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VARIETAL SCREENING OF CORIANDER FOR THEIR SUSCEPTIBILITY TO CIGARETTE BEETLE, *LASIODERMA SERRICORNE*

V.T. Akshaya^{1*}, Jalpa J. Dand^{2*} and A.H. Barad³

¹Department of Entomology, B.A. College of Agriculture, Anand Agricultural University, Anand-388 110, Gujarat, India.

²AINP on VPM: Agricultural Ornithology, ICAR Unit- 9, Anand Agricultural University, Anand-388 110, Gujarat, India.

³Department of Plant Protection, College of Horticulture, Anand Agricultural University, Anand-388 110, Gujarat, India.

*Corresponding author E-mail : akshayvt17@gmail.com

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ABSTRACT

Different coriander varieties Gujarat Coriander 1 (GC 1), Gujarat Coriander 2 (GC 2), Gujarat Coriander 3 (GC 3), Gujarat Coriander 4 (GC 4), Chhattisgarh Sri Chandrasani Dhania 2 (CSCD 2), Ajmer Coriander 1 (AC 1), Ajmer Coriander 2 (AC 2), Ajmer Coriander 3 (AC 3) were evaluated against *L. serricornis* for their oviposition preference, population growth and per cent weight loss, also they were classified in to different groups of resistance based on its oviposition preference and total adults emerged after seventy five days of storage. The oviposition preference of the cigarette beetle on eight coriander varieties, observed for five days followed the order: GC 1 ≤ GC 2 < GC 3 < AC 1 ≤ AC 2 ≤ CSCD 2 ≤ AC 3 < GC 4. Among these, GC 1 (1.01 eggs) and GC 2 (1.63 eggs) recorded the lowest oviposition, indicating higher resistance, whereas GC 4 (11.96 eggs) showed the highest preference and was most susceptible. Adult emergence after seventy five days of storage exhibited a similar trend. Varieties GC 1 (33.26 adults), GC 2 (40.84 adults) and GC 3 (42.40 adults) were statistically at par and identified as more resistant. In contrast, GC 4 (82.31 adults) and AC 3 (72.26 adults) showed significantly higher adult emergence and were the least resistant. The increasing order of adult emergence among the varieties are GC 1 ≤ GC 2 ≤ GC 3 ≤ AC 1 ≤ AC 2 ≤ CSCD 2 ≤ AC 3 ≤ GC 4. In seed damage per cent after seventy five days of storage on the basis of number, GC 1 (24.20%), GC 3 (25.00%), GC 2 (26.23%), AC 1 (27.59%), AC 2 (29.97%) and CSCD 2 (30.86%) were statistically similar, indicating resistance, while GC 4 (45.60%) and AC 3 (39.95%) were found more susceptible. The per cent weight loss after seventy five days of storage among varieties was least in GC 1 (7.45%) while, GC 4 (14.40%) and AC 3 (13.86%) exhibited higher weight loss.

Based on oviposition preference of cigarette beetle varieties, GC 1 and GC 2 were categorised as resistant whereas, GC 3 and AC 1 as moderately resistant. The moderately susceptible group included CSCD 2, AC 2 and AC 3, whereas GC 4 was identified as a susceptible variety. While, based on total number of adults emerged after seventy five days of storage, GC 1 remained resistant. GC 2, GC 3 and AC 1 were classified as moderately resistant, while CSCD 2 and AC 2 were moderately susceptible. The varieties GC 4 and AC 3 were found to be susceptible.

Key words : Varietal Screening, Coriander, Susceptibility to Cigarette Beetle, Coriander varieties.

