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IDENTIFICATION OF NEW SOURCES OF RESISTANCE AGAINST YELLOW STEM BORER (Scirpophaga incertulas) UNDER FIELD CONDITIONS.

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Abstract: The miscellany in Pest populations and continuous selection of virulent biotypes necessitate continuous supplementation of raw material in the form of donor germplasms for insect resistance breeding programmes. Sixty five rice germplasms obtained were screened under field conditions under *tarai* region of Uttarakahnd, India to find out most promising germplasm against yellow stem borer. Among MRST (Group-I) entries RNR 23264 was found highly resistant against yellow stem borer (YSB) at vegetative stage. Resistance reaction was recorded in MTU IJ 206-7-4-1 and RP 4511-260. At reproductive stage HRI 126 was rated as immune against yellow stem borer while BG 380-2 and PTB 33 exhibited moderate level of resistance. At vegetative stage of paddy crop, RP-4642-669 from MRST (Group-II) was highly resistant but at reproductive stage Resistant reaction was observed in RP 4516-3-8, MO 1 and RP 4643-713.

IndexTerms - Yellow stem borer, rice, MRST enteries, screening, resistance

I. INTRODUCTION

The most important crop in terms of acreage, contribution to the production of all food grains, and sources of calories in the diet is rice (*Oryza sativa* L.), which is grown in tropical and subtropical countries, including India. It is the primary source of nourishment for more than two-thirds of Indians (Anonymous,2021,Maclean etal.,2002).Further approximation revealed that the need of rice will be about 137.3 million tonnes by the year 2050 (Mohapatra etal., 2013).It is currently one of the most important cereal crops, feeding over three billion people. The rice cultivation provides livelihood and employment to millions of people due to labour-intensive ccultivation (Suresh,2019).

Incidence of insect pests along with diseases is an important limiting factor in term of rice productivity in India. Out of the twenty three species of insects infesting rice (Atwal and Dhaliwal, 2005; Pasalu and Katti, 2006), yellow stem borer (*Scirpophagam incertulas*) inflicts direct yield losses by causing dead heart and white ear-heads at vegetative and reproductive stage of paddy crop (Rahman et al., 2004,Sulagitti et al., 2018).Yellow Stem Borer (YSB) is reasoned to be among the most destructive and dominant pest of rice crop all over the world . A significant yield loss in the range of 3 to 95 per cent is reported in different rice growing area of India (Jadhao and Khurad,2012).

The excessive use of synthetic chemicals has not only increased the cultivation cost and insecticide resistance but also have adversely affected the human health,environment and beneficial arthropods (Rahman et al., 2009; Sarao and Mangat, 2014) .

Due to added ability to increase yields and decrease insecticide costs ,the Insect resistant varieties will continue to be the cornerstone of food production The conventional resistance breeding for yellow stem borer has not gained much impulsion due to the lack of resistance sources in cultivated rice (*Oryza sativa* and *O. glaberrima*) gene pool. Further deficiency of scientific YSB rearing and varietal screening methods and inherently complex genetics of resistance make it challenging for future research((Wiseman &Webster,1999; Makkar & Bentur,2017).In host plant resistance programmes,screening of diverse germplasms and identification of new genes is more important because pest populations continue to change their virulence pattern. Thus ,it is imerative that new germplasms and genes for insect resistance must be continuously identified (Panda and Khush,1995).

II. OBJECTIVE OF STUDY

The main objective of present research work is to identify the new sources of resistance in some available rice germplasms, so that they can be used as an effective donor in YSB resistance breeding programmes.

III. RESEARCH METHODOLOGY

3.1 All the entries of Multiple Resistance Screening Trial (MRST) (Group-I &II) detailed in Table 1 & Table 3 were field evaluated against YSB under field conditions. Plastic petri dishes were marked with respective entry number and fifty seeds of each entry were kept on double layered moist filter papers placed in petri dishes. Water was added to each petri dish for imbibition of seeds for 24 hours. Thereafter, petri dishes were placed in incubator maintained at 30°C temperature for efficient germination. Sufficient moisture was maintained in each petri dish till germinated seeds were sown into seed bed.

3.2 The seed beds (2 × 1 m) having well manured soil were puddled properly and upper layer was levelled uniformly with the help of a small hand operated leveller to facilitate sowing.

3.3 The germinated seeds of each test entry were sown in the seed bed with the help of forceps. Single row of each entry with 20 pre-germinated seeds was sown and labelled with aluminium tags containing entry numbers. The spacing for rice nursery raising was 2X1 cm. Seeds of a susceptible check variety TN-1 were raised on the borders and in between the rows of test entries.

