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RESEARCH ARTICLE

IDENTIFICATION OF SPOT BLOTCH RESISTANT AND HIGH YIELDING WHEAT GENOTYPES FOR IRRIGATED ENVIRONMENTS IN CHITWAN, NEPAL

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ABSTRACT

The selection of genotypes with disease resistant and high grain yield is the most important task for successful adoption of wheat varieties in Terai regions of Nepal. Among the major foliar diseases, spot blotch caused by *Bipolaris sarokiniana* is the most destructive disease affecting from seedling to maturity stage of the wheat crop. The objective of this study was to identify spot blotch disease resistant and high yielding wheat genotypes. Various replicated field studies namely Initial Yield Trial (IET), Coordinated Varietal Trial (CVT), Wheat Varietal Display (WVD) and National Rainfed Nursery (NRN) were conducted under irrigated environments at Agronomy research field of National maize Research Program (NMRP), Rampur, Chitwan in 2014/15 and 2015/16 using 193 wheat genotypes received from National Wheat Research Program (NWRP), Bhairahawa. Disease scoring was applied using double digit (DD) system with first numerical digit stands for disease height and second numerical digit stands for percent leaf blighted from the test entries. The wheat genotypes evaluated in advanced trials (IET & CVT) namely NL-1244, NL-1249, NL-1272, NL-1264, NL-1258, NL-1254, BL-4406, NL-1211, Gautam, BL-1022, NL-1164 and WK 1204 reacted moderately resistant against spot blotch disease and also produced higher grain yield in both the years.

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INTRODUCTION

Wheat (*Triricum aestivum*L.) belongs to grass family is the third most important cereal crop of Nepal after rice and maize both in area and production (MoAD, 2014). It occupies 22.5 % of total cultivated land and contributes 20.13 % of the total cereal production in Nepal (MoAD, 2016). Worldwide it is grown on nearly 217 million hectares with the production of 653 million tons (FAO STAT, 2013). The area of wheat cultivation has expanded over last decade but productivity could not be increased due to several biotic and abiotic factors. Among the biotic factors diseases play substantial reduction in yield as well as deterioration in quality of wheat grains. Of the foliar diseases, spot blotch (SB) caused by *Bipolaris sarokiniana* (Sacc.in Sorok.) Shoemaker, is a major disease. It is widely prevalent throughout the world especially in Africa, South America, Australia, Canada and Asia particularly in Indian Sub-continent having warm and humid environments associated with imbalanced soil fertility (Van Ginkel and Rajaram, 1998). Yield losses assessment conducted on-station in Bhairahawa, Nepal, showed losses of 24 to 27 percent in highly susceptible varieties, and on-farm studies indicated losses up to 16 percent (Bhatta *et al*., 1998). In farmers' fields in Bangladesh, the average losses due to spot blotch were estimated to be 15 percent (Alam *et al*., 1998), and in Heilongjiang, China, losses of 15 percent have been reported in susceptible genotypes (Xiao *et al*., 1998). In farmer's fields, losses up to 20 percent have been reported, and in several areas it is the major biotic constraint that hampers growing wheat as a commercial crop (Duveiller and Gilchrist, 1994). In South Asia, Dubin and Bimb (1994) reported losses close to 30 percent in experimental studies. Disease severity increases dramatically with stresses favored by plough pan, poor soil drainage or drought and late planting (Dubin and Rajaram, 1996).

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MATERIALS AND METHODS

Description of the Experimental Site

The field experiment was conducted during winter season of 2014/15 and 2015/16 at Agronomy field of National Maize Research Program (NMRP), Rampur, Chitwan, Nepal located between 84^0 19'E longitude and 27^0 40' latitudes and 282 m

above the sea level. Climatically Rampur lies in humid sub-tropical region with average annual rainfall of 1920 mm.

Experimental Design

Different wheat experiments were conducted at Rampur during 2014/15 and 2015/16 with the collaboration with NWRP, Bhairahawa. Four experiments namely; initial evaluation trial (IET), coordinated varietal trial (CVT), wheat varietal display (WVD) and Nepal rain-fed nursery (NRN) were evaluated for major foliage diseases and other agronomic and yield attributing traits. Spot blotch (SB) disease was scored following double digit (DD) system, where first digit stands for disease height and second digit stands for percent leaf blighted. All the experiments were planted in both the years during December 1 to 5. The details of methods and methodologies are given in below table.

SN	Experiments	No. of entries	No. of rep.	Plot size
1	Initial Evaluation Trial (IET)	30	2	$6M^2$
2	Coordinated Varietal Trial (CVT)	20	2	$10M^2$
3	31st National Rain-fed Nursery (NRN)	100	1	$1M^2$
4	Wheat Varietal Display (WVD)	43	1	$1M^2$

RESULTS AND DISCUSSION

1.Initial Yield Trial (IET)

This experiment was conducted n 2014/15 and 2015/16 included 30 wheat genotypes.

Table 1. Response of wheat genotypes for spot blotch (SB) disease and other agronomic traits tested in Initial Evaluation Trial (IET), 2014/15 at Rampur, Chitwan

