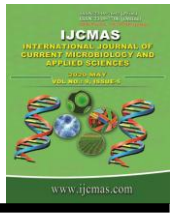
Int.J.Curr.Microbiol.App.Sci (2020) *9*(5): 180-185

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 9 Number 5 (2020)**
Journal homepage: http://www.ijcmas.com



Original Research Article https://doi.org/10.20546/ijcmas.2020.905.020

Screening of Rapeseed and Mustard (*Brassica)* Germplasm and Breeding Material against *Erysiphe cruciferarum* causing Powdery Mildew under Bastar Plateau of Chhattishgarh

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Keywords

Erysiphe cruciferarum, Powdery mildew, *Brassica* sp., Screening, Mustard

Article Info

Accepted:
05 April 2020
Available Online:
10 May 2020

A B S T R A C T

Powdery mildew of mustard caused by *Erysiphe cruciferarum Opiz.ex Junell.*, is one of the most important diseases in India as well as Chhattisgarh. It occurs regularly and caused considerable yield losses in Indian mustard (*Brassica juncea* (Linn.) Czern and Coss. In present investigation, screening of sixty one germplasms of rapeseed and mustard group (*Brassica* species) were carried out during *Rabi* of 2018-19 under field conditions. Among the sixty one germplasms, the UDN-18-24, 18-34, 18-40, 18-44, 18-48, 18-50, 18-56 and 18-61 genotypes were found immune against disease with scale point of zero. While, the genotypes 18-25 was categorized as highly resistant with scale point of one whereas, total thirty six germplasms were rated as moderately resistant to the disease with the scale point of 5 in the year of 2018-19.

Introduction

Rapeseed and mustard (*Brassica juncea)* is the second most important oilseed crop in India with 8.32 million tonnes production and 5.96 million hectares area in 2017-18[1]. It occupies a prominent place being next in importance to groundnut both in area and production. The different forms of rapeseed and mustard grown in India, include toria (*Brassica campestris* or *Brassica rapa*), yellow and brown sarson (*Brassica campestris* or *Brassica rapa*), rai or raya (*Brassica juncea*), taramira (*Eruca sativa*) gobhi sarson (*Brassica napus*), and black mustard (*B. napus*), as important group of oilseed crops in country. In India, the mustard crop suffers every year from many diseases like white rust, *Alternaria* blight, sclerotial stem rot, downy and powdery mildew[2].

The powdery mildew caused by *Erysiphe cruciferarum*, Opiz. ex Junell, is a most important disease of mustard and other crops in Bastar plateaue of Chhattisgarh state and it cause great economic losses. This is one of the most wide spread, destructive most virulent on all *Brassicaceae* plants and cause adverse effect on both quality and quantity of the crop. Powdery mildew is occurs especially when slightly high prevails during flowering stage with optimum temperature (22-27^{O}C) stage and relative humidity in air 95 to 98%. The reduction in grain yield of mustard due to powdery mildew disease was estimated till 17.40 per cent[3].

It is most commonly observed on the upper sides of the leaves (Fig. 1). Infected buds may fail to open. This is because the fungus does not need the presence of water on the leaf surface for the infection to occur. However, the relative humidity of the air does need to be high for spore germination. Therefore, the disease is common in crowded plantings where air circulation is poor and in damp, shaded areas. Powdery mildew of mustard affects not only foliage but also developing green siliquae as well as in growth plant stem (Fig.1)[4].

Materials and Methods

The present investigation was conducted at Saheed Ghundhadur College of Agriculture and Research Station, Jagdalpur, Bastar (C.G.) during *Rabi* 2018-19 and 2019-20. The experimental material comprised of sixty one germplasms of rapeseed and mustard groups (*Brassica juncea, Brassica carinata, Brassica napus, Eruca sativa and B.rapa)* were opted from DRMR (Directorate of Rapeseed and Mustard Research), Bharatpur, Rajasthan. Screening of mustard germplasm for disease resistance was carried out under natural conditions. To promote the natural disease epidemic, the planting of 3 meter double line susceptible variety Varuna was incorporated after each two rows of germplasm. The germplasm were gown in two rows each of 3 meter length with spacing of 40 × 10 cm in randomized block design. The present study was therefore, carried out for finding out the source of resistance against powdery mildew of rapeseed and mustard caused by *Erysiphe cruciferarum*, under natural conditions. Observations were recorded on percent disease severity after 75 days after transplanting and data is shown in Table 1.

0 (Immune)	**= No lesion**
1 (HR)	= Non-sporulating pinpoint size or small brown necrotic spots, less than 5% leaf area covered by lesion.
3 (R)	= Small roundish slightly sporulating larger brown necrotic spots, about 1-2 mm in diameter with a distinct margin or yellow halo, 5-10% leaf area covered by lesions.
5 (MR)	= Moderately sporulating, non-coalescing larger brown spots about, 2-4 mm in diameter with a distinct margin or yellow halo, 11-25% leaf area covered by the spots.
7 (S)	= Moderately sporulating, coalescing larger brown spots about, 4-5 mm in diameter, 26-50 % leaf area covered by the lesions.
9 (HS)	**=** Profusely sporulating, rapidly coalescing brown to black spot measuring more than 6 mm diameter without margin covering more than 50% leaf area.

