Int.J.Curr.Microbiol.App.Sci (2020) Special Issue-11: 2751-2762

EXCELLENT PUBLISHERS

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 Special Issue-11 pp. 2751-2762
Journal homepage: http://www.ijcmas.com

Original Research Article

Identification of Source of Resistance in Wheat Germplasm against Spot Blotch of Wheat Caused by *Bipolaris sorokiniana* under Artificial Epiphytotic Condition

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A B S T R A C T

Spot blotch (*Bipolaris sorokiniana* (Sacc.) Shoem) is a major foliar disease of wheat which causes an economic yield loss ranges from 10-50%. A field experiment was conducted during 2018-19 at Main experimental Station of ANDUAT, Kumarganj, Ayodhya to identify the resistance source of wheat germplasm against spot blotch of wheat under artificial epiphytotic condition. Result showed that Out of 250 genotypes, none of the genotype/lines were found immune and highly susceptible, fifty five genotypes was found resistant, ninety six genotypes were found moderately resistant, Seventy two genotypes were found moderately susceptible and Twenty eight genotypes were found susceptible against *B. sorokiniana*. AUDPC among different wheat germplasm ranges from 101.5 to 784.00on the basis of plant disease intensity showing the fast progress of disease. Minimum AUDPC was found in genotype NHLSZ-1807 while maximum AUDPC was found in susceptible check RAJ 4015. The lesion size was varied from 0.6 to 4.2 cm. It was observed that different wheat genotypes expressed varied type of disease responses and lesion size and symptoms.

Keywords

Bipolaris, Resistant, Spot Blotch, Germplasm, Wheat

Introduction

Wheat (*Triticum aestivum* L.) is the most important cereal crop after rice in India and is well recognized as a world's major cereal crops and staple food of many regions, grown under both irrigated and rainfed conditions (Majumdar *et al.*, 2018). Wheat provides nearly 55 per cent of the carbohydrate and 20 per cent of food calories which is consumed by two billion people (36 per cent of the world population) as staple food (Ragade *et al.,* 2020). Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Rajasthan, Bihar, and Maharashtra are the major wheat growing states in the country in terms of both area and production (Ramdas *et al.*, 2019). Among them, Uttar Pradesh ranks first with respect to area (9.79 million hectare) and production (31.99 million tonnes) but the productivity of 36.50 q/ha is much lower as compared to Punjab and Haryana (Anonymous, 2019).

The crop suffers from a number of diseases caused by fungi, bacteria, viruses, nematodes and mycoplasma. Among the fungal diseases, spot blotch disease of wheat caused by a *Bipolariss orokiniana* (Sacc.) Shoemaker, a hemibiotrophic, phytopathogenic fungus cause a major economic losses in warmer and humid wheat growing regions of the world. *Bipolaris sorokiniana* usually induce symptoms on the leaf, sheath and stem (Chand and Joshi, 2004). The symptoms of spot blotch appear as small, light brown lesions which are scattered throughout the leaves and increase in size with stage advancement. Later, these lesion coalesce and change to large spot (oval to oblong and measuring 0.5 to 10 mm long and 3 to 5 mm wide) after a week of infection.

Spot blotch becomes severe especially during grain filling stage (Joshi and Chand, 2002) and causes significant grain yield losses range from 10-50% (Chowdhury *et al.,* 2013). The management of spot blotch disease through fungicides is not only costly but also it is not an eco-friendly in nature. Use of resistant cultivars is the most cheapest, economical, environmentally safe and durable method to control or manage the disease (Iftikhar *et al.*, 2012; Singh *et al.*, 2015). The main aim of the study to identify the resistance source of wheat germplasm against spot blotch of wheat caused by *Bipolaris sorokiniana* under artificial epiphytotic condition.

Materials and Methods

The experiment was conducted at Main Experimental Station of Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya (U.P.) during *Rabi* 2018-19. Seeds of 250 genotypes were collected from All India Co-ordinated Wheat and Barley Improvement Project, Department of Genetics and Plant Breeding, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya (U.P.).

