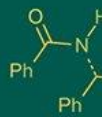


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
IJABR 2026; SP-10(8): 1004-1008
www.biochemjournal.com
Received: 16-05-2026
Accepted: 19-06-2026

AS Ingale
Assistant Professor of
Entomology, Yashwantrao
Chavan Govt. College of
Agriculture, Karad,
Maharashtra, India

DR Kadam
Professor (CAS), Department
of Entomology, Vasantao
Naik Marathwada Krishi
Vidyapeeth, Parbhani,
Maharashtra, India

KV Deshmukh
Assistant Professor of
Entomology, Govt. College of
Agriculture, Nandurbar,
Maharashtra, India

Host preference of melon fruit fly *Zeugodacus cucurbitae* (Diptera: Tephritidae) on different cucurbitaceous crops

AS Ingale, DR Kadam and KV Deshmukh

DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i8SI.9562>

Abstract

The present experiment studied the host preference of melon fruit fly, *Zeugodacus cucurbitae* on different cucurbitaceous crops at Research Farm of Entomology and Entomology laboratory of Vasantao Naik Marathwada Krishi Vidyapeeth, Parbhani (MS) during Summer 2021-22. Field trials indicated that bitter gourd had the highest infestation rate (64.48%), while sponge gourd had the lowest (38.08%). Infestation rates for other hosts, such as bottle gourd, ridge gourd, muskmelon, cucumber and watermelon ranged from 46.12% to 53.94%. Laboratory tests confirmed that bitter gourd was the most preferred host with the highest counts for eggs (65 ± 1.14), larvae (58 ± 1.13), pupae (52 ± 0.92) and adults (52 ± 0.92). Non-choice experiments also showed bitter gourd had the highest counts for eggs and larvae, while counts for other hosts were lower. Overall, bitter gourd was the most favored host under field and laboratory conditions.

Keywords: Host preference, oviposition, fruit fly, *Zeugodacus cucurbitae*, cucurbits, choice test, non-choice test, ridge gourd, muskmelon, sponge gourd

Introduction

Fruit flies (Diptera: Tephritidae) are among the most destructive insect pests of agricultural crops, causing considerable yield losses and economic damage worldwide (Shahzadi *et al.*, 2019)^[8]. The genus *Bactrocera* comprises several economically important species that pose serious threats to horticultural crops owing to their broad host ranges, high reproductive potential and in some species, considerable invasive capacity (Sarwar *et al.*, 2013).^[7] Among them, the melon fruit fly, *Zeugodacus cucurbitae* (Coquillett) (Diptera: Tephritidae) is an economically important and widely distributed pest of cucurbitaceous crops. The species was formerly referred to as *Bactrocera cucurbitae* (Coquillett), including in the original Ph.D. thesis from which the present study was derived. Following subsequent taxonomic revision, the species is currently recognized as *Zeugodacus cucurbitae* (Coquillett); therefore, the currently accepted name *Z. cucurbitae* is used throughout the present manuscript, except when referring to historical literature or the original thesis terminology.

Zeugodacus cucurbitae infests a wide range of cucurbitaceous crops and causes substantial quantitative and qualitative losses. The larvae develop within fruits, resulting in tissue damage, premature fruit rotting, fruit deformation and reduced marketability. Under favourable environmental conditions and high pest pressure, yield losses may reach 90-100 percent (Sapkota, 2019)^[7]. In addition to direct yield losses, fruit fly infestation can adversely affect the economic returns of vegetable growers through deterioration in fruit quality, rejection of infested produce and increased expenditure on pest management (Shahzadi *et al.*, 2019)^[8].

Host selection and preference play an important role in the population dynamics, infestation pattern and damage potential of fruit flies. Different cucurbitaceous crops and varieties may vary considerably in their attractiveness and suitability for oviposition and subsequent larval development. Understanding host preference under both field and laboratory conditions is therefore essential for identifying susceptible and relatively less-preferred hosts and for developing effective, targeted pest management strategies. Such information can also contribute to the optimization of monitoring programmes, improvement of biological control approaches and development of integrated and sustainable management practices.

Corresponding Author:
AS Ingale
Assistant Professor of
Entomology, Yashwantrao
Chavan Govt. College of
Agriculture, Karad,
Maharashtra, India

In view of the economic importance of *Z. cucurbitae* and its association with a wide range of cucurbitaceous crops, the present study was undertaken to investigate the host preference of the melon fruit fly on different cucurbitaceous fruits under field and laboratory conditions and to study its life history and behavioural characteristics. The findings are expected to provide useful information for understanding host-pest interactions and for developing more effective and sustainable management strategies against *Z. cucurbitae*.

