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SCREENING OF DIFFERENT RICE GENOTYPES (*ORYZA SATIVA*) AGAINST *CNAPHALOCROCIS MEDINALIS* (LEPIDOPTERA: PYRALIDAE) UNDER FIELD CONDITIONS IN LAHORE, PAKISTAN

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ABSTRACT

Rice leaf folder has attained the status of major pest from previous few years in Punjab Province. No rice genotype has been reported to carry highly resistance against rice leaf folder. This experiment were conducted in Institute of Agriculture Science University of the Punjab, Lahore during 2016. Randomized complete block design was used having three replications. Out of 34 genotypes 13 course, 12 fine aromatic and 9 fine non aromatic genotypes were selected. Five weeks data showed that in coarse varieties highest leaf folder infestation were recorded on C-9 (18.18% ± 3.27), Sonahri (17.86% ± 2.80), Nile (16.63% ± 3.12) and lowest infestation were found on KSK-133(12.54% ± 1.53), KS-282 (12.44% ± 1.99), Rondo (12.01% ±1.80) while in fine varieties highest leaf folder infestation were recorded on fine aromatic varieties Kashmir-basmati (11.36 % ± 1.81), Basmati-515 (11.36 % ± 1.81), Dhakan,(10.76 % ± 1.65) and Kasalath (9.89 % ± 1.46); lowest leaf folder infestation were observed on fine non aromatic 7260 (5.51 ± 0.94) and 7240 (4.92 ± 0.79). All other varieties showed intermediate leaf folder infestation. According to IRRI Standard Evaluation system (SES) of rice damage rating scale, our results indicates that only 4 varieties were found moderately resistance with rating scale 3 and all other varieties were found resistance with rating scale 1. It is concluded that KSK-133, KS-282, Rondo and fine non aromatic 7260, 7240 having least infestation of rice leaf folder should be grown in rice grown areas of Punjab, Pakistan.

Keywords: Screening, Rice varieties, Rice leaf folder, Punjab, Pakistan

INTRODUCTION

In rice field major yield limiting factor is insect pest attack. Almost 500 insect and spider species can be seen in rice fields in specific season out of which, only rare are threat. Stem borer, rice gandhi bug, plant hopper, *C.medinalis* etc cause significant damage to rice fields (Gunathilagaraj and Gopalan, 1986). In Pakistan 128 different insect pest species were found to attack on rice crop (Ahmed, 1981). Out of which about 15-20 insect species are of economic importance (Pathak and Dyck, 1973).

The mostly Asian countries like China, Sri Lanka, Malaysia, India, Vietnam, Japan and Korea, outbreak of *C. medinalis* with severe rice crop damage have been recorded (Wada *et al*., 1980; Heong, 1997). This dangerous pest spread and multiplied in Pakistan during August and September 1989-90 with severe incidence. Leaf infestation in Punjab, Pakistan were recorded 25% due to this pest was which caused to reduced the yield about 30% and also in few areas 50% (Salim *et al*., 1991). Bautista *et al.* (1984) in his study described losses in rice yield caused by *C.medinalis* directly related to the leaves damage percentage. According to the observation of (Ahmed *et al*., 2005) the attack of this dangerous pest has been increased.

Chinese ministry of Agriculture issued a report in 2003 according to which 23.1 million acres were affected due to rice leaf folder in china. It is observed that rice leaf folder adopted a status of major pest and caused greater yield loss as compared to rice blast. (Xu *et al*., 2003; Wu *et al*., 2004). Eight species of leaf folder attack rice crop severely out of which *C. medinalis* is the most important (Bhatnagar *et al*., 1998). It was miner pest of paddy but now has become a major

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pest in rice growing areas (Maragesan *et al*., 1987). Best option to avoid this pest is the use of resistance varieties. At present breeding of resistance rice varieties is most safe and cost-effective method (Song *et al.,* 2002)

Natural resistance is very important phenomena in plants against different type of insect pests and is considered as very important constituent of IPM. It is also important to determine the resistance level of particular varieties for planning efficient management practices. The objectibe of present study was to screen out the resistance germplasm from various rice genotypes.

