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Evaluation of Rice Local Landraces for Resistance Against Yellow Stem Borer, *Scirpophaga incertulas* (Walker)

Balaji BN[1]*, Vijaykumar L[2], Shivanna B[1], Jemla Naik D[1], Pushpa K[3], Raveendra HR[4]

[1]Department of Agricultural Entomology, College of Agriculture, UAS, GKVK, Bengaluru-560065.

[2]Department of Agricultural Entomology, College of Agriculture, V. C. Farm, Mandya-571405.

[3]Department of Agronomy, College of Agriculture, UAS, GKVK, Bengaluru-560 065.

[4]Division of Plant Pathology, AICRP on Small Millets, ZARS, V.C. Farm, Mandya-571405.

*Corresponding author E-mail: balajibvn123@gmail.com

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Abstract

Field evaluation of 50 (fifty) local landraces of rice against paddy yellow stem borer (YSB), *Scirpophaga incertulas* (Walker) was carried out at the College of Agriculture, V.C. Farm, Mandya during *kharif* and *Summer* 2022-23. The per cent of damage by YSB on different genotypes was evaluated at 30, 60 and 90 days after transplanting (DAT) in both the seasons. Based on the mean per cent incidence rice genotypes were grouped into different resistance categories. In *kharif* 2022, out of 50 local landraces screened ten (10) genotypes recorded resistance reaction with a damage score of 1, twenty seven (27) genotypes were found to be moderately resistant with a score of 3, nine (9) genotypes reacted as moderately susceptible with score of 5 and four genotypes showed susceptible reaction with score of 7. During summer 2023 as well, the same results were observed but the per cent incidence was varied. In both the seasons none of the genotypes were found to be highly resistant or highly susceptible to YSB. The promising resistant and moderately resistant genotypes found in the current study can be further used in resistant breeding programs.

Keywords: *Scirpophaga incertulas,* Screening, local landraces, resistance breeding, SES.

Introduction

Rice (*Oryza sativa* Linn.) is the staple food of more than half of the world's population (Kulagod *et al*., 2011). India is the second-largest producer and consumer of rice in the world after China with an area of 463.79 lakh ha with an annual production of 130.29 million tonnes and productivity of 2809 kg ha^{-1} (Anonymous, 2023). Paddy cultivation, a vital component of global food production, faces formidable challenges from various pests that jeopardize crop yield and quality. Among these, the yellow stem borer poses a significant threat to paddy fields, causing substantial economic losses and compromising food security.

Rice yellow stem borer (YSB; *Scirpophaga incertulas* Walker) is the most destructive pest causing about a 25-30% reduction in yield. This results in an annual yield loss of 27-34% (Pasalu *et al*., 2002) of the production. During the vegetative stage of the crop, the newly emerged caterpillar bores into the stem and feeds on the internal content. As a result, the central shoot dries up and produces dead heart. In the reproductive stage of the crop, grownup larvae bore into the peduncle leading to white ears and offering higher loss to the crop (Karthikeyan and Purushothaman, 2000). Given the substantial impact of YSB infestation on paddy crops, there is a growing need for effective and sustainable pest management strategies. Screening, a comprehensive and systematic approach, emerges as a pivotal tool in identifying and

developing resistant varieties capable of withstanding the onslaught of YSB. This process involves the meticulous evaluation of diverse rice germplasm to pinpoint genetic traits that confer resistance to the YSB.

Several studies have also underscored the importance of screening initiatives in developing YSB-resistant paddy varieties. The work of Pathak and Khan (1994) emphasized the necessity of continuous screening efforts to stay ahead of evolving pest populations. Growing resistant variety is an excellent alternative compared to other management strategies. It is also highly compatible with all other methods of pest management. Hence, identifying the source of resistance against yellow stem borer is an important step, so the current study aims to screen the genotypes for resistance to YSB under field conditions.

Materials and Methods

Field evaluation of local landraces and popular cultivars of rice for resistance against YSB in rice was conducted at A-block, College of Agriculture, V. C Farm, Mandya, UAS, GKVK, Karnataka during *kharif* and *summer* seasons of 2022-23.

Screening material: A total of 50 local landraces of rice (**Tables 2 and 3**) were collected from the Zonal Agricultural Research Station, V.C. Farm Mandya and sown separately for the evaluation. 25 days seedlings of local landraces were transplanted in 3 rows with the spacing 20 cm & 15 cm between rows and plants, respectively. Each entry was raised as per the package of practice, except the plant protection measures (Anonymous, 2016).

