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## Screening of rice varieties against white backed plant hopper (*Sogatella furcifera* Horvath) in net house condition

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### Abstract

Ninety four released varieties for different of India including susceptible check variety TN 1 were evaluated in net house condition at National Rice Research Institute, Cuttack. Four varieties viz., Pathara, Pratap, Tejaswini and Santpheal were found to be moderately resistant to White Backed Plant Hopper (WBPH) having SES Score 3. Fifteen varieties are moderately susceptible having SES Score 5. These four varieties should be popularized among the WBPH endemic areas and used as donor in varietal development programme.

**Keywords:** Screening, white backed plant hopper, rice

### Introduction

Rice is major food crop of Asian countries including India. Rice is infected by more than 100 species of insects and pest, among these plant hoppers, leaf hoppers, stemborer, gallmidges are the most serious and economically important insect pest of rice (Dupo and Barrion, 2009) [1]. The hoppers such as BPH (*N. lugens*), WBPH (*S. furcifera*) and SBPH (*Laodelphax striatellus*) are of most important in India (Pathak, 1968) [2]. WBPH is one of the most serious insects of rice which causes severe yield loss (Khan and Saxena, 1986) [3]. Since early 2000, the outbreak of hoppers is increasing through out the Asian country. (Catindig *et al* 2009) [4]. Krishnaiah (2014) [5] reported the occurrence of hoppers in Bihar, Jharkhand, Uttar Pradesh, Haryana, Punjab, Andhra Pradesh, Tamil Nadu, Odisha and West Bengal. Both nymphs and adults suck phloem sap from leaves and leaves sheaths, reduce plant height, tillering and filled grains under favorable conditions and finally death of plant known as hopper burn (Auclair and Baldos, 1982, Liu *et al*, 2008) [6, 7]. WBPH was first reported in India from Surat, Pusa, Poona and Nagpur regions as early as 1903. A recent report from DRR (2010) [8] estimated that plant hoppers cause losses ranging from 1-2 mill tons of rice annually in India. Presence of weeds around the rice plants and stubbles left over harvest are the sources of pest build up and the infestation of plant hopper. Application of chemicals to this pest is not giving encouraging result and develops resistance of insects. Identification of donors for development of resistance varieties is the only alternative and this will be continuous and from wide sources, as there is also creation of new biotype to break down the resistance. (Glass, 1975) [9]. Mass screening of rice varieties in net house was first started by International Rice Research Institute, Philippine in 1970, there after screening of rice varieties for WBPH was started at Directorate of Rice Research, Hyderabad in 1976 (Kalode *et al.*, 1977) [10].

### Materials and Methods

Identification of new source of resistance for WBPH in 94 rice varieties were conducted in net house of National Rice Research Institute, Cuttack during Kh 2019 through MSST method. Modified seed box screening test (MSST) were used to assess the level of WBPH resistance at seedling stage. Wooden box of size 50x50 x50 cm was filled with fine wet soil and levelled properly. Pre germinated seed of each varieties were sown in 3 cm. apart in a wooden box so that 12 lines were accommodated including resistance check and susceptible check. 12 days after sowing, the seedlings were infested with second instar nymphs at the rate of 3 nymphs /seedling. After infestation, the wooden seed box with seedling were covered with wire mesh wooden cage. Three replications of each genotype along with control were maintained.

The test plants were observed daily for damage after one generation of insect establishment (15 days after infestation). On test lines, symptoms of WBPH damage (hopper burn) was observed. Damage rating of the test lines were done on row basis when 90% of the plants either susceptible check row or susceptible genotype in the seed box were found dead. The genotypes were rated /plant damage using SES score (IRRI, 2002) <sup>[11]</sup> of rice 0-9 score.

