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## Reactions of mustard varieties / germplasms / advanced breeding lines against white rust in field under Konkan conditions

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**Abstract**

In Konkan region of Maharashtra State, white rust disease has been emerging as a serious threat to mustard cultivation during winter season since, last few years. Considering economic importance of the disease, different mustard varieties / germplasms / advanced breeding lines were evaluated against white rust disease in field under Konkan conditions to find the resistant entries. All mustard varieties / germplasms / advanced breeding lines evaluated were found susceptible to white rust disease, under natural epiphytotic. Least disease severity was observed in Mutant variety with 26.66%, followed by JD-6 (27.40%), Geeta (27.41%), Urvashi (28.14%), ACN-9 (28.88%), GM- 2 (29.63%). The highest disease severity was observed in Pusa Bold with 41.48% disease severity.

**Keywords:** Mustard varieties, germplasms, advanced, breeding lines, white rust, Konkan

**Introduction**

Mustard (*Brassica juncea*) though an unconventional crop in Konkan region of Maharashtra state, during recent past its cultivation has been popularising amongst the farmers of Konkan region. The mustard crop, cultivated during *Rabi* season has been infected by many phytopathogens amongst which white rust caused by an oomycete fungus, *A. candida* has been emerging as one of the major constraints in mustard cultivation in Konkan region.

The pathogen *Albugo candida* produces two types of infection, *i.e.* general or systemic and local infection. Local infections are manifested by scattered creamy white coloured, zoosporangial pustules under the surfaces of leaves, and on stems or pod as blisters. The symptoms of general or systemic infection are distortion, hypertrophy, hyperplasia, sterility of inflorescences (stag heads). Elsewhere, the disease (*A. candida*) has been reported to incur accountable quantitative as well as qualitative losses. The combined infection caused 36.88% yield losses of mustard in India (Bal and Kumar, 2014)<sup>[1]</sup>. Saharan *et al.* (2014) reported 1-90% yield losses of mustard in India caused by *A. candida*.

Though several fungicides have been reported efficient to control white rust (*A. candida*) disease of mustard, other *Brassica* spp. and many *cruciferous* crops (Talukder *et al.*, 2012; Abhishek *et al.*, 2017; Muhammad *et al.*, 2017)<sup>[3, 4, 5]</sup> more disease resistant crop varieties need to be explored and integrated with less hazardous fungicides, to manage economically important crop diseases including white rust disease of mustard.

**Material and Methods**

The following 19 Mustard entries available were evaluated for white rust disease intensity in natural epiphytotic condition for the identification resistant sources.

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**Table 1:** Mustard varieties / germplasms / advanced breeding lines evaluated

| Sr. No. | Mustard varieties / germplasm / advanced breeding lines |
|---------|---|
| 1       | RH-749-18   |
| 2       | Sej-2   |
| 3       | GM-2  |
| 4       | Ashirwad  |
| 5       | Geeta   |
| 6       | Pusa Bold   |
| 7       | Mutant  |
| 8       | Varuna  |
| 9       | Bio-902   |
| 11      | PM-24   |
| 12      | PusaTarak   |
| 13      | Laxmi   |
| 14      | Urvashi   |
| 15      | PusaMahak   |
| 16      | RH-9304   |
| 17      | PCR-7   |
| 18      | JD-6  |
| 19      | ACN-9   |

Based on Plant Disease Intensity (PDI) recorded, mustard varieties/germplasm/advanced breeding lines were classified as below using revised rating scale (0-9) given by Bisht *et al.*, 2018.

**Table 2:** Disease rating scale

| Scale/grade | PDI    | Reaction                  |
|-------------|--------|---------------------------|
| 0           | 0      | Immune (I)                |
| 1           | 1-5%   | Highly Resistant (HR)     |
| 3           | 6-10%  | Resistant (R)             |
| 5           | 11-25% | Moderately Resistant (MR) |
| 7           | 26-50% | Susceptible (S)           |
| 9           | >50%   | Highly Susceptible (HS)   |

### Results and Discussion

All those mustard varieties / germplasms / advanced breeding lines evaluated (Table 2) were found susceptible to white rust disease, under natural epiphytotic. Least disease severity was observed in Mutant variety with 26.66%, followed by JD-6 (27.40%), Geeta (27.41%), Urvashi (28.14%), ACN-9 (28.88%), GM-2 (29.63%). The highest disease severity was observed in Pusa Bold with 41.48% disease severity.

**Table 2:** Reactions of different mustard varieties / germplasms / advanced breeding lines against white rust

| Sr. No. | Mustard varieties/germplasm /advanced breeding lines | Disease intensity (%) | Reaction    |
|---------|--|-----------------------|-------------|
| 1.      | RH-749-18  | 33.33                 | Susceptible |
| 2.      | Sej-2  | 30.37                 | Susceptible |
| 3.      | GM-2   | 29.63                 | Susceptible |
| 4.      | Ashirwad   | 32.59                 | Susceptible |
| 5.      | Geeta  | 27.41                 | Susceptible |
| 6.      | Pusa Bold  | 41.48                 | Susceptible |
| 7.      | Mutant   | 26.66                 | Susceptible |
| 8.      | Varuna   | 40.98                 | Susceptible |
| 9.      | Bio-902  | 40.00                 | Susceptible |
| 10.     | Kranti   | 39.25                 | Susceptible |
| 11.     | PM-24  | 36.29                 | Susceptible |
| 12.     | Pusa Tarak   | 34.07                 | Susceptible |
| 13.     | Laxmi  | 37.03                 | Susceptible |
| 14.     | Urvashi  | 28.14                 | Susceptible |
| 15.     | Pusa Mahak   | 34.81                 | Susceptible |
| 16.     | RH-9304  | 31.85                 | Susceptible |
| 17.     | PCR-7  | 35.50                 | Susceptible |
| 18.     | JD-6   | 27.40                 | Susceptible |
| 19.     | ACN-9  | 28.88                 | Susceptible |

**Fig 1:** Field view of the mustard varieties / germplasm / advanced breeding lines screening against white rust

Thus, all those mustard varieties/cultivars presently under cultivation are more or less prone to white rust disease. Therefore, only option available to manage mustard white rust is application of anti-oomycetes fungicides.

Abhishek *et al.* (2017) <sup>[4]</sup> reported that out of 30 genotypes/cultivars of mustard, nine were immune (Bioysr, DRMRIJ-12-39, DRMRIJ-12-48, DRMRIJ-12-14, DRMRIJ-12-44, DRMRIJ-12-26, DRMRIJ-12-28, and DRMRIJ-12-40); seven genotypes *viz.*, DRMRIJ-12-51, DRMRIJ-12-02, RH-305, NPJ-181, RMWR-09-05, RH-1234 and DRMRIJ-12-43 were moderately resistant. Three were susceptible and rest 11 entries were highly susceptible to white rust disease. The present investigation was also supported by Yadav *et al.* (2018) <sup>[6]</sup> who reported white rust susceptibility of majority of the mustard entries, except only eight entries with resistance to white rust disease. Variations in disease reactions arise due to external environmental factors, genetic makeup of the genotypes and evolution of pathogen races.

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