In each genotype, the infestation of YSB was recorded during the vegetative stage (before panicle emergence) by counting the number of dead hearts to the total number of tillers, in 10 randomly selected hills in each test entry at 30 and 60 days after transplanting (DAT). Likewise, at pre-harvest, the infestation of YSB was recorded by counting the total number of ear-bearing tillers and white ears on 10 randomly selected hills and per cent white ears was worked out at 90 DAT.

$$\text{Dead heart (\%)} = \frac{\text{Number of dead hearts}}{\text{Total number of tillers}} \times 100$$

$$\text{White ear (\%)} = \frac{\text{Number of white ears}}{\text{Total number of productive tillers}} \times 100$$

The mean and standard deviation were worked out and based on the level of infestation, rice genotypes were grouped into different resistance categories for the data interpretation. Further, the scoring of rice YSB infestation was made and interpreted based on the Standard Evaluation System for Rice (SES) developed by the International Rice Research Institute (IRRI, 2013) (**Table 1**).

Results and Discussions

Kharif 2022

Results revealed that, among 50 local landraces studied, the per cent dead hearts caused by YSB ranged from 7.04± 4.82 to 41.83± 4.68 per cent, in Chinagari batta and Bili nellu respectively, similarly the per cent white ears ranged from 2.77 ±2.9 to

Table 1: Standard Evaluation System for Screening Rice Yellow Stem Borer

For dead heart			For white ear		
Scale	**Per cent damage**	**Category**	**Scale**	**Per cent damage**	**Category**
0	No damage	Highly Resistant	0	No damage	Highly Resistant (HR)
1	1- 10%	Resistant	1	1-5%	Resistant (R)
3	11- 20%	Moderately Resistant	3	6- 10%	Moderately Resistant (MR)
5	21-30%	Moderately Susceptible	5	11-15%	Moderately Susceptible (MS)
7	31-60%	Susceptible	7	16-25%	Susceptible (S)
9	61% and above	Highly Susceptible	9	26% and above	Highly Susceptible (HS)

22.1 ±4.28 in Bul Bul -1 and Bili nellu respectively (**Table 2**). Overall, in *kharif* 2022, 10 genotypes were found to be resistant (scale 1), 27 genotypes with score 3 were found to be moderately resistant, 9 genotypes were found to be moderately susceptible (scale 5) and 4 genotypes were susceptible with score 7. However, none of the genotypes were found to be highly resistant or susceptible with scores of 0 and 9 respectively.

At 30 DAT, per cent incidence due to dead heart ranged from 7.04± 4.82 to 9.49± 4.2 per cent in Chinagari batta and Aishwarya and those landraces were categorized as resistant genotypes with score 1. Whereas, in moderately resistant categories (score 3), the per cent dead heart ranged between 11.72± 2.95 and 18.81± 7.05 in the Bangara sanna - 3 and Hasnudi. Likewise, in moderately susceptible categories (score 5) the infestation varied from 21.49± 6.07 to 25.35± 6.94 per cent dead heart in the genotypes *viz*., Mysore mallige – 1 and Kavadari. However, per cent dead heart at 30 DAT was observed between 31.48± 4.06 and 41.83± 4.68 in Kanakunja and Bili nellu, which were categorized as susceptible (score 7). Of all the local landraces screened, none of the genotypes were found highly resistant (HR) and highly susceptible with scores of 0 and 9 (**Table 2**).

Similarly, at 60 DAT, none of the genotypes were found to be highly resistant and the genotypes with per cent incidence ranged from 6.1± 5.64 to 9.64± 4 in Chinagari batta and Bilikanna hegge were categorized as resistant genotypes with score 1. Whereas, in moderately resistant categories (score 3), the per cent dead heart showed between 10.82± 2.79 and 17.96± 5.12 in Itan gidda and Hasnudi. Likewise, in moderately susceptible categories (score 5) the infestation varied from 21.49± 6.63 to 26.42± 9.86 per cent dead heart in the genotypes Bangara kaddi and Kavadari. However, per cent dead heart at 60 DAT was observed between 31.21± 4.44 and 42.35 ± 3.33 in Kulaj and Bili nellu and was categorized as susceptible (score 7), meanwhile, none of the genotypes were found to be highly susceptible (score 9) (**Table 2**).