Four rows of each Raj 4015 & A-9-30-1 were sown as border rows around all the sides of experiment as it is susceptible to foliar blight. It was also sown after every 20 entries.

All the recommended agronomical and cultural practices were followed for raising the good crop. The ten days old pure culture of *Biopolaris sorokiniana* multiplied on potato dextrose Agar and sorghum seeds were used for inoculating on entries.

The spore suspension was prepared in sterilized distilled water having a spore load of 50-75 per microscopic field (10x) (Singh *et al.*, 2017; Dibya *et al.*, 2020). This suspension was sprayed at 3-4 leaf stage by using hand atomizer. The second field inoculation was made again in the same method after the 15 days of the first inoculation.

After inoculation, the entries were regularly watched for recording the observations of disease severity. The first observations were made after ten days of inoculation on ten plants selected randomly. The disease score of each selected plants were recorded by using Kumar *et al.*, (1998) double digit scale (Table 1) based on per cent blighted area on the flag and one leaf just below. The maximum disease score of each genotype was recorded finally.

Area under disease progress curve (A-value)

It was calculated by the following formula (Dubin *et al.*, 1998).

$$AUDPC = \Sigma_{i=1}^{n} [(Yi + 1 + Yi) \times 0.5][Ti + 1 - Ti]$$

Where,

Yi= Severity/ intensity (%) at the ith observation.

Ti= Time (days) of ith observation

n= Total number of observation

Per cent disease intensity

It was calculated according to Mc Kinney (1975) formula

$$PDI (\%) = \frac{\text{Sum of all the disease rating}}{\text{Number of plant Observed} \times \text{Maximum disease grading}} \times 100$$

Results and Discussion

Use of resistant variety is the cheapest, economical and eco-friendly method to manage or control the disease. Total 250 wheat germplasms were used to find the resistance source against spot blotch. Out of 250, none of the genotype/lines were found immune and highly susceptible.

Out of 250 genotypes, fifty five genotypes was found resistant namely NHTSZ-1804, NHLSZ-1801, NHLSZ-1806, NHLSZ-1807, NHLSZ-1809, NHLSZ-1810,NW-TS-102, NW-TS-104, NW-TS-105, NW-TS-109, NW-TS-110, NW-LS-201, NW-LS-202,NW-RI-305, NE-IR-103, NE-IR-104, NE-IR-106, NE-IR-109, NE-IR-110, NE-IR-111, NE-RI-301, NE-RI-304, NE-RI-307, NE-RI-308,PZ-RI-309,SPL-HYPT-7, SPL-HYPT-8, SPL-HYPT-10, SPL-HYPT-12, SPL-HYPT-13, SPL-ASF-101, SPL-ASF-104, SPL-ASF-107, N-101, N-102, N-104, N-105, N-106, N-107, N-111, N-113, N-115, N-118, N-119, N-123, N-124, N-126, N-127, N-132, N-136, N-201, N-212, N-215, N-223, N-333 (score 12-24), ninety six genotypes were found moderately resistant (score 34-46), seventy two genotypes were found moderately susceptible (score 56-68), twenty eight genotypes namely CZ-TS-102, CZ-TS-103, CZ-TS-113, CZ-TS-301, CZ-LS-202, CZ-TS-203, CZ-TS-204, CZ-TS-207, CZ-TS-208, CZ-TS-209, CZ-TS-210,PZ-TS-108,PZ-LS-201,PZ-RI-303, PZ-RI-306, PZ-RI-311, DIC-IR-105,SPL-HYPT-3,N-227, N-229, N-301, N-302, N-305, N-306, N-307, N-308, N-314, N-315 were susceptible (score 78-89).

The result was also corroborative to our result as Singh *et al.*,(2017) reported that Out of 176 genotypes, one namely KARAWANI/4NIF3/SOTY/NAD63/CHRIS was found immune, 31 genotypes were found resistant, 75 were moderately resistant, 52 were moderately susceptible and 17 were found susceptible against spot blotch disease of wheat.

