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Disease reaction of canola type mustard (*Brassica juncea* L.) genotypes against Alternaria blight caused by *Alternaria brassicae* (Berk) Sacc. in West Bengal

R. DAS, [1]A. DUTTA AND [2]K. N. MANDAL

Department of Plant Pathology ; [1] Department of Seed Science and Technolgy, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur-741252, Nadia, West Bengal

[2]Sugarcane Research Station, Bethuadahari-741212, Department of Agriculture, Govt. of West Bengal

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ABSTRACT

The study was conducted with the objective to assess the resistance source against Alternaria blight in Canola type mustard during Rabi, 2015-16. Nineteen Canola type mustard germplasms were naturally screened against Alternaria blight under field conditions. None of the entries was found immune or highly resistant or resistant. Significant variability in the severity of the disease was observed among genotypes. The per cent disease severity ranged from 24.44-64.44 % leaf stage and 12.22-63.33% at pod stage. Only two genotypes i.e., PM-22 and PM-28 showed lower severity of Alternaria blight at leaf as well siliqua stage and fall under moderately resistant group (Disease severity 11% to 25%). Nine germplasms were categorized as susceptible (Disease severity 26% to 50%) and susceptible check Varuna was found as highly susceptible (Disease severity > 50%). These two moderately resistant genotypes can be used as good donor for evolving resistant varieties against Alternaria blight in Canola type mustard.

Keywords : Alternaria blight, canola, disease reaction, mustard

Rapeseed and canola are not terms to be used interchangeably. Canola was developed from rapeseed through the use of traditional plant breeding techniques. The crops differ with respect to their chemical composition and nutritional quality. Rapeseed oil contains a high proportion of erucic and eicosenoic acids which are not essential for human growth, and render the oil unfit for human consumption. Canola oil contains low levels of erucic acid, and has the best nutritional profile of any vegetable oil on the market. According to the 1986 trademark, canola oil may not contain more than two percent erucic acid, and the solid fraction of the seed may not contain more than 30 micro moles per gram of glucosinolates. Today one of the world's primary oilseed crops, *B. napus* has been subject to considerable improvement by breeders since the recent spontaneous origin of this modern allopolyploid species around the middle of the last millennium (Iniguez Luy and Federico, 2011). The breeding history of modern double-low (00) varieties with low seed erucic acid and glucosinolate contents involved considerable genetic bottle necks, however (Friedt and Snowdon 2010), meaning that current breeding pools are decidedly narrow especially in Europe, North America and Australia, three of the major growing areas (Chen *et al*. 2008 and Bus *et al*. 2011). Falk (2010) demonstrated the high value of implementing new genetic diversity into a narrow breeding programme by classical breeding methods. Brassica crops are highly infested by various fungal pathogens and insects, while bacterial and viral diseases have little impact on their yield (Abdel-Farida *et al*., 2009). Rapeseed-mustard accounts for more than 25 per cent of the total oilseeds produced in the country. The crop suffers much due to biotic and abiotic factors. Among them, most important disease, Alternaria blight caused by *Alternaria brassicae* (Berk.) Sacc. causing yield losses may vary from 10-70 per cent depending on the type of crop species grown and prevailing environmental conditions. Alternaria blight disease has been reported to affect most of the cruciferous crops throughout the world and is one among the important diseases of rapeseed-mustard with no proven source of transferable resistance in any of the hosts. The pathogen is greatly influenced by weather as the highest disease incidence is reported in wet seasons and in areas with relatively high rainfall. *A. brassicae* can affect host species at all stages of growth, including seed. Symptoms of the disease are characterized by formation of spots on leaves, stem and siliqua. Various fungicides control the Alternaria blight disease with dissimilar cost-benefit ratio (Das, 2015). Under these circumstances there is a need to exploit genetically host resistance in existing varieties and germplasm lines for the identification of resistant sources.

Eleven canola genotypes and one susceptible check Varuna were evaluated for their reaction to Alternaria blight during *Rabi* 2015-16 at District Seed Farm AB Block, BCKV, Kalyani, Nadia under natural conditions. Each line was sown in three meter length in two replications with row to row spacing 30 cm and plant to plant 10 cm. The susceptible check Varuna was sown after two test rows. Nitrogen (N), Phosphate (P_2O_5) and

Short communication

Email : rajudas05@gmail.com

Table 1: Canola type mustard genotypes in which Alternaria blight severity was recorded at Kalyani, WB

Scale	Disease severity (%)	Disease reaction	Genotypes	
			Number	Name
0	0	Immune (I)	Nil	-
1	<5	Highly Resistant (HR)	Nil	-
3	5-10	Resistant (R)	Nil	-
5	11-25	Moderately Resistant (MR)	02	PM-22, PM-28
7	26-50	Susceptible (S)	09	P. Tarak, PM-21, PM-24, PM-25, PM-26, PM-27, PM-29, PM-30, Pusa LES-39
9	>50	Highly Susceptible (HS)	1	Varuna

Table 2: Reaction of canola type mustard germplasms to Alternaria blight severity under natural condition

