

## 27. Identification of new gene for BPH resistance introgressed from *O. rufipogon*.

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Brown planthopper (BPH) *Nilaparvata lugens* is one of the most important pests of rice in India causing severe yield loss. It also transmits viral diseases such as ragged stunt virus (RSV) and grassy stunt virus (GSV) in to rice cultivars (Khush and Brar, 1991). The host plant resistance is an important breeding strategy to reduce BPH damage. So far twenty one genes for BPH resistance have been identified in *indica* varieties (12 genes) and wild species (9 genes) (Qifa Zhang, 2007 Fujita et al., 2008). The break down of resistance in several varieties carrying major resistance genes have been reported from many Asian countries due to emergence of virulent biotypes (Verma et al., 1979 Tanaka and Matsumura, 2001). Identification and deployment of new genes for BPH resistance in modern high yielding varieties is the important strategy to reduce the yield loss.

We screened the *O. rufipogon* (Acc 106412) and its derived line IR 73678-6-9-B along with IR 64 (recurrent parent), known gene donors and resistant (PTB 33) and susceptible checks (TN 1 and BPT 5204) during 2005, 2006 and 2007 in glass house at seedling stage against local biotype (biotype 4) available at the Directorate of Rice Research Hyderabad, India, using standard seed box technique (Heinrichs et al., 1985). In replicated screening over the years, the *O. rufipogon* accession and introgression line (IR73678-6-9-B) showed resistance reaction similar to the resistant check PTB 33. While IR64 found to be moderately resistant (Table 1) indicating that the high level of resistance in IR 73678-6-9-B may be due to the gene for BPH resistance introgressed from *O. rufipogon*. Further to study the inheritance of BPH resistance gene, we crossed IR73678-6-9-B to BPT5204 (susceptible variety). The F<sub>1</sub> was susceptible and F<sub>2</sub> population segregated in 1:3 ratio (resistant : susceptible) indicating the recessive nature of the gene for BPH resistance in IR73678-6-9-B (Table 2).

Among the other donors with known recessive gene screened during 2005 to 2007 only Babawee (*bph4*), ARC10550 (*bph5*) and IR 64 showed moderate resistance while the rest of the donors viz., ASD7 (*bph2*), T12 (*bph7*) Chinsaba (*bph8*) and IR54751-2-34-10-6-2 (*bph12*) showed susceptible reaction (Table 1). We compiled then the damage score of all the known recessive gene donors screened against the present biotype in IRBPHN, INGER nursery from 1997 to 2005 at Directorate of Rice Research Hyderabad, India, we observed the similar damage score indicating that Babawee (*bph4*) and IR 54751-2-44-15-24-3 (*bph11*) were moderately resistant with score < 5 in 0-9 scale (Table 1).

Further to know whether the gene for BPH resistance in IR 73678-6-9-B was introgressed from *O. rufipogon* or the same as in IR 64 and its allelic relation with *bph 4* present in Babawee. IR 73678-6-9-B was crossed with IR 64 (recurrent parent), Babawee and BPT 5204 (susceptible variety). The introgression line IR 54751-2-44-15-24-3 carrying *bph 11* gene introgressed from *O. officinalis* was also moderately resistant to the present biotype. *O. officinalis* is distantly related to *O. rufipogon* and several incompatibility barriers restricts the natural gene flow from one species to another therefore allelic test was not done with *bph11* gene.

The F<sub>2</sub> population of the crosses BPT 5204 x IR 73678-6-9-B, IR64 x IR73678-6-9-B, BPT 5204 x IR64 and Babawee x IR 73678-6-9-B and parents were screened for BPH reaction at seedling stage following standard seed box technique, PTB33 and TN1 used as resistant and susceptible checks, respectively. Twenty days old seedling were infested with second and third instar nymphs at the rate of approximately 4-5 nymphs / seedling and the damage score in 0-9 scale were recorded on individual plants after 3 weeks of infestation when TN1 was completely wilted.

The F<sub>2</sub> population segregated in 1:3 (resistant : susceptible) in case of BPT5204 x IR73678-6-9-B and BPT 5204 x IR64. While the segregation in the crosses IR64 x IR73678-6-9-B and IR73678-6-9-B x Babawee was observed in the ratio of 7:9 (resistant : susceptible) (Table 2). These results indicated that the gene for BPH resistance in IR 73678-6-9-B is recessive and non- allelic to the genes present in IR64 and Babawee (*bph 4*). Since other recessive genes from *indica* varieties were not effective to this biotype and the gene in IR 73678-6-9-B is non allelic to *bph4* and the gene of IR64 hence it is new gene for BPH resistance introgressed from *O. rufipogon* and we have also identified two new genes *Bph22(t)* and *Bph23(t)* introgressed from *O. glaberrima* and *O. minuta*, respectively, hence the gene present in IR 73678-6-9-B is tentatively designated as *bph24(t)*, we are in the process of mapping this gene with molecular markers.

**References**

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