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Screening of Advanced Rice Cultures against Brown Planthopper, *Nilaparvatalugens* (Stal.)

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ABSTRACT

A field experiment was conducted at Agricultural College Farm, Bapataladuring *kharif,* 2019 for testingthe resistance of twenty eight advanced rice cultures against brown planthopper, *Nilaparvatalugens*. The level of resistance of rice genotypes was determined based on the 0-9 damage score as per IRRI's Standard Evaluation System (SES). All 28 cultures *viz.*, BPT 2601, 2787, 2808, 2841, 2846, 2850, 2854, 2863, 2866, 2932, 2935, 2938, 2948, 2950, 2953, 2954, 2956, 2958, 3025, 3029, 3031, 3032, 3033, 3034, 3049, 3050, 3059, 3060 and 3082 were rated as highly resistant (HR) with a damage score of one.

Key words: *Brown planthopper, Rice and Screening.*

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Rice (*Oryza sativa* L.) is the widely consumed staple food for a large part of the world's human population, especially in Asia. In India, rice is grown in an area of 43.79 M ha with a production of 112.91 M t and productivity of 2578 kg ha^{-1}(Ministry of Agriculture and Farmers Welfare, 2018). In Andhra Pradesh, rice is grown in an area of 22.18 M ha with production and productivity of 126.91 M t and 5722 kg ha^{-1} respectively. (Directorate of Economics and Statistics, 2018). Approximately, 52 per cent of the global production of rice is lost annually owing to the damage caused by biotic stress factors, of which 21 per cent is attributed to the attack of insect pests (Yarasi*et al*., 2008).Brown planthopper, *Nilaparvatalugens*(Stal.) (Homoptera: Delphacidae) is one of the destructive rice pest and damage plants by sucking the sap and cause drying up of the plants, the condition calledhopperburn (Paul, 2007).

Excessive use of nitrogenous fertilizers and insecticides can lead to outbreaks of the brown planthopper by increasing the fecundity, and by reducing natural enemies populations. A major tool for managing the BPH is integration of host plant resistance with natural enemy conservation and cultural practices. Among various methods available for managing BPH, cultivation of resistant varieties is the most economical and efficient method (Renganayaki*et al*., 2002). It is compatible with other control tactics and is usually employed in an Integrated Pest Management (IPM) programme. The important advantage of plant resistance is that, the effect of resistant variety is pest specific, cumulative, persistent and reduces the insect population by 50 per cent in each generation (Painter, 1958).Keeping all these points in view an experiment was conducted to evaluate the rice varieties with different levels of resistance.

MATERIAL AND METHODS

The advanced rice cultures obtained from Agricultural Research Station (ARS), Bapatla were evaluated against BPH in Agricultural College Farm,

Table 1. Standard Evaluation System for resistance against brown planthopper

Damage score	No. of BPH/hill	Level of resistance
0	0	Immune (I)
1	1-5.	Highly resistance (HR)
3	5.1-10	Resistance (R)
5	10.1-20	Moderately resistance (MR)
7	20.1-40	Moderately susceptible (MS)
9	>40	Susceptible (S)

Table 2. Reaction of different rice cultures against brown planthopper infestation under field conditions during *kharif*,2019

S. No.	Genotype name	Mean population/hill	Status	Damage scoring
1	BPT 2850	1.5	1	HR
2	BPT 2863	1.46	1	HR
3	BPT 2601	1.52	1	HR
4	BPT 2787	0.96	1	HR
5	BPT 2854	1.19	1	HR
6	BPT 3049	1.24	1	HR
7	BPT 2946	1.42	1	HR
8	BPT 2938	1.2	1	HR
9	BPT 3033	0.97	1	HR
10	BPT 2950	1.78	1	HR
11	TN 1	24.56	7	MS
12	PTB 33	0.72	1	HR
13	BPT 3060	2.29	1	HR
14	BPT 3034	1.34	1	HR
15	BPT 2935	1.15	1	HR
16	BPT 2932	1.12	1	HR
17	BPT 2956	1.35	1	HR
18	BPT 3025	1.25	1	HR
19	BPT 3029	1.1	1	HR
20	BPT 2846	1.32	1	HR
21	BPT 3050	1.27	1	HR
22	BPT 3059	1.04	1	HR
23	BPT 3032	1.34	1	HR
24	BPT 3082	1.08	1	HR
25	BPT 3031	1.03	1	HR
26	BPT 2866	0.99	1	HR
27	BPT 2841	0.99	1	HR
28	BPT 2958	0.99	1	HR
29	BPT 2953	1.16	1	HR
30	BPT 2954	1.07	1	HR
	SEm±	0.05		
	Fcal	Sig		
	CD (0.05)	0.15		
	CV (%)	5.79		