S.N.	Genotypes	SB scoring	GY t/ha	50% heading	50% mat.	PHT cm	Spike len. Cm
1	NL-1236	96	3.1	78	118	88	10
2	NL-1237	97	3.1	76	117	89	9
3	BL-4577	99	3.0	72	117	92	9
4	BL-4581	83	1.8	76	117	107	10
5	BL-4598	72	3.1	77	118	90	10
6	BL-4599	97	2.8	77	118	89	9
7	BL-4605	96	3.0	80	117	98	10
8	BL-4606	95	3.5	71	115	105	11
9	NL-1238	72	3.0	70	116	97	10
10	NL-1239	96	2.9	77	118	91	9
11	NL-1240	73	2.4	85	118	88	9
12	NL_1241	51	2.5	78	118	94	9
13	NL-1242	85	3.2	78	118	93	10
14	NL-1243	96	2.8	77	117	90	9
15	NL-1244	95	3.8	77	117	103	8
16	NL-1245	95	2.9	77	117	95	10
17	NL-1246	72	2.2	78	118	90	9
18	NL-1247	97	3.0	77	117	93	9
19	NL-1248	98	2.9	78	119	87	9
20	NL-1249	94	3.6	78	118	90	9
21	NL-1250	96	3.0	73	116	89	9
22	NL-1251	95	2.0	77	118	92	10
23	NL-1252	97	2.9	81	119	89	9
24	NL-1253	96	3.2	71	115	84	9
25	NL-1254	75	3.6	75	116	86	9
26	NL-1255	96	3.2	68	115	93	9
27	Nl-1256	75	3.1	69	116	89	9
28	NL-1257	95	2.8	76	117	95	9
29	Gautam	98	3.5	75	117	96	11
30	Bhrikuti	74	3.4	74	118	90	10
	Mean		2.97	76	117	92	9.2
	F-test		**	**	ns	**	*
	CV%		11.9	0.8	1.1	4.5	6.7
	LSD(0.05)		0.72	1.2	2.7	8.5	1.3

During 2014/15, exceptmaturity days all other traits were found significantly difference between the tested genotypes. Moderately resistant against spot blotch disease with significantly highest grain yield were recorded on NL-1244 (3.8 t/ha), NL-1249 and NL-1254 (3.6 t/ha). For heading days the variation among the genotypes was recorded 68 to 85 days. The latest for maturity was recorded on NL-1252 (119 days). Similarly during 2015/16, except maturity and spike number, all other traits were significantly difference. The highest grain yield was obtained by NL-1272 (3.083 t/ha) followed by NL-1264 (2.894 t/ha) and NL-1258 (2.819 t/ha) respectively. The genotype Gautam had highest plant height (112 cm) while NL 1274 had lowest plant height (80 cm). The maturity of genotypes varied from 108 day in NL 1260 to 113 day in Gautam. The maximum value of heading days was found in BL 4664 , NL 1261 and Gautam (81 day), while minimum value was recorded in NL 1260 (76 day). Similarly, spike length was maximum in BL 4721 and Gautam (12 cm) and minimum in BL 4713, NL 1260, NL 1268, NL 1270 and NL 1243 (9 cm).

Table 2. Response of wheat genotypes for spot blotch (SB) disease and other agronomic traits tested in Initial Evaluation Trial (IET), 2015/16 at Rampur, Chitwan

S.N.	Genotypes	SB scoring	GY t/ha	50% heading	85% mat.	PHT cm	Spike len. cm
1	BL 4664	98	2.22	81	110	99	10
2	BL 4695	97	2.48	80	112	99	10
3	BL 4699	97	2.79	79	111	108	10
4	BL 4903	98	2.23	79	112	106	11
5	BL 4707	76	2.64	79	112	94	11
6	BL 4708	75	2.36	77	112	87	10
7	BL 4713	86	2.21	80	112	112	9
8	BL 4725	75	2.11	79	112	94	11
9	NL 1258	65	2.82	79	111	92	11
10	NL 1259	65	2.58	79	111	84	11
11	NL 1260	54	2.61	76	108	90	9
12	NL 1261	76	2.11	81	110	95	12
13	NL 1262	65	2.57	78	111	88	10
14	NL 1263	87	2.28	78	111	91	10
15	NL 1264	54	2.89	80	111	90	11
16	NL 1265	76	2.26	80	112	82	11
17	NL 1266	77	2.60	80	112	87	10
18	NL 1267	65	2.41	77	111	85	10
19	NL 1268	76	2.27	79	112	85	9
20	NL 1269	75	2.64	78	111	86	10
21	NL 1270	87	2.38	79	111	89	9
22	NL 1271	76	2.55	79	110	83	10
23	NL 1272	65	3.08	77	111	85	10
24	BL 4721	76	2.38	78	112	113	12
25	NL 1273	87	2.36	79	111	83	10
26	NL 1274	98	2.29	79	111	80	10
27	NL 1243	87	2.32	79	110	85	9
28	NL 1252	86	2.33	80	112	90	10
29	Bhrikuti	86	2.31	79	112	91	11
30	Gautam	87	2.34	81	113	96	12
	Mean		2.448	78.78	110.88	91.4	10.8
	F-test		**	**	ns	**	**
	$LSD_{0.05}$		0.337	1.229	2.483	7.26	1.627
	CV%		6.7	0.8	1.1	3.9	7.9

2.Coordinated Varietal Trial (CVT)

This experiment included 20 wheat genotypes in both the years. Among the tested genotypes during 2014/15 the response to spot blotch ranged from moderately resistant to susceptible against spot blotch diseaseand grain yield ranged from 2.1 t/ha to 3.4 t/ha. The moderately resistant with highest grain yield was obtained from BL-4406 (3.4 t/ha) followed by NL-1207 and BL-4407 (3.3 t/ha), respectively. The earliest for

heading was RR-21 (69 days) and the late one was NL-1208 (81 days). Maturity days ranged from 114-119 days and tallest genotype was BL-4408 (104 cm) and the shortest for plant height was recorded on BL-4406 (91 cm).