Sl. No.	Name of entry	Disease severity of AB on leaves (90 DAS)		Disease severity of AB on pods 15 (DBH)		Disease Reaction
1	P. Tarak	32.22	(34.59)	18.89	(25.76)	S
2	PM-21	32.22	(34.59)	14.44	(22.34)	S
3	PM-22	24.44	(29.63)	14.44	(22.34)	MR
4	PM-24	45.56	(42.45)	12.22	(20.46)	S
5	PM-25	27.78	(31.81)	41.11	(39.88)	S
6	PM-26	40.15	(39.32)	21.11	(27.35)	S
7	PM-27	50.56	(45.32)	22.22	(28.13)	S
8	PM-28	24.44	(29.63)	16.67	(24.09)	MR
9	PM-29	30.00	(33.21)	12.22	(20.46)	S
10	PM-30	41.11	(39.88)	18.89	(25.76)	S
11	Pusa LES-39	32.50	(34.76)	14.44	(22.34)	S
12	Varuna (SC)	64.44	(53.40)	63.33	(52.73)	HS
SEm(±)		**0.861**		**0.964**		
CV (%)		**3.3%**		**4.9%**		
LSD (0.05)		**2.68**		**3.0**		

Figures in parentheses are arc sin angular transformed values

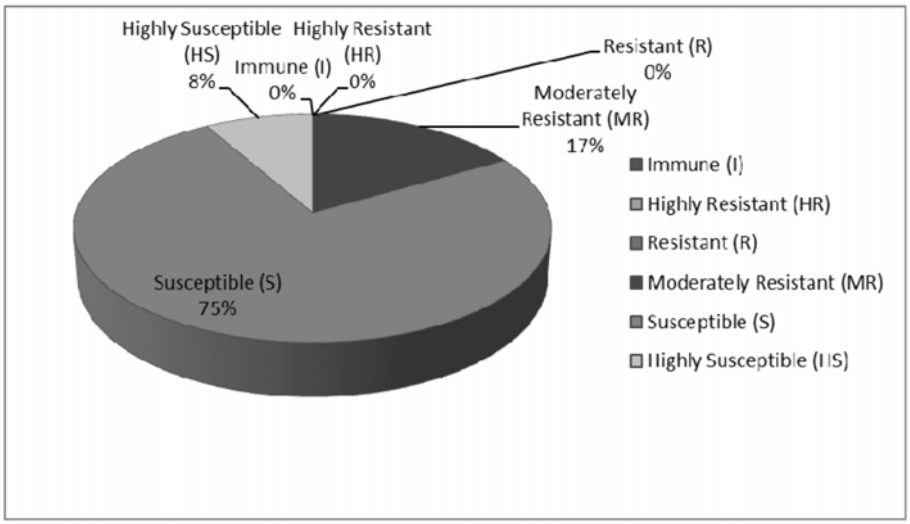

Fig.1: Percentage distribution of the canola type mustard germplasms based on disease reaction against Alternaria blight

Potash (K_2O) fertilizers were applied at the rate of 100:50:50 kg ha^{-1}. Seeds were sown on 26th November, 2015 and grown under prevailing epiphytotic condition for the disease. Observations were recorded on randomly selected five plants from each varieties/lines. The severity of the disease percent in leaf was assessed at 75 DAS while disease severity percent in pods was assessed at 15 days before harvesting (DBH) using 0-9 scale (Anonymous, 2010). Finally the disease severity on leaf and pod were also calculated. On the basis of disease intensity varieties/lines were classified into different groups *viz*., near immune/highly resistant, resistant, moderately resistant, moderately susceptible, susceptible, and highly susceptible.

Eleven Canola type mustard germplasms were naturally screened against Alternaria blight under field conditions. None of the entries was found immune or highly resistant or resistant. Significant variability in the severity of the disease was observed among genotypes. The per cent disease severity ranged from 24.44–64.44 per cent at leaf stage and 12.22 -63.33per cent at pod stage (Table 2). Only two genotypes *i.e*., PM-22 and PM-28 showed lower severity of Alternaria blight at leaf as well siliqua stage and fall under moderately resistant group (Disease severity 11% to 25%). Nine germplasms were categorized as susceptible (Disease severity 26% to 50%) and susceptible check Varuna was found as highly susceptible (Disease severity > 50%). These two moderately resistant genotypes (PM-22 and PM-28) can be used as good donor for evolving resistant varieties against Alternaria blight in canola type mustard. It could be noticed that the vulnerability level was relatively quite high as compared to resistance status (Fig. 1). Different workers evaluated the rapeseed-mustard entries and our results are in accordance with those in many cases (Tripathi *et al*., 1978 and Kolte, 1986). Where there is some deviation that may be due to environmental factors and differences among genotypes and races of pathogens. At N.D. University of Agriculture and Technology, Faizabad, 81 lines/varieties of Indian mustard were screened against blight under natural epiphytotic conditions and reported that none of the genotype was found to be completely free from visible symptoms of disease. Only one YET-25 was fairly resistant against leaf blight, however, 10 and 61 lines were reported moderately resistant and moderately susceptible, respectively (Singh *et al*., 2009). Rahman *et. al.* 2010 found varying degree of disease severity while evaluating 26 varieties/lines of rapeseed-mustard during their extensive research on blight at RARS, Jamalpur. So, from this screening it was concluded that PM-22 and PM-28 canola type mustard germplasms can be used as good donor for evolving resistant varieties against Alternaria blight in canola type mustard.

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