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Short Communication

Sources of resistance to brown leaf spot [*Drechslera oryzae* (Breda de Haan) Subram. & Jain] in some wild *Oryza* spp.

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Brown Leaf Spot (BLS) caused by [*Drechslera oryzae* (Breda de Haan) Subram. & Jain] has been observed frequently in varying severities in almost all the states of India. In Punjab, its incidence and destructive potential on all the modern commercial rice cultivars including PR 103, PR 106, PR 111, PR 114, PR 116, PR 118 and Pusa 44 is increasing [1-2]. Economic losses due to reduced yield (ranging from 30 to 43 %) as well as quality (glume discoloration) are substantial. Various environmental factors along with inherent susceptibility of a rice cultivar are primarily responsible for brown leaf spot epidemics [3]. This disease can be controlled through chemicals but this approach is neither economical nor eco-friendly. Therefore, development of resistant varieties is a better strategy for the management of BLS. Germplasm collections have been evaluated for resistance to BLS but, the sources of resistance are rare in rice particularly in varieties belonging to the cultivated species, *Oryza sativa*. As the wild rice germplasm is known to be a rich source of disease resistance genes [4], the present investigation was planned to evaluate 200 accessions belonging to 14 wild *Oryza* species for resistance against *Drechslera oryzae* under simulated epiphytotic conditions.

The experimental material consisted of 200 accessions with diverse origin, genomes (AA to FF) and phenotypic traits (Table 1) procured from International Rice Research Institute (IRRI), Manila, Philippines (designated as IRGC Nos.) and Central Rice Research Institute (CRRI), Cuttack, Orissa (designated as CR Nos). Nine important commercial cultivars belonging to *O. sativa*, popularly grown in Punjab and the adjoining states were also evaluated in this investigation as checks. Sowing was done during May both in 2003 and 2004 on raised nursery beds in 50 cm long row(s) spaced 30 cm apart. One month old seedlings of each accession were transplanted in 2m long rows spaced 80 cm apart, keeping plant-to-plant distance of 40 cm. One row of highly susceptible cv. PR114 and Pusa 44 was transplanted after every 30 entries. Standard agronomic practices [5] were used for raising the crop.

The pathogen *D. oryzae* isolated from BLS infected leaves of rice cv. PR 114 was maintained on Potato Dextrose Agar (PDA) slants at 28±1°C by sub-culturing at intervals of about 2 weeks regularly. Mass inoculum of the fungus was prepared on PDA in conical flasks of 250 ml capacity. Artificial inoculation of the crop was done by spraying water suspension of *D. oryzae* conidia (1×10^6 conidia/ml) thrice at weekly intervals at the maximum tillering stage. To ensure maximum humidity, water was kept standing in the field till disease developed. At least 20-25 leaves from randomly selected plants of each entry were scored for disease severity near maturity based on % discolored area following 0-9 scale of IRRI, 1996 [6].

In all 13 accessions were resistant (R) with mean BLS score 0-3.40 (Table 1), out of these, eight accessions, namely, IRGC Nos. 100140, 100854, 100983, 102500, 102520, 104020, 104033 and 104350 belonged to *O. glaberrima*, two, namely, IRGC Nos. 104433 and CR 100440 belonged to *O. rufipogon* while one each, namely, CR No 100142 and IRGC Nos. 105440 and 103303 belonged to *O. nivara*, *O. rhizomatis* and *O. australiensis*, respectively. Fifty nine accessions were observed to be moderately resistant (MR) with mean BLS score 3.41-5.40. Of these, 29 belonged to *O. glaberrima*; four to *O. rufipogon*; 14 to *O. nivara*; six to *O. longistaminata*; four to *O. australiensis* while one each belonged to *O. punctata* and *O. brachyantha*, respectively (Table 1). The remaining 129 accessions were susceptible (mean BLS score > 5.41). Majority of the lines observed to be R/MR against *D. oryzae* belonged to the species with AA genome and only a few entries belonged to species with other genomes i.e. CC EE, FF, BBCC and CCDD. Rice accessions observed to be resistant during the present investigation can serve as donors of resistance against BLS in the cultivated rice *O. sativa*. Other workers [7-8] have reported resistance in wild rice accessions against some other major rice diseases; however, only one report on BLS resistance in wild rice [9] is available.

