The Pharma Innovation Journal 2022; 11(12): 5504-5507

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(12): 5504-5507

www.thepharmajournal.com
Received: 14-09-2022
Accepted: 17-10-2022

Surendra Bajiya
Department of Plant Pathology, College of Agriculture, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh, India

Sanjeev Kumar
Department of Plant Pathology, College of Agriculture, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh, India

Archana Rani
Department of Genetics & Plant Breeding, College of Agriculture, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh, India

RS Shukla
Department of Genetics & Plant Breeding, College of Agriculture, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh, India

Mayank Bishnoi
Department of Plant Pathology, College of Agriculture, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh, India

Archana Kumawat
Department of Plant Pathology, College of Agriculture, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh, India

Corresponding Author:
Sanjeev Kumar
Department of Plant Pathology, College of Agriculture, Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh, India

Screening of wheat genotypes against Alternaria leaf blight of wheat

Surendra Bajiya, Sanjeev Kumar, Archana Rani, RS Shukla, Mayank Bishnoi and Archana Kumawat

Abstract
Alternaria blight disease caused by *Alternaria triticina* is most important disease of wheat in Central zones (NEPZ) representing warm and humid climate in India. It is also increasing in Madhya Pradesh, due to climate changes and causes considerable losses in susceptible varieties. A total of 78 wheat varieties/genotypes and 325 CMS F1 hybrids wheat genotypes were screened in field conditions during 2021-2022 as part of the wheat improvement project under JNKVV-Jabalpur to test their resistance. Out of 78 wheat varieties were screened, 6 varieties were found highly resistant, 27 were resistant, 33 were moderately resistant, 7 were moderately susceptible and 5 were susceptible to Alternaria wheat blight. Out of 325 CMS hybrid wheat genotypes were screened, 22 were found highly resistant, 112 were resistant, 113 were moderately resistant, 68 were moderately susceptible, 8 were susceptible and 2 were highly susceptible to Alternaria blight of wheat.

Keywords: *Alternaria triticina*, leaf blight, screening, wheat

Introduction
Wheat is an important part of the human diet, accounting for approximately 20% of daily protein and calories, and is the second most important food crop in developing countries after rice in terms of food security. Wheat production is influenced by several factors, from sowing to storage. Disease is the most important stressor. Wheat is attacked by a variety of fungi, bacteria and viruses, all of which severely reduce yields. Fungi are responsible for most diseases, some of which lead to reduced yields. Black rust, brown/orange, and yellow rust are the three most important leaf diseases in wheat, leading to reduced yields. *Alternaria triticina*, Helminthosporium spp. and Curvularia spp. cause leaf blight, but *Alternaria triticina* is particularly prevalent in the wheat-growing regions of eastern and central-southern India particularily in Madhya Pradesh (Joshi *et al*., 1978) [3]. It causes severe damage to crops and grain yields (Verma *et al.*, 2018) [8].

Finding suitable controls should therefore be largely an obligation. Various methods are available to control the Alternaria blight in wheat. Developing resistant variety is one of the cheapest, safest and most durable methods for the control of Alternaria blight of wheat. (Yogesh *et al.* 2014) [7]. However, reports of development of resistance/tolerance varieties for Alternaria blight disease of wheat is sparse in the country. Therefore, current screening work was conducted find out resistant /tolerance variety against the most important Alternaria blight diseases of wheat in Madhya Pradesh.

Materials and methods
Screening of CMS F1 hybrids of wheat
A field experiment was conducted during Rabi 20201-22 in CRP on Hybrid technology project. The location of the project is on the National high way No. 7 i.e., 8 Km. away from collectorate head quarter in north side under Wheat Improvement Project, Department of Plant Breeding and Genetics, Jawahar Lal Nehru Krishi Vishwa Vidyalaya, Jabalpur (MP). 327 CMS F1 hybrids of wheat were screened against the foliar blight disease. The cross no and experimental details are given below in table-1.

