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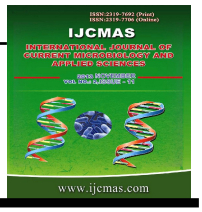

Original Research Article

Screening of semi deep water rice genotypes against yellow stem borer, *Scirpophaga incertulas* (Walker)

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A B S T R A C T

Altogether, 202 semi deep water rice genotypes along with check varieties *Jalpriya* and *Madhukar* have been screened against yellow stem borer, *Scirpophaga incertulas* (Walker) during *kharif* seasons 2009-10, 2010-11 and 2011-12 under natural field condition. The YSB infestation varied from 0 to 28.76% during *kharif* seasons 2009-10, 2010-11 and 2011-12. The check varieties *Jalpriya* and *Madhukar* recorded 21.53 and 15.27% average YSB infestation, respectively, during 3 *kharif* seasons. On the basis of overall performance during 3 *kharif* seasons, the entries Madak 13, WAB 878-4-2-2-3-P1-HP and NDGR 268 were most promising and tolerant with 0.67, 1.33 and 1.67% average YSB infestation, respectively. Further, it has been recorded that the entries, viz. IR 52561-UBN-1-1-2, PR 36949-B-B-16, TCA 80-4, NDGR 296, NDR 392, PSBRC 70, Bhantaful 2 and Kalanamak 2 were also promising with less than 5% average YSB infestation during 3 *kharif* seasons. Hence, it is concluded that the entries Madak 13, WAB 878-4-2-2-3-P1-HP and NDGR 268 are highly resistant to yellow stem borer and may be used as donors for yellow stem borer resistance in breeding program.

K e y w o r d s

Semi deep water rice; genotypes; yellow stem borer; *Scirpophaga incertulas.*

Introduction

The yellow stem borer, *Scirpophaga incertulas* (Walker) is the most important and devastating insect pest of deep water rice causing yield losses to the tune of 27-34% every year (Prasad *et al.*, 2007). The economic threshold level for YSB have been determined to be in between 5 and 10% larval infestation levels (Prasad *et al.*, 1992). The studies on evaluation of rice germplasm/ varieties against stem borer have been conducted by earlier research workers (Chaudhary *et al.* 1984; Padhi, 2002). The use of modern synthetic insecticides in crop pest control programmes around the world has resulted in the disturbance of eco-bio-balance. However, in changing scenario of pest management programme, host plant resistance plays an important role. Keeping in view the above, in present study, an attempt has been made to screen semi deep water genotypes resistant

against yellow stem borer which may be utilized in resistance breeding programmes.

Materials and Methods

The field experiments were conducted with 202 semi deep water rice genotypes along with standard check varieties *Jalpriya* and *Madhukar* in augmented design during *kharif* seasons 2009-10, 2010-11 and 2011-12 at Crop Research Station, Ghaghraghat, Bahraich, Uttar Pradesh. The plot size was 3.0 x 1.5 m^2 with 1.0 m left border all around each plot. The seeds of different entries were sown at line to line spacing of 20 cm during 2nd fortnight of June. The crops were raised adopting a standard package of practices except plant protection measures. The fertilizers were applied @ 80:40:40 kg N:P:K ha^{-1}. The basal application of N:P:K @ 40:40:40 kg ha^{-1} was done just before sowing and top dressing of the rest 40 kg N ha^{-1} was made after hand weeding during last week of August before flooding of the field.

Though semi deep water rice is grown in a water depth of 50 -100 cm at least for one month, the experimental field remains flooded with accumulated rain water from 3rd week of August to 1st week of November with maximum water depth of 70 cm in last week of October during the year 2009; from 4nd week of August to 4th week of October with maximum water depth of 72 cm in 4rd week of September during the year 2010; and 2nd week of August to 3rd week of November with maximum water depth of 78 cm during 2nd week of September during the year 2011.
The infestation of yellow stem borer was very low during vegetative stage and not recorded. At pre harvest, the infestation of yellow stem borer was recorded by counting total tillers, ear bearing tillers and white ears in randomly selected 10 hills per entry and % white ears were worked out. Harvesting was done by the end of November. The scoring for yellow stem borer infestation have been conducted on the basis of Standard Evaluation System developed by IRRI, Philippines, i.e. 0-9 scale, where 0: no infestation, 1: 1to 5% infestation, 3: 6 to 10% infestation, 5: 11 to 15% infestation, 7: 16 to 25% infestation and 9: above 25% infestation.