At 90 DAT, per cent white ear was observed between 2.77 ± 2.9 and 4.53 ± 4.12 in Bul Bul -1 and Chinagari batta, which were considered resistant varieties. Likewise, per cent white ear was observed between 6.43 ± 3.42 and 9.4 ± 2.92 in Moradda and Black Basumathi and was categorized as moderately resistant. The infestation varied from 12.01 ± 3.08 to 14.24 ± 5.08 per cent white ears in the genotypes Kannur and Chinna ponni - 4 and they were regarded as moderately susceptible genotypes. The infestation varied from 16.64 ± 2.57 to 22.1 ± 4.28 per cent white ear in Kulaj and Bili nellu, were regarded as susceptible. However, none of the genotypes were found to be highly resistant and highly susceptible (**Table 2**).

***Summer* 2023**

Results revealed that, among 50 local landraces studied, the per cent dead hearts caused by YSB ranged from 7.18± 3.17 to 37.17 ± 9.43 per cent, similarly the per cent white ears ranged from 2.7 ± 3.25 to 23.39 ± 6.72 (**Table 3**) in the summer screening. During *summer* 2023, 10 genotypes were found to be resistant with scale 1, followed by 27 genotypes with score 3 were moderately resistant, 9 genotypes were found to be moderately susceptible (scale 5) and 4 genotypes were susceptible with score 7. But, none of the genotypes were observed as highly resistant or susceptible with scores of 0 and 9 respectively.

At 30 DAT, the percent of dead heart incidence varied, with Bul Bul-1 and Doddi Batta exhibiting a range of 7.18 ± 3.17 to 8.78 ± 1.65 per cent, categorizing them as resistant genotypes with a score of 1. In the moderately resistant category (score 3), Anandi - 1 and Hasnudi showed dead heart percentages ranging from 11.16 ± 4.06 to 19.05 ± 7.76 per cent.

Table 2: Reaction of local landraces of rice against yellow stem borer, *S. incertulas* during *kharif* 2022

