INTERNATIONAL JOURNAL OF PLANT PROTECTION
VOLUME 9 | ISSUE 1 | APRIL, 2016 | 272-274

● e ISSN-0976-6855 | Visit us : *www.researchjournal.co.in*

IJPP

A CASE STUDY

DOI : 10.15740/HAS/IJPP/9.1/272-274

Evaluation of wheat genotypes for resistance against spot blotch disease

■ CHANDAN KUMAR SINGH*, SAVITA GUPTA, N.K. TIWARI AND DHARMENDRA SINGH

Department of Plant Pathology, N.D. University of Agriculture and Technology, Kumarganj, FAIZABAD (U.P.) INDIA

ARITCLE INFO

Received : 21.01.2016
Accepted : 19.03.2016

KEY WORDS :
Wheat, Spot blotch, *B. sorokiniana*, Screening

*Corresponding author:
Email: chandan.singh175242@gmail.com

ABSTRACT

Spot blotch caused by *Bipolaris sorokiniana* (Sacc.) Shoem 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*, 2011-12 and 2012-13 crop seasons at Main Experiment Station, NDUA and T, Kumarganj, Faizabad to test the resistance of 250 genotypes against *Bipolaris sorokiniana* under artificial epiphytotics conditions. Each genotype was sown in last week of November in single row of one meter length. Variety Raj 4015 was used as check and was sown after every 20 genotypes. Pure culture of pathogenwas inoculatedon genotypesby 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 250 genotypes, one namely KARAWANI/4NIF-3/SOTY/NAD63/CHRIS was found immune, 20 genotypes were found resistant, 146 were moderately resistant, 75 were moderately susceptible and 8 were found susceptible against spot blotch disease of wheat.

How to view point the article : Singh, Chandan Kumar, Gupta, Savita, Tiwari, N.K. and Singh, Dharmendra (2016). Evaluation of wheat genotypes for resistance against spot blotch disease. *Internat. J. Plant Protec.*, **9**(1) : 272-274.

INTRODUCTION

Wheat (*Triticum aestivum* L. emThell.) is one of the most important and strategic cereal crops for the majority of world's population.According to latest report of DWR, Karnal wheat was grown in 30.65 million ha. area and production was 95.85 million tonnes in 2013-14, in India (Anonymous, 2014), whereas in U. P. 97.34 lakh ha. area was under wheat cultivation in 2012-13 and production was 313.33 lakh mt. (Anonymous, 2013). It has good nutritional value than other food grains comprising 71.2g carbohydrates, 11.8g proteins, 1.5g fat, 1.2 g crude fibre, 306 mg phosphorus and 41 mg calcium per 100g grains (Rai and Mauria, 1999).

Spot blotch caused by *Bipolaris sorokiniana* (Sacc.) Shoem. (syn. *Helminthosporium sativum*, teleomorph *Cochliobolous sativus*) is an important wheat disease in warmer and humid growing regions ofthe world such as Eastern India, South East Asia (Joshi *et al*., 2007). Yield losses were estimated to be 18-22 per cent in India (Saari, 1998).The control strategy for

Table A : Kumar *et al.* (1998) double digit scale, based on per cent blighted area on the flag leaf and one leaf just below :

Sr. No.	Severity		Rating	
	Top (flag) leaf	Second top leaf	Disease response	Range
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

the diseases caused by *B. sorokiniana* is based on an integrated approach where genetic resistance is a major element, because economic returns have not always resulted in commercial grain production from fungicide inputs (Duveiller and Sharma, 2009). Hence, search of effective non-fungicidal control of spotblotch disease is of utmost importance. The best, long term, economically and environmentally safe method for sustainable disease control is the use of resistant varieties.

MATERIAL AND METHODS

The experiment was conducted at main experiment station of Narendra Deva University of Agriculture and

Table 1 : Categorization of wheat genotypes against the response of foliar blight disease under artificial disease pressure condition during 2013-2014