Verma *et al.*,(2018) reported that Out of 300 genotypes, no any genotype found immune, 29 genotypes were found resistant, 132 were moderately resistant, 103 were moderately susceptible and 37 were found susceptible against spot blotch disease of wheat.

Kumar *et al.*, (2019) reported that Out of 209 genotypes, five namely NEIR-109, NEIR-110, NEIR-111, NEIR-113 and HS-645 genotypes were found resistant, 117 were moderately resistant, 68 were moderately susceptible and 19 were found susceptible against spot blotch.

Dibya *et al.*, (2020) reported that Out of 200 genotypes, thirty six were found resistant, 91 were moderately resistant, 43 were moderately susceptible and 30 were found susceptible against spot blotch disease of wheat.

Table.1 Double digit scale, based on per cent blighted area on the flag leaf and one leaf just below given by Kumar *et al.* (1998).

A double digit* scale for appraising blight severity				
S. No.	**Severity****		**Rating**	
	Flag leaf	**Flag-1leaf**	**Disease response**	**Range of value**
1.	0	0-1	Immune (I)	00-01
2.	1-2	2-4	Resistant (R)	12-24
3.	3-4	4-6	Moderately Resistant (MR)	34-46
4.	5-6	6-8	Moderately susceptible (MS)	56-68
5.	7-8	8-9	Susceptible (S)	78-89
6.	9	9	Highly susceptible (HS)	99

* First and second value respectively, represents per cent blighted area on the flag leaf and flag-1 leaves.

** Values 1,2,3,4,5,6,7,8, and 9, respectively correspond to 10,20,30,40,50,60,70,80 and 90 per cent blighted area.

Table.2 Response of wheat genotypes against foliar blight (*Bipolaris sorokiniana*) under artificial epiphytotic condition (2018-19)

Entry No.	Genotype	Foliar blight score (0-9 dd)					
		2018-2019					
		Flowering stage	Soft dough stage	Hard dough stage	Lesion size (cm)	Reaction	AUDPC
1.	NHTSZ-1801	12	24	46	1.7	MR	371
2.	NHTSZ-1802	12	24	36	1.2	MR	336
3.	NHTSZ-1803	12	23	36	1.5	MR	329
4.	NHTSZ-1804	02	12	24	1.2	R	175
5.	NHTSZ-1805	02	14	36	0.7	MR	231
6.	NHLSZ-1801	12	14	24	0.8	R	224
7.	NHLSZ-1802	12	23	36	1.0	MR	329
8.	NHLSZ-1803	12	23	36	1.3	MR	329
9.	NHLSZ-1804	24	35	58	1.3	MS	532
10.	NHLSZ-1805	12	25	46	1.2	MR	378
11.	NHLSZ-1806	01	12	24	3.7	R	171.5
12.	NHLSZ-1807	01	02	24	1.0	R	101.5
13.	NHLSZ-1808	12	34	58	0.9	MS	483
14.	NHLSZ-1809	12	14	24	1.0	R	224
15.	NHLSZ-1810	01	12	24	2.8	R	171.5
16.	NW-TS-101	12	35	46	2.0	MR	448
17.	NW-TS -102	12	14	24	1.7	R	224
18.	NW-TS-103	13	24	35	1.2	MR	336
19.	NW-TS-104	02	12	24	1.8	R	175
20.	NW-TS-105	12	14	24	1.2	R	224
20A	RAJ-4015	24	36	78	1.8	S	609
21.	NW-TS-106	12	34	46	1.4	MR	441
22.	NW-TS-107	12	24	57	1.5	MS	409.5
23.	NW-TS-108	24	25	56	1.7	MS	455

