



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(9): 704-707
© 2022 TPI
www.thepharmajournal.com
Received: 06-07-2022
Accepted: 10-08-2022

Puneet Kumar
Department of Entomology,
Acharya Narendra Deva
University of Agriculture and
Technology Kumarganj
Ayodhya, Uttar Pradesh, India

Umesh Chandra
Department of Entomology,
Acharya Narendra Deva
University of Agriculture and
Technology Kumarganj
Ayodhya, Uttar Pradesh, India

Rishabh Mishra
Department of Entomology,
Acharya Narendra Deva
University of Agriculture and
Technology Kumarganj
Ayodhya, Uttar Pradesh, India

Deepak Kumar
Department of Entomology,
Acharya Narendra Deva
University of Agriculture and
Technology Kumarganj
Ayodhya, Uttar Pradesh, India

Ramkumar
Department of Entomology,
Banaras Hindu University,
Varanasi, Uttar Pradesh, India

Kanhaiya Gawande
Department of Soil science,
Banaras Hindu University,
Varanasi, Uttar Pradesh, India

Corresponding Author:
Puneet Kumar
Department of Entomology,
Acharya Narendra Deva
University of Agriculture and
Technology Kumarganj
Ayodhya, Uttar Pradesh, India

Impact of weather parameters on population dynamics of fruit fly (*Bactrocera* spp.) in cucurbits at different locations

Puneet Kumar, Umesh Chandra, Rishabh Mishra, Deepak Kumar, Ramkumar and Kanhaiya Gawande

Abstract

The present studies on the “Impact of weather parameters on population dynamics of fruit fly (*Bactrocera* spp.) in cucurbits at different locations” were conducted in the Department of Entomology, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, during 2020-21. Significant variation in the occurrence of the fruit fly was recorded during the period of investigation. Trapping of fruit fly was started from the 9th SMW and continued up to 25th SMW by using sex attractant, Cuelure and methyl eugenol. Incidence of *B. zonata* and *B. dorsalis*, was observed high (48.75 fruit flies/trap/week) and (38.41 fruit flies/trap/week) respectively on 21st SMW caught by methyl eugenol. And the Incidence of *B. cucurbitae* and *B. tau*, was observed high (33.41 fruit flies/trap/week) and (18.00 fruit flies/trap/week) respectively on 20th SMW caught through cue lure. Mean population of *B. zonata*, *B. dorsalis* showed highly significant positive correlation with minimum temperature and maximum temperature, while the relative humidity showed significantly with negative correlation and rainfall showed non-significantly negative correlation respectively and *B. cucurbitae*, *B. tau* population showed non-significantly positive correlation with minimum temperature and significantly positive correlation with maximum temperature however it was significantly negatively correlated with relative humidity and non-significantly negative correlated with rainfall respectively in Zaid season of 2020.

Keywords: Cue lure, fruit fly, location, trap, cucurbits

Introduction

Pumpkin is attacked by several insect pests during different growth stages which includes Fruit fly *Bactrocera cucurbitae*, Aphid *Aphis gossypii*, Red pumpkin beetle *Aulacophora foveicollis* (Lucas), Hadda beetle *Henosepilachna vigintioctopunctata* (Fabricius), Pumpkin caterpillar *Diaphania indica* (Saunders), and gallfly *Lasioptera falcata* that cause varying degrees of damage to the crop. Fruit flies are pests of quarantine importance and are difficult to control. They have a great impact on Agri or Horti or Forest ecosystem and cause enormous damage to fruits and vegetables. Approximately 4,390 species of fruit flies discovered yet and distributed in the whole world (Norrbom, 2004) [15]. 245 species are of economic importance and are distributed widely in subtropical and temperate regions of the world, with the maximum diversity of species occurring in the tropical regions. More than 200 species of fruit flies have been reported in India nevertheless the majority of them have no economic importance (Madhura and Verghese, 2003) [16]. The major parsimoniously important species of fruit flies are *Bactrocera dorsalis*, *Bactrocera cucurbitae*, *Bactrocera zonata* and *Bactrocera correcta*. Among these, *B. dorsalis*, *B. zonata* *B. correcta* infest guava and mango. *B. cucurbitae*, *B. tau* infests cucurbitaceous vegetables (Nath and Bhushan, 2006) [17] but mainly *B. zonata* and *B. dorsalis* infest guava and mango in North western Uttar Pradesh. Fruit flies are damage about 75% Fruits of Pumpkin in India. This is a most sever Pest in The World. Fruit flies are common along the tropical and subtropical regions of the globe and cause significant economic damage to fruit and vegetable crops. Apart from direct losses (eating the pulp of fruits and vegetables by larvae), they slow down the pace of agricultural development in many countries due of the severe trade quarantines for export. With increasing importance on quality (produce without using insecticide) of fruit and vegetable produce and with the expectancy of growth of trade (high yield in low cast) in horticultural produce, importing as well as exporting nations are giving increasing consideration to fruit fly management at pre-harvest and post-harvest stages.

