

Characterization of relative susceptibility of wheat varieties against rice weevil (*Sitophilus oryzae* Lin.)

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An *in vitro* studied on the relative susceptibility against *Sitophilus oryzae* (Lin) was carried out in eighteen varieties of wheat. The varieties were screened by no choice and free choice test separately and replicated four times. In free choice test hundred pairs of adults were released in each variety. Number of adult oriented in each variety was counted. Significantly minimum number of adult was oriented in variety HUW-552 (3.1) and significantly higher number in variety HD-2285 (13.6). In no choice test five pairs of adults were inoculated in each variety. Adult emergence, total development period and sex ratio were computed. Total developmental period ranged from 32.2 days in DL- 806 to 37.6 day in Lok-1. The number of adult emerged was significantly ranged from 1.7 (Raj-4000) to 12.0 (PBW-468). The sex ratio male (1): female ranged from 0.75 (Raj-4000) to 1.75 (GW-273). The variety Raj-4000 expressed hindrance to orientation and emergence of pest and took a more time for development of *Sitophilus oryzae* L and therefore found relatively least susceptible. It was followed by HUW-522 and HI-8381. However, HI-8498 showed relatively susceptible response.

Key words: *Sitophilus oryzae* Lin., Susceptibility, Free choice, No choice, Sex ration, Orientation, Emergence, Total developmental period.

INTRODUCTION

In spite of the best effort in the improved production technology there occurs several bottlenecks that cause severe losses to the final agricultural produce especially during the post harvest management when food grains remain under storage. A number of insect pests have been reported to be associated with stored grain and their byproduct that causes losses of food energy intended for human and animal health. In wheat, insect pest problem is more serious at the post harvest stage rather than in the field. Among the various insect pest, Rice weevil *Sitophilus oryzae* (Lin.) is most destructive pest of store grain in wheat (Cotton 1920). It is originated in India and worldwide in distribution (Fletcher, 1914 and Cotton 1920). In Madhya Pradesh *Sitophilus oryzae*(Lin.) and *Rhizopartha domnica* (Fab.) were the major pest of the stored wheat, where *Sitophilus oryzae* (Lin.) was most dominating pest of stored wheat (Lal & Shrivastava 1985). Keeping above point in view, a study on the relative susceptibility of eighteen varieties of wheat against *Sitophilus oryzae*(Lin.) was conducted.

MATERIALS AND METHODS

A investigation to assist the effect of wheat varieties on the orientation, development, adult emergence and male: female sex ratio were carried out under the laboratory condition in the Department of Entomology, College of Agriculture, J.N.K.V.V., Gwalior (M.P.). The culture of *S. Oryzae* was maintained *in vitro* at 30±5 °C temperature and 75±5 percent relative humidity with the help of incubator and deciccator respectively, and facilitated them for multiplication for utilization of newly emerged adults in experimentation. The studies were conducted in no choice and free choice tests, separately using eighteen varieties of wheat.

In free choice test hundred uninfected conditional grain of each variety were randomly arranged in a glass trough in circle at equi-distance from the center. Small solid glass rods were kept between the varieties to separate them from each other. Hundred pairs of ten-days old adults were released in center of trough and it is covered by muslin cloth. The number of adults oriented in each variety was counted twenty-four, forty-eight and seventy-two hours after their release.

In no choice test, 20 gm conditioned grain of each varieties was kept in separate specimen tube and all the tubes were kept

in deciccator at 75±5 % relative humidity which was in turn kept in the incubators at 30±5 °C temperature. After a week, weight of grain was adjusted and five pairs of ten-day old adults were released in each tube and forty-eight hours after release, all the adults were removed in the tube. Fifteen days after inoculation, male and female emerged in each variety were recorded daily. The total development period and sex ratio were determined. Both the experiments were replicated four times. The data were subjected to suitable transformation and were statistically analyzed as per Randomized Block Design.

RESULTS AND DISCUSSION

A. Free choice test

Effect of wheat genotype on orientation of Rice weevil *S. oryzae* (Lin.)

24 hours after release

Significant differences between the varieties were observed in the present study (Table.1). Significantly minimum number of adult was oriented in variety HI-8381 (3.80), which was at par with varieties HUW-522, HD-2747 and Raj-4000. However, significantly maximum number of adult was emerged in Lok-1 (12.7).

48 hours after release

Significant different were observed between the varieties in the number of adult oriented 48 hours after release. However significantly minimum number of adult was oriented in variety Raj-4000 (2.0) and was at par with HUW-522 and HI-8381 in comparison to maximum adult oriented (13.23) HD-2285.

72 hours after release

Significantly minimum number of adult was oriented in varieties Raj-3999 (2.51), which was at par with Raj-4000, Huw-522, DL-788-2. However, maximum number of adult was oriented in variety HD-2285 (16.5).

Mean Orientation

Data of mean orientation based on the above three observations in free choice test showed that significantly minimum number of adult oriented in variety HUW-552 (3.1), which was at par with

Table 1 : Effect of different wheat genotype on orientation of rice weevil *Sitophilus oryzae* (Lin.)