Materials and Methods

The present study was conducted at Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, (MS) India during Summer 2020-21 and 2021-22, to assess melon fruit fly host preferences on various cucurbitaceous hosts under field and laboratory conditions. The field experiments involved eight treatments with three replicates each, using a randomized block design (RBD) in plots measuring 3m x 2m. Observations on percentage of fruit damage were calculated by counting the total and infested fruits per plot. In laboratory conditions, the same eight cucurbitaceous hosts were tested using a completely randomized design (CRD). Mature, healthy vegetables were used with 100 g samples placed in plastic cages. For choice tests, 20 fruit fly adults were introduced to cages with 100 g samples of cucumber, bitter gourd, ridge gourd, pumpkin, watermelon, sponge gourd, muskmelon and bottle gourd. After 24 hours, the data on egg, larval, pupal and adult stages were recorded. In non-choice tests, 100 g samples of different vegetables were placed in separate cages with fruit fly adults for oviposition. Eggs were observed under a microscope to check hatch rates and development through egg, larval, pupal and adult stages was monitored.

Results and Discussion

Host preference of melon fruit fly on different hosts under field condition

Summer 2021

The observations on mean percent fruit infestation are shown in Table 1. The mean infestation rates revealed significant differences among cucurbitaceous hosts. Sponge gourd was the least preferred host of melon fruit fly with lowest mean percent fruit infestation of 35.62 which was followed by ridge gourd, bottle gourd, muskmelon and cucumber (44.20%, 44.22%, 45.63% and 45.77%, respectively), which were statistically at par with each other. Watermelon (53.46%) and pumpkin (56.89%) had higher infestation rates, while bitter gourd was the most preferred host with the highest infestation of 62.12%.

Summer 2022

The mean percent fruit infestation data (Table 2) indicated that sponge gourd was the least preferred host of melon fruit fly (40.54%). It was statistically at par with bottle gourd (43.59%), ridge gourd (47.13%), muskmelon (49.00%), cucumber (50.91%) and watermelon (54.42%). However, pumpkin (56.89%) and bitter gourd were highly preferred host (62.12%).

Pooled

The pooled data from two seasons showed significant differences among treatments (Table 3 & Fig. 1). The overall results indicated that bitter gourd was the most preferred host, with the highest fruit infestation rate of

64.48%, followed by pumpkin (59.03%). Sponge gourd was the least preferred, with a minimal infestation rate of 38.08%. Other hosts like, bottle gourd, ridge gourd, muskmelon, cucumber and watermelon showed similar infestation rates ranging from 46.12% to 53.94% and all these treatments were statistically at par with each other. Earlier studies confirm similar findings on melon fruit fly host preferences. Singh *et al.*, (2000)^[9], Mwatawala *et al.*, (2010)^[5] and Koswanudin *et al.*, (2018)^[1] identified bitter gourd as the most preferred and susceptible host. Kumar *et al.*, (2006) reported bitter gourd with the highest infestation (77.03%) followed by ridge gourd (75.65%) and cucumber (73.83%). Gaine *et al.*, (2013) found equal infestation levels in bitter gourd and ridge gourd.

Host preference of melon fruit fly on different hosts under laboratory condition

Host preference of melon fruit fly on different cucurbitaceous hosts in choice test

Studies on laboratory choice tests with eight cucurbitaceous hosts (Table 4) revealed significant differences in melon fruit fly preferences. The data revealed that bitter gourd was the most preferred host with the highest averages for eggs (65 ± 1.14), larvae (58 ± 1.13), pupae (52 ± 0.92) and adults (52 ± 0.92), whereas, the lowest mean counts were observed in sponge gourd with 21 ± 0.79 larvae, 16 ± 0.65 pupae and 13 ± 0.58 adults. The cumulative results of choice test experiments clearly proved that bitter gourd was most preferred host of the melon fruit fly. The findings are in consistent with the results of Shahzadi *et al.*, (2019)^[8] who reported that in choice test, bitter gourd had greater fecundity, larval, pupal and adult rate as compared to other cucurbitaceous hosts i.e., 67, 59, 52 and 40, respectively. Manzar and Srivastava (2017)^[3] and Sohrab and Hasan (2018)^[10] were fairly close to this experiment.