Table 3. Response of wheat genotypes for spot blotch (SB) disease and other agronomic traits tested in Coordinated Varietal Trial (CVT), 2014/15 at Rampur, Chitwan

S.N.	Genotypes	SB scoring	GY t/ha	50% heading	85% mat.	PHT cm	Spike len. Cm
1	BL-4316	95	2.80	73	116	97	9
2	BL-4335	96	3.10	73	115	92	10
3	BL_4341	84	3.20	74	116	98	9
4	BL-4406	85	3.40	70	114	91	10
5	BL_4407	97	3.30	70	114	92	9
6	BL-4463	84	2.90	72	115	97	10
7	BL-4468	62	2.30	80	118	104	10
8	NL-1164	62	2.90	74	116	99	9
9	NL-1190	95	2.00	74	116	95	9
10	NL-1193	62	2.70	70	114	89	8
11	NL-1202	96	3.00	75	117	93	10
12	NL_1203	52	2.80	80	118	97	10
13	NL-1207	73	3.20	77	118	84	8
14	NL-1208	99	2.10	81	118	83	9
15	NL-1211	84	3.30	78	119	100	9
16	NL-1212	86	2.80	73	116	93	10
17	NL-1214	72	2.70	79	119	88	9
18	Bhrikuti	84	3.00	71	114	91	9
19	RR-21	85	2.10	69	114	96	10
20	Gautam	73	3.00	73	116	100	9
	Mean		2.8	74	116	94	9.2
	F-test		ns	**	**	ns	ns
	CV%		15.3	1.1	0.8	6.9	9
	LSD(0.05)		0.9	1.8	1.9	13.6	1.7

Table 4. Response of wheat genotypes for spot blotch (SB) disease and other agronomic traits tested in Coordinated Varietal Trial (CVT), 2015/16 at Rampur, Chitwan

S. N.	Genotypes	SB scoring	GY t/ha	50% heading	85% mat.	PHT cm	Spike len. Cm
1	BL 4406	63	3.56	78	108	92	11
2	BL 4463	65	3.10	77	109	96	11
3	BL 4335	87	2.49	78	109	100	9.5
4	NL 1190	77	2.96	78	108	78	9.5
5	NL 1193	65	3.16	73	109	85	9.5
6	NL 1202	65	3.15	79	108	87	10.5
7	NL 1207	66	3.02	81	109	88	10.5
8	NL 1211	87	2.42	80	109	90	10
9	BL 4581	97	2.79	79	109	111	9.5
10	BL 4606	65	3.09	78	109	104	10
11	NL 1244	64	3.16	78	109	97	9
12	NL 1247	87	2.94	79	109	94	10
13	NL 1249	88	2.60	81	111	90	9.5
14	NL 1250	65	3.04	76	108	82	9.5
15	NL 1253	64	3.43	75	108	84	10
16	NL 1254	76	3.04	78	108	82	9.5
17	NL 1255	87	2.96	74	108	86	10
18	BHRIKUTI	65	3.03	78	109	89	9
19	RR 21	99	2.10	78	109	95	10
20	GAUTAM	76	3.50	78	108	93	11.5
	Mean		2.98	77.58	108.7	90.83	9.95
	F-test		*	**	ns	**	ns
	LSD0.05		0.66	2.317	2.169	9.255	2.179
	CV%		10.7	1.4	1	4.9	10.5

The highest test weight was recorded in BL-4335 (53.2 gm) and the lowest was on BL-4316 (36.3 gm). Similarly in 2015/16, result from CVT revealed that except spike length, number of spikes and maturity days, all other traits were significantly difference and spot blotch severity was observed moderately resistant to highly susceptible among the tested genotypes. The grain yield ranged from 2.1 to 3.56 t/ha. Moderately resistant reaction against spot blotch disease with significantly highest grain yield was observed in BL-4406 (3.56 t/ha) and followed by Gautam (3.50 t/ha) and NL-1253 (3.43 t/ha) with. Heading of tested genotypes ranged from 73 to 81 days and NL-1249 was found late (111 days) for maturity. The genotype BL-4581 was recorded tallest for plant height (111 cm).

3.Wheat Varietal Display (WVD)

In wheat varietal display for both the consecutive years 43 released wheat varieties were included as a display trial. The tested varieties showed variances all the traits as heading, plant height, spike length, spot blotch and grain yield during 2014/15. The grain yield was varied from 1.0 to 5.2 t/ha with moderately resistant to highly susceptible reaction against spot blotch disease. The highest grain yield was recorded from Trticale (5.2 t/ha). During 2015/16, again out of 43 tested varieties the grain yield ranged from 1.37 to 4.45 t/ha (BL-3629) with moderately resistant to highly susceptible disease reaction. For plant height the shortest was Vinayak (70 cm) and the tallest was Rohini (102 cm), respectively.

Table 5. Response of wheat genotypes for spot blotch (SB) disease and other agronomic traits tested in Wheat Varietal Display (WVD), 2014/15 at Rampur, Chitwan

S N	Genotypes	SB scoring	GY t/ha	50% heading	PHT cm	Spike leng cm
1	LR-52	98	1.2	74	89	8
2	LR-64	98	1.1	76	95	8
3	Kalyansona	97	3.2	73	93	9
4	Pitic-62	86	1.4	80	89	10
5	RR-21	98	3.8	69	109	10
6	NL-30	98	1.4	79	94	8
7	HD-1982	98	2.6	66	88	9
8	UP-262	97	3.4	71	101	8
9	Lumbini	98	2.2	68	97	9
10	Triveni	96	2.0	73	100	9
11	Vinayak	99	3.2	65	93	8
12	Siddartha	99	2.6	65	75	7
13	Vaskar	98	2.6	68	80	7
14	Nepal-297	97	3.2	63	87	8
15	Nepal-251	95	3.8	69	100	8
16	Annapurna-1	85	2.8	78	89	8
17	Annapurna-2	84	4.4	73	98	10
18	Annapurna-3	84	3.6	74	94	8
19	BL-1022	99	3.0	66	93	8
20	Bhrikuti	97	3.7	70	82	8
21	NL-1135	98	3.2	65	94	9
22	Annapurna-4	97	3.4	67	89	9
23	Achyut	97	2.3	78	88	9
24	Rohini	98	2.4	70	87	7
25	Kanti	97	2.0	78	93	9
26	Pasanglhamu	73	2.6	76	115	10
27	BL-1473	97	3.2	65	101	8
28	Gautam	75	2.8	75	103	9
29	WK-1204	96	3.0	77	90	8
30	Aditya	84	3.5	70	98	8
31	NL-971	73	4.3	76	97	8
32	Bijay	97	3.7	70	99	8
33	Gaura	97	2.4	75	96	8
34	Dhaulagiri	62	4.7	69	94	8
35	NL-1073	61	4.1	73	87	9
36	NL-1064	52	3.0	83	98	9
37	BL-3623	73	4.6	71	91	8
38	BL-3629	73	3.8	72	96	9
39	BL-3872	62	3.2	79	97	8
40	NL-1055	72	3.2	75	91	8
41	NL-1164	84	3.6	75	99	9
42	Triticale	72	5.2	70	106	9
43	Durum	72	1.0	83	74	6
	Mean	87.5	3.0	72.4	93.7	8.4