24.	NW-TS-109	01	12	24	0.6	R	171.5
25.	NW-TS-110	02	12	24	1.6	R	175
26.	NW-TS-111	01	24	36	1.2	MR	297.5
27.	NW-TS-112	12	24	35	1.4	MR	332.5
28.	NW-LS-201	01	12	24	1.2	R	171.5
29.	NW-LS-202	12	13	24	1	R	217
30.	NW-LS-203	12	23	46	1.7	MR	364
31.	NW-LS-204	01	35	46	1.7	MR	409.5
32.	NW-LS-205	24	25	35	1.4	MR	381.5
33.	NW-LS-206	12	24	67	1.2	MS	444.5
34.	NW-RI-301	12	35	46	1.1	MR	448
35.	NW-RI-302	02	12	46	1.0	MR	252
36.	NW-RI-303	12	35	46	1.1	MR	448
37.	NW-RI-304	14	24	36	1.4	MR	343
38.	NW-RI-305	01	12	24	1.1	R	171.5
39.	NW-RI-306	12	34	46	1	MR	441
40.	NW-RI-307	24	34	58	1.1	MS	525
40A	RAJ-4015	34	46	78	1.4	S	714
41.	NW-RI-308	14	24	46	1.2	MR	378
42	NW-RI-309	13	36	46	1	MR	458.5
43.	NW-RI-310	12	24	36	0.9	MR	336
44.	NE-IR-101	12	24	68	2.4	MS	448
45.	NE-IR-102	01	12	36	1.7	MR	213.5
46.	NE-IR-103	01	12	24	1.5	R	171.5
47.	NE-IR-104	02	12	24	1.9	R	175
48.	NE-IR-105	02	24	36	1.3	MR	301
49.	NE-IR-106	01	12	24	1	R	171.5
50.	NE-IR-107	01	24	35	1.3	MR	294
51.	NE-IR-108	02	12	46	1.7	MR	252
52.	NE-IR-109	01	12	24	1.5	R	171.5
53.	NE-IR-110	02	12	24	2	R	175
54.	NE-IR-111	00	02	12	1.1	R	56
55.	NE-RI-301	01	13	14	1.4	R	143.5
56.	NE-RI-302	00	12	24	1.2	MR	168
57.	NE-RI-303	01	12	24	1.4	MR	171.5
58.	NE-RI-304	00	02	12	1.3	R	56
59.	NE-RI-305	00	02	24	1.5	MR	98
60.	NE-RI-306	01	12	24	1.8	MR	171.5
60A	RAJ-4015	35	46	78	1.8	S	717.5
61.	NE-RI-307	02	12	24	1.6	R	175
62.	NE-RI-308	01	12	24	1.8	R	171.5
63.	CZ-TS-101	02	24	58	1.5	MS	378
64.	CZ-TS-102	12	36	78	2	S	567
65.	CZ-TS-103	02	46	78	1.4	S	602
66.	CZ-TS-104	12	47	68	1.5	MS	609
67.	CZ-TS-105	13	36	58	0.9	MS	500.5
68.	CZ-TS-106	12	36	67	1.2	MS	528.5
69.	CZ-TS-107	14	35	58	1.1	MS	497
70.	CZ-TS-108	12	36	67	1.4	MS	528.5

