Research Article

SCREENING OF RICE VARIETIES AGAINST EARHEAD BUG, *Leptocorisa acuta Stal.* (HEMIPTERA: COREIDAE)

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Abstract- The data on per cent damaged grains per panicle due to ear head bug revealed that the varieties *viz.*, GR-104, GAR-1, GNR-3, IR-22, GR-102 and GAR-2 found moderately resistant (MR) with 4-7 per cent grain damage. GNR-2, GR-12, GR-103, GR-7, GR-101, GR-11, Gurjari, Narmada, NAUR-1 and Masuri varieties were categorized as moderately susceptible(MS) group that recorded 8 to 15 per cent grain damage. Whereas, IR-28 found susceptible (S) with 16-25 per cent grain damage and Jaya was categories into highly susceptible (HS) with more than 26 per cent grain damage.

Keywords- Ear head bug, Grain, Resistant, Susceptible, Variety

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Introduction

Rice is the world's second most important cereal crop. At global level, rice is a staple food crop of paramount importance to more than half of the population with regard to food value and is consumed by more than 60 per cent of the world population. Asia is considered to be 'rice bowl' of world. South Gujarat is an important rice growing tract of the state belonging to Dang, Valsad, Navsari and Surat districts of State. In rice among the biotic factors insect pests cause about 10-15per cent yield losses. The average yield losses in rice have been estimated to vary between 21-51 per cent [1]. Attempts are being made in the Gujarat state to increase the rice production by the high yielding varieties with high rice yields. Lack of pest resistant varieties, poor water management and lack of suitable pest and disease management strategies are the major constraints in rice production [2]. A list of major, minor and sporadic pests attacking paddy crop in Gujarat is reported by Korat and Pathak (1997) [3]. Rice ear head bug is also known as gundhi bug was reported as sporadic and minor pest of rice in South Gujarat. After 1996, the attack of this pest was found to be severe in Valsad, Dang, Surat and Navsari districts. This bug known to feed on the developing rice grains causing discolored, deformed, ill filled and empty/sterile grains and renders considerable qualitative and quantitative losses every year [4]. Of all insect control methods, the planting of pest resistant varieties is the most effective because it leaves no insecticide residue in food or the environment and is constantly effective and generally compatible with other insect control measures. In absence of natural heritable resistance in rice varieties, resistance could be induced by alternate strategies to suppress certain pests. Besides these farmers are always worried about cost of production due to rise in inputs prices year by year. Host plant resistance is one of the reliable and sustainable components of Integrated Pest Management (IPM). There has been substantial progress in this area and number of paddy varieties/ lines have been developed and required to be screened out for their major insect pest susceptibility. Hence the present investigation is carried out on screening of rice varieties against ear head bug, *Leptocorisa acuta* Stal.

Materials and Methods
Experimental details

1.	Location	Wheat Research Station Farm, N.A.U., Bardoli
2.	Season and year	*Kharif* 2012 and 2013
3.	Design	Randomized Block Design (RBD)
4.	Area of experiment	1000 m²
5.	Spacing	20 cm x 15 cm
6.	Method of sowing	Transplanting

The seedlings were transplanted when they were 25 days old. All the post sowing recommended agronomic practices were followed and the experimental area was kept free from insecticidal spray throughout the crop season in order to record the observations on Brown plant hopper incidence. To know the incidence of rice ear head bug *L. acuta* on rice, the observations were recorded as per standard week throughout the crop season. The observations were taken by sweeping insect collecting net five times across the crop canopy from randomly selected field and number of nymph and adults of rice ear head bug were counted. The observations were made at weekly interval starting from appearance of the pest for damaged grains per panicle. The total number of grains and damaged grains by ear head bug were counted on five randomly selected panicles from each plot and then percentage of damage grain was calculated. The scale and reaction for resistance/susceptibility score was judged by using Standard Evaluation System for Rice (SES) for the insect pest [5] which is as under.