Host preference of melon fruit fly on different cucurbitaceous hosts in non-choice test

Melon fruit flies reared on eight cucurbitaceous hosts revealed that bitter gourd was the most preferred host with the highest mean counts for eggs (58 ± 1.11), larvae (52 ± 1.24), pupae (46 ± 0.88) and adults (36 ± 0.92) (Table. 5). Other hosts showed lower counts: cucumber (52 ± 0.98 eggs, 48 ± 1.13 larvae, 44 ± 0.84 pupae, 36 ± 0.86 adults), pumpkin (44 ± 0.93 eggs, 41 ± 1.08 larvae, 38 ± 0.81 pupae, 36 ± 0.75 adults), watermelon (38 ± 0.88 eggs, 34 ± 0.98 larvae, 31 ± 0.78 pupae, 22 ± 0.83 adults), muskmelon (35 ± 0.85 eggs, 28 ± 0.95 larvae, 26 ± 0.75 pupae, 19 ± 0.75 adults), ridge gourd (29 ± 0.83 eggs, 25 ± 0.91 larvae, 22 ± 0.71 pupae, 15 ± 0.71 adults), bottle gourd (25 ± 0.81 eggs, 21 ± 0.90 larvae, 17 ± 0.68 pupae, 13 ± 0.67 adults), and sponge gourd was the least preferred and had the lowest counts (20 ± 0.79 eggs, 16 ± 0.88 larvae, 12 ± 0.61 pupae, 11 ± 0.65 adults). These host preference readings in non-choice test are in conformity with the findings of Shahzadi *et al.*, (2019)^[8] who recorded similar readings in various cucurbitaceous crops. More or less similar results were obtained by Mir *et al.*, (2014)^[4] who revealed that in non-choice experiment, bitter gourd was greater ranked as compared to cucumber, brinjal, pumpkin and muskmelon. The study confirms that bitter gourd is the most favored host for melon fruit fly (*Zeugodacus cucurbitae*), showing the highest infestation rates and developmental stages in both field and laboratory conditions.

Table 1: Host preference of melon fruit fly on different hosts under field condition (*Summer 2021*)

Tr. No	Treatments	Per cent fruit infestation						
		Standard meteorological week						Mean
		10	11	12	13	14	15	
T ₁	Cucumber	44.37 (41.72)	48.10 (43.91)	52.53 (46.45)	58.37 (49.84)	54.37 (47.53)	50.27 (45.16)	51.33 (45.77)
T ₂	Bitter gourd	50.83 (45.49)	52.10 (46.21)	60.30 (50.97)	75.03 (60.34)	68.53 (55.92)	65.93 (54.41)	62.12 (52.22)
T ₃	Ridge gourd	40.57 (39.48)	43.43 (41.21)	50.43 (45.25)	55.53 (48.19)	52.90 (46.67)	49.00 (44.42)	48.64 (44.20)
T ₄	Pumpkin	48.37 (44.06)	51.40 (45.81)	54.80 (47.77)	64.97 (54.01)	62.83 (52.48)	58.97 (50.19)	56.89 (49.05)
T ₅	Watermelon	45.90 (42.65)	49.93 (44.96)	53.27 (46.88)	62.17 (52.07)	55.93 (48.46)	53.57 (47.05)	53.46 (47.01)
T ₆	Sponge gourd	30.13 (33.29)	33.30 (35.20)	40.43 (39.40)	42.10 (40.44)	35.17 (36.32)	32.60 (34.77)	35.62 (36.57)
T ₇	Muskmelon	44.83 (42.03)	42.47 (40.65)	52.23 (46.29)	60.30 (51.04)	55.20 (48.00)	51.37 (45.78)	51.07 (45.63)
T ₈	Bottle gourd	35.37 (36.49)	59.81 (50.73)	46.43 (42.95)	52.50 (46.44)	50.67 (45.39)	47.07 (43.31)	48.64 (44.22)
S.E (m) ±		3.40	3.05	2.85	3.68	3.41	3.45	3.31
CD at 5%		10.33	9.24	8.64	11.17	10.34	10.47	10.03
CV%		10.26	8.56	7.63	8.97	8.78	9.27	8.91

Figures in parenthesis are Arc sin transformed values

Table 2: Host preference of melon fruit fly on different hosts under field condition (*Summer 2022*)

