Reaction of introgression lines of rice to a BPH population from India

S. Santhanalakshmi and P. Kadirvel, Research and Training Centre, Barwale Foundation, Hyderabad 500034, Andhra Pradesh, India. E-mail: kadirvelp@yahoo.com

The brown planthopper (BPH) is an important insect pest of rice, having emerged as a serious threat to rice production in the major rice-growing countries during the green revolution in the 1970s. The application of insecticides to control BPH affects its natural enemies and results in planthopper resurgence. Host-plant resistance is considered an ideal option to manage BPH. Several wild species—*Oryza latifolia, O. minuta, O. nivara, O. officinalis, and O. punctata*—are thought to possess resistance to various biotypes of BPH (Wu et al 1986). The identification and transfer of novel resistance genes from these sources into popular varieties can significantly enhance the yield potential of these cultivars by increasing host-plant resistance to BPH (Brar and Khush 1997).

In this study, a set of 27 introgression lines developed at IRRI, using wild species *O. officinalis, O. australiensis, O. minuta, and O. rufipogon*, was screened against BPH populations from India. The insects were collected from rice fields at the experimental farm of the Barwale Foundation in Hyderabad, India, and reared on susceptible variety Taichung Native 1 (TN1), following the method of Heinrichs et al (1985). The standard seedbox screening test as described by Heinrichs et al (1985) was used to screen the introgression lines. Seeds were presoaked and sown in rows (3-cm intervals) in 60 × 45 × 10-cm seed boxes along with standard checks PTB33 (resistant) and TN1 (susceptible). A row of 20 seedlings was maintained per accession. Ten-day-old seedlings were infested with second- and third-instar nymphs (5–8 per seedling). The experiment was conducted at 28–30 ºC and at 70–80% relative humidity in a greenhouse at the experimental farm of the Barwale Foundation. About a week after insect infestation, hopperburn was observed. Using the *Standard evaluation system for rice (SES)* (IRRI 1986), the plants were scored individually based on a 0–9 scale, when more than 90% of the TN1 plants were killed. The experiment had three replications. Accessions with a mean damage rating of 0–3.9, 4–6.9, and 7–9 were rated as resistant, moderately resistant, and susceptible, respectively.

Five introgression lines derived from the wild species exhibited strong resistance to BPH (see table). IR65482-7-216-1-2-B inherited its BPH resistance from *O. australiensis*; IR71033-62-15-8, IR71033-121-5-B, and IR71033-

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Introgression line	Wild species	Damage rating[a]	Reaction[b]
IR31917-45-3-2	Recurrent parent	9.0 ± 0.0	S
IR54571-1-2-44-15-2-3	*O. officinalis*	9.0 ± 0.0	S
IR54751-2-41-10-5-1	*O. officinalis*	4.8 ± 0.6	MR
IR65482-4-136-2-2-B	*O. australiensis*	9.0 ± 0.0	S
IR65482-7-216-1-2-B	*O. australiensis*	3.4 ± 0.8	R
IR65482-17-511-5-7-B	*O. australiensis*	8.3 ± 1.3	S
IR65482-18-539-2-2-B	*O. australiensis*	9.0 ± 0.0	S
IR71033-1-2-4-B	*O. minuta*	9.0 ± 0.0	S
IR71033-62-15-8	*O. minuta*	3.9 ± 1.8	R
IR71033-105-23-1-B	*O. minuta*	8.0 ± 1.0	S
IR71033-121-5-B	*O. minuta*	3.7 ± 1.3	R
IR71033-4-1-127-B	*O. minuta*	8.3 ± 1.4	S
IR71033-14-2-1	*O. minuta*	9.0 ± 0.0	S
IR71033-121-15	*O. minuta*	3.0 ± 0.0	R
IR71033-4-1-127	*O. minuta*	7.7 ± 1.4	S
IR73382-7-12-1-1-B	*O. rufipogon*	4.3 ± 2.5	MR
IR73382-7-12-1-9-1	*O. rufipogon*	8.9 ± 0.2	S
IR73382-7-12-3-B-B	*O. rufipogon*	8.3 ± 1.1	S
IR73382-85-9-1-2-1-1	*O. rufipogon*	7.0 ± 0.0	S
IR73382-85-9-1-2-2-B	*O. rufipogon*	7.6 ± 0.8	S
IR73384-3-6-10-4-6-2	*O. rufipogon*	8.5 ± 1.0	S
IR73680-9-24-8-1-2-2	*O. rufipogon*	8.3 ± 1.3	S
IR73680-9-4-3-2-3-2	*O. rufipogon*	9.0 ± 0.0	S
IR73680-4-5-10-2-1-2	*O. rufipogon*	3.5 ± 0.3	R
IR73681-1-1-8-6-2-2	*O. rufipogon*	8.5 ± 0.5	S
IR73681-1-1-8-6-3-3	*O. rufipogon*	8.8 ± 0.3	S
IR73885-1-4-3-2-1-10	*O. rufipogon*	6.3 ± 1.3	MR

[a]Mean ± SE of three replications. [b]Damage rating: 1–3.9 (resistant [R]), 4.0–6.9 (moderately resistant [MR]), and 7.0–9.0 (susceptible [S]).

121-15 got it from *O. minuta*; and IR73680-4-5-10-2-1-2, from *O. rufipogon*.

A similar study undertaken at IRRI also indicated that IR65482-7-216-1-2 and IR71033-121-15 were resistant and IR65482-18-539-2-2 was susceptible to BPH populations from Korea (IRRI 2002). Jena et al (2006) recently reported that IR65482-7-216-1-2 carries a dominant resistance gene, *Bph18(t)*. Results of this study suggest that it could be a potential donor of resistance to BPH populations in India as well. Further, in contrast to results obtained in Korea, the introgression line IR65482-4-136-2-2 was found susceptible to BPH in India, suggesting the possibility of a differential reaction of BPH populations from India and Korea to different genes from wild sources. The results of the present study can help breeders improve genetic resistance in rice cultivars as well as explore biotypic differences across BPH populations from different countries.

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