3.4 After completing the sowing the seed bed was covered with cage and sufficient water was added daily to ensure the healthy growth of seedlings. Thereafter, twenty five days old seedling were planted in to the main field by adopting recommended spacing & agronomic practices for rice cultivation .

3.5 Total number of tillers (TT) and dead hearts (DH) were counted on 10 randomly selected hills per entry at 30 DAT, 50DAT and at peak infestation of Yellow Stem Borer. After the emergence of panicles, data was recorded on total panicle bearing tillers (PBT) and white ear heads (WE) on randomly selected 10 hills/entry prior to harvest.

3.6 The per cent dead heart and white head of the individual test entries were computed by using the formula as given by Heinrichs *et al* (1985) [6]:

$$\text{Percent dead heats} = \frac{\text{Total dead hearts}}{\text{Total tillers}} \times 100$$

$$\text{Percent white heads} = \frac{\text{Total white heads}}{\text{Total panicle bearing tillers}} \times 100$$

$$\text{Dead heart/white head index (D)} = \frac{\text{Dead hearts/white heads(\%) in test entry}}{\text{Dead hearts/white heads(\%) in susceptible check}} \times 100$$

The dead hearts/white heads figures (D) have a corresponding rating of "0-9" scale taken from the 4th edition of the "standard evaluation system of rice (IRRI,1996) [7] as follows :

Scale	Dead heart index	White head index	Level of resistance
0	No damage	No damage	I
1	1-10	1-5	HR
3	11-20	6-10	R
5	21-30	11-15	MR
7	31-60	16-25	MS
9	61 above	25 and above	S

IV. RESULTS AND DISCUSSION

The dead heart index value (Table 1) calculated for MRST (Group-I) entries at *vegetative stage* indicates that entry RNR 23264 (6) was highly resistant against yellow stem borer (YSB) attack under field conditions. Resistant reaction was identified in MTU IJ 206-7-4-1 (1) and RP 4511-260 (29) with index values 10.8 and 19.3, respectively. In entries VGL 31996 (4), MPH 5401 (15), PRH 122 (21) and RP 4510-177 (27) moderate level of resistance was observed. They have dead heart index value were 22.9, 28.9, 24.0 and 25.3, respectively. Highly resistant entry RNR 23264 (6) presented immunity and resistant reaction at 30 and 50 DAT. Rest of the entries were rated as moderately susceptible or susceptible with dead heart index ranging from 30.1 to 57.8 and 60.2 to 83.1.

Table 1 : Reaction of AICRIP, MRST-(Group-I) entries to *S.incertulas* at vegetative stage