Table 6. Response of wheat genotypes for spot blotch (SB) disease and other agronomic traits tested in Wheat Varietal Display (WVD), 2015/16 at Rampur, Chitwan

S.N.	Genotypes	SB scoring	GY t/ha	50% heading	PHT cm	Spike len. Cm
1	Lerma 52	75	2.52	78	101	9
2	Lermarojo 64	76	2.91	78	89	8
3	Kalyansona	65	2.89	79	79	10
4	Pitic 62	87	1.75	81	72	10
5	RR 21	65	2.53	78	84	11
6	NL 30	77	2.32	78	87	10
7	HD 1982	74	3.86	74	72	9
8	UP262	99	2.72	74	79	10
9	Lumbini	76	3.92	74	90	10
10	Triveni	98	2.71	74	88	10
11	Vinayak	98	2.7	77	70	8
12	Siddarth	76	3.08	73	76	10
13	Vasker	87	2.32	74	74	10
14	Nepal 297	99	3.09	74	90	10
15	Nepal 251	65	4.08	77	93	10
16	Annapurna-1	87	2.72	79	79	10
17	Annapurna-2	99	1.94	80	84	10
18	Annapurna-3	76	2.9	78	82	10
19	BL 1022	98	1.74	76	74	10
20	Bhrikuti	98	1.94	80	72	10
21	BL 1135	77	2.13	77	82	10
22	Annapurna-4	87	2.32	77	84	11
23	Achyut	87	2.7	80	93	9
24	Rohini	87	2.7	77	102	9
25	Kanti	75	3.08	79	101	9
26	Pashang Lhamu	87	2.3	79	90	11
27	BL 1473	98	1.93	82	79	9
28	Gautam	65	2.9	79	85	10
29	WK 1204	64	2.13	81	78	9
30	Aditya	76	2.3	78	82	10
31	Vijaya	87	2.62	78	85	9
32	NL 971	77	2.7	81	90	10
33	Gaura	64	3.68	81	92	10
34	Dhaulagiri	53	3.69	78	93	10
35	Tilloama	65	2.9	78	81	9
36	Danphe	64	3.48	82	86	10
37	BL 3623 (Bandganaga)	65	4.05	77	86	11
38	BL 3629 (Sworgadwari)	54	4.45	77	88	10
39	BL 3872	87	2.9	77	91	10
40	NL 1055	66	3.29	77	93	10
41	NL 1164	76	5.07	79	96	10
42	Triticale	53	3.9	78	99	10
43	Durum	98	1.37	78	71	8
	Mean		2.867	77.81	85.2	9.744

Table 7. Response of wheat genotypes for spot blotch (SB) disease and other agronomic traits tested in National Rainfed Nursery (NRN), 2014/15 at Rampur, Chitwan

S.N.	Genotypes	SB scoring	GY t/ha	50% heading	PHT cm	Spike len. Cm
1	Nepal-297/Kiritati/wbll-1	99	1.1	70	90	8
2	Anna-4/fret 2//kukuna// fret-2	99	1.3	70	92	9
3	Anna-4/fret 2//kukuna// fret-2	99	0.6	70	86	10
4	BL-3064/kiritatati/wbll-1	99	2.1	70	104	7
5	BL-2649/KIRITATI/3/HUW-234+LR34//PRL/VEE#10	98	1.6	76	105	9
6	BL-2189/KIRITATI/3/HUW-234+LR34//PRL/VEE#10	99	0.9	71	86	8
7	BL-2930/KIRITATI/WBLL- 1	97	1.4	76	98	8
8	BL-3565/WBLL-1*2/TUKURU	97	1.2	75	114	10
9	BHRIKUTI/KRITATI/2*PASTOR	99	1.1	67	81	7
10	BL-2884/FRET 2/TUKURU// FRET-2	95	1.4	71	106	9
11	BL-3235/WBLL-1*2/3/WERAVER/OCI//BORL/95	98	1.2	70	96	10
12	BL-3237/WBLL-1*2/3/WERAVER/OCI//BORL/95	99	0.8	72	109	10
13	BL-2892/KRITITA/KMB 1	99	1.2	71	110	9
14	BL-3625/KTITITA//HUW 234+LR34/PRINIA	99	1.0	70	83	8
15	BL-2931/KRITATI	99	1.2	76	104	8
16	BL-3400/PFAU/WEAVER//KRITTATI	97	1.0	81	80	9
17	BL-3716/WBLL 1*2/BRAMBRAMBLIMG	98	1.0	84	94	10
18	BL-1473/FRET 2/KUKUNA//FRET 2	97	1.4	83	97	9
19	KIRITATI/WBLL 1 BL 2730	97	1.6	75	109	9
20	BHRIKUTI	99	1.4	71	76	8
21	NING 8201//TUKURU	99	1.0	66	98	8
22	BL-3629/KIRITATI//SERI/RAYOM	99	1.4	71	85	9
23	NL;-1002/WAXWING/4/SNI/TRAP#1/3 /KAUZ*2/KAUZ	99	1.2	71	99	7
24	BL-3623KIRITATI//SERI/RAYON	99	1.6	74	83	9
25	BL-3817/KINGBIRD	98	0.4	74	92	9