Introduction

Coriander, *Coriandrum sativum* Linnaeus. also called cilantro, is a spice condiment as well as medicine consumed almost year-round in every region of the nation and world. Coriander plant originated from the Mediterranean region and is extensively grown in Russia, Central Europe, North Africa and Asia. The word “coriander” derives from the Greek word “bed-bug,”

because the scent of freshly cut foliage is said to imitate a bed liner plagued by bugs (Uchibayashi, 2001). The genus includes both wild (*Coriandrum tordylium* (Fenzl) Bornm.) and cultivated (*C. sativum*) species, related to the Apiceae or Umbelliferae family of carrot progenitors (Ishikawa *et al.*, 2003). Globally, India is the leading producer of coriander accounting for approximately 64.5 per cent of the global supply (Anonymous, 2024). Gujarat

consists of 217.05 ha area with 312 MT production and productivity of 1.44 MT per hectare (Anonymous, 2023). The plant serves as a potential source of lipids, particularly abundant in petroselinic acid and an essential oil rich in linalool, which can be extracted from its seeds and aerial parts. Seeds of coriander contains polyphenols, particularly phenolic acids and flavonoids which is considered to be the good source of biologically active metabolites. The bioactive compounds associated with a diverse range of therapeutic properties include antimicrobial, antioxidant, antidiabetic, anxiolytic, antiepileptic, antidepressant, antimutagenic, anti-inflammatory, lipid-lowering, blood pressure-regulating, neuroprotective and diuretic effects. Coriander seeds have copper, zinc, iron and other vital minerals help to raise red blood cells and enhance heart health (Hassan *et al.*, 2024). Seeds of coriander contains 18.21 per cent fatty oil, it is a richest source of vitamin C (125-250 mg/100 g) and vitamin A (52.00 IU/100 g). The dry seeds have 31.5 per cent ether extract, 24.6 per cent carbohydrate, 19.6 per cent non-volatile oil, 6.3 per cent moisture, 5.3 per cent mineral matter, 1.3 per cent protein, 0.3 per cent volatile oil and vitamin A (175 IU per 100g) (Meena, 2005). coriander has also demonstrated the ability to aid in detoxifying lead (Sahib *et al.*, 2013). Coriander seeds are stored for varying time period according to the market demands, so it is also infected with several pests when being stored, one of the major storage pests of coriander is Cigarette beetle (Abdelghany *et al.*, 2010; Singh and Kumar, 2019; Chaudhari *et al.*, 2021). The damage and oviposition behaviour of cigarette beetle varied on different varieties of coriander based on its seed characters and physico-chemical characters. In light of this, a comprehensive study was undertaken to evaluate the oviposition behaviour and damage of cigarette beetle on eight different coriander varieties.

Materials and Methods

Seeds of eight different varieties of coriander were procured from Seed Spices Research station, SDAU, Jagudan; National Research Centre for Seed Spices, Tabiji, Ajmer. These varieties were screened for their susceptibility to cigarette beetle and categorised accordingly. The different coriander varieties, Gujarat Coriander 1 (GC 1), Gujarat Coriander 2 (GC 2), Gujarat Coriander 3 (GC 3), Gujarat Coriander 4 (GC 4), Chhattisgarh Sri Chandrasini Dhanis 2 (CSCD 2), Ajmer Coriander 1 (AC 1), Ajmer Coriander 2 (AC 2), Ajmer Coriander 3 (AC 3) were evaluated against cigarette beetle for their oviposition preference, population growth and per cent weight loss in three repetitions. Fifty seeds of each variety were taken for assessing the

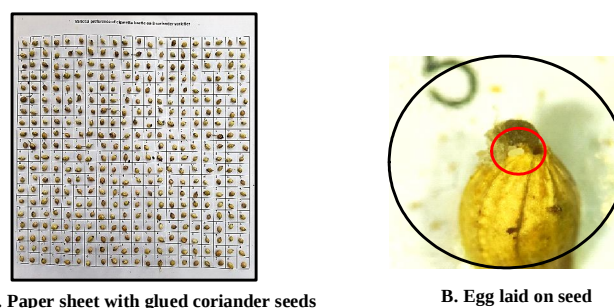


Fig. 1 : Experiment to study the oviposition preference of cigarette beetle on coriander varieties.



