Screening of rice varieties for resistance against brown plant hopper, (*Nilaparvata lugens* Stal)

Mayabini Jena*, R.K. Sahu and B.C. Marandi

Central Rice Research Institute, Cuttack-753006, Orissa, India

ABSTRACT

Rice germplasm collected from Deogarh, Sundargarh, Jharsuguda, Sambalpur and Jagatsinghpur districts of Orissa and Raigarh district of Chhatishgarh, India were screened for their resistance against rice brown plant hopper (BPH). Out of 337 varieties screened, six varieties of CRRI accession numbers 35006 (Banaspati), 35070 (Panidubi), 35155 (Dhoiya bankoi), 35181 (Salkathi), 35184 (Dhobanumberi) and 35228 (Jalakanthi) were found to be highly resistant with score 1. Hence, these varieties can be effectively used in the breeding programme to develop BPH resistant varieties.

Key words: *Rice germplasm, screening, BPH resistance*

Brown plant hopper, *Nilaparvata lugens* Stal, is a major pest of rice in states like Andhra Pradesh, Bihar, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, Punjab, Gujurat and West Bengal of India (Production orientation survey 2004, 2005). Host plant resistance has played an important role in the control of this pest successfully during past two decades. Several resistant varieties have been devoloped and grown in different areas of India (Mathur *et al*, 1999 ; Krishnaiah *et al*, 1999) as a result, it contributed partly towards the suppression of the pest for nearly fifteen years (1983 - 1998). The pest has appeared in damaging form from 1998 onwards. That may be attributed to the cultivation of high yielding varieties susceptible to BPH and also to the break down of resistance of the existing released BPH resistant varieties. Therefore, there is a need to develope varieties with high BPH resistance for which donors with high potentiality is a prime requirement. The land races existing in different areas of India provide enough opportunity to select such donors through proper screening against this pest.

Three hundred and twenty seven varieties (Table 1), collected by the Genetic Resources Division of Central Rice Research Institute (CRRI), Cuttack, Orissa, India from Deogarh , Sundargarh, Sambalpur, Jharsuguda and Jagatsinghpur districts of Orissa and

Table 1. Source of varieties and their reaction to BPH

Place of collection	Total No. of varieties	Score 1	Score 3	Score 5	Score 7	Score 9
Barkot, Deogarh, Orissa	27	1	0	2	3	21
Deogarh,Deogarh, Orissa	5	0	0	0	1	4
Riamal, Deogarh, Orissa	5	0	0	1	1	3
Tileibani, Deogarh, Orissa	14	0	1	1	0	12
Banei, Sundargarh, Orissa	21	1	1	1	1	17
Lahunipada, sundargarh, Orissa	7	2	0	0	1	5
Koira, Sundargarh, Orissa	116	1	7	13	12	83
Jharsuguda, Orissa	4	0	0	0	0	4
Sambalpur, Orissa	87	5	4	8	9	62
Jagatsinghpur, Orissa	34	**2**	0	0	1	31
Raigarh, Chhatishgarh	7	**0**	0	0	0	7

Raigarh district of Chhatishgarh, India were screened for resistance against BPH in the nethouse condition of CRRI, Cuttack during the years 2001 to 2005.

The screening was undertaken according to the Standard Evaluation System of IRRI (1996) with slight modification. Brown plant hopper nymphs of same stage and rice seedlings of uniform age (10day old) of all the varieties were used for the experiment. To get the BPH population, gravid females were released on 45 to 60 day old potted plants of variety TN1 in test cages and were allowed to oviposit for 48 hours. Plants were kept under regular observation to provide healthy condition for nymphal hatching which took about 7-9 days after oviposition at 30 ± 2^0 C. Nymphs were allowed to grow upto second instar stage to be used for screening. Healthy seeds of different varieties were sown in separate rows in Zinc trays of 45cm l x 35cm w x 20cm h for initial screening. As the seedlings became 10 days old, they were thinned out to only 25 plants in each variety. Second instar nymphs of BPH were released in the test tray so as to keep the population @ 10 nymphs plant^{-1}. Observation was taken when the seedlings of susceptible variety TN1 died to the tune of 95 per cent or more. According to the percentage of dead plants the varieties were scored and the degree of resistance or susceptibility was worked out. Varieties, thus found resistant were selected and subjected to screening against the pest under replicated design. The same method of raising seedlings and releasing insects were followed only except that each variety was replicated 4 times. Plant mortality due to insect feeding was recorded and subjected to analysis according to SES scoring to confirm the resistance of varieties to the insect.

Initial screening revealed that 12 varieties were highly resistant to BPH with plant mortality ranging from 4 – 10 percent (Score 1), eleven varieties were found resistant with mortality range of 16–30 per cent (Score 3), twenty-one varieties were moderately resistant with plant mortalities from 32–50 percent (Score 5). The reaction of rest of the varieties was susceptible or highly susceptible with Score 7/9 (Table 1).

The highly resistant varieties were again screened in replicated design, each with 4 replications, the other experimental conditions remaining the same as the initial screening. It was observed that six varieties such as Banaspati, Panidubi, Dhoiya bankoi, Salkathi, Dhoba numberi, and Jalakanthi retained their high resistance quality whereas other six showed resistant reaction with score 3 (Table 2). Variety Salkathi was also reported to possess multiple resistance against five insects including BPH. (Progress Report, All India co-ordinated rice pmprovement programme, 2005).

Table 2. Reaction of varieties against BPH under replicated design

Name of the variety	CRRI Ac. No.	% plant damage	Score
Ganjeijota	34927	22	3
Jhup jhupa	34997	12	3
Sahiba	35003	12	3
Banaspati	35006	3	1
Panidubi	35070	7	1
Dhoiya Bankoi	35155	5	1
Salkathi	35181	3	1
Jhul Puagi	35183	20	3
Dhoba Numberi	35184	8	1
Jala Kanthi	35228	2	1
Chaka Akhi	35677	14	3
Palas Phula	35703	30	3

From the above data, it is clear that the varieties showing high resistance to BPH with score 1 could be successfully used as resistant donors for developing resistant rice varieties against the insect.

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