26	BL-2940/KIRITATI//HUW 234+LR 34//PRINIA//BL3623	97	2.0	76	92	8
27	BL-3623/KIRITATI/3/HUW 234+LR34//PRL/VEE#10//BL3625	99	0.9	66	83	8
28	BL-2818/THELIN#2/TUKUKRU	98	1.2	74	101	9
29	BL-3348/WAXWING*2/TUKURU	99	1.1	75	91	8
30	BL-2189/KIRITATI/3/HUW-234+LR34//PRL/VEE#10/BL3623	97	1.4	84	88	9
31	BL-2860/KIRITATI/3/HUW 234+LR34//PRL/VEE#10//BHRIKUTI	97	1.8	71	101	10
32	BAGAULA/KIRITATI/3/HUW234+LR34//PRL/VEE#10/BL4158	99	0.6	78	84	9
33	BL3348/WAXWING*2/TUKURU	99	0.6	78	87	10
34	NL-971/KINGBIRD	98	0.6	81	78	9
35	WK 1204/KIRITATI//PRL/2*PASTOR//BL 4055	99	1.0	74	77	8
36	BL-3399/FRET 2/TUKURU//FRET 2/BL 4168	97	1.2	81	83	9
37	BL-3623/KIRITATI/3/HUW 234+LR34//PRL/VEE#10//BL3625	98	1.1	74	91	7
38	NL-1110/NL 971	99	0.4	80	83	8
39	BL2818THELIN#2 TUKURU//CROC.1 AE SQ(205)//BOW	99	0.8	77	88	9
40	GAUTAM	99	0.6	75	80	8
41	BL-2860/KIRITATI/3/HUW 234+LR34//PRL/VEE#10//BHRIKUTI	98	0.8	82	79	9
42	PASTOR//HXN7573/2*BAU/3/WBLL-1	99	2.0	84	67	8
43	PASTOR//HXN7573/2*BAU/3/WBLL-1	99	0.2	76	72	10
44	PASTOR//HXN7573/2*BAU/3/WBLL-1	99	0.6	77	70	9
45	PASTOR//HXN7573/2*BAU/3/WBLL-1	99	0.6	79	74	9
46	PASTOR//HXN7573/2*BAU/3/WBLL-1	99	0.2	78	67	8
47	SOKOLL/WBLL-1	99	0.4	78	64	8
48	WORRAKATTA/2*PASTOR	98	0.4	84	58	6
49	1447/PASTOR//KRICHAUFF/3/PAURAQ	98	0.4	83	65	6
50	QING HAIBEI/WBLL-1//BRBT2/3/PAURAQ	95	0.6	84	63	8
51	BERKUT/MUU//DAPHAE#1	99	0.8	76	80	8
52	SLVS/3/CROC_1/AESQUARROSA(224) OPATA/5/VEE/LIRA//VOW/3/BCN/4/KAUZ/6/2*KA/NAC//TRCH	99	0.8	73	71	6
53	KA/NAC//TRCH/3/VORB	99	0.8	70	75	8
54	EMB16/CCBRD//CBRD/4/BETTY/3/CHEN/AE.SQ//2*OPATA	99	0.6	68	71	7
55	WBLL1*2/4/YACO/PBW65/3/KAUZ*2/TRAP//KAUZ*2/5/DEMAI 4	98	1.4	70	76	9
56	WBLLI*2/BRAMBLING/5/BABAX/LR42//BABAX*2/4/ SNI/TRAP#1/3/KAUZ*2/TRAP//KAUZ	97	0.8	78	78	9
57	FRANCOLIN31/WBLLI	99	0.4	73	63	8
58	FRANCOLIN#1//WBLL1*2/BRAMBLING	99	0.6	75	71	9
59	MUTUS/AKURI	99	0.6	75	64	8
60	VIJAY	99	0.8	70	73	7
61	MUU/5/WBLL1*2/4/YACU/PVW65/3/KAUZ*2/TRAP//KAUZ /6/WBLL1*2/4/SNI/TRAP#1/3/KAUZ*2/TRAP//KAUZ	99	0.4	77	75	9
62	MILAN/KAUZ//DHARWAR DRAY/3/BAV92/4/PAURAQ	99	0.8	77	68	8
63	WORRAKATTA/2PASTOR//DANPHE#1	99	0.6	80	68	7
64	KA/NAC/TRCH/3/DAN#1	99	0.8	81	69	8
65	BEWKUT/MUU//DANPHE#1	98	1.3	77	74	8
66	C80.1/3*BATAVIA//2*WBLL1/3/EMB16/CBRD//CBRD/4/CHEWINK#1	99	1.0	71	72	7
67	TOB/ERA//TOB/CNO67/3/PLO.4/VEE#5/5/KAUZ/6/FRET2/7/PASTOR //MILAN/KAUZ/3/BAV92	99	1.4	74	77	10
68	TILILA/JUCHI/4/SERI.1B//KAUZ/HEVO/3/AMAD	99	0.2	79	73	9
69	BAV92//IRENA/KUZ/3/HUITES/4/2*ROLF07	98	0.6	77	71	8
70	FRET2/TUKURU//FRET2/3/MUNIA/CHTO//AMSEL/4/FRET2 /TUKURUY//FRET2	97	1.2	78	72	8
71	FRET2/TUKURU//FRET2/3/MUNIA/CHTO// AMSEL/4/FRET2/TUKURUY//FRET2	97	1.4	78	71	9
72	WBLL1*2/4/BABAX/LR42//BABAX/3/BABAX/LR42//BABAX	99	0.4	79	69	8
73	WBLL1_1/4BOW/NKT//CVRD/3/CBRD/5/WBLL1*2/TUKURU	99	1.0	71	71	9
74	FRANCOLIN#1//WBLL1*2/BRAMBLING	99	0.8	75	68	8
75	FRANCOLIN#1//WBLL1*2/KURURUTU	99	0.6	71	74	7
76	MUTUS/AKURI	99	0.8	75	73	9
77	MILAN/KAUZ//DHARWAR DRAY/3/BAV92/4/CHONT	99	1.2	75	79	8
78	BERKUT/VORB/3/KA/NAC//TRCH	98	1.8	77	75	8
79	TOB/ERA//TOB/CNO67/3/PLO.4/VEE#5/5/KAUZ/6/FRET2/7/PASTOR //MILAN/KAUZ/3/BAV92	99	1.0	77	72	9
80	NLN297	99	0.6	68	75	9
81	TOB/ERA//TOB/CNO67/3/PLO.4/VEE#5/5/KAUZ/6/FRET2/7/PASTOR //MILAN/KAUZ/3/BAV92	99	0.8	75	73	9
82	KA/NAC//TRCH/3/DANPHE/1	99	1.1	77	79	8
83	KA/NAC//TRCH/3/DANPHE/1	97	1.6	76	72	8
84	TU1//2*SUNCO/SA1166/3/TU1/4/FINS1/5/SOKOLL/6/KA/NAC//TRCH	98	0.9	76	73	7
85	EMB16/CBRD//CBRD/3/SUNCO.6/FRAME// PASTOR/4/MILAN/KAUZ//DHARWAR DRY/3/BAV92	99	1.2	75	79	8
86	KA/NAC//TRCH/3/SLVS/ATTILA//EBLL1/4/KA/NAC//TRCH	99	0.6	76	73	9
87	EMB16/CBRD//CBRD/4/BETTY/3/CHEN/AE.SQ//2* OPATA/5/KA/NAC//TRCH	99	1.0	72	71	10
88	EMB16/CBRD//CBRD/4/BETTY/3/CHEN/AE.SQ//2*O PATA/5/KA/NAC//TRCH	99	1.2	74	76	8
89	TOB/ARA//TOB/CNO67/3/PLO/4/VEE#5/5/ KAUZ/6/FRET2/7/PASTOR //MILAN/KAUZ/3/BAV92	99	0.4	77	72	8
90	KA/NAC//TRCH/3/VORB	99	0.6	76	73	8