Fig. 2 : Experimental setup to evaluate different coriander varieties based on population growth of cigarette beetle.

oviposition preference of cigarette beetle. For this purpose, 20 × 20 cm area of paper sheet divided into 400 square blocks were prepared and each seed was stuck in the centre of the block (Fig. 1 A). Such three sheets one each under one repetition was prepared. Each sheet with seeds stuck on it were placed in a plastic container with lid (34 cm length, 26.5 cm width, 8cm height) and 10 pairs of male female adults of cigarette beetle was released on the sheet. The adults were allowed to oviposit on seeds for five days. Each and every seed was observed under stereoscopic binocular microscope to count the number of eggs laid on it (Fig. 1 B). The observation of number of eggs laid on each seed was recorded. The population growth and weight loss of different coriander varieties were evaluated by keeping 50 g of sterilized seeds filled in each plastic tube (Fig. 2). Two to five days old ten pairs of adults were released in each tube for oviposition and was kept undisturbed for seventy five days. Total number of adults emerged after seventy five days of storage and seed damage per cent was worked out, by counting number of damaged seeds out of randomly selected hundred seeds. The loss in weight (%) of 50g seeds filled in plastic tube calculated by the formula,

$$\text{Weight loss} = \frac{(M_1 - M_2)}{M_1} \times 100$$

where,

M_1 = initial weight

M_2 = seed weight after storage

Statistical analysis

The data on oviposition preference and population growth of cigarette beetle includes total number of adults emerged after seventy five of storage and seed damage (%) on the basis of number were analysed using analysis of variance (ANOVA) (Steel and Torrie, 1980). Before analysis, the data on oviposition preference, total number of adults emerged after seventy five days of storage and seed damage per cent were transformed using the square root method $\sqrt{(x + 0.5)}$ transformation. Treatment means were compared using Duncan's New Multiple Range Test.

Categorisation of varieties

The different varieties of coriander were grouped into six categories of susceptibility to cigarette beetle viz., highly resistant, resistant, moderately resistant, moderately susceptible, susceptible and highly susceptible based on two parameters viz., oviposition preference (No of eggs/ 50 seeds) and total number of adults emerged half after seventy five days of storage. For the purpose mean value of individual variable ($\bar{x}_i$) compared with all variables ($\bar{X}$) and standard deviation (SD) following scale adopted by Patel *et al.* (2002).

Category of resistance	Scale for resistance
Highly Resistant	$\bar{x}_i < (\bar{X} - 2SD)$
Resistant	$\bar{x}_i > (\bar{X} - 2SD) < (\bar{X} - SD)$
Moderately Resistant	$\bar{x}_i > (\bar{X} - SD) < \bar{X}$
Moderately Susceptible	$\bar{x}_i > \bar{X} < (\bar{X} + SD)$
Susceptible	$\bar{x}_i > (\bar{X} + SD) < (\bar{X} + 2SD)$
Highly Susceptible	$\bar{x}_i > (\bar{X} + 2SD)$

Results and Discussion

Evaluation based on Oviposition Preference

The data of total number of eggs laid by cigarette beetle on eight different coriander varieties is presented in Table 1. The results revealed that a significantly higher number of eggs were laid on the variety Gujarat Coriander 4 (GC 4), with an average of 11.96 eggs. The next most preferred variety was Ajmer Coriander 3 (AC 3), which was statistically at par with Chhattisgarh Sri

Chandahasini Dhanias 2 (CSCD 2) and AC 2 with mean egg counts of 7.28, 6.68, 6.31 eggs, respectively. The variety AC 2 was statistically similar to AC 1 (4.98 eggs), followed by the variety GC 3 with 3.30 eggs. The least preferred varieties were GC 2 and GC 1, with 1.63 and 1.01 eggs, respectively. The increasing order of oviposition preference on different coriander varieties are: GC 1 ≤ GC 2 < GC 3 < AC 1 ≤ AC 2 ≤ CSCD 2 ≤ AC 3 < GC 4.

Categorisation based on oviposition preference

Based on oviposition preference, as shown in Table 2, none of the varieties fell under the highly resistant category. GC 1 and GC 2 were categorised as resistant, while GC 3 and AC 1 were classified as moderately resistant. The moderately susceptible group included CSCD 2, AC 2, AC 3. The variety, GC 4 was classified as susceptible. None of the varieties were categorised as highly susceptible.