## Results and Discussions

Out of 94 varieties, only 4 varieties show edmoderate resistant reaction having SES score 3. The varieties are Pathara, Pratap, Tejaswini and Santpheal (table-1).No varieties showed resistant reaction in this study. Fifteenvarieties are moderately

susceptible having SES score 5. The varieties are Prathyasa, Karjat-3, MTU1061, MTU2067, MTU 1075, RTN-3, SKL-6 PKV kissan, Bhoi, Gajapati etc. Thirty four varieties showed susceptible reaction to WBPH having SES score 7.The popular varieties are IR24, PR103, PR 106, IMP Sabarmati, Pusa Basmati 1121, IMP Pusa Basmati-1,GR-4 etc. Forty eight varieties are highly susceptible having SES score 9.The popular varieties such as Govind, Basmati 370,PR 116,PR114,Pusa basmati 1,Pusa Sugandh 5,Pusa33,Jaya,GR 6,GR 103 etc. showed highly susceptible reaction. It is evident that resistance source among the released varieties are limited. So more number of varieties should be screened to find out good donors for WBPH resistant varieties.

**Table 1:** List of varieties with their SES score and state released

| Sl.no | varieties         | score | state       | Sl.no |                  |   | state       |
|-------|-------------------|-------|-------------|-------|------------------|---|-------------|
| 1     | Pathara           | 3     | Odisha      | 47    | PKV HMT          | 7 | Maharastra  |
| 2     | pratap            | 3     | Odisha      | 48    | Sye              | 7 | Maharastra  |
| 3     | Tejswini          | 3     | Odisha      | 49    | Meher            | 7 | Odisha      |
| 4     | Santpheal         | 3     | Odisha      | 50    | Panindra         | 9 | Assam       |
| 5     | Pratysha          | 5     | Kerala      | 51    | Pantdhan-16      | 9 | Uttarakhand |
| 6     | Karjat-3          | 5     | Maharastra  | 52    | Pant sugandha-21 | 9 | Uttarakhand |
| 7     | MTU-1061          | 5     | AP          | 53    | Govind           | 9 | Uttarakhand |
| 8     | MTU2067           | 5     | AP          | 54    | VL Dhan-61       | 7 | Uttarakhand |
| 9     | MTU1075           | 5     | AP          | 55    | VL Dhan206       | 7 | Uttarakhand |
| 10    | RTN-3             | 5     | Maharastra  | 56    | VL Dhan207       | 7 | Uttarakhand |
| 11    | SKL-6             | 5     | Maharastra  | 57    | VLK-39           | 7 | Uttarakhand |
| 12    | Pkvkissan         | 5     | Maharastra  | 58    | VL Dhan108       | 7 | Uttarakhand |
| 13    | Bhoi              | 5     | Odisha      | 59    | VL Dhan208       | 7 | Uttarakhand |
| 14    | Gajapati          | 5     | Odisha      | 60    | VL Dhan87        | 7 | Uttarakhand |
| 15    | Surendra          | 5     | Odisha      | 61    | IR 30864         | 7 | Karnataka   |
| 16    | Hiranmayee        | 5     | Odisha      | 62    | Thanu            | 7 | Karnataka   |
| 17    | Phuleradha        | 5     | Karnataka   | 63    | CTN-3            | 7 | Karnataka   |
| 18    | MGD-101           | 5     | Karnataka   | 64    | KCP-1            | 7 | Karnataka   |
| 19    | Magadsugandha     | 5     | Karnataka   | 65    | Basmati370       | 7 | Punjab      |
| 20    | IR-24             | 7     | Uttarakhand | 66    | PR116            | 7 | Punjab      |
| 21    | Pantdhan19        | 7     | Uttarakhand | 67    | PR113            | 9 | Punjab      |
| 22    | Pantdhan18        | 7     | Uttarakhand | 68    | PR 114           | 9 | Punjab      |
| 23    | PR106             | 7     | Punjab      | 69    | China-988        | 9 | HP          |
| 24    | PR103             | 7     | Punjab      | 70    | Himalaya-1       | 9 | Uttarakhand |
| 25    | Naur-1            | 7     | Gujrat      | 71    | Gouri            | 9 | Odisha      |
| 26    | Himalaya-799      | 7     | HP          | 72    | Meghesa-1        | 9 | Meghalaya   |
| 27    | Kankom-2          | 7     | Meghalaya   | 73    | Megharice-2      | 9 | Meghalaya   |
| 28    | Uma               | 7     | Kerala      | 74    | IET-1410         | 9 | JK          |
| 29    | Kartika           | 7     | Kerala      | 75    | Pusa Basmati-1   | 9 | CVRC        |
| 30    | Bhadra            | 7     | Kerala      | 76    | Pusa Sugandha-5  | 9 | CVRC        |
| 31    | Rebati            | 7     | Kerala      | 77    | Pusa-33          | 9 | CVRC        |
| 32    | Panchami          | 7     | Kerala      | 78    | Jaya             | 9 | CVRC        |
| 33    | Lampneh           | 7     | Meghalaya   | 79    | GAR-13           | 9 | Gujrat      |
| 34    | BhaLum-4          | 7     | Meghalaya   | 80    | GR-6             | 9 | Gujrat      |
| 35    | Bha Lum-2         | 7     | Meghalaya   | 81    | Dandi            | 9 | Gujrat      |
| 36    | Bha Lum-1         | 7     | Meghalaya   | 82    | GR-11            | 9 | Gujrat      |
| 37    | Megharice-1       | 7     | Meghalaya   | 83    | GR-7             | 9 | Gujrat      |
| 38    | Sanwal basmati    | 7     | JK          | 84    | GR-103           | 9 | Gujrat      |
| 39    | Imp Sabarmati     | 7     | Delhi       | 85    | Palghar-2        | 9 | Maharastra  |
| 40    | Pusa Basmati 1121 | 7     | CVRC        | 86    | Ratnagiri-1      | 9 | Maharastra  |
| 41    | ImpPusa Basmati-1 | 7     | CVRC        | 87    | Ratnagiri-2      | 9 | Maharastra  |
| 42    | JR-503            | 7     | MP          | 89    | Karjat-6         | 9 | Maharastra  |
| 43    | GR-4              | 7     | Gujrat      | 90    | Panvel-2         | 9 | Maharastra  |
| 44    | Narmada           | 7     | Karnataka   | 91    | Vaidehi          | 9 | Bihar       |
| 45    | GAR-2             | 7     | Gujrat      | 92    | R-Suwashini      | 9 | Bihar       |
| 46    | RTN-4             | 7     | Maharastra  | 93    | Pravat           | 7 | Bihar       |
|       |                   |       |             | 94    | TN-1             | 9 | Punjab      |