71.	CZ-TS-109	13	24	46	2.3	MR	374.5
72.	CZ-TS-110	14	25	45	2.1	MR	381.5
73.	CZ-TS-111	01	24	36	2.1	MR	297.5
74.	CZ-TS-112	01	37	58	1.5	MS	465.5
75.	CZ-TS-113	14	36	78	1.4	S	574
76.	CZ-RI-301	12	46	78	1.6	S	637
77.	CZ-RI-302	12	24	36	1.4	MR	336
78.	CZ-RI-303	13	24	58	1.8	MS	416.5
79.	CZ-RI-304	01	36	46	1.3	MR	416.5
80.	CZ-RI-305	03	13	36	1.6	MR	227.5
80A	RAJ-4015	35	46	78	1.4	S	717.5
81.	CZ-RI-306	12	46	58	1.4	MS	567
82.	CZ-LS-201	12	47	68	1.2	MS	609
83.	CZ-LS-202	14	57	78	0.9	S	721
84.	CZ-LS-203	12	46	78	1.5	S	637
85.	CZ-LS-204	14	56	78	1.4	S	714
86.	CZ-LS-205	12	35	68	1.6	MS	525
87.	CZ-LS-206	12	46	68	1.7	MS	602
88.	CZ-LS-207	12	35	78	1.5	S	560
89.	CZ-LS-208	12	46	78	1.6	S	637
90.	CZ-LS-209	14	56	78	1.8	S	714
91.	CZ-LS-210	12	47	78	1.4	S	644
92.	PZ-TS-101	12	46	68	1.6	MS	602
93	PZ-TS-102	12	46	58	2.7	MS	667
94.	PZ-TS-103	02	45	67	1.5	MS	556.5
95.	PZ-TS-104	02	25	58	1.6	MS	385
96	PZ-TS-105	12	35	58	2.9	MS	490
97.	PZ-TS-106	00	12	46	1.6	MR	245
98.	PZ-TS-107	12	36	67	1.5	MS	528.5
99.	PZ-TS-108	12	46	78	1.8	S	637
100	PZ-TS-109	01	25	46	1.6	MR	339.5
100A	RAJ-4015	34	56	78	2.2	S	784
101.	PZ-TS-110	12	36	68	1.8	MS	532
102.	PZ-TS-111	12	46	68	2.0	MS	602
103.	PZ-LS-201	12	35	78	2.7	S	560
104.	PZ-LS-202	01	25	58	1.6	MS	381.5
105.	PZ-LS-203	02	35	46	0.9	MR	413
106.	PZ-LS-204	02	36	68	1.6	MS	497
107.	PZ-LS-205	02	24	36	1.8	MR	301
108.	PZ-LS-206	12	25	58	2.1	MS	420
109.	PZ-LS-207	02	24	36	2.1	MR	301
110.	PZ-RI-301	02	24	46	1.2	MR	336
111.	PZ-RI-302	12	56	68	2.0	MS	672
112.	PZ-RI-303	12	46	78	1.6	S	637
113.	PZ-RI-304	02	24	46	1.6	MR	336
114.	PZ-RI-305	12	36	46	2.5	MR	455
115.	PZ-RI-306	12	36	78	1.6	S	567
116.	PZ-RI-307	02	12	36	1.8	MR	217
117.	PZ-RI-308	12	24	58	1.4	MS	413

118	PZ-RI-309	01	12	24	2.3	R	171.5
119.	PZ-RI-310	12	36	58	1.2	MS	497
120.	PZ-RI-311	12	46	78	1.4	S	637
120A	RAJ-4015	24	56	78	1.8	S	749
121.	PZ-RI-312	12	35	58	1.6	MS	490
122.	DIC-IR-101	12	47	68	1.8	MS	609
123.	DIC-IR-102	12	35	68	1.6	MS	525
124.	DIC-IR-103	02	36	58	1.5	MS	462
125.	DIC-IR-104	14	56	68	4.2	MS	679
126.	DIC-IR-105	02	24	78	2.6	S	448
127.	DIC-IR-106	02	35	68	1.8	MS	490
128.	DIC-IR-107	12	35	58	1.7	MS	490
129.	SPL-HYPT-1	02	36	68	1.3	MS	497
130.	SPL-HYPT-2	12	24	58	2.4	MS	413
131.	SPL-HYPT-3	02	46	78	1.4	S	602
132.	SPL-HYPT-4	02	36	68	1.2	MS	497
133.	SPL-HYPT-5	00	12	36	1.2	MR	210
134.	SPL-HYPT-6	01	12	35	1.2	MR	210
135.	SPL-HYPT-7	01	13	24	1.3	R	178.5
136.	SPL-HYPT-8	02	13	24	1.1	R	182
137.	SPL-HYPT-9	13	24	46	1.4	MR	374.5
138.	SPL-HYPT-10	02	12	24	1	R	175
139.	SPL-HYPT-11	13	25	36	1.4	MR	346.5
140.	SPL-HYPT-12	02	12	24	1.3	R	175
140A	RAJ-4015	24	46	78	2.2	S	679
141.	SPL-HYPT-13	01	12	24	1.3	R	171.5
142.	SPL-HYPT-14	02	24	36	1.4	MR	301
143.	SPL-HYPT-15	12	25	46	0.9	MR	378
144.	SPL-AST-101	02	12	24	1.8	R	175
145.	SPL-AST-102	01	35	58	1.3	MS	451.5
146.	SPL-AST-103	02	36	68	1.9	MS	497
147.	SPL-AST-104	02	12	24	2.4	MS	175
148.	SPL-AST-105	12	25	46	1.1	MR	378
149.	SPL-AST-106	12	24	35	1.2	MR	332.5
150.	SPL-AST-107	02	12	24	1.7	R	175
151.	N-101	12	13	24	1.4	R	217
152.	N-102	12	24	46	1.2	R	371
153.	N-103	02	35	67	1.8	MS	486.5
154.	N-104	12	14	24	0.9	R	224
155.	N-105	00	12	24	1.3	R	168
156.	N-106	01	11	24	1.2	R	164.5
157	N-107	02	12	24	1.3	R	175
158	N-108	02	24	35	1.7	MR	297.5
159	N-109	12	35	46	1.4	MR	448
160	N-110	12	24	35	1.2	MR	332.5
160(A)	RAJ-4015	24	46	78	1.3	S	679
161	N-111	02	12	24	1.1	R	175
162	N-112	02	24	35	1.3	MR	297.5
163	N-113	12	14	24	1.3	R	224

