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Evaluation of medium duration rice genotypes against leaffolder, *Cnaphalocrocis medinalis* Guen. (Pyraustidae: Lepidoptera)

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Abstract

A total of 15 medium duration rice genotypes with four check entries were screened against rice leaffolder, *Cnaphalocrocis medinalis* (Guenee) at Rice Research Station (TNAU), Ambasamudram during *Pishanam* season, 2013-14. Genotypes were evaluated based on the standard evaluation system for rice with a scale of 0 - 9. The leaffolder infestation varied from 3.76 to 52.13 % of leaf damage in rice. The genotype AS 12079 recorded resistant reaction by recording less than 10% leaf damage (3.76%) with a grade 1. Nine genotypes viz., AS 12005, AS 12010, AS 12029, AS 12035, AS 12039, AS 12050, AS 12066, AS 12073 and ASRH 12001 reacted moderately resistant (11 - 20% leaf damage) to leaffolder with a grade of 3. Three rice genotypes viz., AS 12033, AS 12071, AS 12104 were moderately susceptible reaction by recording less than 35% leaf damage (Grade 5) and one genotype AS 12051 expressed susceptible reaction by recording a leaf damage of 36.24% with a grade 7. The highly susceptible genotype AS 12008 recorded the maximum infestation of 52.13 per cent leaf damage (Grade 9). None of the genotypes were free from leaf damage to be categorized as highly resistant (0% leaf damage).

Keywords: Genotypes, Leaffolder, Resistance, Rice

1. Introduction

Rice (*Oryza sativa* L.) is the most important and staple food crop for more than two thirds of the population in 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]. Rice is affected by number of insect pests during its different growth stages. Among the various insect pests damaging the rice crop, the leaffolder, *Cnaphalocrocis medinalis* Guen. (Pyraustidae: Lepidoptera) is one of the regular pests of rice. It causes heavy losses at the early vegetative stage, medium at tillering stage and low at the milky stage [4]. It has been recorded to cause 63 to 80 per cent yield loss in rice [3, 5]. The leaffolder damages the crop in its larval stage. The young larvae feed on open leaves but later feed inside the rolled leaf formed by folding the leaf longitudinally with a sticky substance. The scraped leaves become membranous, turn whitish in colour. A single larva can damage a number of leaves. This activity disturbs the photosynthesis and plant growth and ultimately yield is reduced. Farmers depend upon a great deal of insecticide applications, even though a lot of insecticide applications are not effective [7]. Therefore, the challenge before the agricultural scientists today is to produce insect resistant plants. Insect resistant plants have the ability to withstand the effects of an insect by becoming resistant to its ill effects by means of genetic manipulation [8]. 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 leaffolder for the benefit of farming communities.

2. Materials and Methods

A total of 15 medium duration rice genotypes and four check entries were collected from Plant Breeding Section, Rice Research Station, Ambasamudram for screening against leaffolder, *C. medinalis* in rice under field condition during *Pishanam* season, 2013-14. The crop was raised adopting standard agronomic practices of irrigation and fertilizer except plant protection measures. The damaged and undamaged leaves were recorded at the time of peak infestation.

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The observations were recorded at 10 randomly selected hills per entry and the per cent damaged leaves were calculated as follows.

$$\text{Damaged leaves (\%)} = \frac{\text{Number of damaged leaves}}{\text{Total number of leaves observed}} \times 100$$

Table 1: Standard Evaluation System for rice leaffolder^[1,2]

S. No.	Scale	Damaged Leaves (%)	Resistance Rating
1.	0	No damage	Highly Resistant
2.	1	1 - 10	Resistant
3.	3	11 - 20	Moderately Resistant
4.	5	21 - 35	Moderately Susceptible
5.	7	36 - 50	Susceptible
6.	9	51 - 100	Highly Susceptible

3. Results and Discussion

Totally, 15 medium duration rice genotypes were screened against leaffolder, *C. medinalis* in rice under field condition during *Pishanam* season, 2013-14. Genotypes were evaluated based on the standard evaluation scale of 0-9 (Table 1). The leaffolder infestation varied from 3.76 to 52.13 % of leaf damage in rice. The results of the present study showed that the genotype AS 12079 recorded resistant reaction by recording less than 10% leaf damage and had minimum infestation of 3.76% leaf damage with a grade 1. Nine genotypes viz., AS 12005, AS 12010, AS 12029, AS 12035, AS 12039, AS 12050, AS 12066, AS 12073 and ASRH 12001 reacted moderately resistant (11-20% leaf damage) to leaffolder with a grade of 3. Three rice genotypes viz., AS 12033, AS 12071, AS 12104 were moderately susceptible to leaffolder (< 35% leaf damage) and one genotype AS 12051 expressed susceptible reaction by recording leaf damage in

between 36 to 50% (Grade 7). The highly susceptible genotype AS 12008 recorded the maximum infestation of 52.13 per cent leaf damage with a grade of 9 (Table 2 & 3). None of the genotypes were free from leaf damage to be categorized as highly resistant (0% leaf damage). The change in results may be due to the changes in the environmental conditions of the area. 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.

Table 2: Screening of medium duration advanced rice genotypes against leaffolder

S. No.	Cultures	Leaf folder damage (%)	Score	Resistance Rating
1.	AS 12005	19.39	3	MR
2.	AS 12008	52.13	9	HS
3.	AS 12010	15.96	3	MR
4.	AS 12029	20.04	3	MR
5.	AS 12033	23.34	5	MS
6.	AS 12035	11.43	3	MR
7.	AS 12039	13.12	3	MR
8.	AS 12050	19.39	3	MR
9.	AS 12051	36.24	7	S
10.	AS 12066	17.74	3	MR
11.	AS 12071	24.12	5	MS
12.	AS 12073	15.42	3	MR
13.	AS 12079	3.76	1	R
14.	AS 12104	23.34	5	MS
15.	ASRH 12001	13.12	3	MR
16.	CORH 3	24.12	5	MS
17.	ASD 16	17.74	3	MR
18.	ADT 45	24.06	5	MS
19.	ADT 49	18.01	3	MR

R- Resistant; HR- Highly Resistant; MR- Moderately Resistant; MS- Moderately Susceptible; S- Susceptible; HS- Highly Susceptible

Table 3: Categorization of rice genotypes based on the mean per cent leaf damage

Damaged Leaves (%)	Genotypes	No. of Genotypes	Status
No damage	--	Nil	Highly Resistant
-10	AS 12079	One	Resistant
11-20	AS 12005, AS 12010, AS 12029, AS 12035, AS 12039, AS 12050, AS 12066, AS 12073 and ASRH 12001	Nine	Moderately Resistant
21-35	AS 12033, AS 12071, AS 12104	Three	Moderately Susceptible
36-50	AS 12051	One	Susceptible
51-100	AS 12008	One	Highly Susceptible

4. Conclusion

Natural resistance in plants against insect pests is one of the important components of IPM. Hence, the highly resistant genotype AS 12079 can be used in breeding programme as a source of leaffolder resistance in rice.

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