Evaluation Based on Population growth

Table 3 presents the population growth of cigarette

Table 1 : Oviposition preference of *L. serricorne* on different varieties of coriander.

S. no.	Varieties	No of eggs laid/50 seed
1	Gujarat Coriander 1 (GC 1)	1.23 ^a (1.01)
2	Gujarat Coriander 2 (GC 2)	1.46 ^a (1.63)
3	Gujarat Coriander 3 (GC 3)	1.95 ^b (3.30)
4	Gujarat Coriander 4 (GC 4)	3.53 ^e (11.96)
5	Chhattisgarh Sri Chandahasini Dhanias 2 (CSCD 2)	2.68 ^d (6.68)
6	Ajmer Coriander 1 (AC 1)	2.34 ^c (4.98)
7	Ajmer Coriander 2 (AC 2)	2.61 ^{cd} (6.31)
8	Ajmer Coriander 3 (AC 3)	2.79 ^d (7.28)
S. Em. ±		0.09
F test		Sig.
C.V. (%)		6.76

Note: (1) Figures outside the parentheses are $\sqrt{(x + 0.5)}$ transformed values and those inside the parentheses are retransformed values. (2) Treatment means with the letter (s) in common are not differed significantly by DNMRT at a 5 % level of significance. (3) Sig. – Significant

Table 2 : Categorisation of varieties based on oviposition preference.

Class	Scale	Varieties	
Mean=5.39; SD=3.29			
Highly Resistant	$\bar{x}_i < (\bar{X} - 2SD)$	< -1.19	-
Resistant	$(\bar{X} - SD) < \bar{x}_i < (\bar{X} + SD)$	-1.19 - 2.09	Gujarat Coriander 1 Gujarat Coriander 2
Moderately Resistant	$(\bar{X} - SD) < \bar{x}_i < \bar{X}$	2.09 - 5.39	Gujarat Coriander 3 Ajmer Coriander 1
Moderately Susceptible	$\bar{X} < \bar{x}_i < (\bar{X} + SD)$	5.39 - 8.69	Chhattisgarh Sri Chandrabhasini Dhania 2 Ajmer Coriander 2 Ajmer Coriander 3
Susceptible	$(\bar{X} + SD) < \bar{x}_i < (\bar{X} + 2SD)$	8.69 - 11.99	Gujarat Coriander 4
Highly Susceptible	$\bar{x}_i > (\bar{X} + 2SD)$	>11.99	-

Note: $\bar{X}$: Mean, $\bar{x}_i$ - treatment mean, SD: Standard deviation.

beetle in different coriander varieties, following initial release with ten pairs of adults for seventy five days of storage under laboratory conditions. Population growth was measured in terms of total number of adults emerged after seventy five days of storage and seed damage (%) on the basis of number.

Total number of adults emerged after seventy five days of storage

As shown in Table 3, after seventy five days of storage period, the lowest number of adult *cigarette beetles* emerged from the variety GC 1 (33.26 adults). GC 1 was statistically at par with GC 2 (40.84 adults) and GC 3 (42.40 adults), however, the number of adults emerging from GC 2 was higher than GC 1 but lower than GC 3. The next highest number of adults emerged from AC 1 (50.34 adults), which was also statistically at par with GC 2, GC 3 and AC 2. The mean number of adults emerged from AC 2 (60.18 adults) was statistically similar to CSCD 2 (66.25 adults) and AC 3 (72.26 adults). The maximum number (81.21 adults) emerged from GC 4, which was statistically at par with AC 3. Overall, the ascending order of adult emergence among the coriander varieties was: GC 1 ≤ GC 2 ≤ GC 3 ≤ AC 1 ≤ AC 2 ≤ CSCD 2 ≤ AC 3 ≤ GC 4.