Sr. No.	% damaged grainsper panicle	Scale	Reaction
1.	No damage	0	HR (Highly Resistant)
2.	Less than 3 %	1	R (Resistant)
3.	4-7 %	3	MR (Moderately Resistant)
4.	8-15 %	5	MS (Moderately Susceptible)
5.	16-25 %	7	S (Susceptible)
6.	26-100 %	9	HS (Highly Susceptible)

Result and Discussion

The data on per cent damaged grains per panicle due to ear head bug [Table-1,2] and [Fig-1] revealed that all varieties showed more or less per cent damaged grains. Bugs started infesting the panicles at milky stage and continue till hardening of grains. It was also observed that early maturing varieties showed higher per cent damaged grains.

I year (*Kharif* 2012)

The results of first year experiment [Table-1] and [Fig-1] revealed that none of the variety was found free from the attack of *L. acuta* and the difference in percentage of damaged grains per panicle in different varieties was found significant.

However, among all varieties, significantly lower percentage of damaged grains were found in GR-104 (4.83%), which was found statistically at par with GAR-1 (5.93%), GNR-3 (5.96%), IR-22 (6.04%), GR-102 (6.17%) and GAR-2 (6.32%). Slightly higher percentage of damaged grains was found in GNR-2 (8.49%), which was at par with GR-12 (9.14%), GR-103 (9.93%), GR-7 (10.55%), GR-101(10.79%) and GR-7 (10.92%). The moderately higher damaged grains was recorded in Narmada with 11.18 per cent and found at par with Gurjari (11.27%), NAUR-1 (11.97%) and Masuri (12.74%). Significantly highest percentage of damaged grains per panicle was observed in IR-28 (17.09%) as well as in susceptible check Jaya (27.09%).

Table-1 *Varietal screening of rice against ear head bug during Kharif 2012 and kharif 2013*

Sr. No.	Varieties	*Kharif* 2012			*Kharif* 2013		
		Damaged grain/panicle (%)	Scale	Reaction	Damaged grain/panicle (%)	Scale	Reaction
A.	Early Varieties						
1.	GR-7	18.78 (10.43)	5	MS	19.12 (10.83)	5	MS
2.	GR-12	17.57 (9.14)	5	MS	17.90 (9.49)	5	MS
3.	Gurjari	19.55 (11.27)	5	MS	19.82 (11.56)	5	MS
4.	GNR-3	14.11 (5.96)	3	MR	13.96 (5.84)	3	MR
5.	NAUR-1	20.17 (11.97)	5	MS	20.75 (12.60)	5	MS
6.	GAR-1	14.08 (5.93)	3	MR	13.80 (5.70)	3	MR
7.	GAR-2	14.55 (6.32)	3	MR	14.82 (6.57)	3	MR
8.	IR-28	24.40 (17.09)	7	S	25.00 (17.89)	7	S
B.	Mid-late varieties						
9.	GR-11	19.26 (10.92)	5	MS	19.58 (11.28)	5	MS
10.	GNR-2	16.93 (8.49)	5	MS	17.39 (8.95)	5	MS
11.	IR-22	14.19 (6.04)	3	MR	14.07 (5.94)	3	MR
12.	Jaya (Sus. check)	31.36 (27.09)	9	HS	32.25 (28.49)	9	HS
C.	Late varieties						
13.	Masuri	20.89 (12.74)	5	MS	21.42 (13.37)	5	MS
14.	GR-101	19.14 (10.79)	5	MS	19.47 (11.15)	5	MS
15.	GR-102	14.35 (6.17)	3	MR	14.02 (5.92)	3	MR
16.	GR-103	18.32 (9.93)	5	MS	18.78 (10.42)	5	MS
17.	GR-104	12.67 (4.83)	3	MR	12.52 (4.73)	3	MR
18.	Narmada	19.46 (11.18)	5	MS	20.04 (11.80)	5	MS
S. E. (m)		0.85			0.90		
C. D. at 5%		2.44			2.60		
C. V.		8.04			8.41		
* Values in outside the parentheses are arc sine transformed values and inside are original values.							

