

## Net house evaluation of resistance in rice genotypes against white backed plant hopper, *Sogatella furcifera* (Horvath)

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### ABSTRACT

Fifty one rice varieties including checks, were evaluated as per Standard Evaluation System for their resistance against white backed plant hopper *Sogatella furcifera* (Horvath) under net house condition at National Rice Research Institute, Cuttack during 2011 and 2012. Result of the experiment revealed that five varieties i.e. PS-3, Satabdi, Radhi, Kalinga 1 and Hazaridhan were found resistant (Score 1) against WBPH during both the year under study and can be used as donor for varietal development programme. Thirteen varieties i.e. Annada, Satyakrishna, Virendra, Sadabahar, Heera, Varsadhan, Jogen, Neela, Khanish, Tara, ASD-16, CSR-4 and PR-113 were moderately resistant (Score 3) and thirty one varieties were under susceptible to highly susceptible category (score  $\geq 5$ ).

**Key words:** WBPH, rice, resistance, screening

White backed plant hopper (WBPH) *Sogatella furcifera* (Horvath) is more abundant during the early stage of the growth of rice crop. This insect is a serious pest of rice in tropical Asia (Kadirvel et al., 2003). Severely WBPH attacked seedlings become stunted and eventually die (Dale, 1994). Both nymphs and adults suck cell sap at the base of the rice plant and the leaf surface. The attacked plants become yellow and later acquire a rust-red appearance. WBPH can become sufficiently numerous to kill the plants by hopper burn. Gravid females cause ovipositional punctures in leaf sheaths. Feeding puncture and lacerations caused by ovipositor predispose the plants to micro organisms and honeydew excretion encourages the growth of sooty mould. It is a major pest of rice in hilly tracts of Uttar Pradesh (Sachan and Garg, 1992) and Haryana (Kushwaha et al., 1982). Till now very few donors viz., Uday, Saras, Anjali, Falguna, Kranti, Krishnabeni, Himadhan, Kshira, Satabdi, IRGC10118, Kalyani II, IC519228 and IC519139 have been identified (Rath et al., 2005, 2009, 2010 and Rath, 2008). Thus it is necessary to identify resistant genotypes for endemic areas and donors for varietal developmental programme.

Hence an attempt has been made to evaluate rice varieties under green house condition to find out suitable donors against WBPH.

Fifty one rice varieties including WBPH resistant Ptb 33 and susceptible check TN 1 were evaluated against WBPH under net house condition at ICAR-National Rice Research Institute, Cuttack during 2011 and 2012. Varieties were sown in line in plastic trays of size 12"x18". A uniform plant population of 20 plants was maintained for each variety. A mother culture of WBPH was maintain and reared on the susceptible variety TN 1 to get uniform population of specific instar of WBPH in the net house. After 10 days of germination, WBPH nymphs i.e., mixed population of 2<sup>nd</sup> and 3<sup>rd</sup> instars were collected and released on the seedlings at the rate of 8 insects per plant, and kept inside a cage for ten days. After ten days of insect feeding, observations on per cent plant mortality/damage were recorded as per the IRRI Standard Evaluation system (IRRI, 2002). The susceptible varieties were rejected and the highly resistant, resistant and moderately resistant varieties were again evaluated in the same procedure during 2012.

**Table 1.** Evaluation of Fifty one rice varieties against WBPH under net house condition during 2011.

S.N.	Damage	No. of score(SES)	Rice varieties
1	0	1	Ptb-33
2	1	5	PS-3,Satabdi, Radhi, Kalinga I and Hazaridhan
3	3	13	Annada, Satyakrishna, Virendra, Sadabahar, Heera, Varsadhan, Jogen, Neela, Khanish, Tara, ASD-16, CSR-4 and PR-113
4	5	15	Tapaswini, Krishnahansa, WITA-9, Rajashree, Indravati, Geetanjali, Hanseswari, BTP-5204, Sneha, Pooja, Rasi, VLD-61, WGL-32100, PR-118, PR-115,
5	7	11	Padmini,NLR-34449, Utkalprava, CR-1014, Chandan, GR-4, CSR-5, WGL-32183,Kalinga-III ,Pant dhan and ARB-2,
6	9	6	CSR-23,IR-36, WR-3-2-6-1, Masuri, Lalchandam and TN-1

SES= Standard Evaluation System, IRRI, 2002.

**Table 2.** Evaluation of selected rice varieties against WBPH under net house condition during 2012.

S.N.	Damage score(SES)	No. of Varieties	Rice varieties
1	0	1	Ptb-33
2	1	5	PS-3,Satabdi, Radhi, Kalinga I and Hazaridhan
3	3	13	Annada, Satyakrishna, Virendra, Sadabahar, Heera, Varsadhan, Jogen, Neela, Khanish, Tara, ASD-16, CSR-4 and PR-113

SES= Standard Evaluation System, IRRI, 2002.