Tr. No	Treatments	Per cent fruit infestation						
		Standard meteorological week						Mean
		14	15	16	17	18	19	
T ₁	Cucumber	48.20 (43.96)	51.00 (45.58)	55.53 (48.22)	60.53 (51.11)	47.90 (43.79)	42.27 (40.54)	50.91 (45.53)
T ₂	Bitter gourd	55.17 (48.01)	58.97 (50.19)	65.57 (54.11)	80.57 (64.31)	76.13 (61.14)	64.63 (53.58)	66.84 (55.22)
T ₃	Ridge gourd	45.17 (42.21)	48.07 (43.89)	50.33 (45.19)	55.50 (48.17)	43.33 (41.15)	40.40 (39.45)	47.13 (43.34)
T ₄	Pumpkin	52.10 (46.21)	55.27 (48.04)	62.40 (52.21)	70.47 (57.32)	68.37 (55.83)	58.37 (49.83)	61.16 (51.57)
T ₅	Watermelon	50.67 (45.38)	53.17 (46.82)	55.57 (48.21)	61.47 (51.66)	58.80 (50.09)	46.87 (43.20)	54.42 (47.56)
T ₆	Sponge gourd	35.20 (36.25)	41.63 (40.16)	45.90 (42.64)	49.20 (44.54)	38.40 (38.27)	32.90 (34.96)	40.54 (39.47)
T ₇	Muskmelon	47.40 (43.51)	49.27 (44.58)	52.90 (46.68)	56.17 (48.56)	45.50 (42.38)	42.77 (40.83)	49.00 (44.42)
T ₈	Bottle gourd	35.37 (36.45)	44.97 (42.11)	50.43 (45.25)	52.57 (46.48)	40.50 (39.50)	37.73 (37.83)	43.59 (41.27)
S.E (m) ±		2.80	2.60	3.15	3.56	3.45	2.86	3.07
CD at 5%		8.49	7.89	9.55	10.79	10.45	8.68	9.30
CV%		8.01	7.05	8.06	8.45	9.07	8.24	8.15

Figures in parenthesis are Arc sin transformed values

Table 3: Host preference of melon fruit fly on different hosts under field condition (*Pooled Summer 2021 and 2022*)

Tr. No	Treatments	Per cent fruit infestation		
		Mean of Summer 2021	Mean of Summer 2022	Pooled Summer 2021 and 2022
T ₁	Cucumber	51.33 (45.77)	50.91 (45.53)	51.12 (45.65)
T ₂	Bitter gourd	62.12 (52.22)	66.84 (55.22)	64.48 (53.72)
T ₃	Ridge gourd	48.64 (44.2)	47.13 (43.34)	47.89 (43.77)
T ₄	Pumpkin	56.89 (49.05)	61.16 (51.57)	59.03 (50.31)
T ₅	Watermelon	53.46 (47.01)	54.42 (47.56)	53.94 (47.29)
T ₆	Sponge gourd	35.62 (36.57)	40.54 (39.47)	38.08 (38.02)
T ₇	Muskmelon	51.07 (45.63)	49.00 (44.42)	50.04 (45.03)
T ₈	Bottle gourd	48.64 (44.22)	43.59 (41.27)	46.12 (42.75)
S.E (m) ±		3.31	3.07	3.19
CD at 5%		10.03	9.3	9.665
CV%		8.91	8.15	8.53