Table 1: Experimental details of CMS hybrid genotypes

S. NO.	No of hybrids	325
1	No of row	02
2	Row to row distance	20cm
3	Row length	3.5m
4	Fertilizer dose (NPK kg/ha)	120: 60: 40
5	Gross plot size	3.5x2x0.20 =1.4 m2
6	Date of Sowing	14/11/2021
7	Date of harvesting	10/04/2022
8	No of replication	03

Screening of varieties/ germplasm

Another field experiment was conducted during Rabi 2020-21 in Wheat Improvement Project, Department of Plant Breeding and Genetics, Jawahar Lal Nehru Krishi Vishwa Vidyalaya, Jabalpur (MP). 84 genotypes/lines of wheat viz; MP 3382, MP 3336, JW 3288, JW 3211, JW 3020, JW 3173, JW 1255, MP 3523, MP 3527, MP 3535, MP 3536, 1201, MP 1142, GW 273, GW 322, GW 366, GW 451, MP 3541, MP 3545, MP 3503, MP 3493, MP 3542, 3495, MP 3552, MP 3521, MP 3469, MP 3556, HI 8498, MP 1106, HD 2285, Sonalika, MP 4010, HI 1418, HD 4672, MP 1215, MP 1202, HD 2864, DBW 14, GW 173, Lok 1, RAJ 3777, RAJ 3765, WH 147, MP 3516, MP 3466, OLIGO-1,2,3,4,5,6,8, Black Wheat, MP 3436, GS 190, GS 10016, GS 7059, GS 7014, PWB 343, HI 8663, MP 3558, MP 3567, MP 3557, MP 3288, MP 1203, MP 3224, MP 3544, *Tricticumpolicon*, HD 2932, HI 8713, HI 8737, HI 1454, HI 1663, HI 1633, CYMT 31, VL 829, C 306 and Sujata were screened against the leaf blight disease. The cross no and experimental details are given below in table -2.

Table 2: Experimental details of wheat genotypes

S.No.	No of hybrids	78
1	No of row	02
2	Row to row distance	20cm
3	Row length	3.5m
4	Fertilizer dose (NPK kg/ha)	120: 60: 40
5	Gross plot size	6 x 0.2 =1.2 m2
6	Date of Sowing	12/11/2021
7	Date of harvesting	15/04/2022
8	No of replication	03

Disease severity at different growth stages will be measured under natural conditions using the 0-9 Double digit scale of Singh *et al*., 2007. The observations were recorded on 10 plants randomly selected from each plot. From this observations percent disease index (PDI) was calculated. The disease reaction was grouped in five categories i.e. highly resistant, resistant, moderately resistant, susceptible and highly susceptible.

Results and Discussion

In order to find out the source of resistance against leaf blight disease, 78 wheat genotypes and 325 CMS Hybrid wheat genotypes were screened under field condition in the year 2021-22. Data revealed that out of 78 wheat genotypes tested against leaf blight of wheat, 06 genotypes *viz*., OLIGO 8, Black wheat, MP 3544, PBW 343, HI 8713, *Triticumpolicon* were highly resistant. 27 genotypes were found to be resistant; 33 genotypes were moderately resistant and 07 genotypes were found to be moderately susceptible (Table-3). Among 78 genotypes, only 05 genotypes *viz.*, HI 1663, GS 7059, WH 147, GW 451, GW 322 showed susceptible reaction against the disease.

