378
32	HD3343	34	45	78	24	45	78	707	672
33	NIDW1149	12	36	64	13	41	65	457	645
34	GW322	12	24	78	24	35	78	483	602
35	HI8627	25	46	68	13	34	67	647.5	518
36	HI1544	24	36	78	24	36	78	609	609

37	DBW110	2	14	46	12	24	46	266	371
38	HI8737	36	47	68	13	34	67	693	518
39	UAS466	14	25	57	13	25	58	423.5	423.5
40	HI8812	25	36	68	13	14	68	577.5	381.5
41	HPW468	14	25	57	13	25	58	423.5	423.5
42	GW1348	25	36	68	12	24	68	577.5	448
43	DBW277	0	3	14	1	12	14	70	136.5
44	DDW49	14	25	58	1	24	57	427	371
45	PBW823	1	12	58	1	12	57	290.5	287
46	PBW822	12	24	46	12	13	45	371	290.5
47	MP4010	15	26	78	23	36	79	507.5	609
48	HD3345	14	25	46	13	24	46	385	374.5
49	HI1634	26	37	68	12	13	68	588	371
50	HPW349	13	24	47	23	25	46	378.0	416.5

Evaluation of cultivar for foliar blight resistance

On the basis of data on disease score given in Table-1 List of all category varieties is presented in Table 2. Out of 50 cultivars screened no any cultivar was found Immune and highly susceptible during both the crop season. Eleven cultivars namely HD-3043, HD-3249, HD-2733, PBW-781, DBW-257, DBW-39, UP-2338, K-1317, HI1612, HD-3293, DBW-277 out of 50 were found resistant, nineteen cultivars (PBW-644, HD-2329, BL-804, HS-365, HD-2967,

HD-3277, PBW-343, DBW-187, HW-741, HW-2044, HD-3171, HD-2888, DBW-252, K-8027, DBW-273, DBW-110, PBW-822, PBW-3345, HPW-349) were moderately resistant. Thirteen cultivars viz BL-832, WH-542, UAS-3002, NIDW-1149, HI-8627, HI-8737, UAS-466, HI-8812, HPW-468, GW-1348, DDW-49, PBW-823, HI-1634 were noted as moderately susceptible while seven cultivars ie HI-18713, NDW-1158, HI-8811, HD-3343, GW-322, HI-1544, MP-4010 were found to be susceptible to foliar blight disease.

Table 2: List of category wise cultivar on the basis of disease reaction

S.N	Disease reaction	Double digit scale	Cultivars	N of cultivars
1	Immune (I)	00-01	00	00
2	Resistant (R)	12-24	HD-3043, HD-3249, HD-2733, PBW-781, DBW-257, DBW-39, UP-2338, K-1317, HI1612, HD-3293, DBW-277	11
3	Moderately resistant (M.R.)	34-46	PBW-644, HD-2329, BL-804, HS-365, HD-2967, HD-3277, PBW-343, DBW-187, HW-741, HW-2044, HD-3171, HD-2888, DBW-252, K-8027, DBW-273, DBW-110, PBW-822, PBW-3345, HPW-349	19
4	Moderate susceptible	56-68	BL-832, WH-542, UAS-3002, NIDW-1149, HI-8627, HI-8737, UAS-466, HI-8812, HPW-468, GW-1348, DDW-49, PBW-823, HI-1634	13
5	Susceptible	78-89	HI-18713, NDW-1158, HI-8811, HD-3343, GW-322, HI-1544, MP-4010,	07
6	Highly susceptible	99		0

Conclusion

On the basis of results presented and discussed concludes that Disease data was recorded using double digit scale based on per cent blighted area on flag leaf and one leaf just below. Out of 50 Cultivars, no any cultivars found immune, 11 cultivars were found resistant, 19 were moderately resistant, 13 were moderately susceptible and 7 were found susceptible against spot blotch disease of wheat.

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