91	KA/NAC//TRCH/3/VORB	97	1.4	73	75	8
92	MILAN/KUZ//DHARWAR DRY/3/BAV92/4/CHONT	98	0.6	82	65	8
93	WORRAKATTA/2*PASTOR//MUU/3/MUU	98	1.0	77	70	7
94	METSO/ER2000/4/PAT24/ALD//DOVE/BUC/3/GONDO	98	1.2	77	70	8
95	METSO/ER2000/4/PAT24/ALD//DOVE/BUC/3/GONDO	98	2.0	77	74	8
96	FRETE2/TUKURU//FRET2/3/MUNIA/CHTO//AMSEL/ 4/FRET2/TUKURU/FRET	98	1.2	77	75	8
97	ATTILA*2/PBW65*2//MURJ	95	1.6	80	72	8
98	FRANCOLIN#1//WBLL1*2/KIRITATI	99	0.8	75	68	8
99	ALTAR84/AESQUARROSA(221)//3*BORL95/3/ UEES/JUN//KAUZ/4/WBLL1/5MUTUS	98	1.0	72	68	8
100	WK1204	99	1.0	77	69	8
	Mean	99	1.0	77	69	8

Table 8. Response of wheat genotypes for spot blotch (SB) disease and other agronomic traits tested in National Rainfed Nursery (NRN), 2015/16 at Rampur, Chitwan