Out of the 325 CMS F1 hybrids lines tested against leaf blight of wheat; 22 genotypes *viz.*, CRP-21-39, CRP-21-40, CRP-21-47, CRP-21-48, CRP-21-59, CRP-21-65, CRP-21-73, CRP-21-75, CRP-21-79, CRP-21-84, CRP-21-107, CRP-21-114, CRP-21-118, CRP-21-137, CRP-21-149, CRP-21-178, CRP-21-200, CRP-21-229, CRP-21-238, CRP-21-256, CRP-21-269, CRP-21-289 were highly resistant (Table-4). 112 genotypes were found to be resistant; 113 genotypes were moderately resistant and 68 genotypes were found to be moderately susceptible, 08 genotype were susceptible. Only 02 genotypes *viz.*, CRP-21-69, CRP-21-239 showed highly susceptible reaction against the disease. Large number of resistance sources and a smaller number of susceptible genotypes observed during screening might be due to the prevalence of low disease pressure throughout growing season owing to adverse weather conditions. It also depends upon their genetic constitution; some may be resistant or some may be susceptible for leaf blight disease and also upon the favorable environmental conditions prevailing. Among CMS hybrid line there is such variation due to a line and restorer line taken and cross among themselves and resistant lines were identified. Screening of several genotypes were also performed by Akram and Singh 2003 [1]; Lokhande, 1993 [4]; Singh *et al.* 2003 [5], Shivankar & Lokhande, 1993 [4]; Verma *et al.*, 2018 [8] and various resistant genotypes were identified.

Table 1: Screening of CMS Hybrid wheat genotypes against leaf blight Disease.

Reaction	Range of disease score	Total no. of entries	Name of entries
Highly resistant (HR)	00-03	22	CRP-21-39, CRP-21-40, CRP-21-47, CRP-21-48, CRP-21-59, CRP-21-65, CRP-21-73, CRP-21-75, CRP-21-79, CRP-21-84, CRP-21-107, CRP-21-114, CRP-21-118, CRP-21-137, CRP-21-149, CRP-21-178, CRP-21-200, CRP-21-229, CRP-21-238, CRP-21-256, CRP-21-269, CRP-21-289
Resistant (R)	11-25	112	CRP-21-1, CRP-21-2, CRP-21-4, CRP-21-6, CRP-21-11, CRP-21-13, CRP-21-14, CRP-21-15, CRP-21-16, CRP-21-17, CRP-21-19, CRP-21-20, CRP-21-23, CRP-21-26, CRP-21-30, CRP-21-32, CRP-21-33, CRP-21-34, CRP-21-35, CRP-21-36, CRP-21-37, CRP-21-38, CRP-21-41, CRP-21-42, CRP-21-44, CRP-21-45, CRP-21-56, CRP-21-57, CRP-21-58, CRP-21-61, CRP-21-62, CRP-21-66, CRP-21-71, CRP-21-78, CRP-21-80, CRP-21-81, CRP-21-82, CRP-21-87, CRP-21-90, CRP-21-91, CRP-21-97, CRP-21-100, CRP-21-101, CRP-21-104, CRP-21-105, CRP-21-106, CRP-21-108, CRP-21-109, CRP-21-115, CRP-21-119, CRP-21-120, CRP-21-121, CRP-21-122, CRP-21-126, CRP-21-130, CRP-21-136, CRP-21-138, CRP-21-240 CRP-21-141, CRP-21-142, CRP-21-146, CRP-21-150, CRP-21-156, CRP-21-158, CRP-21-160, CRP-21-164, CRP-21-165, CRP-21-166, CRP-21-174, CRP-21-181, CRP-21-201, CRP-21-202, CRP-21-203, CRP-21-212, CRP-21-214, CRP-21-215, CRP-21-216, CRP-21-222, CRP-21-223, CRP-21-224, CRP-21-228, CRP-21-233, CRP-21-237, CRP-21-241, CRP-21-242, CRP-21-245, CRP-21-246, CRP-21-255, CRP-21-257, CRP-21-258, CRP-21-261, CRP-21-263, CRP-21-264, CRP-21-265, CRP-21-270, CRP-21-275, CRP-21-276, CRP-21-278, CRP-21-281, CRP-21-282, CRP-21-288, CRP-21-295, CRP-21-296, CRP-21-299, CRP-21-302, CRP-21-305, CRP-21-310, CRP-