164	N-114	02	24	36	1.2	MR	301
165	N-115	12	12	24	1.4	R	210
166	N-116	01	24	35	1.1	MR	294
167	N-117	12	24	36	0.9	MR	336
168	N-118	12	12	24	1.4	R	210
169	N-119	00	14	24	1.6	R	182
170	N-120	02	12	35	1.6	MR	213.5
171	N-121	12	36	46	1.3	MR	455
172	N-122	02	24	36	1.2	MR	301
173	N-123	00	02	24	1.2	R	98
174	N-124	02	12	24	1.3	R	175
175	N-125	02	24	35	1.1	MR	297.5
176	N-126	02	12	24	0.9	R	175
177	N-127	01	12	24	1.1	R	171.5
178	N-128	12	24	36	1.6	MR	336
179	N-129	02	12	35	1.5	MR	213.5
180	N-130	02	24	36	1.0	MR	301
180(A)	RAJ-4015	24	46	78	3.7	S	679
181	N-131	02	12	45	1.5	MS	248.5
182	N-132	01	12	24	2	R	171.5
183	N-133	02	24	36	1.3	MR	301
184	N-134	00	24	46	2.3	MR	329
185	N-135	02	12	36	1.7	MR	217
186	N-136	02	12	24	1.3	R	175
187	N-201	12	12	24	1.4	R	210
188	N-202	12	24	36	2.4	MR	336
189	N-203	12	36	46	1.2	MR	455
190	N-204	00	12	56	1.9	MS	280
191	N-205	14	35	68	0.8	MS	532
192	N-206	02	34	68	2.1	MS	483
193	N-207	02	35	58	0.8	MS	455
194	N-208	02	24	68	1.1	MS	413
195	N-209	00	24	36	2.1	MR	294
196	N-210	02	24	46	2.3	MR	336
197	N-211	01	12	35	0.7	MR	210
198	N-212	02	25	24	1.6	R	266
199	N-213	00	24	36	1.2	MR	294
200	N-214	01	12	46	1.7	MR	248.5
200(A)	RAJ-4015	24	46	78	1.9	S	679
201	N-215	12	25	24	0.8	R	301
202	N-216	02	12	36	2.1	MR	217
203	N-217	02	12	36	0.8	MR	217
204	N-218	12	24	36	1.1	MR	336
205	N-219	02	24	46	2.1	MR	336
206	N-220	02	24	37	2.3	MR	304.5
207	N-221	02	12	56	0.7	MR	287
208	N-222	02	12	46	1.6	MR	252
209	N-223	02	24	24	1.2	R	259
210	N-224	02	12	35	1.7	MR	213.5

