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## Screening of medium duration rice cultures for their reaction to yellow stem borer, *Scirpophaga incertulas* Walker (Pyraustidae: Lepidoptera)

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**Abstract**

A total of 23 medium duration rice cultures were screened against yellow stem borer in rice under field condition at Rice Research Station, Ambasamudram during *Kar* season, 2013-14. The yellow stem borer infestation varied from 0 to 26.45% of white ear in rice. Out of 23 medium duration cultures screened, the entries AS 12021, AS 12029, AS 12032, AS 12033, AS 12071, AS 12090 and AS ST 12010 recorded nil incidence of stem borer in rice. Hence, they can be utilized in breeding programme as a source of resistance against yellow stem borer in rice.

**Keywords:** Germplasm, Resistance, Yellow Stem Borer, Rice

**1. Introduction**

Rice (*Oryza sativa* L.) is the most important and staple food crop for more than two thirds of the population of India. One of the major yield limiting factor in rice cultivation is the attack of insect pests that causes 20-30 per cent losses every year [6]. Eight species of stem borers of rice are known to be of significant importance in Asia. They infest the crop from seedling to maturity and account for a larger share of the crop loss. The yellow stem borer, *Scirpophaga incertulas* Walker (Pyraustidae: Lepidoptera) has assumed the number one pest status and attacks the crop at all stages of its growth. It causes dead hearts at active tillering stage and white ears at harvest stage, which leads to complete failure of the crop. This is the most important and devastating insect pest of rice causing yield loss of 27-34% every year [4]. Farmers frequently use chemical insecticides for the control of this pest. This reliance on use of insecticides leads to numerous undesirable consequences. Growing resistant varieties is an important component of rice IPM as it is compatible with all the methods of pest control without producing any side effects to the environment.

Hence, the present study aimed to identify the new sources of resistant genotypes developed at Rice Research Station (TNAU), Ambasamudram for the management of yellow stem borer.

**2. Materials and Methods**

A total of 23 medium duration cultures were collected from Plant Breeding Section, Rice Research Station, Ambasamudram for screening against yellow stem borer in rice under field condition during *Kar* season, 2013-14. The crop was raised following standard agronomic practices of irrigation and fertilizer. The infestation of yellow stem borer was very low during vegetative stage and the dead heart damage was not recorded. The white ear incidence was recorded and expressed as per cent white ears calculated as per the formula [2].

$$\text{Per cent dead heart} = \frac{\text{Number of dead hearts}}{\text{Number of total tillers}} \times 100$$

$$\text{Per cent white ear} = \frac{\text{Number of white ears}}{\text{Number of productive tillers}} \times 100$$

The damage rating and scale was given for the test entries by following the IRRI Standard Evaluation System for rice shown in Table 1 [3].

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**Table 1:** Standard Evaluation System for screening resistance to rice yellow stem borer

Dead Heart (DH)			White Ear (WE)		
Damage (%)	Scale	Status	Damage (%)	Scale	Resistance Rating
0	0	Highly Resistant (HR)	0	0	Highly Resistant (HR)
1-10	1	Resistant (R)	1 - 5	1	Resistant (R)
11-20	3	Moderately Resistant (MR)	6 - 10	3	Moderately Resistant (MR)
21-30	5	Moderately Susceptible (MS)	11 - 15	5	Moderately Susceptible (MS)
31-60	7	Susceptible (S)	16 - 25	7	Susceptible (S)
61 & above	9	Highly Susceptible (HS)	26 & above	9	Highly Susceptible (HS)

### 3. Results and Discussion

Out of 23 medium duration cultures screened, the entries AS 12021, AS 12029, AS 12032, AS 12033, AS 12071, AS 12090 and AS ST 12010 recorded nil incidence of stem borer in rice. The cultures AS 12005, AS 12018, AS 12025, AS 12036, AS 12064, AS 12066, AS 12070, AS 12071/3, AS 12083, AS 12089, AS 12091, AS ST 12019 and AS 12031 recorded grade 1 (0.72-5.24% white ear). During the reproductive stage two cultures viz., AS 12014 and AS 12074 were moderately resistant with '3' scale (6-10% White ear) (Table 2). The resistance in genotypes may be due to the presence of a strong repellent or a lack of feeding stimulus in the plants, and either due to the presence of toxic material or nutritional deficiencies in the plant for insect. Stem borer resistance is derived from several characteristics of the rice plant. Rice varieties with vascular bundles arranged closer than the width of the larval head offered resistance to larval boring. Varieties with thick layers of sclerenchyma tissue were usually less heavily infested than those with thin layers. Similarly internal factors such as silica content and other chemical characteristic may be

involved [1]. Differential response of varieties is due to oviposition preference by yellow stem borer [5]. The 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 [8]. Plant resistance to the stem borers in rice may be attributed through two physical characteristics that caused direct mortality and other sub lethal effects to the young larvae of borer: 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 premature hardness of the internodes to reduce penetration and feeding of larvae [7].

The mechanism varietal resistance in rice to the yellow stem borer in terms of vascular bundles arrangement, layers of sclerenchyma tissue, water content and silica content are to be explored for the promising genotypes in future. The Highly Resistant and Resistant genotypes can be used in breeding programme as a source of stem borer resistance.

**Table 2.** Screening of medium duration advanced rice cultures against stem borer (Kar season, 2013-2014)

S. No.	Cultures	White ear (%)	Scale	Status
1.	AS 12005	0.72	1	R
2.	AS 12008	26.45	9	HS
3.	AS 12014	7.17	3	MR
4.	AS 12018	4.34	1	R
5.	AS 12021	0.00	0	HR
6.	AS 12025	5.21	1	R
7.	AS 12029	0.00	0	HR
8.	AS 12032	0.00	0	HR
9.	AS 12033	0.00	0	HR
10.	AS 12036	1.54	1	R
11.	AS 12064	1.75	1	R
12.	AS 12066	2.57	1	R
13.	AS 12070	2.50	1	R
14.	AS 12071	0.00	0	HR
15.	AS 12071/3	2.95	1	R
16.	AS 12074	6.87	3	MR
17.	AS 12083	5.24	1	R
18.	AS 12089	1.23	1	R
19.	AS 12090	0.00	0	HR
20.	AS 12091	3.47	1	R
21.	AS ST 12010	0.00	0	HR
22.	AS ST 12019	1.14	1	R
23.	AS 12031	3.83	1	R
24.	ADT 49	7.57	3	MR
25.	Co 49	0.00	0	HR

HR: Highly Resistance; R-Resistance; MR-Moderately Resistance; HS-Highly Susceptible

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