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Screening of barley germplasm and released cultivars against stripe disease (*Drechslera graminea*) under artifical inoculation condition

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Barley (*Hordeum vulgare L.*) is the fourth largest cereal crop in the world with a share of 7% of the global cereal production (Pal *et al.,* 2012). It is mainly grown as a rabi season crop in different temperate regions of the world including India. Barley is used as a feed for animals, malt for industrial uses and for human food. At present, Barley is subjected to various fungal, bacterial, viral and noninfectious diseases. The major barley diseases prevalent in the world as well as in India include leaf rust, covered and loose smut, spot or net blotch, powdery mildew, stripe disease, bacterial blight and molya. Stripe disease caused by *Drechslera graminea* (Telomorph: *Pyrenophora graminea*) is an important seed borne disease of barley and responsible for 21.6% - 31.9% yield losses in Rajasthan. Moreover, yield loss up to 73% have also been reported where cultivation of susceptible cultivars are in practice (Mathur and Bhatnagar, 1991; Arabi *et al.,* 2004). A range of systemic and contact fungicides are available as seed dresser for the seed borne disease control (Singh and Khetarpal, 2005). However, their continuous application not only disturbed the ecosystem, but also rendered the pathogen resistant for the fungicide (Soni *et al.,* 2017). Hence, the use of resistant barley cultivars is one of the economic and best sustainable alternatives for controlling barley stripe disease. Therefore, screening of the available released varieties and genotypes of barley were carried out to identify the source of resistance against the pathogen of stripe disease of barley.

To find out the genetic source of resistance against *Drechslera graminea*, 40 germplasm lines and 13 released cultivars obtained from Rajasthan Agricultural Research Institute (RARI), Durgapura, Jaipur were screened under artificial created epiphytotic conditions at RARI, research farm, Durgapura, Jaipur during 2016-17 and 2017-18. The disease is seed borne in nature and pathogen successfully infect seedling during germination of seed therefore seeds were inoculated in 1:10 ratio. For inoculation, seeds were surface sterilized with sodium hypochlorite (1.0%) and washed thoroughly. The seeds drenched in water were left overnight. These soaked seeds were inoculated by plunging in an active mycelial suspension of the highly virulent isolate Dg-03. Seed was sown in plot (3m x 2m) with two replications in RBD. Plants were also inoculated by foliar spray at 25 days after sowing to maintain high disease pressure. The injury was made by rubbing the

Table.1 The reaction of different germplasm and varieties against stripe disease of barley under field conditions

S. No	Category	Disease Reaction	Germplasm lines/varieties
1	no infection	HR	BD1716, BD1726, BD1731, BD1735, BD1743, BD1744
2	1-5% disease incidence	R	BD1712, BD1723, BD1730, BD1732, BD1733, BD1734, BD1737, BD1739, BD1745, BD1750 and RD2660
3	5.1-10% disease incidence	MR	BD1711, BD1713, BD1714, BD1715, BD1718, BD1724, BD1725, BD1727, BD1728, BD1736, BD1740, BD1741, BD1742, BD1746, BD1747, BD1748, BD1749, RD2508, RD2849, RD2786, RD2668, RD2715, RD2592
4	10.1- 25% disease incidence	MS	BD1719, BD1720, BD1721, BD1729, RD2794, RD2552, RD2503, RD2052, RD2624
5	25-50% disease incidence	S	BD1717, BD1722
6	Above 50% Disease incidence	HS	RD2035

leaf surface mildly with a moist cotton swab containing carborundum powder before spray. Per cent disease incidence was recorded at the maturity stage (first week of March) of the crop and calculated by following formula.

$$PDI\ (\%) = \frac{\text{Total number of diseased plants}}{\text{Total number of plants observed}} \times 100$$

Data were observed in first week of March on the basis of resistance and susceptible reaction with pathogen and tabulated in six categories on the basis of Mathur and Bhatnagar (1991).