Sig - Significant at 5 % level, HR - Highly Resistant, MS - Moderately Susceptible

Bapatla during *kharif, 2019*. The experiment was laid out in randomized block design which was replicated thrice. Each entry was transplanted in two rows of two metre length with a spacing of 30 cm between each entry. Each replication was separated with a gap of 30 cm which were used as irrigation channels. One month old seedlings were transplanted in the field with a spacing of 20 x 15 cm.

Observations on number of BPH/hill (nymphs &adults)were recorded from 30 days after transplanting at week days interval from 10 randomly selected hills in each entry. The status of rice genotypes was assessed as per Standard Evaluation System (SES) for rice developed by International Rice Research Institute (IRRI) to rate on 0-9 scale into different categories of resistance based on mean data of BPH(IRRI, 2002).

RESULTS AND DISCUSSION

Screening of twenty eight cultures obtained from Agricultural Research Station (ARS)was done under field conditions during *kharif* 2019. The results of screening trails showed that all 28 cultures *viz*., BPT 2601, 2787, 2808, 2841, 2846, 2850, 2854, 2863, 2866, 2932, 2935, 2938, 2948, 2950, 2953, 2954, 2956, 2958, 3025, 3029, 3031, 3032, 3033, 3034, 3049, 3050, 3059, 3060 and 3082 were rated as highly resistant (HR) with a damage score of one (Table 4.2). The entries BPT 2787 (0.96), BPT 3033 (0.97), BPT 2866, BPT 2841, BPT 2958 (0.99), BPT 3031 (1.03), BPT 3059 (1.04), BPT 3082 (1.08), BPT 2954 (1.07), BPT 3029 (1.10) and BPT 2932 (1.12) were statistically on par with each other. BPT 3060 recorded the highest mean population per hill among the screened entries *i.e.*, 2.29 per hill. In case of susceptible check, TN 1 recorded 24.56 mean population per hill and scored 7 in the scale. PTB 33 which is a resistant check scored one and found with 0.72 mean population per hill.

The results were in accordance with Chandrasekhar and Suresh (2017) who evaluated 30 rice cultures for their resistance against BPH including the resistant and susceptible checks, PTB 33 and TN 1 respectively. They reported lowest mean damage rating on PTB 33 as 1.00 and PTB 41 exhibited a damage score ranging from 1.00- 1.67 when compared to TN1 (9.00)whereas the genotype BPT 5204 was rated as susceptible with a damage score of 8.33. Similarly, Deekshita et al. (2017) evaluated 28 paddy advanced cultures for resistance against BPH and reported that four cultures *viz*., BPT 2789, BPT 2703, BPT 2787 and BPT 2688were resistant with a damage score of 3.00 while remaining 24 genotypes *viz*., BPT2702, 2717, 2719, 2741, 2766, 2768, 2769, 2678,2677, 2680, 2780, 2781, 2782, 2783, 2784, 2786,2788, 2790, 2791, 2793, 2795, 2796, 2797 and 2798were moderately resistant with a damage score of 5.00.

CONCLUSION

Based on the above results and discussions, it can be concluded that all 28 rice cultures exhibited resistance to BPH and entries BPT 2787 (0.96), BPT 3033 (0.97), BPT 2866, BPT 2841, BPT 2958 (0.99), BPT 3031 (1.03), BPT 3059 (1.04), BPT 3082 (1.08), BPT 2954 (1.07), BPT 3029 (1.10) and BPT 2932 (1.12) which were statistically on par with each other recorded least mean population per hill compared to other entries. The susceptible check TN 1 has recorded the highest mean population per hill (24.56) and the resistant check recorded the lowest mean populaton per hill (0.72) compared to the entries.

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