MATERIALS AND METHODS

The research study were conducted in the field area of Institute of Agriculture Sciences University of the Punjab, Lahore, Pakistan during 2016. According to Table 1, 34 genotypes were grown for screening purpose in which 9 fine non aromatic, 12 fine aromatic and 13 were coarse non aromatic. The nursery was sown by following all standard agronomic practices raised bed is well prepared (Ashfaq *et al.,* 2011) and 100 seed of each genotype were sown separately.

Seedlings were transplanted after 35 days of its germination following RCBD with three replicates (Ashfaq *et al*., 2011). 13 plants of each genotype were sown in each replicate. According to (Sagheer *et al*., 2008) rice plants were shifted in standing water with care and maintain the plants and rows distance with 22 cm respectively. All recommended practices were done accordingly.

Monitoring were carried on and at 5th week of transplanting leaf folder infestation were observed. First data of rice leaf folder infestation were calculated at 5th week and onward up to 9thweek. Three plants were selected randomly to calculate leaf infestation for *C. medinalis* in each replicate and no control measure was adopted to control rice leaf folder in screening experiment.

The *C. medinalis* calculation were done by the formula given below

$$\text{Leaves folded (\%)} = \frac{\text{Infested leaves number / hill}}{\text{Number of total leaves / Hill}} \times \frac{\text{Infested Hill}}{\text{Number of total Hill in sample area}} \times 100$$

After calculating the infestation based on damage rating and scale

Table 1.
Different genotypes of rice used for screening purpose.

Fine non aromatic	Fine aromatic	Coarse non aromatic
7260	Basmati-515	Rondo
7246	Basmti-370	Pimple marker
7240	Superbasmati	KSk-133
7651	Basmati-2000	IRRI-6
7280	PK786	KS-282
7897	PS-2	00515-1
7206	Kashmir basmati	00518-1
8900	Khushbo	Taino33
7208	PK386	Blue Nile
	Pakkhal	NP125
	Kasalath	C-9
	Dhakan	Leepa velly
		Sonahri

Table 2.
The status of rice genotype was determined according to following IRRI, Standard Evaluation System (SES) for rice.

Rating Damage (%)	Scale	Status
0	0	Highly Resistance
1 – 15	1	Resistance
16 – 30	3	Moderately Resistance
31 – 50	5	Moderately susceptible
51 – 75	7	Susceptible
>75	9	Highly Susceptible

Table 3.
Means comparison of leaf infestation due to *Cnaphalocrocis medinalis* on various genotype of *oryza sativa* at various dates of observation during 2016.

Genotype	Mean infestation (%) ± S.E.
C-9	18.18 ± 3.27 a
Sonahri	17.86 ± 2.80 ab
Blue Nile	16.63 ± 3.12 bc
00518-1	16.42 ± 2.92 c
Leepa velly	15.87 ± 2.66 cd
Taino-33	14.74 ± 2.64 d
00515-1	13.18 ± 2.12e
NP125	13.12 ± 2.32 e
IRRI-6	12.97 ± 2.03 e
KSK-133	12.54 ± 1.53 ef
KS-282	12.44 ± 1.99 ef
Kashmir Basmti	12.24 ± 2.01 ef
Rondo	12.01 ±1.80 efg
Basmati-515	11.36 ± 1.81 fgh
Dhakan	10.76 ± 1.65 ghi
Pimple Marker	10.25 ± 1.39 hij
Kasalath	9.89 ± 1.46 ijk
Basmati-370	9.46 ± 1.55 ijkl
Basmati-2000	9.38 ± 1.38 jkl
7206	9.24 ±1.70 jkl
PK386	9.1 ± 1.39 jkl
Pakkhal	8.58 ± 1.29 klm
7208	8.50 ± 1.44 lmn
Super Basmati	8.44 ± 1.36lmn
8900	8.36 ± 1.52 lmn
PS-2	7.74 ± 1.25 mnq
Khushboo	7.48 ± 1.03 mnop
7897	7.41 ± 1.39 mnop
7246	7.22 ± 1.29 nop
7280	6.66 ± 1.14 opq
7651	6.30 ± 1.10 pq
PK786	5.65 ± 0.88 qr
7260	5.51 ± 0.94 qr
7240	4.92 ± 0.79 r