211	N-225	12	24	46	2.0	MR	371
212	N-226	14	35	46	1.3	MR	455
213	N-227	12	36	78	1.2	S	567
214	N-228	12	46	68	1.1	MS	602
215	N-229	12	56	78	1.1	S	707
216	N-230	12	24	46	0.6	MR	371
217	N- 231	02	36	68	1.7	MS	497
218	N-232	12	35	58	1.6	MS	490
219	N-233	02	12	24	2.1	R	175
220	N-234	12	36	58	0.7	MS	497
220(A)	RAJ-4015	24	46	78	1.3	S	679
221	N-235	12	36	68	1.2	MS	532
222	N-236	12	36	46	1.6	MR	455
223	N-301	12	46	78	1.8	S	637
224	N-302	12	47	78	2.5	S	644
225	N-303	02	24	58	2	MS	378
226	N-304	12	46	68	2	MS	602
227	N-305	12	46	78	1.1	S	637
228	N-306	12	56	78	1.5	S	707
229	N-307	12	46	78	0.8	S	637
230	N-308	12	56	78	1.2	S	707
231	N-309	24	57	68	1.4	MS	721
232	N-310	12	46	58	1.1	MS	567
233	N-311	12	56	67	2.3	MS	668.5
234	N-312	02	36	58	2.7	MS	462
235	N-313	12	46	58	3.2	MS	567
236	N-314	01	24	78	1.4	S	444.5
237	N-315	02	36	78	0.7	S	532
238	N-316	03	34	68	1.4	MS	486.5
239	N-317	12	46	68	1.2	MS	602
240	N-318	02	36	58	1.2	MS	462
240(A)	RAJ-4015	24	46	78	1.7	S	679
241	N-319	02	35	46	2.1	MR	413
242	N-320	02	24	68	2.6	MS	413
243	N-321	03	24	58	1.6	MS	381.5
244	N-322	24	47	68	1.7	MS	551
245	N-323	02	24	46	1.2	MR	336
246	N-324	12	35	67	0.7	MS	521.5
247	N-325	12	36	46	1.7	MR	455
248	N-326	01	12	36	1	MR	213.5
249	N-327	02	12	36	0.7	MR	217
250	N-328	02	24	58	2.4	MS	378

Table.3 Categorization of wheat genotypes against the response of spot blotch disease under artificial epiphytotic condition (2018-2019)