S.N.	Genotypes	50% heading	PHT cm	Spike L cm	SB scoring	GY t/ha
1	SOKOLL/3/PASTOR//HXL7573/2*BAU/4/MASSIV/PPR47.89C	81	79	9	95	2.71
2	SOKOLL/3/PASTOR//HXL7573/2*BAU/4/BECARD	81	81	10	73	1.57
3	PICAFLOR #1/5/FRET2/KUKUNA//FRET2/3/YANAC/4/FRET2/KIRITATI	76	82	9	99	2.14
4	BAVIS/4/TC870344/GUI//TEMPORALERA M 87/AGR/3/2*WBLL1	78	83	10	98	1.75
5	QUAIU #1/3/PBW343*2/KUKUNA//PBW343*2/KUKUNA	77	76	11	98	2.13
6	FRANCOLIN#1/8/PBW343*2/KUKUNA/6/PVN//CAR422/ANA/5/ BOW/CROW//BUC/PVN/3/YR/4/TRAP#1/7/PBW343	78	80	10	97	1.56
7	TILHI/SOKOLL*2//KINGBIRD #1	78	77	10	96	2.33
8	WHEAR/KUKUNA/3/C80.1/3*BATAVIA//2*WBLL1/4/HUW234+LR34/ PRINIA//PBW343*2/KUKUNA/3/ROLF07	79	80	10	97	2.53
9	ATTILA*2/PBW65	73	85	9	97	1.93
10	HUHWA1/BAJ #1	77	79	9	98	2.54
11	ND643/2*WBLL1/4/WHEAR/KUKUNA/3/C80.1/3*BATAVIA//2*WBLL1	78	80	10	99	2.34
12	SUP152//ND643/2*WBLL1	76	80	8	97	2.32
13	BAJ #1/SUP152	78	82	10	96	2.72
14	BAJ #1/KISKADEE #1	79	78	9	97	1.55
15	BAJ #1/KISKADEE #1	78	84	9	98	1.85
16	BAJ #1/KISKADEE #1	76	82	10	97	2.73
17	SUP152*2/3/INQALAB 91*2/KUKUNA//KIRITATI	78	87	9	99	1.95
18	BAJ #1/3/KIRITATI//HUW234+LR34/PRINIA/4/KIRITATI//HUW234+LR34/PRINIA	77	89	8	98	2.52
19	WBLL1*2/BRAMBLING/5/BABAX/LR42//BABAX*2/4/SNI/TRAP#1/3/ KAUZ*2/TRAP//KAUZ	79	87	10	98	2.15
20	Bhrikuti	79	76	11	96	2.24
21	BAVIS #1//ND643/2*WBLL1	80	88	10	98	2.04
22	BAVIS #1//ND643/2*WBLL1	79	86	10	99	2.34
23	LERKE/5/KAUZ/3/MYNA/VUL//BUC/FLK/4/MILAN/6/PROGRESOF2007/7 /KIRITATI/4/2*SERI.1B*2/3/KAUZ*2/BOW//KAUZ	78	86	9	98	2.23
24	JUPARE C 2001	78	76	6	95	1.75
25	PH896-21/5/BRAK_2/AJAIA_2//SOLGA_8/3/CANELO_8// SORA/2*PLATA_12/4/YAZI_1/AKAKI_4// SOMAT_3/3/AUK/GUIL//GREEN/6/HUBEI//SOOTY_9/RASCON_37/3/2* SOOTY_9/RASCON_37/4/SOOTY_9/RASCON_37	80	81	6	95	2.53
26	BELLAROI/4/BCRIS/BICUM//LLARETA INIA/3/DUKEM_12/2*RASCON_21	80	83	7	93	2.14
27	LABUD/NIGRIS_3//GAN/3/AJAIA_13/YAZI/10/PLATA_10/6/MQUE/4/ USDA573//QFN/AA_7/3/ALBA-D/5/AVO/HUI/7/PLATA_13/8/THKNEE_11/9/CHEN/ALTAR 84/3/HUI/POC//BUB/RUFO/4/FNFOOT/11/SORA/2*PLATA_12//SOMAT_ 3/4/STORLOM/3/RASCON_37/TARRO_2//RASCON_37/5/CADO/BOOMER_33 AINZEN_1/6/2*CMH82A.1062/3/GERARDOVZ	79	77	6	93	2.92
28	394//SBA81/PLC/4/AAZ_1/CREX/5/HUI//CIT71/CII/9/CBC509 CHILE/6/ECO/CMH76A.722//BIT/3/ALTAR KJOVE_1/7/AJAIA_12/F3LOCAL(SEL.ETHIO.135.85)//PLATA_13/8/ SOOTY_9/RASCON_37//WODUCK/CHAM_3	80	69	5	99	1.65
29	BL 2818/THELIN#2/TUKURU	77	115	9	97	2.42
30	BL2786/CHIBIA//PRLII/CM65531/3/SKAUZ/BAV92	80	108	9	98	1.76
31	JUN/GEN//WAXWING*2/BRAMBLING	80	111	10	98	2.03
32	BL3348/WAXWING*2/TUKURU	77	86	9	99	2.34
33	BL3743/KIRITATI/WBLL1	81	105	9	97	2.13
34	CHILERO/KINGBIRD	80	101	10	98	2.23
35	NL1053/BL3621	81	105	11	97	2.32
36	ANNA-4/FRET2/KUKUNA//FRET2//BL3896	79	104	9	96	1.66
37	ANNA-4/FRET2/KUKUNA//FRET2//BL3896	79	96	10	96	1.56
38	ANNA-4/FRET2/KUKUNA//FRET2//BL3896	79	95	9	97	2.14
39	BL2189/KIRITATI/3/HUW234+LR34//PRL/VEE#10//BL3623	80	98	10	98	1.55
40	Gautam	79	76	10	97	1.75
41	BL2940/KIRITATI/HUW234+LR34//PRINIA//BL3624	78	103	8	99	2.04
42	BL2931/KIRITATI//BL1496/MILAN/3/CROC-1/AE.SQ(205)//KAUZ	76	109	8	99	1.86

