

Identification of Resistance Source for Powdery Mildew Disease of Indian Mustard and Studying its Inheritance

J Nanjundan¹, C Manjunatha¹, J Radhamani², Rashmi Yadav², Arun Kumar³, Ajay Kumar Thakur³,
Mohana Lal Meena¹, Rishi Kumar Tyagi², Devender Kumar Yadava⁴ and Dhiraj Singh³

¹ICAR-Indian Agricultural Research Institute, Regional Station, Wellington, Nilgiris, Tamil Nadu-643231, India

²ICAR-National Bureau of Plant Genetic Resources, New Delhi-110012, India

³ICAR-Directorate of Rapeseed Mustard Research, Bharatpur, Rajasthan-321303, India

⁴ICAR-Indian Agricultural Research Institute, New Delhi-110012, India

Abstract: Powdery mildew of Indian mustard, caused by *Erysiphe cruciferarum* Opiz. Ex. Junell., is emerging as a major threat in mustard growing regions of India leading to significant yield losses. All the Indian mustard varieties presently under commercial cultivation are highly susceptible to powdery mildew and so far no resistance source could be identified to combat this pathogen. In the present investigation, evaluation of 1,020 Indian mustard germplasm accessions against *E. cruciferarum* was undertaken at ICAR-Indian Agricultural Research Institute, Regional Station, Wellington, The Nilgiris, Tamil Nadu, under the natural hot spot conditions, which resulted in identification of 12 accessions which are moderately resistant and one accession, namely PMW 18, with high degree of resistance consistently for five successive seasons against the powdery mildew pathogen. Analysis of F_1 , segregating F_2 and backcross populations, obtained by crossing the Indian mustard accession PMW 18 (highly resistant) with PMW 25 (highly susceptible), resulted in 9:6:1 (Resistant:Susceptible:Highly susceptible) ratio in F_2 , 1:2:1 (Resistant:Susceptible:Highly susceptible) ratio in susceptible back cross and all resistant phenotype in resistant back cross population. Based on these ratios, an inheritance model wherein presence of two genes with semi-dominant and gene dosage effect is proposed to explain the inheritance of powdery mildew in Indian mustard. Based on the variability observed in F_2 population, a new disease rating system using six scales i.e. 0, 1, 2, 3, 4 and 5, based solely on the progress of the pathogen growth in different plant parts has been proposed in this study. This is the first report of identification of a highly resistance Indian mustard germplasm accession PMW 18 against *E. cruciferarum* and its inheritance studies will provide a platform for initiating a systematic research work towards mapping, tagging and characterization of powdery mildew resistance genes in Indian mustard followed by their transfer to popular Indian mustard cultivars by adopting suitable breeding/marker-assisted breeding strategies.

Keywords: Indian mustard, powdery mildew, *E. cruciferarum*, resistance, inheritance.