Material and Methods

Population dynamics of fruit flies from every locations had 3 replications namely Student's instructional farm, MES horticulture, MES vegetable, akma farm during February to June 2020. The traps were hung with help of string on the branches of trees at MES Horticulture, at MES vegetable science, at akma farm and at Students' instructional farm. String of each trap was greased as and when required to keep ants away from traps and to save the trapped fruit flies from them. These traps were installed in the field at the time of crop germination at ground level. The traps were hung with the help of string on the branches of the tree. The old pheromone traps were replaced with fresh traps every month. Data on attracted and trapped male pumpkin fruit flies were collected on a weekly basis. The trapped male pumpkin fruit flies were identified based on morphological character.

Result and Discussion

The incidence data were recorded during the Zaid season from 9th standard meteorology week (SMW) to 25th SMW of 2020 at four locations namely Student's instruction farm (SIF), MES horticulture, MES Vegetables, akma Farm. In these regions collected four species (*B. zonata*, *B. dorsalis*, *B. cucurbitae*, *B. tau*) by methyl eugenol and cue lure traps. *B. zonata* and *B. dorsalis* observed in methyl eugenol trap and *B. cucurbitae*, *B. tau* observed in cue lure trap.

During Zaid at student's instructional farm, the minimum population of *B. zonata* 4.66, *B. dorsalis* 3.33 fruit flies/trap/week was recorded in 9th SMW and Maximum population *B. zonata* 45.0, *B. dorsalis* 40 fruit flies/trap/week was recorded in 21st SMW caught through methyl eugenol rakshak trap. And the minimum population of *B. cucurbitae*

2.00, *B. tau* 0 fruit flies/trap/week was recorded in 9th SMW and Maximum Population *B. cucurbitae* 34.33, *B. tau* 18.0 fruit flies/trap/week was recorded in 20th SMW caught through cue lure rakshak trap. At MES Horticulture, the minimum population of *B. zonata* 3.66, *B. dorsalis* 2.66 fruit flies/trap/week was recorded in 9th SMW and maximum population *B. zonata* 47.33, *B. dorsalis* 36 fruit flies/trap/week was recorded in 21st SMW caught through methyl eugenol rakshak trap And the minimum population of *B. cucurbitae* 1.66 fruit flies/trap/week was recorded in 9th SMW and maximum population *B. cucurbitae* 26.33, *B. tau* 17 fruit flies/trap/week was recorded in 20th SMW caught through cue lure rakshak trap.

At MES vegetable, the minimum population of *B. zonata* 4.33, *B. dorsalis* 3.66 fruit flies/trap/week was recorded in 9th SMW and the maximum population *B. zonata* 53.33, *B. dorsalis* 39 fruit flies/trap/week was recorded in 21st SMW caught through methyl eugenol rakshak trap. And the minimum population of *B. cucurbitae* 2.66, *B. tau* 0 fruit flies/trap/week was recorded in 9th SMW and the maximum Population *B. cucurbitae* 40.66, *B. tau* 19 fruit flies/trap/week was recorded in 20th SMW caught through cue lure rakshak trap.