Results and Discussion

The results are summarized in table 1 and 2. The YSB infestation varied from 0 to 28.76, 0 to 19.58 and 0 to 16.25% during *kharif* seasons 2009-10, 2010-11 and 2011-12, respectively. The results clearly indicated that altogether 6, 8 and 3 semi deep water rice genotypes were most promising against yellow stem borer with no infestation during *kharif* seasons 2009-10, 2010-11 and 2011-12, respectively (Table 1). It has also been noted that 25, 22 and 27 SDWR genotypes were also promising against yellow stem borer with up to 5% infestation during *kharif* seasons 2009-10, 2010-11 and 2011-12, respectively. On the basis of overall performance of all the genotypes against yellow stem borer during the three *kharif* seasons, the promising semi deep water rice entries have been categorized along with check varieties, Jalpriya and Madhukar (Table 2). It is clear from the data that the SDWR entries Madak 13, WAB 878-4-2-2-3-P1-HP and NDGR 268 were most promising with 0.67, 1.33 and 1.67% in comparison to check varieties Jalpriya and Madhukar with 21.53 and 15.27 % average stem borer infestation, respectively. Earlier, Chaudhary et al. (1984) and Padhi (2002) have rated the cultivars with less than 5% YSB

Table.1 Screening of semi deep water rice genotypes against yellow stem borer during kharif 2009-10, 2010-11 and 2011-12

Sl. No.	Reaction score	No. of entries		
		2009-10	2010-11	2011-12
1	0	6	8	3
2	1(1-5% WE)	25	22	27
3	3(6-10% WE)	44	50	46
4	5(11-15% WE)	75	64	66
5	7(16-25% WE)	42	36	28
6	9(25% & above)	5	1	14
7	d	5	21	18
Total		202	202	202

-WE: white ears -d: dead/ damaged

Table.2 Promising semi deep water rice genotypes against yellow stem borer during *kharif* 2009-10, 2010-11 and 2011-12.

Sl No.	Semi DeepWater Rice Genotypes	% White Ears			
		2009-10	2010-11	2011-12	Average
1.	Madak 13	1.33	0.67	0.00	0.67
2.	WAB 878-4-2-2-3-P1-HP	1.67	1.33	0.00	1.33
3.	NDGR 268	2.67	2.33	0.00	1.67
4.	IR 52561-UBN-1-1-2	0.00	4.67	2.33	2.33
5.	PR 36949-B-B-16	4.67	0.00	3.25	2.64
6.	TCA 80-4	0.00	3.67	3.50	2.39
7.	NDGR 296	3.25	3.33	4.67	3.75
8.	NDR 392	4.33	3.50	2.75	3.53
9.	PSBRC 70	4.33	0.00	3.75	2.69
10.	Bhantaful 2	4.25	3.67	2.33	3.42
11.	Kalanamak 2	4.67	3.33	2.75	3.58
12.	*Check Jalpriya*	28.76	19.58	16.25	21.53
13.	*Check Madhukar*	17.33	15.15	13.33	15.27
	CD (0.05)	-	-	-	1.63
	CV (%)	-	-	-	14.23

infestation as highly resistant. Thus, it is very likely that the semi deep water rice genotypes Madak 13, WAB 878-4-2-2-3-P1-HP and NDGR 268 may be rated as highly resistant against yellow stem borer. Also, the entries IR 52561-UBN-1-1-2, PR 36949-B-B-16, TCA 80-4, NDGR 296, NDR 392, PSBRC 70, Bhantaful 2 and Kalanamak 2 were promising with 2.33, 2.64, 2.39, 3.75, 3.53, 2.69, 3.42 and 3.58

% average yellow stem borer infestation, respectively. Hence, these semi deep water rice genotypes may be rated as resistant. It has been noted earlier that yellow stem borer larvae feeding on resistant varieties were smaller, had low survival, and caused lower percentages of dead hearts/ white ears than those feeding on susceptible varieties (Pathak and Khan, 1994). However, Rustamani et al. (2002) observed differential response of varieties is due oviposition preference by yellow stem borer. Zhu et al. (2002) investigated that resistant varieties caused mortality or inhibited the growth of stem borers, and resistance was highly correlated with smaller interval vascular bundles and larger width of the leaf sheath ridge. Recently, Sarwar (2012) opined that rice plant resistance to the stem borers may be attributed through two physical characteristics that caused direct mortality and other sub lethal effects to the borer young larvae: - 1) Tight oppression of the leaf sheath around the stalk to prevent larval movement (susceptible cultivars might have leaf sheaths that loosen rapidly as the plant grows) and 2) premature hardness of the internodes to reduce penetration and feeding of larvae. It is likely that resistance is a complex process and one or all the phenomenon are involved in stem borer resistant varieties.

On the basis of present studies, it is concluded that the semi deep water rice genotypes Madak 13, WAB 878-4-2-2-3-P1-HP and NDGR 268 are highly resistant against yellow stem borer, *Scirpophaga incertulas* (Walker) under natural field condition and may be used as resistant donors in breeding programme. Also, the entries IR 52561-UBN-1-1-2, PR 36949-B-B-16, TCA 80-4, NDGR 296, NDR 392, PSBRC 70, Bhantaful 2 and Kalanamak 2 are resistant against yellow stem borer and may be used in breeding programme based on the other characteristics required by the breeders.

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