



EVALUATION OF THE BARLEY GENOTYPES AGAINST SPOT BLOTCH DISEASE CAUSED BY *BIPOLARIS SOROKINIANA*

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Abstract

Spot blotch caused by *Bipolaris sorokiniana* (Sacc. in Sorok.) Shoem. is an important disease of barley. 342 genotypes of barley were screened against spot blotch under natural condition. None genotypes were found immune and highly susceptible. Out of 342 genotypes, one genotype was found resistant namely 6B89.2027/5/ATACO/BERMEJO//2HIGO/3/CLN-B/80.5138/GLORIA -BAR/COPAL/4/CHER VON-BAR/6/LEGACY. Ninety seven genotypes were found moderately resistant against spot blotch. One hundred seventy two genotypes were found moderately susceptible. Seventy one genotypes were rated as susceptible against spot blotch.

Key words : Barley, spot blotch, *Bipolaris sorokiniana*, resistant genotype.

Introduction

Barley (*Hordeum vulgare* L.) is popularly known as “Jau” in hindi. It ranks 4th among the major food grain crops after wheat, rice and maize in the world with regard to acreage and production. In Uttar Pradesh, barley covered an area of about 1.70 lakh hectares with a production of 2.87 lakh tonnes and productivity of 16.90q/ha. The most important uses of barley in India are as grain feed to live stock and poultry, malt for manufacture of beer and other liquor like whisky, brandy etc. Wheat and barley crop in eastern Uttar Pradesh, suffers from a number of fungal diseases such as loose smut, black rust, brown rust, yellow rust, covered smut, powdery mildew, stripe disease and net blotch etc., but spot blotch caused by *Bipolaris sorokiniana* is more severe than other diseases. It causes marked reduction in grain yield and quality of barley crop (Nutter *et al.*, 1985; Arabi and Jawahar, 2003). Yield losses of 25-45% in barley crop have been reported in Kazakhstan and 41% in Russia (Iftikhar *et al.*, 2009). Spot blotch can be controlled by a number of ways but integrated disease management is the best method for controlling the pathogen (Mehta, 1993; Dubin and Duvieller, 2000). One of the most important strategies to reduce the impact of this disease is to use cultivars that have resistant to spot blotch. Thus, the objective of this investigation was to evaluate the barley

genotypes against spot blotch disease caused by *Bipolaris sorokiniana*.

Materials and Methods

The experiment was conducted at Experimental Station of Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad (U.P.), India; during 2014-15. Seeds of 342 genotypes (ICARDA) were collected from All India Co-ordinated Wheat and Barley Improvement Project, Department of Genetics and Plant Breeding, Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad (U.P.), India. Each genotypes/lines was sown (4th week of November) in single row of one meter length at a distance of 25 cm row to row and 5 cm plant to plant in augmented design. Two rows of RD 2503 were sown as border rows around all the sides of experiment as the variety RD 2503 is known to susceptible to foliar blight. Variety RD 2503 was also used as check and was sown after every 20 entries. All the recommended agronomical and cultural practices were followed for raising the good crop. Observations of disease severity were recorded at flowering, soft dough and hard dough stages. For data collection 5 plants were randomly selected and tagged in each row. The disease score of each selected plants were recorded by using Kumar *et al.* (1998)'s double digit scale based on per cent blighted area on the flag and Flag-1 leaf as given in table 1.

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

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 percent 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 percent blighted area.

Table 2 : Categorization of barley genotypes against the response of spot blotch disease under natural disease pressure.