At akma farm, the minimum population of *B. zonata* 3.33, *B. dorsalis* 2.66 fruit flies/trap/week was recorded in 9th SMW and maximum population *B. zonata* 49.33, *B. dorsalis* 38.0 fruit flies/trap/week was recorded in 21st SMW caught through methyl eugenol rakshak trap And the minimum population of *B. cucurbitae* 2.00, *B. tau* 0 fruit flies/trap/week was recorded in 9th SMW and Maximum population *B. cucurbitae* 39.33, *B. tau* 18.0 fruit flies/trap/week was recorded in 20th SMW caught through cue lure rakshak trap.

Table 1: Mean population of different fruit fly species caught through methyl eugenol and cue lure during 2020 at four locations.

SMW	Mean population of fruit flies/trap/week in 2020			
	Caught through methyl eugenol		Caught through cue lure	
	<i>Bactrocera zonata</i>	<i>Bactrocera dorsalis</i>	<i>Bactrocera cucurbitae</i>	<i>Bactrocera tau</i>
9	4.00	3.08	2.08	0
10	7.08	3.58	4.25	0
11	9.08	5.58	5.5	0.50
12	10.25	7.41	6.91	0.83
13	16.66	10.58	11.25	3.50
14	21.08	15.58	14.08	7.41
15	25.00	18.75	18.25	8.08
16	30.25	20.58	24.66	8.33
17	32.5	22.83	26.58	10.08
18	33.58	24.91	29.66	12.00
19	38.75	28.00	33.16	14.25
20	42.00	32.75	33.41	18.00
21	48.75	38.41	25.25	10.25
22	41.41	29.00	16.91	5.33
23	33.08	22.58	11.66	4.33
24	21.58	14.41	5.91	1.50
25	13.91	8.50	3.75	0.91
Mean	25.23	18.03	16.07	6.19

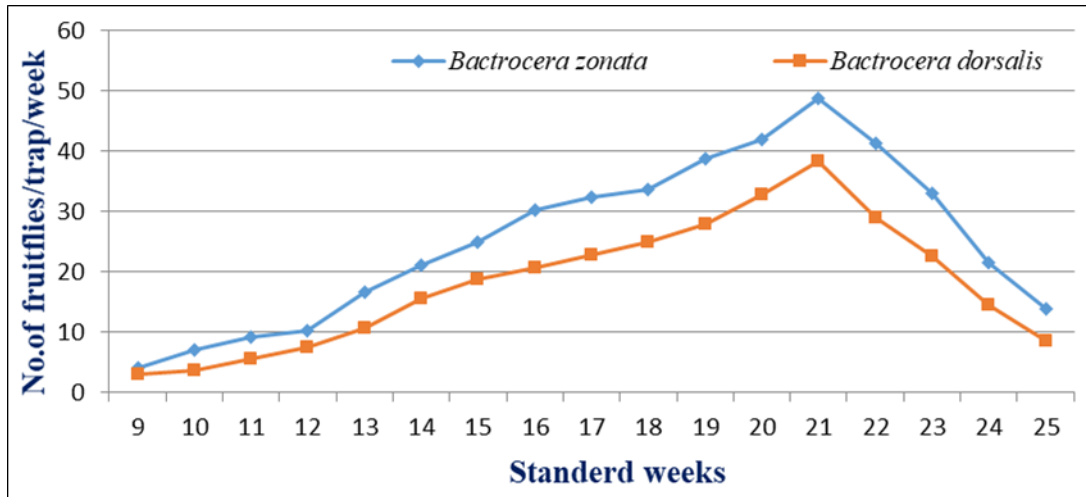


Fig 1: Seasonal incidence of *B. zonata* and *B. dorsalis* in Methyl eugenol Rakshak Traps during Zaid season