Categorisation based on total number of adults emerged

Based on the total number of adults that emerged after seventy five days of storage, coriander varieties were classified into different categories, as shown in Table

4. Notably, none of the varieties were categorised as highly resistant. The variety, GC 1 was categorised as resistant. The varieties, GC 2, GC 3, AC 1 were classified as moderately resistant. While, CSCD 2 and AC 2 were found to be moderately susceptible. The susceptible varieties were GC 4 and AC 3.

Based on ovipositional preference and the number of adults emerged, GC 1 was identified as the variety in resistant category. The seeds of GC 1 are bold, medium-sized and contain essential oil content ranging from 0.1 to 1.0 per cent in dry seeds also when crushed, the seeds exhibit a lemony citrus aroma, attributed to the presence of terpenes such as linalool and pinene (Anonymous, 2020). While GC 4 was found to be the most susceptible variety formed on the two above mentioned parameters, as indicated in Tables 2 and 4. The seeds of GC 4 are medium-sized, oblong in shape and brownish in colour. The linalool content in GC 4 (68.80%) is lower than that of GC 3 (72.16%), which is categorised as a moderately resistant variety.

Seed damage (%) on the basis of number

As presented in Table 3, the number of damaged seeds out of hundred randomly selected seeds after storage was recorded. The lowest number of damaged seeds were observed in GC 1 (24.20%), followed by GC 3 (25.00%), GC 2 (26.23%), AC 1 (27.59%), AC 2 (29.97%) and CSCD 2 (30.86%). These varieties were statistically at par with each other. The highest number of damaged seeds was recorded in GC 4 (45.60%),

Table 3 : Evaluation based on population growth of cigarette beetle and weight loss of different varieties of coriander.

S. no.	Treatments	Total no. of adults emerged	Seed damage (%) on the basis of number	Weight loss (%)
1	Gujarat Coriander 1 (GC 1)	5.81 ^a (33.26)	4.97 ^a (24.20)	7.45
2	Gujarat Coriander 2 (GC 2)	6.43 ^{ab} (40.84)	5.17 ^a (26.23)	9.49
3	Gujarat Coriander 3 (GC 3)	6.55 ^{ab} (42.40)	5.05 ^a (25.00)	9.05
4	Gujarat Coriander 4 (GC 4)	9.10 ^e (82.31)	6.79 ^b (45.60)	14.40
5	Chhattisgarh Sri Chandrahasini Dhania 2 (CSCD 2)	8.17 ^d (66.25)	5.60 ^a (30.86)	10.32
6	Ajmer Coriander 1 (AC 1)	7.13 ^{bc} (50.34)	5.30 ^a (27.59)	9.61
7	Ajmer Coriander 2 (AC 2)	7.79 ^{cd} (60.18)	5.52 ^a (29.97)	9.80
8	Ajmer Coriander 3 (AC 3)	8.53 ^{de} (72.26)	6.36 ^b (39.95)	13.86
	S. Em. ±	0.22	0.18	-
	F test	Sig.	Sig.	-
	C.V. (%)	5.16	5.54	-

Note: (1) Figures outside the parentheses are $\sqrt{(x + 0.5)}$ transformed values and those inside the parentheses are retransformed values. (2) Treatment means with the letter(s) in common are not differed significantly by DNMRT at a 5 % level of significance. (3) Sig. – Significant.

Table 4 : Categorisation of varieties based on total number of adults emerged after seventy five days of storage

Class	Scale	Varieties	
Mean = 55.98; SD=15.98			
Highly Resistant	$\bar{x}_i < (\bar{X} - 2SD)$	<24.02	-
Resistant	$(\bar{X} - SD) < \bar{x}_i < (\bar{X} - 2SD)$	24.02-40.00	Gujarat Coriander 1
Moderately Resistant	$(\bar{X} - SD) < \bar{x}_i < \bar{X}$	40.00-55.98	Gujarat Coriander 2 Gujarat Coriander 3 Ajmer Coriander 1
Moderately Susceptible	$\bar{X} < \bar{x}_i < (\bar{X} + SD)$	55.98-71.96	Chhattisgarh Sri Chandrasahini Dhania 2 Ajmer Coriander 2
Susceptible	$(\bar{X} + SD) < \bar{x}_i < (\bar{X} + 2SD)$	71.96-87.94	Gujarat Coriander 4 Ajmer Coriander 3
Highly Susceptible	$\bar{x}_i > (\bar{X} + 2SD)$	>87.94	-