S. no.	Disease reaction	Score	No. of genotypes	Genotypes
1.	Immune(I)	00-01	NIL	NIL
2.	Resistant (R)	12-24	1	6B89.2027/5/ATACO/BERMEJO//HIGO/3/CLN-B/80.5138// GLORIA -BAR / COPAL/4/CHER VON-BAR/6/LEGACY
3.	Moderately Resistant (MR)	34-46	97	Prior, Ymer, Hanna, Volla, Bido, Weihenstephan Meltharesistente I, Gull, Plumage Archer, Trumpf, Cheri, Defra, Magnific 104, CLE 232, C 9173, ND 15140, Scarlett, Danuta, Harrington, Bowman, Dayman, SUDAN, NDB 112, ND 17268, ND 17293, ND 19957, ND 19970, ND 23211, PRTL/MSEL, 19088/4/18172 /3/o& 2007/15468 // 16021 , Canela/ Gob82DH// Gob 24DH , ND 19074 , CI 7251, ARUPO/K8755// ALELI, CLE 250, GP 313, CLE 231, C 97050, C97068, C 97073, Grignon, BETZES, ANDRE, PISTACHO, GLORIA-BAR/COME, RHODES//TB-B/CHZO/3/GLORIA-BAR/COPAL, PAPELILLO TROMPILLO-BAR, MJA/ESPERANZA//GLORIA-BAR/COME, LINAZABAR/ JAZMIN, LINAZA-BAR/JAZMIN/5/CENB/3/LBIRAN/UNA8271//GLORIA-BAR/COME/4/SEN, BLLU/3/LBIRAN/CI9650// LIGNEE640, LBIRAN/ UNA80 //LIGNEE640/3/BBSC/4/CHAMICO, ABETO// GLORIABAR/ COME/3/SEN/4/MJA /5/ PETUNIA1/6/CABUYA, BLLU/MINN DESC//PEUNIA 1, PETUNIA 1/CALI92//BLLU , CABUYA, SEN, BREA/DL70, CANELA, PETUNIA-2, PEREGRIN, AZAFRAN, GOB24DH, ICARO, RECLA 6, ZIGZIG/BLLU//PETUNIA 1, EGYPT4/TERAN78//P.STO/3/QUINA*2/4/ CARDO/ VIRDEN//ALOE, CABUYA/ESMERALDA, 6B89.2027//PENCO/CHEVRON-BAR/ 4/6B89.2027/3/SVANHALL-BAR/MSEL//AZAF/ GOB24DH , FREDERIKSON/ STANDER-BAR //M81/3/ CABUYA, ROBUST/LA MOLINA 94, M104/ TOCTE, STANDER-BAR/CABUYA, LEGACY* 2/ 5/ATACO/ BERMEJO//HIGO/3/CLN-B/ 80/5138//GLORIA-BAR/COPAL/4/CHEVRON-BAR, MERITB/ALELI, MSE//CLI18/ E. QUEBRACHO, HART-BAR CANELA// MSEL, MNS1//CALI 192/ ROBUST , PFC9202/ CANELA, LOGAN-BAR//FNC I 22/ DEFRA, BUCKM8.88/E.ACACIA/ /MSEL, MERIT B/CANELA, Alanda-01, Saida, Tichedrett, Carina/Moroc9-75, Lignee527/Aths//Lignee 527/NK 1272, Lignee527//Lignee 527/ NK1272, Demhay, Asta, Abay, Shishai, Nawair 1, Oderbrucker, Egypt 4, Estate, Mauritna
4.	Moderately Susceptible (MS)	56-68	172	Union, Isaria, Haisa, Diamant, Villa, Lisa, Aurore, Kenia, Perun, Karat, Malt. Heda, Magnific102, Logan, Ambey488, CLE 226, CLE 233, CLE 178, CLE176, Br2, FNC 6-1, FNC 112, FNC 1, Quilmes Ayelen, Ana, MN 599, Bonita, Quilmes Pampa, Quebracho, Bianca, Clivia, ND 10277, C 9172, C9201, C 9038, C 9046, C 9053,

Table 2 continued...

