

Relative susceptibility of some promising fennel varieties against *Lasioderma serricorne* (Fab.).

Bhoopender Kherwa*, Narendra Singh¹, S.K. Dotasara and H. L. Deshwal

Department of Entomology, SKRAU, Bikaner-334 006 Rajasthan
e-mail: ento.naren@gmail.com

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ABSTRACT

The present investigation was conducted to examine the varietal preference of fennel against *Lasioderma serricorne* (Fab.) under laboratory conditions in the Department of Entomology, College of Agriculture, Bikaner from March, 2014 to Aug., 2014. Ten varieties of fennel viz., GF-2, UF-206, RF-143, RF-145, HF-125, RF-178, RF-101, HF-118, RF-205 and Local were tested against *L. serricorne* in relation to ovipositional response, developmental period, adult emergence, per cent grain damage and weight loss. On the basis of different parameters, GF-2 and UF-206 were found comparatively less susceptible while RF-101, HF-125, local, RF-205 and RF-143 were moderately susceptible, whereas, HF-118, RF-178 and RF-145 were the most susceptible varieties.

Key words: Fennel, *L. serricorne*, relative susceptibility.

Fennel, *Foeniculum vulgare* (Mill.) commonly known as "saunf" belongs to the family Apiaceae (Umbelliferae) and is believed to be native of Southern Europe and Mediterranean region. In India the domestic consumption of the important seed spices viz., cumin, coriander, *ajowan*, fennel, fenugreek etc. is quite high as they are routinely used for culinary and medicinal purposes. About 17 to 25 per cent losses are caused by insects, moulds, rodents etc. to different spices during storage. These losses are caused by converting seed into powder form (Malhotra, 2007). Among the various stored grain insect pests, cigarette beetle, *L. serricorne* (Coleoptera: Anobiidae) is the serious pest of several stored commodities. Beside its main host tobacco and cigarettes, it has also been recorded on turmeric, ginger, castor beans, wheat, coconut meal, pepper, cardamom, mustard, chilli, fennel, cumin and opium leaves (Samuel *et al.*, 1984). It is well known fact that food constituents had played a vital role in the

survival and reproduction potential of the insects. The seed characters and physico-chemical characters of the variety also interfere the normal physiology or feeding of the insect, adversely affects the biology of the pest and these make a variety resistant to insect attack. Keeping this in view, an attempt has been made to study the growth and development of this pest on some promising fennel varieties.

MATERIALS AND METHODS

For determining the relative susceptibility of the different varieties, only sound and healthy seeds were selected after mechanical separation. The seeds were sterilized in oven at 60 + 5°C for 8 hours to avoid any hidden infestation. Prior to the experiment, the seeds of each variety were conditioned at least for a week in an incubator maintaining 30 + 2°C and 70 + 5 per cent relative humidity in which the tests were carried out. The moisture content of the seeds was determined by moisture meter. All the varieties were inoculated simultaneously and there were three replications

*Corresponding Author :

¹ Department of Entomology, SKNCOA, Jobner

for each variety. (The experiment was conducted at 30 + 2°C temperature and 70 + 5 per cent relative humidity). The following observations were recorded.

- i. Developmental period (eggs to adults)
- ii. Adult emergence
- iii. Ovipositional response
- iv. Grain damage
- v. Weight loss

For the study of ovipositional response, 5 pairs of freshly emerged adults were introduced in glass vials (15 x 5 cm) separately on each variety for oviposition. The total number of eggs laid by the female was counted daily till 15 days after release. Twenty newly emerged larvae were released in specimen tube containing 20g sample of each variety and the number of seeds in each sample were counted. The specimen tubes were covered with muslin cloths. From the day fresh emergence started, the dates and number of adults emerged were noted twice (morning and evening) daily to work out the total developmental period (egg to adult) and per cent adult emergence on the basis of larvae placed in each specimen tube. The damaged grains and weight loss were recorded after 90 days of the released of eggs. For this purpose, the sample of seeds was spread upon a white sheet and damaged seeds were counted. The percentages of damaged seeds were calculated. The loss in weight was obtained after removing all insect stages and frass. It was worked out by subtracting the final weight from the initial weight and converted into percentage.