CVRC; Central varietal release committee, J&K; Jammu and Kashmir, HP; Himachal Pradesh, AP; Andhra Pradesh; MP; Madhya Pradesh.

## Discussion

Rath *et al.*, (2005) <sup>[12]</sup> evaluated 90 rice varieties for WBPH in net house. Only nine varieties namely Uday, Sarasa, Kranthi, Phalguna, Krishnabeni, Anjali, Himadhan and Kalyani-2 showed resistant reaction. Chandrasekhar *et al.*, (2017) <sup>[13]</sup> screened 30 rice varieties in net house conditions and found nine varieties to be resistant. The varieties are IR72, PTB 41, CO43, IR64, IR36, etc. Rath (2018) <sup>[14]</sup> studied the reaction of WBPH for 51 varieties and found the varieties namely Pusa sugandh-3, Satabdi, Radhi, Kaling-1, Hazaridhan showed resistant reaction. Seventy four rice varieties/land races were evaluated for WBPH. Only 3 varieties namely Panorama, Sambha, Karthik sambha etc showed resistant reaction (Venkatesh *et al.*, 2019) <sup>[14]</sup>

## Conclusion

The varieties viz., Pathara, Pratap, Tejaswini and Santpheal can be popularized in WBPH endemic areas and utilized as donors for varietal development programme.

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