43	BAGULA/KIRITATI/3/HUW234+LR34//PRL/VEE#10//BL4158	81	89	11	97	2.14
44	BL 2930/KIRITATI/WBLL1//BL4154	79	97	10	97	2.22
45	BL 2930/KIRITATI/WBLL1//BL4154	82	88	10	95	2.13
46	WK1204/KIRITATI//PRL/2*PASTOR//BL4055	79	108	9	98	2.11
47	BL2884/FRET2/TUKURU//FRET2//BL4125	78	110	10	98	1.35
48	BL3565/WBLL1*2/TUKURU//BL4136	79	115	10	96	1.95
49	BL2473/KIRITATI//BL4173	81	86	10	97	2.01
50	BL2879/WAXWING*2/TUKURU//BL4170	77	103	11	98	1.55
51	FANG9021/KIRITATI//PRL/2*PASTOR//BABAX/LR42//BABAX*2/3/KUKUNA	78	105	11	98	3.07
52	NL971/NL1082	79	91	9	97	1.84
53	BL3063/NL972	78	90	11	98	1.94
54	BL3063/NL971	78	97	9	98	1.95
55	JUN/GEN/WAXWING*2/TUKURU//BL3063	80	100	10	97	1.94
56	NL1008/KIRITATI/WBLL1//NING8201	77	95	10	98	2.52
57	BL3235/WAXWING/4/SNI/TRAP#1/3/KAUZ*2//NING8201/WAXWING*2/TUKURU	77	102	10	98	2.34
58	NL297/KIRITATI/WBLL1//BAGULA//GAUTAM	80	108	10	97	2.51
59	BL3743/NL1065	80	91	10	97	2.23
60	Vijay	77	90	9	99	1.95
61	KIRITATI/WBLL1/BL2730//SABUF	82	112	11	95	2.91
62	JUN/GEN/WAXWING*2/TUKURU//BL3063	79	106	10	97	2.63
63	BL3539/WBLL1*2/3/WEAVER/OCI//BORL95//NL922	79	101	9	97	2.31
64	NL1066/NL750//NL1071/NING8319	78	95	9	98	2.62
65	NL971/KINGBIRD//NL971	82	90	9	98	2.13
66	NL1067/BL3623	79	92	9	98	2.33
67	NL1067/BL3623	79	92	9	99	2.32
68	BL3064/OASIS/SKAUZ//4*BCN/3/2*PASTOR//NL724	79	108	9	98	2.14
69	NL1057/BABAX/LR42//BABAX*2/3/VIVITSI//G 162	80	107	9	97	2.14
70	NL1008/KIRITATI/WBLL1//NING8201	79	89	10	97	2.23
71	BL2860/KIRITATI/3/HUW234+LR34//PRL/VEE#10/BHRIKUTI	81	110	10	97	1.76
72	ANNA-3/NL1098	80	92	11	96	1.85
73	NL971/NL1082	80	89	10	96	2.51
74	NL971/NL1082	81	91	10	98	2.91
75	BL3743/NL1065	79	88	9	96	2.72
76	BL2786/KAMB-1*2/BRAMBLING	80	87	10	98	2.73
77	NL1007/PFAU/WEAVER//KIRITATI/CROC-1/AE.SQ(224)//OPATA/3/PASTOR	80	106	10	97	1.94
78	BL3348/WAXWING*2/TUKURU//GISVZ/SABUF	78	88	10	99	3.30
79	NL1053/BL3621//WK1204	78	93	9	98	1.93
80	Nepal 297	74	87	10	97	2.72
81	NL1053/BL3621//WK1204	81	94	9	98	2.14
82	NL971/KINGBIRD//NL971	82	91	9	98	2.73
83	BL3063/NL971	82	94	9	97	2.14
84	NL1067/BL3623	82	85	10	96	2.72
85	NL1053/BL3621//WK1204	78	81	9	99	2.05
86	KACHU #1	82	90	10	95	1.37
87	KACHU//KIRITATI/2*TRCH	83	94	10	96	1.36
88	KACHU/CHONTE	83	85	10	97	1.94
89	KIRITATI//HUW234+LR34/PRINIA/3/BAJ #1	79	89	10	98	1.95
90	KIRITATI//HUW234+LR34/PRINIA/3/BAJ #1	79	83	10	97	2.34
91	KIRITATI//HUW234+LR34/PRINIA/3/BAJ #1	78	88	10	99	2.44
92	KIRITATI//HUW234+LR34/PRINIA/3/BAJ #1	78	83	10	98	2.63
93	ND643/2*WBLL1//VILLA JUAREZ F2009	78	81	9	98	1.95
94	ND643/2*WBLL1/4/WHEAR/KUKUNA/3/C80.1/3*BATAVIA//2*WBLL1	77	83	9	97	2.52
95	TUKURU//BAV92/RAYON/4/WHEAR/KUKUNA/3/C80.1/3*BATAVIA//2*WBLL1	78	84	8	99	1.66
96	BAJ #1/KISKADEE #1	77	79	10	98	1.87
97	BAJ #1/KISKADEE #1	77	76	10	98	1.76
98	BAJ #1/KISKADEE #1	77	81	10	97	1.47
99	SW89.5277/BORL95//SKAUZ/3/PRL/2*PASTOR/4/HEILO/5/WHEAR/SOKOLL	82	72	8	97	1.95
100	WK 1204	82	76	10	96	4.39
	Mean	78.98	90.62	9.44	97.04	2.18
	SE Mean	0.184	1.09	0.109	0.311	0.05
	St. Dev	1.842	10.89	1.085	2.901	0.46
	CV%	2.33	12.01	11.5	2.99	21.10

4. 31st National Rainfed Nursery

Nepal rainfed nursery included 100 wheat genotypes and planted in single replication in both the years. Most of the tested genotypes produced less than 1 t/ha grain yield. However, the genotype BL-3064/kiritatati/wbll-1 produced highest grain yield (2.1t/ha) followed by PASTOR//HXN75 73/2*BAU/3/WBLL-1 (2.0 t/ha) during 2014/15. The tested genotypes showed moderately resistant to susceptible reaction against spot blotch disease and all other traits were also varied, respectively. Similarly during 2015/16, all the tested genotypes produced more than one ton grain yield, while WK-1204 was superior for grain yield (4.39 t/ha) production with moderately resistant reaction against spot blotch disease.

Conclusion

From the results of two years experimentation the genotypes selected for high yielding and disease resistant from Initial Yield Trial (IET) for further verification in Coordinated varietal trial (CVT) were; NL-1244, NL-1249, NL-1254, NL-1272 NL-1264 and NL-1258.Similarly, from Coordinated varietal trial the high yielding and disease resistant genotypes were; BL-4406, NL-1211, BL-4406, Gautam and NL-1253 and should be promoted in CFFT. The selected disease resistant and high yielding genotypes in WVD and NRN were; BL-3064/kiritatati/wbll-1, PASTOR//HXN7573/2*BAU/3/WBLL-1, BL-1022, NL-1164. BL2884/FRET2/TUKURU//FRET2// BL4125, WK 1204) and these genotypes should be used in

further wheat breeding program as a source of spot blotch resistant.

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