II year (*Kharif* 2013)

The data of second year on per cent damaged grains presented in [Table-1] and [Fig-1] revealed that difference in per cent damaged grains in different varieties was found significant. However, among all varieties significantly lowest percentage of damaged grains was found in GR-104 (4.73%), which was at par with GAR-1 (5.70%), GNR-3 (5.84%), GR-102 (5.92%), IR-22 (5.94%) and GAR-2 (6.57%). The other varieties which showed comparatively lower percentage of damaged grains were GNR-2 (8.95%), GR-12 (9.49%), GR-103 (10.42%), GR-7 (10.83%), GR-101 (11.15%), GR-11 (11.28%) and Gurjari (11.56%) and were found at par with each other. The variety Narmada, NAUR-1 and Masuri recorded 11.80, 12.60 and 13.37 per cent damaged grain, which was lower than the susceptible check

variety Jaya. Significantly highest percentage of damaged grains was found in IR-28 (17.89%) and Jaya (28.49%).

Pooled

The pooled results of varietal screening against ear head bug [Table-2] and [Fig-1] indicated that none of the variety was free from the attack of *L. acuta* and the difference in percentage of damaged grains per panicle in different varieties was found significant. However, among all varieties, significantly lower percentage of damaged grains was recorded in GR-104 (4.78%), which was statistically at par with GAR-1 (5.82%), GNR-3 (5.90%) and IR-22 (5.99%). Similarly, lower damaged grains were also seen in GR-102 and GAR-2, which recorded 6.05 and 6.44 per

cent damage and found at par with each other. Slightly higher percentage of damaged grains was found in GNR-2 (8.72%), which was at par with GR-12 (9.32%) and GR-103 (10.18%). The moderately higher damaged grains per cent was recorded in GR-7 with 10.63 per cent damage and showed at par findings with GR-101 (10.97%), GR-11 (11.10%), Gurjari (11.42%), Narmada (11.49%) and NAUR-1 (12.28%). Masuri recorded significantly higher susceptibility with 13.06 per cent panicle damage, but significantly highest percentage of damaged grains per panicle was observed in IR-28 (17.49%) as well as in susceptible check Jaya (27.79%). The interaction effect between varieties and year was non-significant showing consistent performance of different varieties during the period of both years. Based on per cent damaged grains per panicle due to ear head bug is presented in [Table-2], the varieties *viz.*, GR-104, GAR-1, GNR-3, IR-22, GR-102 and GAR-2 found moderately resistant in the scale 3 (4-7% grain damage). Whereas, the other varieties like GNR-2, GR-12, GR-103, GR-7, GR-101, GR-11, Gurjari, Narmada, NAUR-1 and Masuri were categories into moderately susceptible group of scale 5 (8-15% grain damage). The variety IR-28 fit into susceptible group of scale 7 (16-25% grain damage), while Jaya was categorized into highly susceptible class of scale 9 (26-100% grain damage). These results

are concerned with Diwakar (1975) [6], Grist (1981) [7] and Saroja and Raju (1985) [8] who reported that the ear head bugs remained in the field till the grain hardening take place and the successive generations migrated from early maturing varieties to late maturing varieties and cause serious damage. While, similar type of screening trend was found in the results of Ghule (2006) [9] who showed that the varieties *viz.*, IR-28, GR-10, GR-6, GR-7, GR-3, GR-9, Kada, IR-66, TN1, Gurjari, GR-12 and GR-102 were moderately resistant and the remaining varieties *viz.,* GR-4, GR-5, Ratna, GR-11, Jaya, GR-103, GR-101, Masuri and GR-104 were slightly resistant to ear head bugs. He also found that the incidence of rice ear head bug was greater in mid-late and late maturing varieties as compared to early maturing varieties. In another findings of Mandape (2013) [10] revealed that the variety Pawana was resistant having 1 scale, varieties *viz.*, IR-22, GR-9, GR-102 and GR-104 showed moderately resistant reaction having 3 scale, while varieties *viz.*, NAUR-1, GR-4, GR-6, GR-7, GR-10, GR-11, GR-12, GR-101, GR-103, Gurjari, Narmada and PR 116 were slightly resistant having scale 5. The varieties *viz.*, IR-28 and IR-50 were susceptible with scale 7, while remaining varieties viz., IR-66, Dandi, Jaya and PRH-10 showed highly susceptible reaction with scale 9. Thus, this result confirms the findings of present investigation.

