



Resistance in wheat genotypes to rice (*Oryza sativa*) weevil (*Sitophilus oryzae*)*

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India is the fourth largest producer of wheat in the world. It covers about 13% of the cropped area of India (Anonymous 2007). Though India is the self sufficient in wheat production but unfortunately a number of insect pests have been associated with its stored products which cause loss of food energy essential for human and animal consumption (Prakash *et al.*, 2004a). Among the storage insect pest rice weevil (*Sitophilus oryzae*) is one of the most important and serious insect which causes severe loss to stored wheat and paddy. Being internal feeder the development takes place only on whole grains and larva as well as adult stage feed the grain voraciously. (Uttam *et al.* 2004, Chauhan *et al.* 2005, Prakash *et al.* 2004 b and Jha 2005) have been reported the reaction of wheat cultivars to different stored grain insects and similarly the different cereals to a particular insect of *Sitophilus oryzae*. In view of the various work, present work was carried out during 2010-11 to highlight the reaction of *S. oryzae* to various wheat cultivars.

Eight promising cultivars of wheat (each 200 g) were procured from the Division of Agronomy, Indian Agricultural Research Institute, New Delhi. Each cultivar was kept separately in muslin cloth tightened with a rubber band and kept in desiccators maintaining 70% relative humidity (RH). Insect culture of *Sitophilus oryzae* was maintained as a stock culture in a glass jar (15 × 5 × 10.5 cm) having wheat grain as a host. Glass jar covered with markin cloth tightened with rubber band and kept at 27±1.5°C and 70 % RH. To avoid broken grain 100 selected seeds were put into homoeopathic vials (6.5 cm × 1 cm. dia) and open end was plugged with cotton. Like this six homoeopathic vials were prepared for one cultivar which comprises six replications. All the eight cultivars and 6 replications of 100 seeds were weighed in single pan balance before conditioning. For conditioning all these vials were put into a desiccator of 70% RH for 15 days.

After conditioning again all the replications of eight cultivars were weighed. Thereafter 2 pairs of freshly emerged adults of *S. oryzae* were released and open end of vials were plugged with cotton safety of wheat grain require 8% moisture content but for the development of *S.oryzae* favourably it requires 70% RH which is equal to 15 % moisture. All these vials were kept in desiccators at 70 % RH to provide favourable conditions for the developement of *S. oryzae*. Number of insects emerged were counted after 90 days. Although the life cycle of *S. oryzae* takes about 4-5 weeks for completion but in this experiment observations were recorded after 90 days as most of the farmers store their grains minimum for three months. Weight and number of damaged grain, weight and undamaged grain and weight of total grain were recorded. Per cent weight loss in each cultivar was adjudged by the formula Adam and Schulten (1978).

$$\text{Percent weight loss} = \frac{(\text{UNd}) - (\text{DNu})}{\text{U} (\text{Nu} + \text{Nd})} \times 100$$

U, Weight of undamaged grain; Nu, No of undamaged grain; D, weight of damaged grain; Nd, no. of damaged grains

Minimum (2.405 g) weight of 100-grain was recorded in WH 542 while the maximum (5.818) was observed in HI 8381(d). Rest all of the cultivars ranged between 2.872 (PBW 343) to 4.380 (DDW 12) before conditioning the grain. After 15 days of conditioning under 70 per cent RH the minimum weight 2.628 was observed in WH 542 while the maximum 6.340 g weight was recorded in HI 8381(d) (Table 1).

Minimum (13.333) insects were observed in C 306 while the maximum 57.667 number of insects were observed in HI 8381 after 90 days of storage conditions. Rest of the cultivars ranged between 14.283 in PBW 343 to 32.000 (PDW 291(d)). Minimum total weight of grain was observed in WH 542, i e 2.073 g while the maximum (5.00 g), total weight of grain was recorded in HI 8381(d). Rest of the cultivars ranged between 2.523 (PBW 343) to 4.105 (DDW 12). Maximum

*Short note

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Table 1 Mean value of initial weight, conditioned weight, number of insect emerged, weight of grain, per cent grain loss and per cent weight loss in wheat cultivars after 90 days infestation of *Sitophilus oryzae* under storage condition