Sr. No.	Disease reaction	Double digit scale	Genotypes	No. of genotypes
1.	Immune (I)	00-01	KARAWANI/4NIF3/SOTY/NAD63/CHRIS	1
2.	Resistant (R)	12-24	DBW-46, DBW-51, HS-514, NHESZ-04, NHTSZ-05, HI-1572, NHLSZ-02, NHLSZ-03, NHLSZ-04, NHLSZ-11, NHLSZ-12, NHLSZ-13, NW-TS-01, NW-TS-02, NW-TS-03, NW-TS-04, NW-TS-09, NW-TS-10, NW-LS-09, NW-RI-03	20
3.	Moderately resistant (MR)	34-46	VL-829, VL-900, DBW-52, HD-2997, MACS3742(D), HD-3043, HI-8703(D), LOC-62, UAS-320(D), AKAW-4210-6, NHESZ-01, NHESZ-02, NHESZ-03, NHESZ-07, NHESZ-09, NHESZ-11, NHESZ-12, NHESZ-13, NHTSZ-02, NHTSZ-03, NHTSZ-04, NHTSZ-06, NHTSZ-07, NHTSZ-08, NHSLZ-01, NHSLZ-05, NHSLZ-06, NHSLZ-07, NHSLZ-08, NHSLZ-09, NHSLZ-10, NW-TS-05, NW-TS-06, NW-TS-07, NW-TS-08, NW-TS-11, NW-TS-12, NW-DM-01, NW-DM-03, NW-DM-04, NW-DM-05, NW-DM-06, NW-DM-07, NW-DM-08, NW-DM-09, NW-DM-10, NW-DM-11, NW-DM-12, NW-LS-01, NW-LS-02, NW-LS-03, NW-LS-04, NW-LS-05, NW-LS-06, NW-LS-07, NW-LS-08, NW-LS-10, NW-LS-11, NW-LS-12, NW-RF-02, NW-RF-03, NW-RF-04, NW-RF-05, NW-RF-06, NW-RF-07, NW-RF-08, NW-RF-09, NW-RF-10, NW-RF-11, NW-RF-12, NW-RF-13, NW-RF-14, NW-RF-15, NW-RI-01, NW-RI-02, NW-RI-04, NW-RI-05, NW-RI-06, NW-RI-07, NW-RI-08, NW-RI-09, NW-RI-10, NE-TS-01, NE-TS-02, NE-TS-04, NE-TS-05, NE-TS-06, NE-TS-07, NE-TS-08, NE-TS-09, NE-TS-10, NE-TS-11, NE-TS-12, NE-TS-13, NE-TS-14, NE-TS-15, NE-TS-16, NE-TS-17, NE-TS-18, NE-TS-19, NE-LS-02, NE-LS-03, NE-LS-06, NE-LS-07, NE-LS-08, CZ-TS-12, CZ-TS-13, CZ-TS-17, CZ-LS-02, CZ-LS-06, CZ-LS-08, CZ-LS-09, CZ-LS-10, CZ-RF-01, CZ-RF-08, CZ-RF-09, PZ-TS-04, PZ-TS-05, PZ-TS-06, PZ-TS-09, PZ-TS-10, PZ-TS-11, PZ-TS-12, PZ-TS-16, PZ-TS-17, PZ-TS-18, PZ-LS-2, PZ-LS-3, PZ-LS-4, PZ-LS-6, PZ-LS-8, PZ-LS-9, PZ-RF-04, SZ-TS-04, SZ-TS-05,	146
4.	Moderately susceptible (MS)	56-68	HP-1913, HS-507, HS-513, USA-316, NHESZ-05, NHESZ-06, NHESZ-10, NHTSZ-01, NW-DM-02, NW-TS-13, NW-RF-01, NW-RF-16,NE-TS-03,NE-TS-10,NE-TS-12, NE-TS-15, NE-TS-16, NE-TS-19,NE-LS-04, NE-LS-09, NE-LS-10, NE-LS-11, NE-LS-12,NE-RF-02, NE-RF-03, NE-RF-04, NE-RF-05, NE-RF-06, NE-RF-07,CZ-TS-01, CZ-TS-05, CZ-TS-06, CZ-TS-09, CZ-TS-10, CZ-TS-11, CZ-TS-14, CZ-TS-15, CZ-TS-16, CZ-TS-18, CZ-TS-19, CZ-LS-01, CZ-LS-03, CZ-LS-04, CZ-LS-05, CZ-LS-07, CZ-RF-02, CZ-RF-02, CZ-RF-03, CZ-RF-04, CZ-RF-05, CZ-RF-06, CZ-RF-07, CZ-RF-10,PZ-TS-01, PZ-TS-02, PZ-TS-03, PZ-TS-07, PZ-TS-08, PZ-TS-13, PZ-TS-14, PZ-TS-15, PZ-LS-01, PZ-LS-05, PZ-LS-07, PZ-RF-01, PZ-RF-02, PZ-RF-03, PZ-RF-05,SZ-TS-01, SZ-TS-02,SZ-TS-03, SPL-AST-01, SPL-AST-04, SPL-AST-09, SPL-AST-10, SPL-AST-11,	75
5.	Susceptible (S)	78-89	NE-LS-01, NE-LS-05, NE-RF-01,CZ-TS-02, CZ-TS-03, CZ-TS-04, CZ-TS-07, CZ-TS-08	8

Technology, Kumarganj, Faizabad (U.P.) during crop season *Rabi*, 2013-14. Seeds of 250 genotypes 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.). Each genotype was sown (fourth 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. Two rows of susceptible varieties (A-9-30-1 and Raj 4015) to foliar blight were sown as border rows around all the sites of experiment.