Sl. No.	Genotypes	%DH		%WE	Score	Category
		30 DAT	60 DAT	90 DAT		
1	Aishwarya	9.49 ± 4.2	7.49 ± 3.95	4.51 ± 1.36	1	R
2	Anandi - 1	12.41 ± 4.3	12.29 ± 4.08	6.58 ± 2.49	3	MR
3	Arvath Pilai	8.03 ± 2.79	7.91 ± 3	3.89 ± 4.16	1	R
4	Anilam Anil	11.88 ± 2.28	13.04 ± 1.82	8.1 ± 2.2	3	MR
5	Bangara sanna - 3	11.72 ± 2.95	12.83 ± 4.61	6.55 ± 3.07	3	MR
6	Bheema sale - 2	12.51 ± 3.07	11.96 ± 3.38	6.76 ± 4.73	3	MR
7	Bilikanna hegge	8.4 ± 2.59	9.64 ± 4	3.56 ± 2.96	1	R
8	Bele jaddi alneram batta	13.13 ± 2.76	13.72 ± 3.87	7.41 ± 4.9	3	MR
9	Bul Bul -1	8.15 ± 3.61	6.67 ± 4.15	2.77 ± 2.9	1	R
10	Bangara kaddi	22.64 ± 6.3	21.49 ± 6.63	12.05 ± 4.24	5	MS
11	Bili nellu	41.83 ± 4.68	42.35 ± 3.33	22.1 ± 4.28	7	S
12	Black basumathi	12.25 ± 3.82	12.36 ± 2.39	9.4 ± 2.92	3	MR
13	Barma Black	14.43 ± 6.58	14.5 ± 6.64	7.28 ± 3.95	3	MR
14	Bili dadi goltiga	8.14 ± 3.14	7.82 ± 3.01	3.14 ± 3.45	1	R
15	Chinna ponni - 4	23.37 ± 6.08	22.81 ± 6.96	14.24 ± 5.08	5	MS
16	Chinagari batta	7.04 ± 4.82	6.1 ± 5.64	4.53 ± 4.12	1	R
17	Dodda Byranellu	12.28 ± 2.46	12.31 ± 2.38	8.44 ± 2.99	3	MR
18	Doddi Batta	8.78 ± 1.7	8.46 ± 1.74	3.29 ± 1.22	1	R
19	Dunda	22.88 ± 4.57	22.65 ± 5.21	12.47 ± 2.58	5	MS
20	Dubainallu	23.13 ± 4.17	21.58 ± 3.9	14 ± 7.18	5	MS
21	Esadli	14.12 ± 7.01	12.29 ± 5.62	8.07 ± 3.32	3	MR
22	G K variety tall	13.18 ± 3.87	13.48 ± 4.14	6.84 ± 4.27	3	MR
23	Giddaraja kamal	18.25 ± 5.52	17.82 ± 5.81	7.11 ± 2.91	3	MR
24	Gujarath basamati	31.85 ± 5.64	31.67 ± 13.2	18.34 ± 5.06	7	S
25	Gulwadi sannaki	14.91 ± 4.52	14.65 ± 5.43	8.36 ± 4.36	3	MR
26	Hasnudi	18.81 ± 7.05	17.96 ± 5.12	8.98 ± 4.76	3	MR
27	Itan gidda	12.31 ± 5.06	10.82 ± 2.79	9.15 ± 2.68	3	MR
28	Jadda batta	18.16 ± 5.08	16.7 ± 7.14	7.96 ± 4.86	3	MR
29	Kempu dadi gidda	21.75 ± 3.92	22.55 ± 5.75	13.25 ± 3.32	5	MS
30	Kulaj	32.55 ± 5.19	31.21 ± 4.44	16.64 ± 2.57	7	S
31	Kalikatesi	14.31 ± 5.71	13.63 ± 2.09	6.82 ± 4	3	MR
32	Kari kandake	17.61 ± 4.12	15.71 ± 5.15	7.41 ± 1.67	3	MR
33	Kanakunja	31.48 ± 4.06	33.12 ± 5.86	16.99 ± 3.81	7	S
34	Kalanamak - 1	7.12 ± 2.87	6.6 ± 2.79	4.05 ± 2.11	1	R
35	Kavadari	25.35 ± 6.94	26.42 ± 9.86	12.19 ± 2.29	5	MS
36	Kaduvelpe	15.02 ± 4.9	14.66 ± 4.8	7.27 ± 2.18	3	MR
37	KN- local	15.78 ± 3.15	15.62 ± 4.09	7.3 ± 2.29	3	MR
38	Kempurajmudi	12.73 ± 3.91	11.92 ± 3.31	7.13 ± 2.34	3	MR
39	KS Local	14.36 ± 5.34	12.12 ± 6.51	6.82 ± 2.81	3	MR
40	Kannur	22.04 ± 2.92	23.3 ± 7.99	12.01 ± 3.08	5	MS
41	Kyasare - 2	14.56 ± 3.47	12.16 ± 1.79	7.31 ± 3.93	3	MR
42	Kari swarna	12.86 ± 3.1	12.65 ± 4.38	7.32 ± 3.51	3	MR
43	Malgudi sanna - 2	8.6 ± 2.5	8.31 ± 2.89	3.51 ± 2.8	1	R
44	Mysore mallige - 1	21.49 ± 6.07	21.8 ± 7.14	13.22 ± 5.94	5	MS
45	Mavaokar	16.82 ± 3.16	17.31 ± 5.61	8.83 ± 3.22	3	MR
46	Manjupani	12.47 ± 4.53	12.49 ± 4.69	7.94 ± 3.19	3	MR
47	Mallige - 2	12.33 ± 2.53	11.71 ± 2.4	6.76 ± 3.12	3	MR
48	Mobikar	23.42 ± 3.38	22.11 ± 5.18	12.92 ± 2.46	5	MS
49	Moradda	15.48 ± 5.29	17.22 ± 5.92	6.43 ± 3.42	3	MR
50	Malgudi sanna - 1	7.81 ± 4.98	8.4 ± 5.31	4.21 ± 4.17	1	R

DAT- Days after transplanting, R- Resistant, MR- Moderately Resistant, MS- Moderately Susceptible; S- Susceptible; DH- dead heart; WE- white ears.

Similarly, in the moderately susceptible category (score 5), Mobikar and Kavadari had infestations ranging from 22.08 ± 6.15 to 26.33 ± 12.39 per cent. However, genotypes Kulaj and Bili nellu, falling into the susceptible category (score 7), exhibited dead heart percentages between 32.38 ± 5.86 and 38.48 ± 7.33 per cent at 30 DAT. Notably, none of the local landraces screened demonstrated high resistance (HR) or high susceptibility with scores of 0 and 9, respectively (**Table 3**).