Out of 40 germplasm lines and 13 released varieties of barley evaluated against *Drechslera graminea*, six (BD1716, BD1726, BD1731, BD1735, BD1743, BD1744) and eleven (BD1712, BD1723, BD1730, BD1732, BD1733, BD1734, BD1737, BD1739, BD1745, BD1750 and RD2660) genotypes were characterized as highly resistance and resistant, respectively (Table 1). Eighteen germplasm lines (BD1711, BD1713, BD1714, BD1715, BD1718, BD1724, BD1725, BD1727, BD1728, BD1736, BD1738, BD1740, BD1741, BD1742, BD1746, BD1747, BD1748 and BD1749) and six released varieties (RD2508, RD2849, RD2786, RD2668, RD2715 and RD2595) were categorized as moderately resistant. Four germplasm lines (BD1719, BD1720, BD1721 and BD1729) and five released varieties (RD2794, RD2552, RD2503, RD2624 and RD2052) were found moderately susceptible. One released variety, RD2035 was found highly susceptible, whereas two germplasm lines, BD1717 and BD1722 were found susceptible. A number of studies on screening of barley germplasm lines against stripe disease have been reported (Arabi, *et al.,* 2004, Arabi and Jawhar, 2003, Kumar *et al.,* 1999 and Mathur and Bhatnagar, 1992). Yener *et al.,* (2016) evaluated the performance of 20 landraces and three cultivars of barley (*Hordeum vulgare L.*) to leaf stripe disease under greenhouse conditions and landraces, and reported 3 and 5 lines possessing resistance and susceptibility to eight isolates of the fungus, respectively. Barley cultivar Çumra 2001 showed a resistant reaction to all isolates. Cultivars Atılır and Larende were susceptible to 9 isolates of *D. graminea.* Seedling reactions of 15 barley cultivars grown in Turkey were screened against five isolates of *D. graminea* and found the cultivars Çumra 2001 and Yerçil 147 were resistant to all five isolates. Cultivar Sladoran was resistant to 4 isolates. The cultivars Erginel 90, Orza 96, Çetin 2000 and Aydanhanım were susceptible to three isolates of the fungus (Ulus *et al.,* 2007). The reactions of other varieties ranged between resistant and susceptible depending on the isolates. In the present study, the highly resistant germplasm (BD1716, BD1726, BD1731, BD1735, BD1743 and BD1744) could provide resistance and can reduce disease incidence. The resistance genotypes can be used as donor parents in the breeding programmes for the development of stripe disease resistant barley cultivars.

References

1. Arabi MIE, M Jawhar, B Al-Safadi and N Mirali. 2004. Yield responses of barley to leaf stripe (*Pyrenophora graminea*) under experimental conditions in Southern Syria. *Journal of Phytopathology.* **152**:519–523.
2. Arabi MIE and M Jawhar. 2003. A simple technique for detennining the reaction of barley genotypes to *Pyrenophora graminea*. *Journal of Phytopathology.* **151**:47-49.
3. Kumar V, I Hooda, and GS Sindhan. 1999. Assessment of resistance in barley varieties to leaf stripe disease caused by *Drechslera graminae*. *Indian Phytopathology* **29**:122-124.
4. Mathur AK and G C Bhatnagar. 1991. Barley stripe: its prevalence and yield loss in grain yield. *Journal of Mycology and Plant Pathology.* **21**:280-282.
5. Mathur AK and GC Bhatnagar. 1992. Source of resistance in barley against stripe disease caused by *Helminthosporium gramineum*. *Indian Phytopathology.* **45**:115-116.
6. Pal D, S Kumar and RPS Verma. 2012. Pusa Losar (BHS 380) the first dual-purpose barley variety for Northern Hills of India. *Indian Journal of Agricultural Science* **82**:164-165.
7. R Soni, VK Tanwar and SM Yadav. 2017. Survey and Screening of Genotypes against Alternaria solani caused early blight of tomato in southern part of Rajasthan. *Chemical Science Review Letters* **6**:1483-1489.
8. Singh B, and RK Khetarpal. 2005. Methodes of salvaging germplasm infected with plant pathogens, *NBPGR, Pusa Campus,* New Delhi, India. pp-2.
9. Ulus C and A Karakaya. 2007. Assessment of the seedling reaction of some turkish barley cultivars to barley stripe. *J. Agri. Sci,.* **13**:413-419.
10. Yener C, A Karakaya, C A oguz, K Akan, N Ergün, and I Sayim, 2016. Determination of the Reactions of some Barley (*Hordeum vulgare* L.) landraces and cultivars to *Drechslera graminea*. *Mediterranean Agriculture Science.* **29**:43-47.