RESULTS AND DISCUSSIONS

The respective fennel varieties showed significant variation in oviposition response of *L. serricorne*. The maximum number of eggs were deposited on the fennel variety HF-118 (42.02), which was at par with RF-178 (41.1) showing suitable for oviposition followed by RF-145 (38.7), RF-205 (36.7), RF-143 (34.0), local (33.0), HF-125 (30.0), and RF-101 (29.0). The GF-2 (24.7) and UF-206 (25.8) being unfavorable for oviposition (Table 1 and Figure 1). The variation in fecundity due to the softness/hardness of the varieties. These finding are in accordance with that of Rolania and Bhargava (2009) who reported GF-2

showing unfavorable for oviposition, however JF-376, HF-118 and UF-205 were suitable for oviposition among the fennel varieties. Sudhakar and Pandey (1982) also reported significant variation in egg laying capacity of *Sitophilus oryzae* on different wheat varieties. Gupta *et al.* (2000) and Uttam *et al.* (2004) observed similar variation in fecundity of *S. oryzae* on maize and barley varieties, respectively.

The growth and development of the insect and degree of infestation greatly influence by the type of food. The studies on varietal susceptibility have immense practical value. Considering the importance of *L. serricorne*, the present studies were, therefore, carried out with a view to study the growth, development and degree of infestation of this pest on different fennel varieties with an idea to select the less susceptible varieties, although some preliminary work on this aspect has been done by some workers are discussed here.

The developmental period of *L. serricorne* was greatly influenced by different fennel varieties. The developmental period of beetles varied from 46.4 to 65.5 days, being shortest on HF-118 and longest on GF-2. These finding are in accordance with that of Rolania and Bhargava (2009) who reported GF-2 and UF-206 as less susceptible, however JF-376, HF-118 and UF-205 were among the highly susceptible fennel varieties, however the same type of work on other commodities have been discussed (Table 1 and Figure 1). The present observations corroborate with that of Vuayalakshmi *et al.* (1990) who reported that the developmental period of *L. serricorne* was greatly influenced by different turmeric varieties. Similarly, Sachan and Chandel (1991) reported significant variation in developmental period of *L. serricorne* on different groundnut varieties. Sharma and Bhattacharya (1994) also found that the developmental period of this pest was ranged from 49.00 to 53.00 days on different soybean varieties. The variation in the development period amongst test varieties may be due to difference in physico-chemical nature of the varieties might be nutritionally inadequate for the development of insect. These results are in conformity with the earlier finding of Padmavathamma and Rao (1989).

Table 1. Oviposition response, developmental period and adult emergence of *L. serricorne* on different fennel varieties

Varieties	Oviposition response (eggs/female)	Developmental period (days)	Adult emergence (%)
GF-2	24.79	65.48	46.40 (42.88)*
UF-206	25.81	61.69	50.78 (45.44)
RF-143	34.00	49.57	62.56 (52.28)
RF-145	38.46	47.84	70.30 (56.98)
HF-125	30.04	55.08	56.56 (48.81)
RF-178	41.11	47.23	79.90 (63.42)
RF-101	29.07	57.73	54.19 (47.41)
HF-118	42.02	46.46	80.79 (65.19)
RF-205	36.72	49.47	67.83 (55.46)
Local	33.05	54.47	57.59 (49.37)
S.Em + CD (P = 0.05)	0.84 2.47	1.58 4.66	0.98 2.89

* Percentages transformed to angles; outside values are its back transformation to percentages.