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				Berolina, C 8730, C 9205, C 9315, C 9528, BCD 47, Baronesse, CLE 203 INYA AROMO, Carumbe, ND 17380, ND18365, ND19858, ND20047, ND20119, ND18341/ BICHY 2000//ND19164, ND 23112, ND 23180, CI3331, CI5098, Pr 434771, CLE 240, CLE 244, CLE 247, CLE 257, A. Madi, YAGAN, CLE 248, CLE 210, CERISE/ SHYRI/ /ALELI, CLE 246, CLE 234, CB 9214, C9317, C 9402, C 9412, C 9430, C 97006, C 97043, NCL9970, ND 21990, INIA411-SANCristobal, Moronera INIA, PIRI, EMIR, MINAK, BUSSELL-BAR, ARAMIR, MULTUM, DL69/ BAHTIM 10//H251 , CARINA-BAR, MENUET, ARAMIR/ COSSACK, CERISE, IDEAL-BAR, GLORIA-BAR/ COPAL, KARAN 280, LEGIA, GOLDMARKER, AMPA/COTA//GLORIA-BAR/ COPAL, VIOLETA, JUGLANS, LINAZA-BAR, 83S.514, CALICUCHIMA 92, CLN-B/80.5138//GLORIA-BAR/ COPAL/3/LBIRAN/UNA80//LIGNEE640/4/ MAMMUT/NOHA//GLOR IA-BAR, CAMPILLO LLERENA/DAPHENE//SEN, LBIRAN/UNA8271//GLORIA-BAR/COME/3/SEN, ROBUST// GLORIA-BAR/ COPAL, BELLA UNION, CIRUELO, TECOMA, JACINTO, TRIUMPH-BAR/TYRA/ /ARUPO*2/ABN-B/3/CANELA, CARDO/VIRDEN/6/CEN-B/3/ LBIRAN/ UNA8271//GLORIA-BAR/COME/4/SEN/5/TOCTE, AYAROSA/BLLU// CALI92, TECOMA /MINN DESC 2//CIRU, TOCTE, MADRE SELVA, ARUPO/ K8755// MORA, PETUNIA 1, ZIG ZIG, CHEMICO/ TOCTE//CONGONA, FALCON-BAR, LIMON/BICHY 2000, GOBERANDORA, GOB96DH, NE175-B, CAPUCHONA 20, P.STO/3/LBIRAN/UNA80//LIGNEE640/4/ BLLU/5/PETUNIA 1, CALI92/ ROBUST// PENCO/ CHERVON-BAR /3/SLLO /ROBUST//QUNIA, ATAH92/2* M81// TOCTE, DONARIS/GLORIA-BAR//CELO/3/GRANDO/4/TECOMA/5/ PUEBLA/CARDO// TOCTE, SLLO/ROBUST//QUNIA /3/CALI92/4/ LEGACY, ROBUST/IBTA MALTERA, LIMON/BICHY 2000/3/ALELI/CANELA// GOB96DH, CANELA/GOB89 DH// CANELA/GOB82DH/4/ ARUPO K8755//MORA /3/ALELI/ 5/ ARUPO*2/KC-B//ALELI, ICARO/4/GOB/HUMAI10//CANE LA/3/ALELI/5/ AZAF, CANELA/CHERI, MERIT, B/3/ ARUPO/ K8755//MORA, BR2/3/SVANHAL-BAR/MSEL// AZAF /GOB 24DH, BR2/CANELA, ADABELLA, CANICAPA, IBTA80, Rum, WI2291/Tadmor, Arta/JLB06-36 , BEKA, HB120, HOLKR, DIMTU, Misratch, Tokonda, Peruvian, Gold, Abyssian, Reka I, Lechtaler, Speciale, L94, Bolvia, Aim, Hiproly, I5, Helis Franken, Cebada capa, Nymfe, Power, SJ056576, San cristobal, Pasadena, Philadelphia, Conchita, Tocada, Cristalia
5.	Susceptible (S)	78-89	71	Karl, Stirling, Pirolina, MN 610, CLE 202, C 9616, C 9035, ND 14016, ND14600, C8806, C8828, ND18337/4/ 17401/3/ 15043// 16453/A64, ND18919 /ND 19119-1, ND22888, CLE 253, TOLAR, CLE251, CB9215, C9404, C9609, C97012, CEV97013, MZQ/DL71, MAZURKA, PUEBLA. BA, GOLONDRINA, LIGNEE640, ROLANDBAR, B1-BAR//MARI-B/ COHO/3/GADA/4/5*GRIT, OROSUS, MILAGROSA/ CARDO//QUNIA, DUCO, ALOE/GERANIO //MJA, ARUPO, PENCO/ CHEVRON-BAR , BICHY2000, RELKA 112, AZAF/ICARO, ESMERALDA, ACUARIO T95, LEO-BAR, LA MOLINA 94, LA MOLINA 96, BR 2 atahualpa, BRS 195, Manel, Saesea, Arta, zanbaka, Shege, IPA 7, Bigo, Abed Binder 12, Magnif 104, Astrix, Varunda, Bancroft, Barabas, Christina, Fronteir, Poet, Sebastian, Simba, Moronera, Bodrge, Aricade, Victoriana, Breamer, Cocktail, NFC Tipple
6.	Highly Susceptible (HS)	99	NIL	NIL