S. No.	Disease reaction	Score	No. of genotypes	Genotypes
1	**Immune(I)**	00-01	NIL	NIL
2	**Resistant (R)**	12-24	55	NHTSZ-1804, NHLSZ-1801, NHLSZ-1806, NHLSZ-1807, NHLSZ-1809, NHLSZ-1810,NW-TS-102, NW-TS-104, NW-TS-105, NW-TS-109, NW-TS-110,NW-LS-201, NW-LS-202,NW-RI-305,NE-IR-103, NE-IR-104, NE-IR-106,NE-IR-109, NE-IR-110,NE-IR-111,NE-RI-301, NE-RI-304, NE-RI-307, NE-RI-308,PZ-RI-309,SPL-HYPT-7, SPL-HYPT-8, SPL-HYPT-10, SPL-HYPT-12, SPL-HYPT-13,SPL-ASF-101, SPL-ASF-104, SPL-ASF-107,N-101, N-102, N-104, N-105, N-106, N-107, N-111, N-113, N-115, N-118, N-119, N-123, N-124, N-126, N-127, N-132, N-136, N-201, N-212, N-215, N-223, N-333.
3	**Moderately Resistant (MR)**	34-46	96	NHTSZ-1801, NHTSZ-1802, NHTSZ-1803, NHTSZ-1805, NHLSZ-1802, NHLSZ-1803, NHLSZ-1805, NW-TS-101, NW-TS-103, NW-TS-106, NW-TS-111, NW-TS-112, NW-LS-203, NW-LS-204, NW-LS-205,NW-RI-301, NW-RI-302, NW-RI-303, NW-RI-305, NW-RI-306, NW-RI-308, NW-RI-309, NW-RI-310,NE-IR-102, NE-IR-105, NE-IR-107, NE-IR-108,NE-RI-302, NE-RI-303, NE-RI-35, NE-RI-306,CZ-TS-109, CZ-TS-110, CZ-TS-111, CZ-RI-302, CZ-RI-304, CZ-RI-305, PZ-TS-106, PZ-TS-109, PZ-LS-203, PZ-LS-205, PZ-LS-207,PZ-RI-301, PZ-RI-304, PZ-RI-305, PZ-RI-307,SPL-HYPT-5, SPL-HYPT-6, SPL-HYPT-9, SPL-HYPT-11, SPL-HYPT-14, SPL-HYPT-15,SPL-AST-105, SPL-AST-106,N-108, N-109, N-110, N-112, N-114, N-116, N-117, N-120, N-121, N-122, N-125, N-127, N-128, N-130, N-131, N-133, N-134, N-135, N-202, N-203, N-209, N-210, N-211, N-213, N-214, N-216, N-217, N-218, N-219, N-220, N-221, N-222, N-224, N-225, N-226, N-230, N-235, N-237, N-319, N-323, N-325, N-326, N-327
4.	**Moderately Susceptible (MS)**	56-68	72	NHLSZ-1804, NHLSZ-1808, NW-TS-107, NW-TS-108,NW-LS-206,NW-RI-307,NE-IR-101,CZ-TS-101, CZ-TS-104, CZ-TS-105, CZ-TS-106, CZ-TS-107, CZ-TS-108, CZ-TS-112,CZ-RI-303, CZ-RI-306, CZ-LS-201, CZ-LS-205, CZ-LS-206,PZ-TS-101, PZ-TS-102, PZ-TS-103, PZ-TS-104, PZ-TS-105, PZ-TS-107, PZ-TS-110, PZ-TS-111,PZ-LS-202, PZ-LS-204, PZ-LS-206,PZ-RI-302, PZ-RI-308, PZ-RI-310, PZ-RI-312,DIC-IR-101, DIC-IR-102, DIC-IR-103, DIC-IR-104, DIC-IR-106, DIC-IR-107,SPL-HYPT-1, SPL-HYPT-2, SPL-HYPT-4, SPL-AST-102, SPL-AST-103,N-103, N-204, N-205, N-206, N-207, N-208, N-228,N-231,N-232,N-234,N-235, N-303,N-304, N-309,N-310,N-311,N-312,N-313,N-316, N-317, N-318, N-320, N-321, N-322, N-324, N-328
5.	**Susceptible (S)**	78-89	28	CZ-TS-102, CZ-TS-103, CZ-TS-113, CZ-TS-301, CZ-LS-202, CZ-TS-203, CZ-TS-204, CZ-TS-207, CZ-TS-208, CZ-TS-209, CZ-TS-210,PZ-TS-108,PZ-LS-201,PZ-RI-303, PZ-RI-306, PZ-RI-311, DIC-IR-105,SPL-HYPT-3,N-227, N-229, N-301, N-302, N-305, N-306, N-307, N-308, N-314, N-315
6	**Highly Susceptible (HS)**	99	NIL	NIL

It is evident from the result presented in (Table 2) the AUDPC calculated for 250 wheat genotypes on the basis of plant disease intensity varied from 101.5 to 784.00 showing the fast progress of disease in all genotypes. The lesion size was varied from 0.6 to 4.2 cm. It was observed that different wheat genotypes expressed varied type of disease responses and lesion size and symptoms against *Bipolaris sorokiniana* under artificial epiphytotic conditions in field (Table 3). This finding was well supported by Pandey *et al.,* (2016).

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