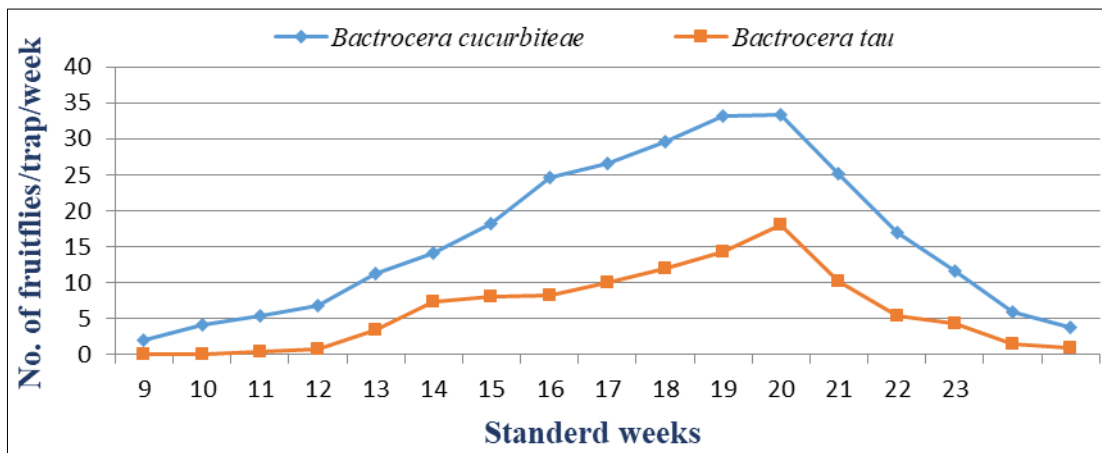


Fig 2: Seasonal incidence of *B. cucurbitae* and *B. tau* in cue lure rakshak traps during Zaid season.

Effect of weather factor on the incidence of the fruit flies population

The mean population of *B. zonata* and abiotic factors viz. minimum temperature, maximum temperature, relative humidity and rainfall has been given in table 1. It is evident from data that the mean population of *B. zonata* showed a

highly significant positive correlation with minimum temperature (0.663**) and maximum temperature (0.869**) while the relative humidity (-0.667**) showed significantly with negative correlation and rainfall showed (-0.321) non significantly negative correlation during Zaid season 2020-21.

Table 2: Relationship between population of fruit flies and weather parameters in Zaid season during 2020

Fruit fly species	Weather parameters			
	Temperature °C		Relative humidity (%)	Rainfall(mm)
	Minimum	Maximum		
Caught through methyl Eugenol trap				
<i>Bactrocera zonata</i>	0.663**	0.869**	-0.667**	-0.321
<i>Bactrocera dorsalis</i>	0.623**	0.872**	-0.681**	-0.355
Caught through cue lure trap				
<i>Bactrocera cucurbitae</i>	0.330	0.716**	-0.577*	-0.403
<i>Bactrocera tau</i>	0.316	0.740**	-0.625**	-0.393

**significant at 1%, * significant at 5%

It is evident that the data of relationship mean population of *B. dorsalis* with abiotic factor was worked out and presented in table 2. revealed that *B. dorsalis* population had a highly significant positive correlation with minimum temperature (0.623**) as well as maximum temperature (0.872**), however it was significantly negatively correlated with relative humidity (-0.681**) and non-significantly negative correlated with rainfall (-0.355) during Zaid season of 2020.

It is evident from data that the mean population of *B. cucurbitae* with abiotic factor was worked out and presented in table 2 revealed that *B. cucurbitae* population showed non significantly positive correlation with minimum temperature (0.330) and significantly positive correlation with maximum temperature (0.716**), however it was less significantly negative correlated with relative humidity (-0.577*) and non-significantly negative correlated with rainfall (-0.403) in Zaid season of 2020.

The data of relationship between mean population of *B. tau* with abiotic factor was worked out and presented in table 2 revealed that *B. tau* population showed non significantly positive correlation with minimum temperature (0.316) and significantly positive correlation with maximum temperature (0.740**), while it was significantly negative correlation with relative humidity (-0.625**) and non-significantly negative correlation with rainfall (-0.393) in Zaid season of 2020.