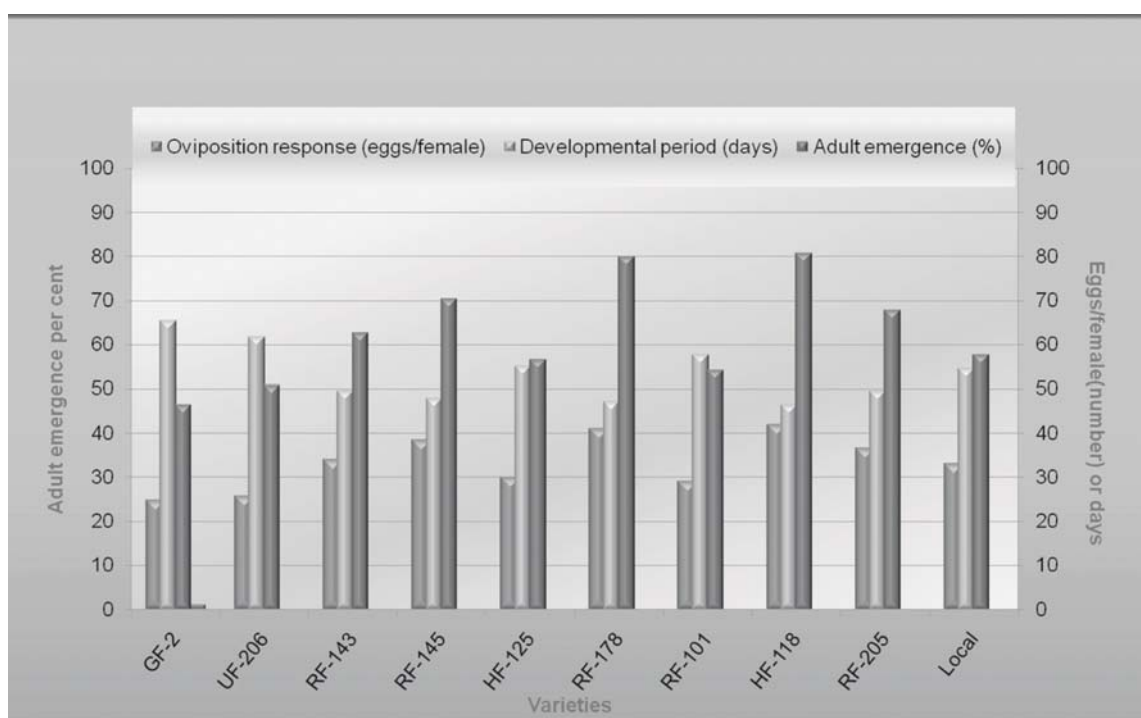


Fig. 1. Oviposition response, developmental period and adult emergence of *L. serricorne* on different fennel varieties.

Behaviour of different varieties towards successful emergence of adults differed significantly. The maximum percentage of adult emergence was recorded on the variety HF-118 (80.7%), which was at par with RF-178 (79.9%), while minimum in GF-2 (46.4%) (Table 1 and Figure 1). The present observations corroborate with that of Rolania and Bhargava (2009) reported maximum percentage of adult emergence was recorded on the fennel variety JF-376 and HF-118, while minimum in GF-2 and UF-206. Similarly, Vuayalakshmi *et al.* (1990); Sharma and Bhattacharya (1994) and Singh and Prasad (2001) also found variation in adult emergence of this pest on different turmeric, soybean and mustard varieties, respectively.

The percentage of damaged grains and loss in weight of different fennel varieties due to infestation of the beetle ranged from 22.44 to 66.35 and 2.35 to 16.32, respectively, being maximum damaged grains and weight loss in HF-118 and minimum in GF-2 (Table 2 and Figure 2). The present observations corroborate with that of Rolania and Bhargava (2009) reported maximum grain damage and weight loss in JF-376, HF-118 and UF-205, while minimum in GF-2. Similarly,

Table 2. Grain damage and weight loss by *L. serricorne* on different fennel varieties.