Results and Discussion

Since the use of resistant varieties is considered to be the best method for disease management, therefore, available genotypes were screened for the search of source of resistance in barley against the spot blotch caused by *Bipolaris sorokiniana*. It is evident from table

2 that none genotypes were found immune and highly susceptible. Out of 342 genotypes, one genotype was found resistant namely 6B89.2027/5/ATACO/ BERMEJO/ /2HIGO/3/CLN-B/80.5138// GLORIA - BAR/ COPAL /4/CHER VON-BAR /6/ LEGACY. Ninety seven genotypes were found moderately resistant

against spot blotch. Some of these were Prior, Ymer, Hanna, Volla, Bido, Weihenstephan Melthausistente I, Gull, Plumage Archer, Trumpf, Cheri, Defra, Magnific 104, CLE 232, C 9173, ND 15140, Scarlett, Danuta, Harrington, Bowman, Dayman, SUDAN, NDB 112, ND 17268, ND 17293, ND 19957, ND 19970, ND 23211, PRTL /MSEL.

One hundred seventy two genotypes were found moderately susceptible against spot blotch. Some of these were Union, Isaria, Haisa, Diamant, Villa, Lisa, Aurore, Kenia, Perun, Karat, Malt. Heda, Magnific102, Logan, Ambey 488, CLE 226, CLE 233, CLE 178, CLE176, Br2, FNC 6-1, FNC 112, FNC 1, Quilmes Ayelen, Ana, MN 599, Bonita, Quilmes Pampa, Quebracho, Bianca, Clivia, ND 10277, C 9172, C9201, C 9038, C 9046, C 9053, Berolina, C 8730, C 9205, C 9315, C 9528, BCD 47, Baronesse, CLE 203 INYA AROMO, Carumbe, ND 17380, ND18365, ND19858, ND20047, ND20119, ND18341/BICHY 2000//ND19164, ND23112, ND23180, CI 3331, CI 5098, Pr 434771, CLE 240, CLE 244, CLE 247, CLE 257, A. Madi, YAGAN, CLE 248, CLE 210, CERISE/SHYRI//ALELI. Seventy one genotypes were found susceptible against spot blotch. Some of these were Karl, Stirling, Pirolina, MN 610, CLE 202, C 9616, C 9035, ND 14016, ND14600, C8806, C8828, ND18337/4/17401/3/ 15043//16453/A64, ND18919/ND 19119-1, ND22888, CLE 253, TOLAR, CLE251, CB9215, C9404, C9609, C97012, CEV97013. Concurrent with the present findings, it has been also reported by Jain *et al.* (2014) who evaluated 85 barley germplasm under epiphytotic conditions. None germplasms were found immune. Out of these, 68 genotypes were found resistant, 7 were moderately resistant, 7 were moderately susceptible and 3 were found susceptible. Saadi *et al.* (2002) screened barley cultivars (Beecher, Jimmah 59, Jimmah 54, Omani, Jimmah 6, Jimmah 53, Jimmah 58, Drakey and Jimmah 51). Among them Beecher, Jimmah 59, Jimmah 54, Omani, K65 and Cooley were found resistant against spot blotch. Singh *et al.* (2007) and Verma *et al.* (2013) have also reported barley genotypes, which were resistant against spot blotch.

This study revealed that 342 genotypes of barley have shown various level of resistance to susceptible proneness

for spot blotch of barley in accordance with their potential to resist from the attack of *Bipolaris sorokiniana*. The above study helps in selecting genotypes to avoid the crop from getting affected by the pathogen.

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