Many accessions belonging to *O. glaberrima*, *O. rufipogon*, *O. minuta*, *O. latifolia*, *O. australiensis* and *O. longistaminata* are earlier known [4] to have been utilized for transferring their disease/ insect resistance to *O. sativa*, [4], despite several pre- and post-

Table 1. Reaction of accessions belonging to different *Oryza* species against *Drechslera oryzae* under simulated epiphytotic conditions at Ludhiana

Species/genome	Reaction*	Accession Nos**
O. glaberrima AA	R(8)	IRGC Nos 100140, 100854, 100983, 102500, 102520, 104020, 104033, 104350
	MR(29)	IRGC Nos 101800, 102196, 102206, 102226, 102263, 102336, 102356, 102380, 102445, 102489, 102512, 10252, 102532, 102538, 102542, 102544, 102550, 102557, 102563, 102600, 102615, 102980, 103292, 103335, 103445, 103930, 103960, 103990, 104200
	S(2)	IRGC Nos 102925, 103383
O. barthii AA	S(7)	IRGC Nos 100117, 100119, 101242, 101248, 103580, 104068, 104287
O. rufipogon AA	R(2)	IRGC Nos 104433 and CR No 100440
	MR(4)	IRGC Nos 80660, 103404 and CR Nos 100436, 100464
	S(14)	IRGC Nos 80562, 81885, 103827, 104389, 104404, 105214, 105491 and CR Nos 100434, 100444, 100462, 100466, 100470, 100485, 100488
O. nivara AA	R(1)	CR No. 100142
	MR(14)	IRGC No 106313 and CR Nos, 100101, 100104, 100113, 100114, 100117, 100118, 100127, 100128, 100136, 100140, 100145, 100298, 100333
	S(91)	IRGC Nos 80547, 80599, 80693, 80706, 80722, 81825, 81835, 81847, 81859, 81940, 81941, 82018, 100593, 103841, 104688, 105410, 105695, 105722, 106079, 106154, 106397, CR Nos 100096, 100097, 100105, 100106, 100107, 100109, 100110, 100111B, 100115, 100116, 100122, 100123, 100124, 100125, 100137, 100139, 100144, 100148, 100175, 100269, 100272, 100276, 100280, 100283, 100287, 100288, 100289, 100290, 100293, 100296, 100299, 100300, 100301, 100302, 100303, 100304, 100311, 100312, 100313, 100316, 100318, 100322, 100327, 100328, 100329, 100330, 100331, 100333, 100335, 100336, 100337, 100339, 100340, 100344, 100345, 100347, 100353, 100355, 100357, 100426, 100427, 100428, 100432, 100454, 100460, 100463, 100477, 100481, 100482, 100486
O. longistaminata AA	MR(6)	IRGC Nos 81950, 101198, 101200, 100206, 101210, 104301
	S(3)	IRGC Nos 101221, 105200, 105262
O. meridionalis AA	S(2)	IRGC Nos 105291, 105295
O. glumaepatula AA	S(1)	IRGC Nos 104387
O. minuta BBCC	S(1)	IRGC 101097
O. punctata BBCC	MR(1)	IRGC 103887
	S(3)	IRGC Nos. 141434, 104064, 104071
O. rhizomatis CC	S(1)	IRGC Nos. 105440
O. latifolia CCDD	S(2)	IRGC Nos. 100966 and 103787
O. grandiglumis CCDD	R(1)	IRGC 105155
O. australiensis EE	R(1)	IRGC Nos. 103303
	MR(4)	IRGC Nos. 105165, 105268, 105270, 105272
	S(1)	IRGC Nos. 100882
O. eichingeri FF	S(1)	IRGC Nos. 100881
O. brachyantha FF	MR(1)	IRGC Nos 81960
O. sativa AA (checks)	S(9)	PR 103, PR 106, PR 108, PR 110, PR 114, PR 115, PR 116, PR 118, Pusa 44

*Reaction R (Resistant) mean score = 0-3.40, MR (Moderately Resistant) mean score = 3.41-5.40, S (Susceptible) mean score ≥ 5.41 on 0-9 scale of SES for rice [6]; Figures in parentheses indicate the number of accessions, **Accessions designated as IRGC Nos. obtained from IRRI, Manila, Phillipines, while those designated as CR Nos. obtained from CRRI, Cuttack, India

fertilization barriers. *O. nivara*, the progenitor of *O. sativa* subsp. *indica* and *O. rufipogon* which are endemic to south and south East Asia grow sympatric with rice and are easily crossable to *O. sativa* [10-11]. In spite of this, the detection and alien gene transfer for BLS resistance has received only a very little attention so far, for the widening of the *O. sativa* gene pool. This report indicates sources of brown leaf spot resistance in many *Oryza* spp.

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