Figures in parenthesis are Arc sin transformed values

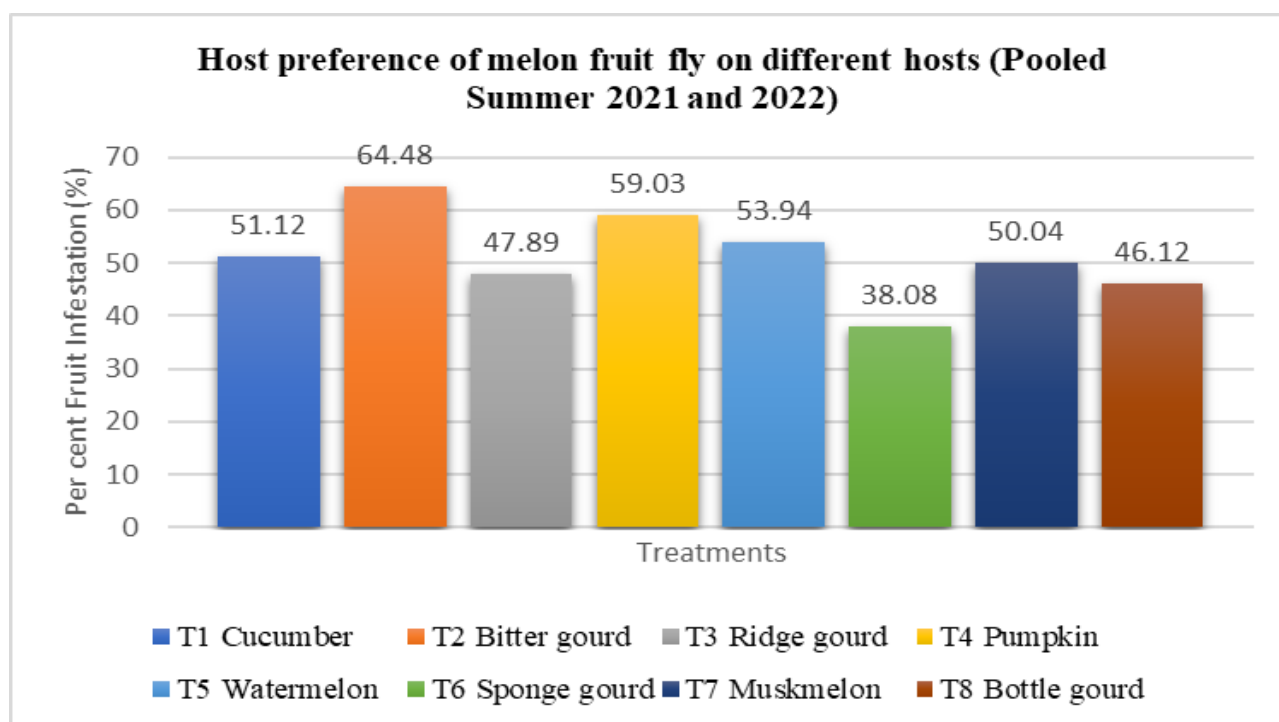
Table 4: Host preference of melon fruit fly on different cucurbitaceous hosts in choice test

Tr. No	Treatment	Fecundity $\pm$ SE	Larvae formed $\pm$ SE	Pupa Developed $\pm$ SE	Adults formed $\pm$ SE
T ₁	Cucumber	59 $\pm$ 0.98	52 $\pm$ 0.95	45 $\pm$ 0.87	38 $\pm$ 0.79
T ₂	Bitter gourd	65 $\pm$ 1.14	58 $\pm$ 1.13	52 $\pm$ 0.92	41 $\pm$ 0.83
T ₃	Ridge gourd	33 $\pm$ 0.81	29 $\pm$ 0.81	22 $\pm$ 0.71	17 $\pm$ 0.61
T ₄	Pumpkin	54 $\pm$ 0.95	48 $\pm$ 0.93	41 $\pm$ 0.81	33 $\pm$ 0.72
T ₅	Watermelon	43 $\pm$ 0.91	38 $\pm$ 0.85	32 $\pm$ 0.78	27 $\pm$ 0.69
T ₆	Sponge gourd	25 $\pm$ 0.76	21 $\pm$ 0.79	16 $\pm$ 0.65	13 $\pm$ 0.58
T ₇	Muskmelon	38 $\pm$ 0.86	33 $\pm$ 0.83	26 $\pm$ 0.74	21 $\pm$ 0.64
T ₈	Bottle gourd	31 $\pm$ 0.78	27 $\pm$ 0.80	19 $\pm$ 0.68	16 $\pm$ 0.60

(F = 9.00; P = 0.0002)

Table 5: Host preference of melon fruit fly on different cucurbitaceous hosts in non-choice test

Tr. No	Treatment	Fecundity $\pm$ SE	Larvae formed $\pm$ SE	Pupa Developed $\pm$ SE	Adults formed $\pm$ SE
T ₁	Cucumber	52 $\pm$ 0.98	48 $\pm$ 1.13	44 $\pm$ 0.84	33 $\pm$ 0.88
T ₂	Bitter gourd	58 $\pm$ 1.11	52 $\pm$ 1.24	46 $\pm$ 0.88	36 $\pm$ 0.92
T ₃	Ridge gourd	29 $\pm$ 0.83	25 $\pm$ 0.91	22 $\pm$ 0.71	15 $\pm$ 0.71
T ₄	Pumpkin	44 $\pm$ 0.93	41 $\pm$ 1.08	38 $\pm$ 0.81	36 $\pm$ 0.86
T ₅	Watermelon	38 $\pm$ 0.88	34 $\pm$ 0.98	31 $\pm$ 0.78	22 $\pm$ 0.83
T ₆	Sponge gourd	20 $\pm$ 0.79	16 $\pm$ 0.88	12 $\pm$ 0.61	11 $\pm$ 0.65
T ₇	Muskmelon	35 $\pm$ 0.85	28 $\pm$ 0.95	26 $\pm$ 0.75	19 $\pm$ 0.75
T ₈	Bottle gourd	25 $\pm$ 0.81	21 $\pm$ 0.90	17 $\pm$ 0.68	13 $\pm$ 0.67