RESULTS AND DISCUSSION

The Data presented in Table 3 revealed significant differences regarding resistance level among different genotype against rice leaf folder. In coarse varieties highest leaf folder infestation were recorded on C-9 (18.18% ± 3.27), Sonahri (17.86% ± 2.80), Blue nile (16.63% ± 3.12) and lowest infestation were found on KSK-133(12.54% ± 1.53), KS-282 (12.44% ± 1.99), Rondo (12.01% ±1.80).While in fine varieties highest leaf folder infestation were recorded on fine aromatic varieties Kashmir-basmati (11.36 % ± 1.81), Basmati-515 (11.36 % ± 1.81), Dhakan,(10.76 % ± 1.65), Kasalath (9.89 % ± 1.46) and basmati 370(9.46 ± 1.55); lowest leaf folder infestation were observed on fine non aromatic varieties 7260 (5.51 ± 0.94) and 7240 (4.92 ± 0.79).All other varieties showed intermediate leaf folder infestation.

The table values expressed means average infestation of 34 varieties in five observed dates in five Weekes (5th to 9th of transplanting).

The results revealed significant difference regarding resistance level among different genotypes. In coarse varieties highest leaf folder infestation were recorded on C-9 (18.18% ± 3.27), Sonahri (17.86% ± 2.80), Blue nile (16.63% ± 3.12) and lowest infestation were found on KSK-133 (12.54% ± 1.53), KS-282 (12.44% ± 1.99), Rondo (12.01% ±1.80). However, in fine varieties highest leaf folder infestation were recorded on fine aromatic varieties Kashmir-basmati (11.36 % ± 1.81), Basmati-515 (11.36 % ± 1.81), Dhakan (10.76 % ± 1.65), Kasalath (9.89 % ± 1.46) and basmati 370(9.46 ± 1.55); lowest leaf folder infestation were observed on fine non aromatic varieties 7260 (5.51 ± 0.94) and 7240 (4.92 ± 0.79). All other varieties showed intermediate leaf folder infestation. According to IRRI, SES of *Oryza sativa* rating damage scale, our results indicates only 4 varieties (C-9, Sonahri, Blue Nile and 00518) were found moderately resistance with rating scale 3 and all other varieties were found resistance with rating scale 1. Out of these resistance varieties coarse varieties pimple marker, Rondo, KS-282, KSK-133 and IRRI-6 , in fine aromatic

varieties PK786, khushbo, PS-2, Super basmati and Pakkhal in fine non aromatic 7240, 7260, 7651, 7280,7246 have least rice leaf older infestation as compared to other varieties. Keeping in view the results these varieties are recommended for farmers particularly in areas of Punjab having high incidence of rice leaf folder attack.

Results indicate that there is significant difference in infestation regarding week wise observation, highest observation were observed in 9th week of transplanting and lowest infestation was noted at 5th week of transplanting. Findings of our results showed that fine varieties have less attack than short duration coarse varieties. These results are matched to Dhaliwal *et al*. (1979) who found more attack of rice leaf folder on coarse varieties. Our experiment results were not matched with the findings of Malik *et al*. (1985) who described lowest damage on Basmati 370. Results of this experiment are also in accordance with Ahmed *et al.,* 2005 .They reported super basmati was found intermediate resistance variety against rice leaf folder. The results of these experiments provide direction to Farmer to use resistance varieties in these areas and indication of resistance germplasm for researcher for their research use in future experiments.

CONCLUSION

It is concluded high leaf folder infestation were recorded on coarse and fine aromatic varieties. Fine non aromatic varieties have less leaf folder infestation .This research facilitate the breeder to select the germplasm which has resistance against rice leaf folder to develop resistance varieties of rice in future. This study as an IPM tool will decrease the pesticides cost by using resistance varieties.

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