			21-315, CRP-21-316, CRP-21-317, CRP-21-321, CRP-21-322
Moderately resistant (MR)	33-47	113	CRP-21-3, CRP-21-5, CRP-21-7, CRP-21-8, CRP-21-18, CRP-21-21, CRP-21-22, CRP-21-24, CRP-21-25, CRP-21-27, CRP-21-28, CRP-21-29, CRP-21-31, CRP-21-46, CRP-21-49, CRP-21-50, CRP-21-51, CRP-21-52, CRP-21-53, CRP-21-54, CRP-21-55, CRP-21-60, CRP-21-63, CRP-21-64, CRP-21-67, CRP-21-70, CRP-21-72, CRP-21-83, CRP-21-85, CRP-21-86, CRP-21-88, CRP-21-89, CRP-21-94, CRP-21-95, CRP-21-98, CRP-21-110, CRP-21-111, CRP-21-112, CRP-21-113, CRP-21-116, CRP-21-117, CRP-21-123, CRP-21-125, CRP-21-128, CRP-21-129, CRP-21-131, CRP-21-133, CRP-21-147, CRP-21-148, CRP-21-151, CRP-21-155, CRP-21-157, CRP-21-161, CRP-21-162, CRP-21-163, CRP-21-169, CRP-21-172, CRP-21-176, CRP-21-177, CRP-21-179, CRP-21-180, CRP-21-184, CRP-21-185, CRP-21-186, CRP-21-188, CRP-21-191, CRP-21-192, CRP-21-193, CRP-21-196, CRP-21-197, CRP-21-198, CRP-21-205, CRP-21-206, CRP-21-207, CRP-21-209, CRP-21-210, CRP-21-211, CRP-21-217, CRP-21-218, CRP-21-219, CRP-21-230, CRP-21-231, CRP-21-235, CRP-21-236, CRP-21-243, CRP-21-244, CRP-21-247, CRP-21-248, CRP-21-249, CRP-21-250, CRP-21-253, CRP-21-254, CRP-21-266, CRP-21-267, CRP-21-268, CRP-21-273, CRP-21-279, CRP-21-280, CRP-21-285, CRP-21-286, CRP-21-287, CRP-21-290, CRP-21-291, CRP-21-292, CRP-21-300, CRP-21-301, CRP-21-306, CRP-21-311, CRP-21-312, CRP-21-318, CRP-21-319, CRP-21-323, CRP-21-324
Moderately susceptible (MS)	55-69	68	CRP-21-9, CRP-21-10, CRP-21-12, CRP-21-43, CRP-21-68, CRP-21-76, CRP-21-77, CRP-21-92, CRP-21-93, CRP-21-96, CRP-21-99, CRP-21-102, CRP-21-124, CRP-21-132, CRP-21-134, CRP-21-135, CRP-21-139, CRP-21-140, CRP-21-143, CRP-21-144, CRP-21-145, CRP-21-152, CRP-21-153, CRP-21-154, CRP-21-159, CRP-21-167, CRP-21-168, CRP-21-170, CRP-21-171, CRP-21-173, CRP-21-175, CRP-21-182, CRP-21-183, CRP-21-189, CRP-21-190, CRP-21-194, CRP-21-195, CRP-21-199, CRP-21-204, CRP-21-208, CRP-21-213, CRP-21-220, CRP-21-221, CRP-21-225, CRP-21-226, CRP-21-227, CRP-21-232, CRP-21-251, CRP-21-252, CRP-21-259, CRP-21-260, CRP-21-271, CRP-21-272, CRP-21-277, CRP-21-283, CRP-21-284, CRP-21-293, CRP-21-294, CRP-21-297, CRP-21-298, CRP-21-304, CRP-21-307, CRP-21-308, CRP-21-313, CRP-21-314, CRP-21-320, CRP-21-325
Susceptible (S)	77-89	8	CRP-21-74, CRP-21-103, CRP-21-127, CRP-21-187, CRP-21-234, CRP-21-262, CRP-21-303, CRP-21-309
Highly susceptible (HS)	> 99	2	CRP-21-69, CRP-21-239
Total		325	

Table 2: Screening of wheat varieties/germplasm against leaf blight of wheat.