Ent. No.	Designation	Cross	Per cent infestation by yellow stem borer						Final score	Resistance grade
			30 DAT		50 DAT		Mean			
			Dead heart (%)	Dead heart index	Dead heart (%)	Dead heart index	Dead heart (%)	Dead heart index		
1.	MTU IJ 206-7-4-1	–	0.0	0.0 (0)	1.8	25.7 (5)	0.9	10.8	3	R
2.	Salkathi (35181)	Land race	0.0	0.0 (0)	13.4	100.0 (9)	6.7	80.7	9	S
3.	SKL 7-61-09-10-12	SYE 17-14/Suraksha	0.0	0.0 (0)	7.2	100.0 (9)	3.6	43.4	7	MS
4.	VGL 31996	BPT 5204/ARC 5984/Kavya	1.4	14.6(3)	2.3	32.9(7)	1.9	22.9	5	MR
5.	BG 380-2	–	3.6	37.5 (7)	5.4	77.1 (9)	4.5	54.2	7	MS
6.	RNR 23264	Chendan /Pak. basmati	0.0	0.0 (0)	0.9	12.9 (3)	0.5	6.0	1	HR
7.	6444	Hybrid	1.7	17.7 (3)	4.7	67.1 (9)	3.2	38.6	7	MS
8.	ADTRH-1	Hybrid	0.0	0.0 (0)	5.7	81.4 (9)	2.9	34.6	7	MS
9.	CORH-2	Hybrid	2.5	26.0 (5)	5.9	84.3 (9)	4.2	50.6	7	MS
10.	TN 1 (S.check)	–	9.6	100.0 (9)	7.0	100.0 (9)	8.3	100.0	9	S
11.	DRRH-1	Hybrid	4.6	47.9 (7)	1.5	21.4 (5)	3.0	36.1	7	MS
12.	DRRH-20	Hybrid	3.0	31.3 (7)	7.0	100.0 (9)	5.0	60.2	9	S
13.	HRI-126	Hybrid	5.7	59.3 (7)	5.9	84.3 (9)	5.8	69.8	9	S
14.	KRH-2	Hybrid	3.5	36.5 (7)	1.7	24.3 (5)	2.6	31.3	7	MS
15.	MPH-5401	Hybrid	0.9	9.4 (1)	3.8	54.3 (7)	2.4	28.9	7	MS
16.	NSD-2	Hybrid	3.2	33.3 (7)	1.8	25.7 (5)	2.5	30.1	5	MR
17.	NUSD-3	Hybrid	3.0	31.3 (7)	8.0	100.0 (9)	5.5	66.3	9	S
18.	PHB-71	Hybrid	0.0	0.0 (0)	8.5	100.0 (9)	4.3	51.8	7	MS
19.	PR 6201	Hybrid	2.4	25.0 (5)	7.9	100.0 (9)	5.2	62.6	9	S
20.	SURAKSHA	–	5.6	58.3 (7)	2.8	40.0 (7)	4.2	50.6	7	MS
21.	PRH-122	Hybrid	0.9	9.4 (1)	3.2	45.7 (7)	2.0	24.0	5	MR
22.	PSD-1	Hybrid	2.4	25.0 (5)	2.9	41.4 (7)	2.7	32.5	7	MS
23.	PSD-3	Hybrid	8.8	91.7 (9)	3.9	55.7 (7)	6.4	77.1	9	S
24.	Sahyadri	Hybrid	6.2	64.6 (9)	7.7	100.0 (9)	6.9	83.1	9	S
25.	PHALGUNA	–	5.7	59.4 (7)	3.9	55.7 (7)	4.8	57.8	7	MS
26.	RP 4510-175	MR 1523 / TN-1	2.4	25.0 (5)	5.1	72.9 (9)	3.8	45.8	7	MS
27.	RP 4510-177	MR 1523/TN-1	1.9	19.8 (3)	2.3	32.9 (7)	2.1	25.3	5	MR
28.	RP 4511-257	TN-1/MR 1523	2.7	28.1 (5)	5.0	71.4 (9)	3.9	46.9	7	MS
29.	RP 4511-260	TN-1/ MR 1523	1.7	17.7(3)	1.5	21.4 (5)	1.6	19.3	3	R
30.	PTB 33	–	2.0	20.8 (5)	4.5	64.3 (9)	3.3	39.8	7	MS

* Values in parentheses are score given at each DAT

** I= Immune, HR= Highly Resistant, R=Resistant, MR=Moderately Resistant, MS=Moderately Susceptible, S=Susceptible

The results revealed that entries RNR 23264, MTU IJ 206-7-4-1 and RP 4511-260 were excellent in their performance against YSB attack when compared with other enteries of MRST(Group-I). The promising reaction of RNR 23264 at vegetative stage was also reported from Bhubneswar, Ludhiana and Rajendra Nagar locations (Anonymous, 2015)[1].

Reaction of entries belonging to MRST (Group-I) against yellow stem borer at *reproductive stage* (Table 2) indicates that white head index value among different entries ranged from 0 to 92.6. Only one entry, abridged with code HRI 126 (13) was rated as immune. Resistant reaction was observed in Sahyadri (24) with white head index values 0 and 9.6. Moderate resistance response was recorded in BG 380-2 (8) and PTB 33 (30) against yellows stem borer with index values 12.8 and 14.9, respectively. Rest of the entries exhibited moderate susceptibility or susceptible reaction against yellow stem borer at reproductive stage.

Table 2 : Reaction of AICRIP, MRST-(Group-I) entries to *S. incertulas* at reproductive stage

. No.	Designation	Cross	White head (%)	White head index	Score	Resistance grade
1.	MTU IJ 206-7-4-1	–	1.6	17.0	7	MS
2.	Salkathi (35181)	Land race	4.4	46.8	9	S
3.	SKL 7-61-09-10-12	SYE 17-14/Suraksha	3.0	31.9	9	S
4.	VGL 31996	BPT 5204/ARC 5984/Kavya	4.3	45.7	9	S
5.	BG 380-2	–	1.2	12.8	5	MR
6.	RNR 23264	Chendan /Pak. basmati	3.6	38.3	9	S
7.	6444	Hybrid	2.0	21.3	7	MS
8.	ADTRH-1	Hybrid	5.9	62.8	9	S
9.	CORH-2	Hybrid	5.6	59.6	9	S
10.	TN 1 (S.check)	–	9.4	100.0	9	S
11.	DRRH-1	Hybrid	1.7	18.0	7	MS
12.	DRRH-20	Hybrid	3.7	39.4	9	S
13.	HRI-126	Hybrid	0.0	0.0	0	I