Table 3: Reaction of local landraces of rice against yellow stem borer, *S. incertulas* during *summer* 2023

Sl. No.	Genotypes	% DH		% WE	Score	Category
		30 DAT	60 DAT	90 DAT		
1	Aishwarya	8.19 ± 5.72	7.45 ± 3.02	3.8 ± 2.52	1	R
2	Anandi - 1	11.16 ± 4.06	13.3 ± 5.34	7.36 ± 3.1	3	MR
3	Arvath Pilai	7.33 ± 3.03	8.07 ± 3.09	4.3 ± 5.65	1	R
4	Anilam Anil	12.86 ± 3.2	12.04 ± 2.94	7.5 ± 2.8	3	MR
5	Bangara sanna - 3	13.46 ± 4.58	12.39 ± 5.32	7.38 ± 3.95	3	MR
6	Bheema sale - 2	12.62 ± 3.77	12.72 ± 4.12	7.75 ± 6.11	3	MR
7	Bilikanna hegge	8.66 ± 3.42	8.98 ± 2.75	2.88 ± 2.33	1	R
8	Bele jaddi alneram batta	14.67 ± 6.04	13.21 ± 3.02	7.81 ± 5.19	3	MR
9	Bul Bul -1	7.18 ± 3.17	7.66 ± 3.55	3.22 ± 3.62	1	R
10	Bangara kaddi	23.58 ± 5.77	21.9 ± 4.57	12.56 ± 5.78	5	MS
11	Bili nellu	38.48 ± 7.33	37.17 ± 9.43	23.39 ± 6.72	7	S
12	Black basumathi	12.99 ± 4.27	12.26 ± 3.84	8.82 ± 1.66	3	MR
13	Barma Black	14.04 ± 6.6	14.03 ± 5.64	6.93 ± 3.31	3	MR
14	Bili dadi goltiga	7.61 ± 3.81	7.86 ± 3.1	2.7 ± 3.25	1	R
15	Chinna ponni - 4	23.51 ± 9.78	23.12 ± 9.99	13.89 ± 6.25	5	MS
16	Chinagari batta	7.38 ± 6.49	6.37 ± 5.09	3.38 ± 3.53	1	R
17	Dodda Byranellu	12.49 ± 3.19	12.41 ± 2.89	8.72 ± 4.01	3	MR
18	Doddi Batta	8.78 ± 1.65	8.93 ± 2.42	4.04 ± 1.75	1	R
19	Dunda	24.14 ± 5.86	24.93 ± 15.13	13.79 ± 3.69	5	MS
20	Dubainallu	22.32 ± 4.2	21.54 ± 3.67	13.34 ± 7.41	5	MS
21	Esadli	13.91 ± 6.47	13.76 ± 5.97	8.58 ± 5.23	3	MR
22	G K variety tall	13.2 ± 3.94	13.25 ± 4.1	7.21 ± 4.67	3	MR
23	Giddaraja kamal	17.41 ± 7.5	18.72 ± 7.13	8.05 ± 3.68	3	MR
24	Gujarath basamati	33.57 ± 5.03	31.81 ± 9.57	16.67 ± 5.52	7	S
25	Gulwadi sannaki	14.57 ± 4.9	14.48 ± 4.59	8.58 ± 4.75	3	MR
26	Hasnudi	19.05 ± 7.76	18.54 ± 6.13	9.39 ± 6.52	3	MR
27	Itan gidda	12.04 ± 4.16	11.48 ± 4.08	9.3 ± 3.31	3	MR
28	Jadda batta	18.47 ± 6.25	18.97 ± 7.53	8.14 ± 4.89	3	MR
29	Kempu dadi gidda	22.81 ± 8.53	22.71 ± 8.54	14.31 ± 4.77	5	MS
30	Kulaj	32.38 ± 5.86	31.62 ± 6.9	15.43 ± 3.34	7	S
31	Kalikatesi	14.31 ± 5.71	13.88 ± 3.48	6.5 ± 3.24	3	MR
32	Kari kandake	17.62 ± 3.94	18.15 ± 6.57	7.33 ± 1.13	3	MR
33	Kanakunja	33.1 ± 7.57	32.05 ± 7.35	17.77 ± 6.62	7	S
34	Kalanamak - 1	7.3 ± 2.3	6.08 ± 2.04	3.65 ± 2.61	1	R
35	Kavadari	26.33 ± 12.39	25.42 ± 7.49	13.12 ± 2.89	5	MS
36	Kaduvelpe	14.9 ± 4.51	14.7 ± 3.39	7.85 ± 3.78	3	MR
37	KN - local	18.23 ± 5.38	16.33 ± 4.83	8.4 ± 2.88	3	MR
38	Kempurajmudi	12.69 ± 3.78	13.12 ± 5.66	7.42 ± 3.58	3	MR
39	KS Local	13.1 ± 5.93	11.88 ± 5.79	7.11 ± 3.82	3	MR