Varieties	Grain damage (%)	Weight loss (%)
GF-2	22.44 (28.02)*	2.35 (8.71)*
UF-206	26.54 (31.01)	6.55 (14.83)
RF-143	38.88 (38.57)	11.37 (19.71)
RF-145	58.26 (49.76)	12.39 (20.61)
HF-125	36.88 (37.39)	10.66 (19.02)
RF-178	64.92 (53.69)	15.74 (23.37)
RF-101	30.75 (33.68)	9.54 (17.98)
HF-118	66.35 (54.76)	16.32 (23.76)
RF-205	41.77 (40.26)	12.09 (20.34)
Local	37.28 (37.59)	11.12 (19.48)
S.Em + CD at 5%	0.62 1.82	0.55 1.62

* Percentages transformed to angular; outside values are its back transformation to percentages

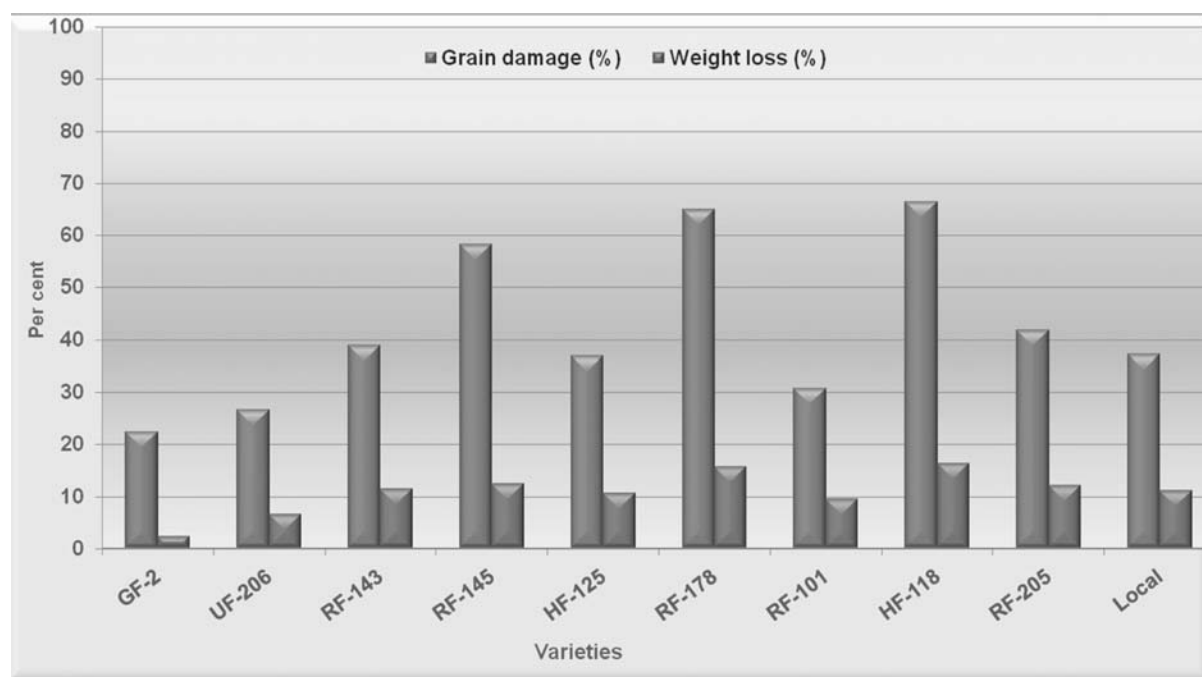


Fig. 2. Grain damage and weight loss by *L. serricorne* on different fennel varieties.

Vuayalakshmi *et al.* (1990) also found that the weight loss in different turmeric varieties due to infestation of *L. serricornis* varied from 0.68 to 3.42 per cent, support the present findings.

CONCLUSION

Ten varieties of fennel viz., GF-2, UF-206, RF-143, RF-145, HF-125, RF-178, RF-101, HF-118, RF-205 and Local were tested against *L. serricornis* in relation to ovipositional response, developmental period, adult emergence, per cent grain damage and weight loss. None of the fennel variety was found resistant to the test insect, however, on the basis of different parameters, comparatively GF-

2 and UF-206 were found less susceptible while RF-101, HF-125, local, RF-205 and RF-143 were moderately susceptible, whereas, HF-118, RF-178 and RF-145 were among the most susceptible varieties.

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