Note: $\bar{X}$: Mean, $\bar{x}_i$ - treatment mean, SD: Standard deviation.

followed by AC 3 (39.95%), which were also statistically similar. Thus, the increasing order of seed damage is as

follows: GC 1 ≤ GC 3 ≤ GC 2 ≤ AC 1 ≤ AC 2 ≤ CSCD 2 < AC 3 ≤ GC 4.

Per cent weight loss

The per cent weight loss of each coriander variety, initially filled with fifty grams of seeds and inoculated with ten pairs of adults, after seventy five days of storage is presented in Table 3, The minimum weight loss was observed in GC 1 (7.45%), followed by GC 3 (9.05%), GC 2 (9.49%), AC 1 (9.61%), AC 2 (9.80%) and CSCD 2 (10.32%). The highest weight loss was recorded in GC 4 (14.40%), followed by AC 3 (13.86%). Therefore, the increasing order of weight loss among the different coriander varieties is as follows: GC 1 < GC 3 < GC 2 < AC 1 < AC 2 < CSCD 2 < AC 3 < GC 4.

Similar observations were given by Singh and Prasad (2001), who studied the development cigarette beetle on mustard or rapeseed varieties under laboratory conditions and inferred that bright yellow seeds with fine grain size were preferred over bold, dark coloured seeds. Saeed *et al.* (2015) investigated effect of morpho-physio chemical plant factors on the preference of cigarette beetle larvae and adults on four cultivars of tobacco analysis revealed that larvae and adult of this beetle had a positive relationship with moisture content, Total sugar, nicotine and chlorides had non-significant association with preference by both larvae and adults, respectively.

Summary and Conclusion

The oviposition preference of the cigarette beetle followed the order: GC 1 ≤ GC 2 < GC 3 < AC 1 ≤ AC 2 ≤ CSCD 2 ≤ AC 3 < GC 4. Among these, GC 1 (1.01 eggs) and GC 2 (1.63 eggs) recorded the lowest oviposition, indicating higher resistance, whereas GC 4 (11.96 eggs) showed the highest preference and was most susceptible. Adult emergence after seventy five days of storage exhibited a similar trend. Varieties GC 1 (33.26 adults), GC 2 (40.84 adults) and GC 3 (42.40 adults) were statistically at par and identified as more resistant. In contrast, GC 4 (82.31 adults) and AC 3 (72.26 adults) showed significantly higher number of adult emergence and were the least resistant. It follows an increasing order of adult emergence as, GC 1 ≤ GC 2 ≤ GC 3 ≤ AC 1 ≤ AC 2 ≤ CSCD 2 ≤ AC 3 ≤ GC 4. Seed damage per cent on the basis of number increased in the order of GC 1 ≤ GC 3 ≤ GC 2 ≤ AC 1 ≤ AC 2 ≤ CSCD 2 < AC 3 ≤ GC 4. Here, GC 1 (24.20%), GC 3 (25.00%), GC 2 (26.23%), AC 1 (27.59%), AC 2 (29.97%) and CSCD 2 (30.86%) were statistically similar, indicating resistance, while GC 4 (45.60%) and AC 3 (39.95%) were more susceptible. The per cent weight loss among varieties followed the trend: GC 1 < GC 3 < GC 2 < AC 1 < AC 2 < CSCD 2 < AC 3 < GC 4. Here also GC 1 (7.45%), GC 3 (9.05%), GC 2 (9.49%), showing resistance to infestation, while

GC 4 (14.40%) and AC 3 (13.86%) exhibited the highest weight loss and were the most susceptible.

