Evaluation of Resistance in Some Rice Germplasm against White Backed Planthopper, *Sogatella furcifera*

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The White Backed Plant Hopper (WBPH), *Sogatella furcifera* Horvath damages rice crop in many parts of India including Andhra Pradesh, Assam, Bihar, Delhi, Haryana, Himachal Pradesh., Tamil Nadu, Uttar Pradesh., West Bengal, Madhya Pradesh, Manipur, Odisha, Maharashtra, Rajasthan and Punjab (Chelliah and Gunathilagaraj,1990). Both nymphs and adults suck phloem sap causing reduced vigor, stunting, yellowing of leaves and delayed tillering. It is a major pest of rice in hilly tracts of Uttar Pradesh (Sachan and Garg, 1992) and in Haryana after rice root weevil (Kushwaha *et al.*, 1982). This pest is more abundant during the early stage of the growth in rice crop, especially in nurseries. Under favorable conditions, WBPH produces several generations and can cause hopper burn in the rice crop. Thus it is necessary to find out resistant varieties for endemic areas and donors for varietal development programme. Till now, very few donors viz., Udaya, Saras, Anjali, Phalguna, Kranti, Krishnabeni, Himadhan, Kishira, Satabdi, IRGC10118 and Kalyani II have been identified Rath *et al.*, (2005; 2009) and Rath (2008). So an attempt has been made to evaluate the resistance of 136 germplasm against WBPH in net house conditions at Central Rice Research Institute (CRRI), Cuttack during 2008-2010.

Two set of Sixty eight rice germplasm along with White backed plant hopper (WBPH) resistant and susceptible check varieties Ptb33 and TN1, respectively were evaluated against WBPH under net house condition at CRRI Cuttack during 2008 and 2009, respectively. Each genotype was sown in a line in a plastic tray. A uniform plant population of 10 plants was maintained for each variety. A mother culture of WBPH was maintained and reared in the susceptible variety TN1 to get sufficient number of WBPH population of uniform sizes in the net house. After 10 days of germination, WBPH nymphs (mixed population of 2nd and 3rd instars) were collected and released on the seedlings at the rate of 7-8 insects per plant. The plastic trays were kept inside a cage for ten days. After ten days of insect feeding, observations were recorded on the per cent mortality of the plants as per the Standard Evaluation System,(IRRI , Anonymous1996). The highly susceptible 106 genotypes were rejected and others selected from the

Table 1. Evaluation of rice germplasm against WBPH under net house condition during 2008

Sl.No	Damage score(SES)	No. of genotypes	Rice genotypes
1	0	2	Ptb 33 and IC519228
2	1	1	IC 519139
3	3	3	IC 519145, IC 519180 and IC 519186
4	5	3	IC 519132, IC 519135and IC 519229
5	7	4	IC 519136, IC 519163, IC 519190 and IC 519200
6	9	57	IC 519115, IC 519116 ,IC 519117, IC 519118, IC 519120 , IC 519121, IC 519122, IC 519123, IC 519124, IC 519129, IC 519130 , IC 519131, IC 519133, IC 519134, IC 519137, IC 519138, IC 519140 , IC 519141, IC 519142, IC 519143, IC 519144, IC 519147, IC 519148, IC 519149, IC 519151, IC 519152, IC 519153, IC 519154, IC 519155, IC 519156, IC 519157, IC 519158, IC 519161, IC 519162, IC 519164, IC 519166, IC 519167, IC 519168, IC 519171, IC 519173, IC 519174, IC 519175, IC 519176, IC 519177, IC 519183, IC 519185, IC 519188, IC 519189, IC 519202, IC 519203, IC 519204, IC 519206, IC 519208, IC 519211, IC 519213, IC 519215, IC 519217, IC 519222, IC 519223, IC 519224 and TN-1

SES = Standard evaluation system, IRRI 1996

Table 2. Evaluation of rice germplasm against WBPH under net house condition during 2009

Sl.No.	Damage score(SES)	No. of genotypes	Rice genotypes
1	0	2	Ptb 33 and AC837
2	1	1	AC 1477
3	3	1	AC 1444
4	5	1	AC 1126
5	7	14	AC 827, AC 1360, AC 1452, AC 1438, AC 1500, AC 1571, AC 761, AC 776, AC 1367, AC 1436, AC 1533, AC 1649, AC 1041 and AC 1129,
6	9	51	AC 610, AC 614, AC 615, AC 621 , AC 633 , AC 648 , AC 653 , AC 660 , AC 731 , AC 733 , AC 750 , AC 758 , AC 790 , AC807 , AC 814 , AC 819 , AC 830 , AC 841 , AC 1260 , AC 1309 , AC 1318 , AC 1368 , AC 1400 , AC 1412 , AC 1432 , AC 1440 , AC 1446 , AC 1526 , AC 1609 , AC 1031 , AC 1049 , AC 1051, AC 1052 , AC 1067, AC 1102, AC 1110 , AC 1111 , AC 1112 , AC 1131 , AC 1132 , AC 1133 , AC 1177 , AC 1212 , AC 1220 , AC 1223 , AC 1234 , AC 1241 , AC 1245 , AC 1249 , AC 1250 and TN-1

SES = Standard evaluation system, IRRI 1996

trials during 2008 and 2009 were again evaluated in same procedure during 2010.