14.	KRH-2	Hybrid	5.6	59.6	9	S
15.	MPH-5401	Hybrid	3.6	38.3	9	S
16.	NSD-2	Hybrid	1.9	20.2	7	MS
17.	NUSD-3	Hybrid	5.6	59.6	9	S
18.	PHB-71	Hybrid	5.0	53.2	9	S
19.	PR 6201	Hybrid	4.4	46.8	9	S
20.	SURAKSHA	–	1.9	20.2	7	MS
21.	PRH-122	Hybrid	4.9	52.1	9	S
22.	PSD-1	Hybrid	8.7	92.6	9	S
23.	PSD-3	Hybrid	3.8	40.4	9	S
24.	Sahyadri	Hybrid	0.9	9.6	3	R
25.	PHALGUNA	–	4.7	50.0	9	S
26.	RP 4510-175	MR 1523 / TN-1	1.7	18.0	7	MS
27.	RP 4510-177	MR 1523/TN-1	4.3	45.7	9	S
28.	RP 4511-257	TN-1/MR 1523	1.7	18.0	7	MS
29.	RP 4511-260	TN-1/ MR 1523	4.3	45.7	9	S
30.	PTB 33	–	1.4	14.9	5	MR

* I= Immune, HR= Highly Resistant, R=Resistant, MR=Moderately Resistant, MS=Moderately Susceptible, S=Susceptible

It is apparent from the results that entries HRI 126, Sahyadri, BG 380-2 and PTB 33 were recognised as good source of resistance at reproductive stage against yellow stem borer attack under field conditions. Promising reaction of BG 380-2 for yellow stem borer attack under field conditions at reproductive stage was also documented by its performance at Rajendranagar, Hyderabad (Anonymous, 2015). PTB 33 was found promising both at vegetative and reproductive stage against yellow stem borer in present study.

At *vegetative stage* of paddy crop, the dead heart index values for MRST (Group-II) eateries is presented in Table 3. The results specified that entries DJP 1998-11-1-1-1 (3), HRI 152 (7), NSD 2 (13), PSD 3 (19), PTB 33 (20) and RP 4511-257 (21) and Phalguna (10) were resistant against yellow stem borer attack at vegetative stage. Moderate level of resistance was detected in entries CB 20090 (1), 6444 (2) and RP 4643-723 (34) with dead heart index values 20.8, 27.7, 26.7 and 20.7, respectively. Entry RP 4642-669 (32) was rated as highly resistant with dead heart index value 7.9. Rest of the entries were identified as moderately susceptible and susceptible with dead heat index values 32.6 to 56.4 and 62.3 to 75.2.

Table 3 :Reaction of AICRIP, MRST-(Group-II) entries to *S. incertulas* at vegetative stage

Ent. No.	Designation	Cross	Per cent infestation by yellow stem borer						Final score	Resistanc grade
			30 DAT		50 DAT		Mean			
			Dead heart (%)	Dead heart index	Dead heart (%)	Dead heart index	Dead heart (%)	Dead heart index		
1.	CB 20090	CO 43/ASD 19	3.0	28.8 (5)	1.1	11.2 (3)	2.1	20.8	5	MR
2.	6444	–	5.7	54.8 (7)	0.0	0.0 (0)	2.8	27.7	5	MR
3.	DJP 1998–11–1–1–1	–	2.3	22.1 (5)	1.7	17.3 (3)	2.0	19.8	3	R
4.	DRRH 2	–	4.0	38.5 (7)	1.5	15.3 (3)	5.5	54.5	7	MS
5.	TN 1 (S.check)	–	10.4	100.0 (9)	9.8	100.0 (9)	10.1	100.0	9	S
6.	HRI 148	–	4.1	39.4 (7)	3.2	32.7 (7)	3.7	36.6	7	MS
7.	HRI 152	–	1.1	10.6 (3)	2.5	25.5 (5)	1.8	17.8	3	R
8.	JGL 13595	MTU 4870/JGL 418	6.5	62.5 (9)	4.9	50.0 (7)	5.7	56.4	7	MS
9.	KRH 2	–	5.0	48.0 (7)	2.5	25.5 (5)	3.9	38.6	7	MS
10.	Phalguna	–	1.1	10.5 (3)	3.0	30.6 (7)	2.0	19.8	3	R
11.	MRP 5401 (Suruchi)	–	7.0	67.3 (9)	4.3	43.9 (7)	5.7	56.4	7	MS
12.	MTU IJ 206–7–4–1	–	2.9	28.9 (5)	7.7	78.5 (9)	5.3	52.4	7	MS
13.	NSD 2	Hybrid	0.0	0.0 (0)	3.9	39.8 (7)	1.9	18.8	3	R
14.	NUSD 3	Hybrid	3.9	37.5 (7)	2.9	29.6 (5)	3.3	32.6	7	MS
15.	Suraksha	–	6.3	60.6 (9)	7.1	71.4 (9)	6.7	66.3	9	S
16.	PA 6201	–	5.0	48.0 (7)	6.3	64.3 (9)	5.7	56.4	7	MS
17.	PHB–71	–	2.2	21.2 (5)	3.1	31.6 (7)	2.7	26.7	5	MR
18.	PSD–1	–	14.0	100.0 (9)	0.0	0.0 (0)	7.0	69.3	9	S