Overall, coriander varieties, GC 1, GC 2 and GC 3 emerged as the most common resistant varieties against cigarette beetle infestation based on multiple parameters, including oviposition, adult emergence, per cent seed damage and weight loss of each variety after storage. On the other hand, GC 4 and AC 3 were found to be the most susceptible. Based on oviposition preference of cigarette beetle, varieties GC 1 and GC 2 were categorised as resistant, GC 3 and AC 1 as moderately resistant. The moderately susceptible group included CSCD 2, AC 2 and AC 3, whereas GC 4 was identified as a susceptible variety. Considering the total number of adults emerged after seventy five days of storage, GC 1 remained resistant. GC 2, GC 3 and AC 1 were classified as moderately resistant, while CSCD 2 and AC 2 were moderately susceptible. The varieties GC 4 and AC 3 were found to be susceptible.

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References

- Abdelghany, A.Y., Awadalla S.S., Abdel-Baky N.F., El-Syrafi H.A. and Fields P.G. (2010). Stored-product insects in botanical warehouses. *J. Stored Prod. Res.*, **46**(2), 93-97.
- Anonymous (2020). AICRP on Spices. Retrieved from: <http://14.139.189.27/AICRPS/Varieties.pdf>. Assessed on: 17-06-25.
- Anonymous (2023). State wise area, production and productivity of coriander in India. Retrieved from: [// www.indiastatmedia.com](http://www.indiastatmedia.com). Assessed on: 20-08-24.
- Anonymous (2024). Proposal for new work on codex standard for dried seeds- coriander. Retrieved from <https://www.fao.org>. Assessed on 14-09-24.
- Chaudhari, N.J., Muralidharan C.M., Joshi M.K.J. and Solanki C.B. (2021). Assessment of storage losses due to *Lasioderma serricorne* F. on seed spices. *Indian J. Entomol.*, **83** (3), 397-400.
- Hassan, W.F., Zinhoum R.A. and El-Razik A. (2024). Influence of pest infestation, type of packages and different storage periods on seeds and essential oil composition of Coriander, *Coriandrum sativum* L. Family: Apiaceae. *Egypt. J. Chem.*, **67**(2), 321-337.
- Ishikawa, T., Kondo K. and Kitajima J. (2003). Water-soluble constituents of coriander. *Chem. Pharmaceut. Bull.*,

- 51(1), 32–39.
- Meena, R.S. (2005). Studies on the major insect pest of coriander (*Coriandrum sativum* L.) and its management (*Doctoral thesis*, Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan). Retrieved from <https://krishikosh.egranth.ac.in/items/062cfb45-b50d-44af-b7a1-f52d85d3a1ff>.
- Patel, I.S., Prajapati B.G., Patel G.M. and Pathak A.R. (2002). Response of castor genotypes to castor semilooper, *Achaea janata* (Fab.). *J. Oilseeds Res.*, **19** (1), 153
- Saeed, M., Khan S.A., Liaquat M., Farid A., Khan A., Khan S.M. and Badshah T. (2015). Effect of morpho-physio chemical plant factors on preference of *Lasioderma serricorne* (f.) (Coleoptera: Anobiidae) on four cultivars of tobacco. *J. Entomol. Zool. Stud.*, **3** (1), 149-153.
- Sahib, N.G., Anwar F., Gilani A.H., Hamid A.A., Saari N. and Alkharfy K.M. (2013). Coriander (*Coriandrum sativum* L.): A potential source of high value components for functional foods and nutraceuticals : A review. *Phytotherapy Research*, **27** (10), 1439-1456.
- Singh, R. and Kumar A.S. (2019). Effect of ozone fumigation on controlling drugstore beetle and quality of coriander during storage. *Int. J. Chem. Stud.*, **6** (1), 698-702.
- Singh, S. and Prasad S.K. (2001). Development of *Lasioderma serricorne* on seeds of some rapeseed and mustard varieties/species. *Indian J. Entomol.*, **63** (1), 92-95.
- Steel, R.G. and Torrie J.H. (1980). *Principles and procedures of statistics*, New York: Mcgraw hill Book Company, 137.
- Uchibayashi, M. (2001). The coriander story. *Yakushigaku Zasshi*, **36**(1), 56-57.