S. No.	Variety	Number of Oriented adult hours after release			
		24	48	72	Mean
1	Raj-4000	5.3 (2.28)	2.0(1.49)	3.5(1.91)	3.60(1.89)
2	Lok-1	12.7(3.62)	7.0(2.61)	3.3(3.07)	9.70(3.10)
3	HD-2285	11.2(3.28)	13.2(3.66)	16.5(4.08)	13.6(3.63)
4	HD-2707	7.15(2.66)	3.2(1.85)	5.0(2.26)	5.20(3.67)
5	GW-173	9.7(3.13)	6.7(2.65)	5.0(2.29)	7.13(2.69)
6	PBW-469	6.5(2.59)	5.5(2.27)	7.3(2.73)	6.40(2.53)
7	DI-788-2	6.0(2.49)	3.7(2.05)	3.5(1.95)	4.40(2.16)
8	PBW-470	8.5(2.95)	9.7(3.15)	11.0(3.34)	9.70(3.14)
9	HUW-522	3.5(1.95)	2.7(1.78)	3.3(1.93)	3.10(1.88)
10	HI-8498	10.0(3.22)	8.2(2.93)	7.5(2.74)	8.50(2.96)
11	PBW-468	6.0(2.49)	7.5(2.58)	9.0(2.94)	7.50(2.67)
12	Raj-3999	4.5(2.99)	3.2(1.85)	2.5(1.68)	3.40(1.91)
13	HD-2747	4.0(2.04)	4.7(2.20)	4.5(2.07)	4.40(2.10)
14	HI-8381	3.8(1.70)	3.7(1.98)	7.5(2.81)	5.0(2.16)
15	JGW-9	6.7(2.61)	7.0(2.73)	9.5(3.81)	7.80(2.81)
16	GW-273	6.0(2.51)	5.2(2.33)	3.5(1.81)	4.90(2.21)
17	Agra Local	5.5(2.41)	7.0(2.64)	11.0(3.25)	7.80(2.76)
18	DI-803-3	5.2(2.37)	3.7(1.96)	4.5(2.18)	4.50(2.17)
	S.E m \pm	0.31	0.28	0.32	0.30
	CD at 5 %	0.88	0.81	0.92	0.87

*Figures in parentheses are $\sqrt{n+0.5}$ transformed values

variety Raj 4000 (3.60), HD-2747 (4.40), DL- 788-2 (4.40) and HI-8381 (5.02). However, significantly higher number of adult was oriented in variety HD-2285 (13.6), which was at par with LOK-1, PBW-470.

Effect of different wheat genotypes on number of adult emerged

Data presented in Table-2 indicated that significantly minimum number of adult was emerged in variety Raj-4000 (1.7), which

Table 2 : Effect of different wheat genotypes on infestation of rice weevil *Sitophilus oryzae* (Lin.)

S. No.	Variety	Total development period (Days)	Number of Adult emerge	Sex ratio
2	Lok-1	33.5	3.2	1.12
3	HD-2285	34.6	4.7	1.00
4	HD-2707	33.4	2.2	1.00
5	GW-173	36.9	5.2	1.75
6	PBW-469	33.9	3.5	1.50
7	DI-788-2	35.2	2.5	1.50
8	PBW-470	33.6	5.2	1.29
9	HUW-522	33.4	3.2	1.50
10	HI-8498	35.6	10.0	1.46
11	PBW-468	36.0	12.0	1.27
12	Raj-3999	33.8	3.7	1.16
13	HD-2747	34.8	4.0	1.37
14	HI-8381	33.8	2.2	1.50
15	JGW-9	33.5	2.2	1.00
16	GW-273	34.1	3.5	1.37
17	Agra Local	34.2	2.5	1.37
18	DI-803-3	32.3	2.5	1.50
	S.E m \pm	1.28	0.82	0.31
	CD at 5 %	NS	2.33	NS

was at par with HI-8381, JGW-9 and DL-788-2. While maximum number of adult was emerged in variety PBW-468 (17.0), at par with HD-2285.

Effect of different wheat genotypes on development period of beetle

There were no significant differences were observed in different variety for the data, however, maximum total development period was observed in variety Raj-4000 (37.6 Days) and minimum in the variety DL-803-3 (32.3 Days).

Effect of different wheat genotypes on sex ratio of beetle

The sex ratio male (1): female was not found significant whereas variety Raj-4000 have minimum (0.75) and variety Gw-273 (1.75) have maximum female emergence.

In no choice test, total developmental period did not differ significantly among the variety, which ranged from 32.2 days in DL-806 to 37.6 day in Raj-4000. It means that pace of development of pest on variety Raj-4000 was 16.4% slower than variety DL-803-3. Shorter period of development indicated that DL-803-3 was congenial for the development of pest, on other hand in Raj-4000 with long developmental period showed that it may have some antibiosis. The number of adult emerged was significantly lesser in variety Raj-4000 (1.7) which was at par with HI-8381, JGW-9 and DL-788-2. While maximum number of adult emerged in variety PBW-468 (17.0) was at par with HD-2285. These finding are in concordance with Chunniram and Singh (1996) who reported comparatively higher weevil emergence on variety HD-2285. Kundu and Gupta (1969) also studied the relative susceptibility of 16 wheat varieties to *S. oryzae*

and reported that on the basis of number of weevil emergence variety H.D.-1592 was highly resistance, while S-331 was most susceptible.

It was concluded that variety Raj-4000 showed relatively least susceptible response. The variety expressed hindrance to orientation and emergence of pest, showed lesser sex-ratio and took a more time for development of *Sitophilus oryzae* L. It was followed by HUW-522 and HI-8381. However, HI-8498 showed relatively susceptible response.

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