19.	PSD–3	Hybrid	2.1	20.2 (5)	1.8	18.4 (3)	1.9	18.8	3	R
20.	PTB 33	Donor	0.0	0.0 (0)	2.7	27.6 (5)	1.4	13.9	3	R
21.	RP4511–257	TN1/MR 1523	0.0	0.0 (0)	2.8	28.6 (5)	1.4	13.9	3	R
22.	RP 4511–260	TN1/MR 1523	8.5	81.7(9)	6.2	63.3 (9)	5.7	56.4	7	MS
23.	RP 4516–3–8	MR 1523/RP 2068–18–3–5	7.8	75.0(9)	4.8	48.9 (7)	6.3	62.3	9	S
24.	RP 4518–2–6	MR 1523/Abhaya	6.2	59.6(9)	1.3	13.3 (3)	3.7	36.6	7	MS
25.	MO–1	–	2.5	24.0 (5)	7.7	78.6 (9)	5.1	50.4	7	MS
26.	RP4613–244	W 1263/Aganni	3.1	29.8 (5)	6.5	66.3(9)	4.8	47.5	7	MS
27.	RP 4615–591	Phalguna/Aganni	6.4	61.5 (9)	3.8	38.8 (7)	5.1	50.4	7	MS
28.	RP 4621–1842	Aganni/Bhumansan	4.9	47.1 (7)	3.4	34.7 (7)	4.2	41.5	7	MS
29.	RP 4621–1845	Aganni/Bhumansan	1.4	13.5 (3)	7.0	71.4 (9)	4.0	39.6	7	MS
30.	Kavya	–	13.9	100.0 (9)	4.1	41.8 (7)	7.6	75.2	9	S
31.	RP 4639–110	TN1/Abhaya	1.4	13.5 (3)	5.7	58.2 (7)	3.3	32.6	7	MS
32.	RP 4642–669	ARC15831/W–1263	0.0	0.0 (0)	1.6	16.3 (3)	0.8	7.9	1	HR
33.	RP 4643–713	Aganni/ARC15831	1.5	14.4 (3)	2.6	26.5 (5)	2.0	19.8	3	R
34.	RP 4643–723	Aganni/ARC15831	0.0	0.0 (0)	4.2	42.9 (7)	2.1	20.7	5	MR
35.	Salkathi (35181)	–	6.7	64.4 (9)	7.6	77.6 (9)	7.2	71.3	9	S

* Values in parentheses are score given at each DAT

** I= Immune, HR= Highly Resistant, R=Resistant, MR=Moderately Resistant, MS=Moderately Susceptible, S=Susceptible

In the presented screening programme, DJP 1998-11-1-1-1, HRI 152, NSD 2, PSD 3, PTB 33 and RP 4511-257 were found to have good level of resistance against yellow stem borer during. Performance of entries under MRST 06 against yellow stem borer was also tested at different locations under AICRIP. Entry CB 20090, 6444, PHB 71 and PTB 33 were also found promising at Pusa location (Anonymous, 2016) [2].