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). This suspension was sprayed at 3-4 leaf stage by using hand atomizer. The second field inoculation was made again in the same manner 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 A) based on per cent blighted area on the flag and one leaf just below. The maximum disease score of each genotype was recorded finally.

RESULTS AND DISCUSSION

Use of resistant variety is a cheapest and most economical method of disease control. Two hundred fifty varieties (Table 1) were screened under field conditions by double digit scale based on per cent blighted area on the flag and flag-1 leaf at hard dough stages. Out of which, onlyone genotype (KARAWANI/4NIF-3/SOTY/NAD63/CHRIS) was rated as immune, 20 genotypes *viz*., DBW-46, DBW-51, HS-514, NHESZ-04, NHTSZ-05, HI-1572, NHLSZ-02, NHLSZ-03, NHLSZ-04, NHLSZ-11, NHLSZ-12, NHLSZ-13, NW-TS-01, NW-TS-02, NW-TS-03, NW-TS-04, NW-TS-09, NW-TS-10, NW-LS-09, NW-RI-03were rated as resistant, 146 genotypes moderately resistant, 75 genotypes moderately susceptibleand 8 genotypes susceptible for spot blotch disease under field conditions.

Similar observations were recorded by other workers.Kenganal *et al.* (2008) screened wheat cultivars against *Helminthosporium sativum* [*Cochliobolus sativus*] occurring on wheat. Out of 15 wheat cultivars screened, NIDW-295 and MACS-2496 were found immune; DDK-1013, DWR-185, DWR-225, RAJ-4037 and MACS-2846 were highly resistant; GW-344 and DWR-195 were resistant; GW-322, DDK-1001 and DWR-162 were moderately resistant, DWR-2006 and DWR-1006 were susceptible and DDK-1009 was highly susceptible.Singh *et al.* (1995) In field inoculation trials only 15 of 257 genotypes were consistently resistant to *H. sativum* (*Cochliobolus sativus*). A further 47 were moderately resistant and 158 moderately susceptible, with 33 rated susceptible and 4 highly susceptible. No genotype was free from infection during the 3 test years.

REFERENCES

Anonymous (2013).Wheat Progress report 2012-2013, *All India Co-ordinated Wheat and Barley Improvement Project. DWR, Karnal*.

Anonymous (2014).Wheat Progress report 2013-2014, *All India Co-ordinated Wheat and Barley Improvement Project. DWR, Karnal*. 1p.

Duveiller, E. and Sharma, R.C. (2009). Genetic improvement and crop management strategies to minimize yield losses in warm non-traditional wheat growing areas due to spot blotch pathogen *Cochliobolus sativus*. *J. Phytopathol.*,**157**: 521–534.

Joshi, A.K., Kumari, M., Singh, V.P., Reddy, C.M., Kumar, S., Rane, J. and Chand, R. (2007). Stay green trait: variation, inheritance and its association with spot blotch resistance in spring wheat (*Triticum aestivum* L.). *Euphytica*, **153**: 59–71.

Kenganal, M.Y., Hanchinal, R.R. and Nadaf, H.L. (2008). *In vitro*screening of wheatgenotypes against *Helminthosporium sativum*. *Res. Crops*, **9**(2) : 450-455.

Kumar, J., Singh, G. and Nagarajan, S. (1998). A field scale for leaf blight recording. *Indian Wheat Newsletter,* **4** : 3.

Rai, M. and Mauria, S. (1999). Coarse cereals, not for poor alone.*The Hindu Survey of Indian Agriculture*, pp. 55-59.

Saari, E.E. (1998). Leaf blight disease and associated soil-borne fungal pathogens of wheat in south and south East Asia. CIMMYT, Mexico D.F., pp. 37–51.

Singh, R.V., Singh, B.N., Singh, A.K., Singh, D. and Singh, V.B. (1995). Screening of wheat genotypes against foliar blight caused by *Helminthosporium sativum. Plant Diseae Rec.*, **10 1** : 88-90.