The observations and screening was carried out as per the scale suggested by All India Coordinated Research Project on Rapeseed and Mustard (AICRP), DRMR, ICAR, Bharatpur, Rajasthan[5]. Data were collected and transformed into arc sign value and

statistically analyzed as per the design using ANOVA. Actual and transformed (in parenthesis) values along with mean, CD (*P<0.05*) and CV (%) presented in Table 1. Scale (0-9) for reaction to powdery mildew for rating of germplas (AICRP, DRMR, ICAR).

Results and Discussion

Powdery mildew caused by *Erysiphe cruciferarum* is one of the most important diseases of rapeseed mustard crops. In present investigation screening of sixty one cultivars genotypes of rapeseed mustard group (*Brassica* species) were carried out during *Rabi* of 2018-19 under field conditions. The present study indicates that following genotypes were found better source of resistance to powery mildew are UDN-18-24, UDN-18-34, UDN-18-40, UDN-18-44, UDN-18-48, UDN-18-50, UDN-18-56 and UDN-18-61 genotypes were found immune against disease with scale point of 0.

Table.1 Screening of *Brassica germplasm* and breeding material against powdery mildew of mustard under field condition during 2018-2019

S.N.	Entry/ Germplasm	Powdery mildew disease reaction at 75 days after sowing		Germplasm reaction
		Disease severity on leaves (%)	Scale	
1	UDN-18-1	09.00 (17.43)	3	R
2	UDN-18-2	14.00 (21.92)	5	MR
3	UDN-18-3	16.50 (23.95)	5	MR
4	UDN-18-4	13.00 (21.12)	5	MR
5	UDN-18-5	08.00 (16.43)	3	R
6	UDN-18-6	09.00 (17.43)	3	R
7	UDN-18-7	13.00 (21.12)	5	MR
8	UDN-18-8	10.00 (18.35)	3	R
9	UDN-18-9	16.00 (23.54)	5	MR
10	UDN-18-10	17.50 (24.68)	5	MR
11	UDN-18-11	13.00 (21.12)	5	MR
12	UDN-18-12	10.00 (18.43)	3	R
13	UDN-18-13	13.00 (21.12)	5	MR
14	UDN-18-14	14.00 (21.92)	5	MR
15	UDN-18-15	11.00 (19.35)	5	MR
16	UDN-18-16	10.50 (18.78)	5	MR
17	UDN-18-17	15.00 (22.78)	5	MR
18	UDN-18-18	16.50 (23.95)	5	MR
19	UDN-18-19	11.00 (19.20)	5	MR
20	UDN-18-20	13.00 (21.12)	5	MR
21	UDN-18-21	08.50 (16.94)	3	R
22	UDN-18-22	11.00 (19.35)	5	MR
23	UDN-18-23	24.50 (29.67)	5	MR
24	UDN-18-24	00.00 (0.00)	0	IMMUNE
25	UDN-18-25	05.00 (12.92)	1	HR
26	UDN-18-26	23.00 (28.65)	5	MR
27	UDN-18-27	17.00 (24.27)	5	MR

28	UDN-18-28	11.00 (19.35)	5	MR
29	UDN-18-29	15.00 (22.78)	5	MR
30	UDN-18-30	11.00 (19.35)	5	MR
31	UDN-18-31	09.50 (17.95)	3	R
32	UDN-18-32	16.50 (23.95)	5	MR
33	UDN-18-33	11.00 (19.35)	5	MR
34	UDN-18-34	00.00 (0.00)	0	IMMUNE
35	UDN-18-35	13.00 (21.12)	5	MR
36	UDN-18-36	10.00 (18.43)	3	R
37	UDN-18-37	12.00 (20.20)	5	MR
38	UDN-18-38	17.00 (24.34)	5	MR
39	UDN-18-39	16.00 (23.54)	5	MR
40	UDN-18-40	00.00 (0.00)	0	IMMUNE
41	UDN-18-41	11.00 (19.35)	5	MR
42	UDN-18-42	09.00 (17.43)	3	R
43	UDN-18-43	08.00 (16.43)	3	R
44	UDN-18-44	00.00 (0.00)	0	IMMUNE
45	UDN-18-45	15.50 (23.16)	5	MR
46	UDN-18-46	21.00 (27.27)	5	MR
47	UDN-18-47	08.50 (16.94)	3	R
48	UDN-18-48	00.00 (0.00)	0	IMMUNE
49	UDN-18-49	14.00 (21.97)	5	MR
50	UDN-18-50	00.00 (0.00)	0	IMMUNE
51	UDN-18-51	14.00 (21.97)	5	MR
52	UDN-18-52	10.50 (18.90)	5	MR
53	UDN-18-53	22.00 (27.97)	5	MR
54	UDN-18-54	08.00 (16.43)	3	R
55	UDN-18-55	11.50 (19.82)	5	MR
56	UDN-18-56	00.00 (0.00)	0	IMMUNE
57	UDN-18-57	23.00 (28.65)	5	MR
58	UDN-18-58	09.00 (17.43)	3	R
59	UDN-18-59	10.00 (18.43)	3	R
60	UDN-18-60	15.50 (23.12)	5	MR
61	UDN-18-61	00.00 (0.00)	0	IMMUNE
CD		**45.19**		
CV		**65.70**		