Cultivars	100-grain weight before conditioning (g)	100-grain weight after conditioning (g)	Number of insect emerged after 90 days	Total weight of grain after 90 days (g)	Per cent grain loss	Per cent weight loss (g)
WH 542	2.40±0.086	2.63±0.065	17.50±6.407	2.07±0.093	24.00±6.593	8.013±2.732
WH 896	4.14±0.052	4.51±0.038	29.67±11.020	3.58±0.173	31.33±6.766	11.230±2.942
DDW 12	4.38±0.034	4.76±0.032	14.67±4.120	4.10±0.032	18.00±2.394	5.697±1.047
PDW 291(d)	3.99±0.036	4.51±0.066	32.00±7.763	3.55±0.115	40.00±5.329	10.165±1.829
PDW 239	3.63±0.033	4.09±0.016	18.33±8.172	3.39±0.117	29.67±6.075	6.532±1.749
PBW 343	2.87±0.041	3.23±0.057	14.28±5.417	2.52±0.133	33.50±6.179	10.330±2.169
HI 8381(d)	5.82±0.051	6.34±0.079	57.67±16.800	5.00±0.253	45.67±7.868	18.285±7.463
C 306	4.24±0.063	4.61±0.076	13.33±6.667	3.97±0.099	23.50±6.355	4.880±1.547
SE(m)	0.054	0.058	9.008	0.147	6.134	3.360
LSD (P= 0.05)	0.15	0.17	25.97	0.42		

per cent grain loss 45.667 was recorded in HI 8381(d) while the minimum 18.00 per cent grain loss was recorded in DDW 12. Rest all the cultivars ranged between 23.50 (C 306) to 40.00 (PDW 291(d)). However, minimum 4.88 per cent weight loss was recorded in C 306 while the maximum per cent weight loss (18.285) was recorded in HI 8381(d). For rest of the cultivars the per cent weight loss ranged between 5.697 (DDW 12) to 11.23 (WH 896).

The overall comparative study revealed that the weight of grains after conditioning, number of insects after 90 days and total weight of grain were found significantly differ with each other. However, per cent grain loss and per cent weight loss were not found significantly differ with each other. Results also revealed that the variety, HI 8381(d) was recorded nearly 46.00 % grain loss as well as maximum weight loss of 18.285 per cent where as were observed from DDW 12. However, the variety C 306 showed minimum weight loss (4.88 %) and also harboured lowest number of adult insects even after 90 days (13.333). Integrated approach to obtain high rate of hygienic products would involve use of clean and healthy wheat seeds and improved packaging. Insects could be destroyed by proper sized sieve, heat disinfestations and low temperature storage. Present study supports and suggests storing the variety which has minimum weight loss and per cent grain loss. Chouhan *et al.* (2005) reported the influence of wheat varieties on biological activities of rice weevil. They found DL 803-3 was least preferred by rice weevil orientation, which resulted in least emergence and loss in grain damage. They also suggested the volume of grain influenced the biological activity of the pest positively, while density negatively. Prakash *et al.* (2004b) reported seed weight loss of *Sitotroga cerealella* in wheat was 9.80 % in PBW 343 and 5.47 in WH 147. In the present study also the minimum weight loss 4.880 was observed in case of C 306 by *S. oryzae* while the maximum was 18.285 in case of HI 8381. However, Jha (2005) reported the maximum

emergence of rice moth *Corcyra cephalonica* (Stnt.) in wheat variety of HD 2285 while the maximum grain damage was recorded in Kanchan. In this case also the minimum emergence of *S. oryzae* was recorded in C 306 while the minimum per cent grain loss was recorded in DDW 12 Thus wheat variety DDW 12 showed lowest per cent grain loss and lowest percent weight loss (g) against *S. oryzae* as compared to other evaluated varieties.

SUMMARY

Eight promising cultivars of wheat, viz. WH 542, WH 896, DDW 12, PDW 291(d), PDW 239, PBW 343, HI 8381(d) and C 306 were evaluated against the infestation of *Sitophilus oryzae* (L.) after 90 days of storage condition. The maximum per cent grain loss (45.6), weight loss (18.28) and number of insect emerged (57.6) were recorded in HI 8381(d). However, the minimum percent weight loss and number of insects emerged were 4.88 and 13.33, respectively in C 306. The minimum per cent grain loss (18.0) was recorded in DDW 12. Statistically the per cent grain loss and percent weight loss were found to be not significant. The findings from this study suggest that the varieties DDW 12 and C 306 are best for field as well as storage condition.

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