The white head index values (Table 4) of MRST (Group-II) eateries at *reproductive stage* disclosed that at reproductive stage of paddy crop, immunity response against yellow stem borer was found in CB 20090 (1) and RP 4511-257 (21), while RP 4615-591 (27) was rated as highly resistant. Resistant reaction was observed in RP 4516-3-8 (23), MO 1 (25) and RP 4643-713 (33), in which white head index values were found as 6.9, 8.9 and 8.9, respectively. Entries PTB 33 (20) and RP 4639-110 (31) were rated as moderately resistant with index values 14.5 and 10.3. In other entries white head index ranged from 15.2 to 22.7 and 26.2 to 90.3 and found as moderately susceptible and susceptible to yellow stem borer attack at reproductive stage.

Table 4: Reaction of AICRIP, MRST-(Group-II) entries to *S.incertulas* at reproductive stage

Ent. No.	Designation	Cross	White head (%)	White head index	Score	Resistance grade
1.	CB 20090	CO 43/ASD 19	0.0	0.0	0	I
2.	6444	–	7.1	48.9	9	S
3.	DJP 1998–11–1–1–1	–	4.5	30.0	9	S
4.	DRRH 2	–	2.4	16.6	7	MS
5.	TN 1 (S.check)	–	14.5	100.0	9	S
6.	HRI 148	–	4.7	32.4	9	S
7.	HRI 152	–	5.8	40.0	9	S
8.	JGL 13595	MTU 4870/JGL 418	5.4	37.2	9	S
9.	KRH 2	–	2.7	18.6	7	MS
10.	Phalguna	–	2.6	17.9	7	MS
11.	MRP 5401 (Suruchi)	–	4.9	33.7	9	S
12.	MTU IJ 206–7–4–1	–	3.3	22.7	7	MS
13.	NSD 2	Hybrid	4.7	32.4	9	S
14.	NUSD 3	Hybrid	6.3	43.4	9	S
15.	Suraksha	–	13.1	90.3	9	S

16.	PA 6201	–	8.2	56.6	9	S
17.	PHB–71	–	9.5	65.5	9	S
18.	PSD–1	–	7.5	51.7	9	S
19.	PSD–3	Hybrid	6.9	47.6	9	S
20.	PTB 33	Donor	2.1	14.5	5	MR
21.	RP4511–257	TN1/MR 1523	0.0	0.0	0	I
22.	RP 4511–260	TN1/MR 1523	3.8	26.2	9	S
23.	RP 4516–3–8	MR 1523/RP 2068–18–3–5	1.0	6.9	3	R
24.	RP 4518–2–6	MR 1523/Abhaya	3.1	21.4	7	MS
25.	MO–1	–	1.3	8.9	3	R
26.	RP4613–244	W 1263/Aganni	2.2	15.2	7	MS
27.	RP 4615–591	Phalguna/Aganni	0.7	4.8	1	HR
28.	RP 4621–1842	Aganni/Bhumansan	1.7	11.7	5	MR
29.	RP 4621–1845	Aganni/Bhumansan	2.6	17.9	7	MS
30.	Kavya	–	4.1	28.3	9	S
31.	RP 4639–110	TN1/Abhaya	1.5	10.3	5	MR
32.	RP 4642–669	ARC15831/W–1263	3.2	21.0	7	MS
33.	RP 4643–713	Aganni/ARC15831	1.3	8.9	3	R
34.	RP 4643–723	Aganni/ARC15831	3.2	22.0	7	MS
35.	Salkathi (35181)	–	3.9	26.9	9	S

* I= Immune, HR= Highly Resistant, R=Resistant, MR=Moderately Resistant, MS=Moderately Susceptible, S=Susceptible

Results revealed that entries CB 20090, RP 4511-257, RP 4615-591, RP 4516-3-8 and MO.8 and RP 4643-713 were excellent in their performance at reproductive stage. Other reports also indicate that CB 20090, RP 4621-1842, RP 4613-244, RP 4639-110, RP 4643-713 and PTB 33 were promising against yellow stem borer at reproductive stage at Kaul (Haryana) (Anonymous, 2016) [2].

Entries CB 200-90, PTB 33, RP 4511-257 and RP 4643-723 were found resistant at both vegetative and reproductive stage of the crop against yellow stem borer.

IV. Conclusion

Identification of new sources of resistance in diversed rice genotypes is an eco-friendly approach for management of Yellow stem borer via insect resistance breeding programmes. Out of Sixty five rice germplasms, we detected RNR 23264 and RP-4642-669 showing high level of resistance, while resistant reaction was presented by MTU IJ 206-7-4-1,RP 4511-260, RP 4516-3-8, MO 1 and RP 4643-713.The identified sources of resistance can be used in further studies and breeding programmes to tackle the problem of yellow stem borer in different paddy growing areas.

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