HR= Highly Resistant, R= Resistant, MR= Moderate Resistant

Figure.1 Powdery mildew symptoms on leaf (a), siliqua (b) and stem (c)

The genotypes UDN-18-25 (5 % leaves) was categorized as highly resistant with scale point of 1 whereas UDN-18-1 (9 % leaves), UDN-18-5 (8 % leaves), UDN-18-6 (9 % leaves), UDN-18-8 (10 % leaves), UDN-18-12 (10 % leaves), UDN-18-21 (8.5 % leaves), UDN-18-31 (9.5 % leaves), UDN-18-36 (10 % leaves), UDN-18-42 (9 % leaves), UDN-18-43 (8 % leaves), UDN-18-47 (8.5 % leaves), UDN-18-54 (8 % leaves), UDN-18-58 (9 % leaves) and UDN-18-59 (10 % leaves) was screened under resistant category with the scale point of 3 similarly, UDN-18-2 (14 % leaves), UDN-18-3 (16.5 % leaves), UDN-18-4 (13 % leaves), UDN-18-7 (13 % leaves), UDN-18-10 (17 % leaves), UDN-18-11 (13 % leaves), UDN-18-13 (13 % leaves), UDN-18-14 (14 % leaves), UDN-18-15 (11 % leaves), UDN-18-16 (10.5 % leaves), UDN-18-17 (15 % leaves), UDN-18-18 (16.5 % leaves), UDN-18-19 (11 % leaves), UDN-18-20 (13 % leaves), UDN-18-22 (11 % leaves), UDN-18-23 (24.5 % leaves), UDN-18-26 (23 % leaves), UDN-18-27 (17 % leaves), UDN-18-28 (11 % leaves), UDN-18-29 (15 % leaves), UDN-18-30 (11 % leaves), UDN-18-32 (16.5 % leaves), UDN-18-33 (11 % leaves), UDN-18-35 (13 % leaves), UDN-18-37 (12 % leaves), UDN-18-38 (17 % leaves),UDN-18-39 (16 % leaves), UDN-18-41 (11 % leaves), UDN-18-45 (15.5 % leaves), UDN-18-46 (21 % leaves), UDN-18-49 (14 % leaves), UDN-18-51 (14 % leaves), UDN-18-52 (10.5 % leaves), UDN-18-53 (22 % leaves), UDN-55 (11.5 % leaves), UDN-18-57 (23 % leaves) and UDN-18-60 (15.5 % leaves) were rated as moderately resistant to the disease with the scale point of 5. Similar study was conducted by S. Kumar *et al.*, 2017.

Acknowledgements

Authors are thankful to DRMR (Directorate of Rapeseed and Mustard Research), Bharatpur, Rajasthan for provide the seeds of mustard and also Saheed Ghundadhur College of Agriculture and Research Station, Jagdalpur, Bastar, Chhattisgarh, India for providing necessary facilities.

References

Anonymous (2018). Agriculture statistics at a glance-2018, Directorate of economics and statics,

DAC and FW, Government of India.

Mukerji KG, Upadhyay RK, Saharan GS, Sokhi SS, Khangura RK. (1999). IPM system in agriculture, vol. 5:91-135.

Saharan GS, Koushik JC (1981). Occurrence and epidemiology of powdery mildew

of Brassica. *Indian Phytopath*ology, 35: 17-21.

Enright SM and Cipollini D (2007). Infection of powdery mildew *Erysiphe cruciferarum* (Erysiphaceae) strongly affects growth and fitness of *Alliaria petiolata* (Brassicaceae). *American Journal of Botany*. 94 : 1813-1820.

Anonymous (2019). AICRP on RM ICAR, Directorate of Rapeseed and Mustard, Bharatpur (Raj.). Proceedings 26th Annual group meeting held at BAU, Ranchi (Jharkhand) Aug.3-5, 2019. 1-10.

Kumar S, Prasad R, Singh, D Yadav, SP and Kumar V (2017). Screening of brassica germplasm and breeding material against *Erysiphe cruciferarum* causing powdery mildew of rapeseed mustard under artificial condition. *Environment & Ecology,* 35 (1) 112-115.

How to cite this article:

Vandana Chadar, R. R. Bhanwar, Y. P. S. Nirala and Luchika Rana. 2020. Screening of Rapeseed and Mustard (*Brassica)* Germplasm and Breeding Material against *Erysiphe Cruciferarum* causing Powdery Mildew under Bastar Plateau of Chhattishgarh. *Int.J.Curr.Microbiol.App.Sci.* 9(05): 180-185. doi: https://doi.org/10.20546/ijcmas.2020.905.020