Table-2 *Varietal screening of rice against ear head bug (Two years pooled)*

| Sr. No.	Varieties	Damaged grain/panicle (%)	Scale	Reaction
A.	Early Varieties			
1.	GR-7	18.95 (10.63)	5	MS
2.	GR-12	17.74 (9.32)	5	MS
3.	Gurjari	19.69 (11.42)	5	MS
4.	GNR-3	14.04 (5.90)	3	MR
5.	NAUR-1	20.46 (12.28)	5	MS
6.	GAR-1	13.94 (5.82)	3	MR
7.	GAR-2	14.69 (6.44)	3	MR
8.	IR-28	24.70 (17.49)	7	S
B.	Mid-late varieties			
9.	GR-11	19.42 (11.10)	5	MS
10.	GNR-2	17.16 (8.72)	5	MS
11.	IR-22	14.13 (5.99)	3	MR
12.	Jaya (Sus. check)	31.81 (27.79)	9	HS
C.	Late varieties			
13.	Masuri	21.15 (13.06)	5	MS
14.	GR-101	19.31 (10.97)	5	MS
15.	GR-102	14.19 (6.05)	3	MR
16.	GR-103	18.55 (10.18)	5	MS
17.	GR-104	12.59 (4.78)	3	MR
18.	Narmada	19.75 (11.49)	5	MS
S. E. (m)± (T)	0.56			
S. E. (m)± (TxY)	0.88			
C. D. at 5% (T)	1.58			
C. D. at 5% (TxY)	NS			
C. V. %	8.23			
* Values in outside the parentheses are arc sine transformed values and inside are original values.				
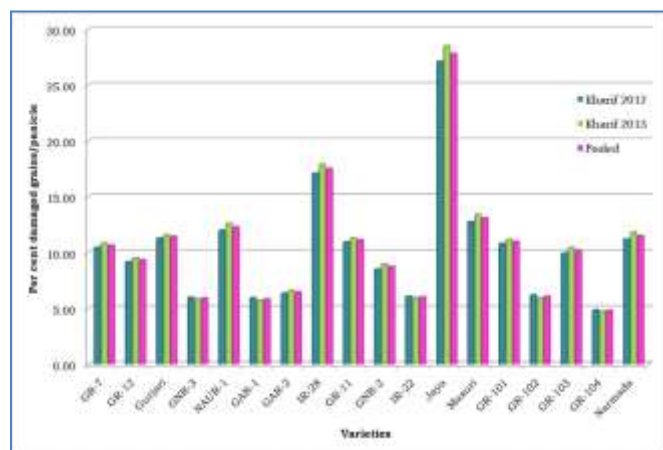
Fig-1 Varietal screening of rice against ear head bug

Summary and Conclusion

The data on per cent damaged grains per panicle due to ear head bug revealed significant results among evaluated varieties and indicated that the varieties *viz.,* GR-104, GAR-1, GNR-3, IR-22, GR-102 and GAR-2 found moderately resistant with 4-7 per cent grain damage. Whereas, the other 10 varieties *i.e.* GNR-2, GR-12, GR-103, GR-7, GR-101, GR-11, Gurjari, Narmada, NAUR-1 and Masuri were categorized into moderately susceptible group that recorded 8 to 15 per cent grain damage.

Application of research: The variety IR-28 found susceptible with 16-25 per cent grain damage, while Jaya was categories into highly susceptible with more than 26 per cent grain damage.

Research Category: Entomology

Abbreviations:
N. M. : Navinchandra Mafatlal
N.A.U.: Navsari Agricultural University
Fig.   : Figure
CD   : Critical Difference
C.V.   : Co-efficient of variance
et al., : et allii ; and co-workers
S. E. m + :Standard Error of mean
i.e.   : That is

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