Sl. No.	Genotypes	% DH		% WE	Score	Category
		30 DAT	60 DAT	90 DAT		
40	Kannur	22.85 ± 7.52	23.83 ± 11.79	13.53 ± 6.62	5	MS
41	Kyasare - 2	12.6 ± 2.83	12.55 ± 2.64	7.28 ± 4.21	3	MR
42	Kari swarna	13.31 ± 4.88	13.32 ± 4.76	7.39 ± 3.44	3	MR
43	Malgudi sanna - 2	8.52 ± 2.21	8.59 ± 2.65	3.64 ± 2.94	1	R
44	Mysore mallige - 1	23.87 ± 10.24	21.78 ± 6.9	15.28 ± 14.14	5	MS
45	Mavaokar	17.39 ± 5.97	17.2 ± 5.46	9.35 ± 4.82	3	MR
46	Manjupani	13.32 ± 3.4	12.46 ± 4.49	8.21 ± 4.33	3	MR
47	Mallige - 2	13.29 ± 2.28	13.37 ± 4.73	7.08 ± 3.32	3	MR
48	Mobikar	22.08 ± 6.15	22.18 ± 6.69	13.11 ± 3.55	5	MS
49	Moradda	15.56 ± 5.74	16.44 ± 7.95	6.79 ± 4.1	3	MR
50	Malgudi sanna - 1	8.18 ± 5.79	7.05 ± 4.31	4.62 ± 5.11	1	R

DAT- Days after transplanting, R- Resistant, MR- Moderately Resistant, MS- Moderately Susceptible; S- Susceptible; DH- dead heart; WE- white ears.

Likewise, at 60 DAT, no genotypes exhibited high resistance. Among the genotypes, Kalanamak - 1 and Bilikanna hegge demonstrated dead heart incidences ranging from 6.08 ± 2.04 to 8.98 ± 2.75 per cent, classifying them as resistant with a score of 1. In the moderately resistant category (score 3), KS Local and Jadda batta showed dead heart percentages ranging from 11.88 ± 5.79 to 18.97 ± 7.53 per cent. Similarly, within the moderately susceptible category (score 5), Dubainallu and Kavadari had infestations ranging from 21.54 ± 3.67 to 25.42 ± 7.49 per cent. However, at 60 DAT, Kulaj and Bili nellu exhibited dead heart percentages between 31.62 ± 6.9 and 37.17 ± 9.43 per cent, categorizing them as susceptible with a score of 7. However, none of the genotypes were highly susceptible with a score of 9 (**Table 3**).

At 90 DAT, the percent of white ear incidence ranged between 2.7 ± 3.25 and 4.62 ± 5.11 per cent in Bili dadi goltiga and Malgudi sanna - 1, designating them as resistant varieties. Similarly, Kalikatesi and Hasnudi exhibited white ear percentages ranging from 6.5 ± 3.24 to 9.39 ± 6.52 per cent, categorizing them as moderately resistant. Genotypes Bangara kaddi and Mysore mallige - 1 demonstrated infestations ranging from 12.56 ± 5.78 to 15.28 ± 14.14 per cent, considered moderately susceptible. The white ear infestation in Kulaj and Bili nellu varied from 15.43 ± 3.34 to 23.39 ± 6.72 per cent, marking them as susceptible. However, none of the genotypes were identified as highly resistant or highly susceptible (**Table 3**).

The results of the present study corroborate with Balaji *et al*., (2023) who reported that out of 50 local landraces, five genotypes recorded resistance reaction with a damage score of 1, 23 genotypes were found to be moderately resistant with a score of 3, 17 genotypes reacted as moderately susceptible with score of 5 and five genotypes showed susceptible reaction with score of 7. Among all the screened popular cultivars four genotypes were found to be resistant, four genotypes showed moderately resistant reactions, one genotype was moderately susceptible and one genotype reacted as susceptible. None of the local landraces and popular cultivars were found to be highly resistant or highly susceptible to YSB.