Reaction	Range of Disease Score	Total no. of Entries	Name of entries
Highly resistant (HR)	00-03	06	OLIGO 8, Black wheat, MP 3544, PBW 343, HI 8713, *Triticumpolicon*
Resistant (R)	11-25	27	MP 3336, JW 3288, MP 3523, JW 3211, MP 3536, MP 1142, JW 3020, MP 3542, JW 3173, MP 3495, MP 3556, GW 273, MP 1106, MP 3516, MP 3466, GW 366, MP 3436, HD 4672, HD 2864, GW 173, LOK 1, OLIGO 1, OLIGO 2, OLIGO 5, VL 829, HI 1633, HI 8738
Moderately resistant (MR)	33-47	33	MP 3382, JW 1255, MP 3523, HI 1418, MP 3536, HI 8498, MP 1201, HD 2285, MP 3541, RAJ 3765, MP 3503, MP 3545, MP 3493, MP 3552, MP 3521, MP, 3469, OLIGO 3, OLIGO 4, OLIGO 6, MP 1215, MP 1202, MP 3558, GS 190, MP 3567, GS 10016, MP 3557, GS 7014, CYMT 31, Sujata, HI 8663, C 306, MP 3224, HD 2932
Moderately susceptible (MS)	55-69	07	Sonalika, DBW 14, RAJ 3777, MO 4010, MP 3288, HI 1454, MP1203
Susceptible (S)	78-89	05	HI 1663, GS 7059, WH 147, GW 451, GW 322
Highly susceptible (HS)	> 99	-	-
	Total	78	

Conclusion

Out of 78 wheat varieties were screened, 6 varieties were found highly resistant, 27 were resistant, 33 were moderately resistant, 7 were moderately susceptible and 5 were susceptible to Alternaria wheat blight. Out of 325 CMS hybrid wheat genotypes were screened, 22 were found highly resistant, 112 were resistant, 113 were moderately resistant, 68 were moderately susceptible, 8 were susceptible and 2 were highly susceptible to Alternaria blight of wheat. The resistant varieties can be utilized in breeding programme to develop high yielding varieties.

References

1. Akram M, Singh A. Screening and host response characterization of wheat against *Bipolarissorokiniana.* Indian Phytopathology. 2003;56(2):201-204.
2. Chenulu VV, Singh A, Joshi LM. Estimation of losses due to *Alternaria* leaf blight of wheat caused by Alternariatriticina. Abstract International Symposium Plant Patholog. 1967;193:190-192.
3. Joshi LM, Srivastava KD, Singh DV, Goel LB, Nagarajan S. Annotated compendium on wheat diseases in India. Indian Council of Agricultural Research. New Delhi; c1978. p. 332.
4. Shivankar SK, Lokhande VV. Field evaluation of wheat varieties against leaf blight. Proc. lndian Phytopathology Society; c1993. p. 85-87.
5. Singh DP, Chand R, Dodan DS, Singh KD, Tewari AN, Singh KMO, *et al*. Evaluation of wheat and triticale genotypes for resistance to leaf blight caused by *Bipolaris sorokiniana* and *Alternaria triticina*. Indian Phytopathology. 2003;56(4):473-475.
6. Ambhore SN, Mangesh D, Bharsakle S, Gotarkar SB, Patil MJ. Screening of wheat germplasm lines against alternaria leaf blight of wheat. Journal of Plant Disease Sciences. 2005;1:133-135.

7. Yogesh R, Patel B, Viren A, Patel J. Science guardian screening of wheat varieties against Alternaria leaf blight of wheat. Bioscience Guardian. 2014;4:19-21.
8. Verma G, Kumar S, Chandra Pal, Varma S. Evaluation of wheat genotypes for resistance against foliar blight disease. Int. J Curr. Microbiol. App. Sci. 2018;7(11):1642-1646.
DOI: https://doi.org/10.20546/ijcmas.2018.711.186