The result of the experiment conducted during 2008 (Table1) revealed that only IC519228 was highly resistant and recorded damage score '0'. The genotype IC 519139 was resistant recording damage score '1' and three genotypes *viz.*, IC 519145, IC 519180 and IC 519186 were moderately resistant to the pest with a damage score of '3'. Three genotypes *viz.*, IC 519132, IC 519135 and IC 519229 were less susceptible showing damage score of '5', while, genotypes IC 519136, IC 519163, IC 519190 and IC 519200 were moderately susceptible with damage score of '7'. Rest of the entries showed high to very high level of susceptibility.

The result of the experiment conducted during 2009 (Table2) revealed that AC837 was highly resistant and recorded damage score '0'. The genotype AC 1477 was resistant recording damage score of '1' while the genotype AC 1444 was moderately resistant to the pest with a damage score of '3'. The genotype AC 1126 was moderately susceptible with damage score of '5'. Rest of the genotypes showed high to very high susceptibility.

The result of the experiment conducted during 2010 (Table 3) revealed that IC 519228 and AC 837 were highly resistant and recorded damage score of '0'. The genotypes IC 519139 and AC 1477 were resistant recording damage score '1' and four genotypes *viz.*, AC 1444, IC 519145, IC 519180 and IC 519186 were moderately resistant to the pest showing damage score of '3'. The resistance behavior of the germplasm recording damage score of '0-3'during 2008 and 2009 was confirmed during 2010. Four genotypes *viz.*, AC 1126,IC 519132, IC 519135 and IC 519229 were less susceptible with damage score of '5'. This result confirmed the earlier observation during 2008 and 2009.

Table 3. Evaluation of selected rice germplasm against WBPH under net house condition during 2010

Sl.No.	Damage score(SES)	No. of genotypes	Rice genotypes
1	0	3	Ptb 33, IC519228 and AC837
2	1	2	IC 519139 , AC 1477
3	3	4	AC 1444 ,IC 519145, IC 519180 and IC 519186
4	5	4	AC 1126,IC 519132, IC 519135and IC 519229
5	7	10	AC 827, AC 1360, AC 1452, AC 1438, AC 1500, AC 1571, IC 519136, IC 519163, IC 519190 and IC 519200
6	9	9	AC 761, AC 776, AC 1367, AC 1436, AC 1533, AC 1649, AC 1041, AC 1129 and TN-1

SES = Standard evaluation system, IRRI 1996

The remaining 18 entries *viz.*, AC 827, AC 1360, AC 1452, AC 1438, AC 1500, AC 1571, IC 519136, IC 519163, IC 519190, IC 519200, AC 761, AC 776, AC 1367, AC 1436, AC 1533, AC 1649, AC 1041 and AC 1129 were moderate to highly susceptible to WBPH with damage scores of '7-9'

WBPH has become a serious pest of rice and can cause considerable damage either alone or as a mixed population along with BPH. Using artificial infestation studies, Khatri *et al.*, (1983) reported that the yield loss due to this pest may range from 11 to 39% when 15 insects/hill were released. Host plant resistance offers the best solution for pest management. Rath *et al.*, 2005, 2008 and 2009 and Rath 2008 earlier reported some promising lines that are resistant against WBPH. The resistant cultures reported here and also reported in the earlier studies can serve as donors for developing resistant varieties against this serious pest.

References

Anonymous 1996. Standard Evaluation System, IRRI, Philippines.

Chelliah S and Gunathilagaraj K 1990. Rice pest management: Status and strategies. Lead paper presented in the *National Symposium on Rice in Wetland Ecosystems*, December 19-21, 1990, Kottayam, Kerala. 54 pp.

Khatri A K, Gangrade G A and Rathore V S 1983. Studies on the crop losses in rice caused by the white backed planthopper (*Sogatella furcifera*) and the economic injury level in India. *Tropical Pest Management*. **29 :** 220-223.

Kushwaha K S, Mrig K K and Singh R 1982. Damage to rice cultivars by white backed planthopper. *Indian Journal of Entomology* **44 :** 283-284.

Rath P C 2008. Evaluation of rice genotypes against white backed planthopper (*Sogatella furcifera* Horvath). *Oryza.* **45(4) :** 331-332.

Rath P C, Prakash A, Nandagopal V and Subudhi H N 2009. Comparative studies of some rice genotypes against white backed planthopper (WBPH) *Sogatella furcifera* Horvath. *Journal of Applied Zoological Research* **20(2) :** 125-126.

Rath P C, Prakash A, Rao J and Subudhi H N 2005. Screening of rice varieties against white backed planthopper (WBPH) *Sogatella furcifera* Horvath, in net house condition. *Journal of Applied Zoological Research* **16(1) :** 21-22.

Rath P C, Subudhi H N, Nandagopal V and Prakash A 2008. Categorization of rice varieties for resistance against white backed planthopper (WBPH) at Cuttack.*Journal of Plant Protection and Environment* **5(1) :** 74-75.

Sachan S K and Garg D K 1992. Field pest of rice in hills of Uttar Pradesh. *Oryza* **29 :** 81-83.

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