Similarly, Justin and Preetha (2014) reported that among the 77 genotypes screened during *kharif* 2011, TP 08079, TP 10015, TP 10019, TP 10029 and TP 10031 were found to be highly resistant with damage score '0'. During *kharif* 2012, the genotypes *viz.,* TP 10006, TP 10007, TP 10008, TP 10009, TP 10010, TP 10011 and TP 10012 were found to be highly resistant with score '0'. During *rabi* 2011, TP 10007 was found to be highly resistant without any dead

heart or white ear damage. During *rabi* 2012, fifty-seven genotypes were screened for resistance to rice stem borer and 15 genotypes recorded zero incidence of stem borer. Similarly, the highest incidence of stem borer (white ears) was observed in TN-1 and RpPatho-02 (13.13% WE). The rice cultures CR 2711-76 and CR 3005-230-5 were found resistant to stem borer at the reproductive stage. The genotypes CR 3005-77-2 and CR 3006-8-2 showed moderate resistance (Visalakshmi *et al.*, 2014).

Meanwhile among the 231 paddy genotypes screened against yellow stem borer, per cent white ears at 80 DAT varied between 0.84 (resistant) and 25.96 (susceptible). 74 genotypes proved to be resistant by recording less than 5 per cent white ears. Eighty-seven genotypes reacted as moderately resistant (6-10% white ear), forty-five genotypes showed moderately susceptible by recording less than 15 per cent white ears and twenty-five genotypes showed susceptible reaction by recording a white ear per cent in between 16 to 25%. The susceptible check TN1 recorded 25.96 per cent white ear. None of the genotypes were free from white ear, to categorized as highly resistant (0% white ear), similarly, none of the genotypes reacted as highly susceptible (26-100% white ear) (Girish *et al*., 2013).

Likewise, the results of the rice germplasm screening for resistance to stem borer recorded the white ear at 75 and 95 DAT. Out of forty-six rice cultures screened, TP 10003, TP 10004, TP 10039 and TP 08095 were found minimal incidence and were rated as resistant categories. TP 10002, TP 10005, TP 10016, TP 10038, TP 10051, TP 10052, TP 09048 and TP 09052 were rated as moderately resistant (Preetha, 2017). Meanwhile, five accessions (AD 16124, AD 15101, AD 16189, AD 12182 and AD 12272) recorded no dead heart and white ear head damage and were found to be highly resistant. Three accessions (AD 16157, AD 12132, AD 16157) were found to be highly susceptible (Sharmitha *et al.,* 2019).

Yadav *et al*., (2023) reported that among the 20 rice accessions screened against *S. incertulus* during *summer* 2022, the rice variety Radha-13 showed a lower infestation (about 0.54% dead heart) than other accessions against YSB. Moreover, the rice accessions Subarna Sub-1 and NR2188-13-5-2-5-1 were moderately resistant to YSB, with 9.95 per cent. Conclusively, most of the rice accessions evaluated had better plant resistance against YSB. Further, Rajadurai and Kumar (2017) reported that out of 193 genotypes screened, fifty-six genotypes were found resistant, ninety-five were found moderately resistant, twenty-eight were moderately susceptible, eight were susceptible and six were highly susceptible. The resistance in all the genotypes is due to the strong antibiosis and phenolics, as they cause mortality in rice stems (Zhu *et al*., 2002).

Pest screening is necessary to evaluate the damage caused by different rice genotypes/varieties and investigate host plant resistance against insects as a pest-mitigating strategy. In our current study, we have undertaken an effort to identify rice varieties that exhibit resistance to the YSB across various aspects. These resilient varieties show promise for integration into breeding programs. Employing host plant resistance mechanisms emerges as a promising, eco-friendly and cost-effective approach to pest control, leading to reduction in the pesticide consumption. Cultivating these resistant varieties becomes crucial for effective insect pest management. Our research highlights that a majority of the tested genotypes demonstrate either resistance or moderate resistance. Consequently, it is essential to delve into the mechanisms underpinning this resistance, paving the way for their application in future breeding programs targeted at combating the YSB in paddy cultivation.

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