F_{7,32} = 204.87; p < 0.0001 (significant)**Fig 1:** Host preference of melon fruit fly on different hosts under field condition (Pooled)

Conclusion

The present study demonstrated a consistent pattern of host preference in *Zeugodacus cucurbitae* across field and laboratory conditions. Bitter gourd was the most preferred host, recording the highest fruit infestation and supporting greater development of eggs, larvae, pupae and adults, whereas sponge gourd was consistently the least preferred host. The agreement between field and laboratory observations strengthens the evidence for differential host suitability in *Z. cucurbitae*. These findings provide a useful basis for prioritizing highly susceptible cucurbit crops for monitoring and timely management, and may contribute to the development of more targeted and sustainable management strategies against this economically important pest.

Acknowledgement

The author thanks the Head, Department of Agricultural Entomology, VNMKV, Parbhani (MS) for providing research facilities throughout the experiment and their valuable guidance in research. The present study was a part of Ph.D. (Agri) dissertation submitted by Ingale A. S. to the Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (MS)

Financial Support

No financial support was availed

Author Contribution Statement

Ingale A S and Kadam D R conceived and designed the research, Ingale A S conducted research and analyzed the

data, Deshmukh K V and Ingale A S wrote the manuscript which was guided by Kadam D R.

Conflict of Interests

No conflict of interests

References

1. Koswanudin D, Basukriyadi A, Samudra IM, Ubaidillah R. Host preference fruit flies *Bactrocera carambolae* (Drew & Hancock) and *Bactrocera dorsalis* (Drew & Hancock) (Diptera: Tephritidae). Indonesian Journal of Entomology. 2018;15(1):40-49.
2. Kumar NKK, Verghese A, Shivakumara B, Krishnamoorthy PN, Ranganath HR. Relative incidence of *Bactrocera cucurbitae* (Coquillett) and *Dacus ciliatus* Loew on cucurbitaceous vegetables. From Basics to Applied Knowledge. 2006:249-253.
3. Manzar A, Srivastava JP. Biology of melon fruit fly *Bactrocera cucurbitae* (Coq.) on bitter gourd (*Momordica charantia* L.). Trends in Biosciences. 2017;10(1):42-43.
4. Mir SH, Dar SA, Mir GM, Ahmad SB. Biology of *Bactrocera cucurbitae* (Diptera: Tephritidae) on cucumber. Florida Entomologist. 2014;97(2):753-758.
5. Mwatawala M, Maerere AP, Makundi R, De Meyer M. Incidence and host range of the melon fruit fly, *Bactrocera cucurbitae* (Coquillett) (Diptera: Tephritidae) in Central Tanzania. International Journal of Pest Management. 2010;56:265-273.
6. Sapkota R. Damage assessment and management of cucurbit fruit flies in spring summer squash. Journal of Entomology and Nematology. 2019;2:7-12.
7. Sarwar M, Hamed M, Rasool B, Yousaf M, Hussain M. Host preference and performance of fruit flies *Bactrocera zonata* (Saunders) and *Bactrocera cucurbitae* (Coquillett) (Diptera: Tephritidae) for various fruits and vegetables. International Journal of Scientific Research in Environmental Sciences. 2013;1(8):188-194.
8. Shahzadi K, Khan MA, Gul T, Ahmad T, Aslam F, Ishfaq M, et al. Host preference of *Bactrocera cucurbitae* (Diptera: Tephritidae). Acta Scientific Agriculture. 2019;3(11):80-83.
9. Singh SV, Mishra A, Bisen RS, Malik YP, Mishra A. Host preference of red pumpkin beetle, *Aulacophora foveicollis*, and melon fruit fly, *Bactrocera cucurbitae*. Indian Journal of Entomology. 2000;62:242-246.
10. Sohrab, Hasan W. Investigation on population fluctuation of cucurbit fruit flies, *Bactrocera cucurbitae*, associated with cucurbit crops. International Journal of Bioassays. 2018;7(6):5652-5658.