During 2011, out of 51 rice varieties, the check variety Ptb33 was found to be highly resistant with score '0', five varieties viz., PS-3, Satabdi, Radhi, Kalinga I and Hazaridhan were resistant with score '1' and thirteen varieties viz., Annada, Satyakrishna, Virendra, Sadabahar, Heera, Varsadhan, Jogen, Neela, Khanish, Tara, ASD-16, CSR-4 and PR-113 were moderately resistant with score '3'. Similarly, six varieties viz., CSR-23, IR-36, WR-3-2-6-1, Masuri, Lalchandam, and TN-1 were highly susceptible and completely killed by the pest with damage score '9'. Eleven varieties viz., Padmini, NLR-34449, Utkalprava, CR-1014, Chandan, GR-4, CSR-5, WGL-32183, Kalinga-III, Pant dhan and ARB-2 were moderately susceptible with damage score '7' and fifteen varieties viz., Tapaswini, Krishnahansa, WITA-9, Rajashree, Indravati, Geetanjali, Hanseswari, BTP-5204, Sneha, Pooja, Rasi, VLD-61, WGL-32100, PR-118 and PR-115 were susceptible to WBPH with damage score '5' (Table 1).

Nineteen varieties in the category of highly resistant, resistant and moderately resistant were evaluated again along with resistant check during 2012. During 2012 Ptb 33 was highly resistant with score '0', five varieties i.e., PS-3, Satabdi, Radhi, Kalinga I and Hazaridhan were resistant with score '1' and thirteen varieties viz., Annada, Satyakrishna, Virendra,

Sadabahar, Heera, Varsadhan, Jogen, Neela, Khanish, Tara, ASD-16, CSR-4 and PR-113 were moderately resistant with score '3' and confirmed the result similar to that of previous year. In a similar artificial infestation trial Rath and Subudhi (2011) reported IR64 Sub 1, IR64 MAS, PS-3, Satabdi, Kalinga I and Hazaridhan were resistant to WBPH. In artificial studies, Khatri et al. (1983) reported that the yield loss due to this pest may range from 11-39% when 15 insects per hill were released. WBPH has become a serious pest and cause considerable damage either alone or mixed with brown plant hopper (BPH) in rice crop. So host plant resistance offers the best solutions for this pest management. Based on the net house screening results, it can be concluded that five varieties i.e., PS-3, Satabdi, Radhi, Kalinga I and Hazaridhan were resistant and Ptb 33 was highly resistant against WBPH and can be used in integrated pest management and as well as donor for varietal developmental programme against this serious pest.

**REFERENCES**

Dale D (1994). Insect Pest of Rice Plant-Their Biology and Ecology. In: Biology and management of rice insects, Heinrichs, E.A. (Ed.). Wiley, Newyork, ISBN:0-7021814-2, pp: 363-485

IRRI (2002). Standard Evaluation System for rice (SES), International Rice Research Institute (IRRI),

Philippines pp. 56

- Kadirvel P, Maheswaran M and Gunathilagaraj K (2003). Detection of simple sequence repeat markers associated with resistance to white backed plant hopper, *Sogatella furcifera* (Horvath) in rice IRRN 28(2): 22-23
- Khatri AK, Gangrade GA and Rathore VS (1983). Studies on the crop losses in rice caused by the white backed plant hopper (*Sogatella furcifera*) and the economic injury level in India. Tropical Pest Management 29: 220-223
- Kushwaha KS, Mrig K and Singh R (1982). Damage to rice cultivars by white backed plant hopper. Indian J. Ent. 44: 283-284
- Rath PC (2008). Evaluation of rice genotypes against white backed plant hopper (*Sogatella furcifera* Horvath). Oryza 45(4): 331-332
- Rath PC and Marndi BC (2010). Evaluation of resistance in some rice germplasm against white backed plant hopper, *Sogatella furcifera*. Ind.J.Plant Prot. 38(2): 197-199
- Rath PC, Prakash A, Nandagopal V and Subudhi HN (2009). Comparative studies of some rice genotypes against white backed plant hopper (WBPH) *Sogatella furcifera* Horvath. Journal of Applied Zoological Research 20(2):125-126
- Rath PC, Prakash A, Rao J and Subudhi HN (2005). Screening of rice varieties against white backed plant hopper (WBPH) *Sogatella furcifera* Horvath in net house condition. Journal of Applied Zoological Research 16(1): 21-22
- Rath PC, Subudhi HN, Nandagopal V and Prakash A (2008). Categorization of rice varieties for resistance against white backed plant hopper (WBPH) at Cuttack. Journal of Plant Protection and Environment 5(1): 74-75
- Rath PC and Subudhi HN (2011). Green house evaluation of selected rice varieties against white backed plant hopper *Sogatella furcifera* (Horvath). Oryza 48(2): 188-189
- Sachan SK and Garg DK (1992). Field pests of rice in hills of Uttar Pradesh. Oryza 29: 81-83