References

1. Sumathi ER, Manimaran M, Devi N, Ilamaram M, Agila R. Population Dynamics and Management of Mango Fruit Fly *Bactrocera dorsalis* (Hendel) (Diptera: Tephritidae). Int. J Curr. Microbiol. App. Sci. 2019;8(01):2705-2710.
2. Meena DS, Acharya VS, Kumar D. Seasonal Incidence of Fruit Fly, *Bactrocera cucurbitae* on Bottle Gourd and their Correlation with Abiotic. Factors. Int. J Curr. Microbiol. App. Sci. 2019;8(12):381-388.
3. Dhillon MK, Naresh JS, Ram S, Sharma NK. Influence of physio chemical traits of bitter gourd, *Momordica charantia* L. on larval density and resistance to melon fruit fly, *Bactrocera cucurbitae* (Coquillett). J Appl. Entomol. 2005;129:393-399.
4. Vignesh R, Viraktamath S. Population dynamics of melon fruit fly, *Bactrocera cucurbitae* (Coquillett) on cucumber (*Cucumis sativus* L.). Karnataka J Agric. Sci. 2015;28(4):528-530.
5. Anonymous. Package of Practices for Horticulture Crops. Univ. Agric. Sci., Dharwad, 2007, 258-261.
6. Ganie SA, Khan ZH, Ahangar RA, Bhat HA, Hussain B. Population dynamics, distribution, and species diversity of fruit flies on cucurbits in Kashmir Valley. India Journal of Insect Science. 2013;13:65.
7. Nande AS, Shukla A. Population dynamics of fruit fly *bactrocera dorsalis* (hendle) on sapota. Agric. Sci. Digest. 2014;34(1):70-72.
8. Hasyim A, Muryatia S, Kogel WJ. Population fluctuation of adult males of the fruit fly, *bactrocera tau* walker (Diptera: tephritidae) in passion fruit orchards in relation to abiotic factors and sanitation. Indonesian Journal of Agricultural Science. 2008;9(1):29-33.
9. Khan MA, Khaliq AGA, Subhani MN, Ali A. efficacy of methyl eugenol and cue-lure traps for monitoring melon fruit fly in relation to environmental conditions in bitter gourd J Agric. Res. 2010;48(4).
10. Shinde PB, Naik KV, Golvankar GM. Influence of abiotic factors on the relative abundance of fruit flies infesting cucumber. Journal of Entomology and Zoology Studies. 2018;6(5):16-18.
11. Divya S, Kalyanasundaram M, Sidhanandham V. Studies on the combination of different traps and lures in cucurbit fruit fly attraction. Journal of Entomology and Zoology Studies. 2019;7(3):996-998
12. Barma P, Jha S, Banerjee S. Prediction of the population development of melon fruit fly (*Bactrocera cucurbitae* Coq.) on pointed gourd (*Trichosanthes dioica* Roxb.). African J Agric. Res. 2013;8(38):4740-4747.
13. Dhandapani N, Shelkar UR, Murugan M. Bio-intensive pest management (BIPM) in major vegetable crops. An Indian perspective. Food Agric. Environ. 2003;1(2):333-339.
14. Dhillon MK, Singh R, Naresh JS, Sharma HC. The melon fruit fly, *Bactrocera cucurbitae*: A review of its biology and management. Entomol. J Insect Sci. 2005;5(1):1-16.
15. Norrbom AL. Host plant database for Anastrepha and Toxotrypana (Diptera: Tephritidae: Toxotrypanini). Diptera data dissemination disk; c2004, Feb 22; 2.
16. Verghese A, Nagaraju DK, Kamala Jayanthi PD, Anil Kumar HR, Madhura HS. Management of the Nut Weevil, *Sternochetus mangiferae* (Fabricius) on Totapuri, a mango variety of processing industry. Pest Manage. Horticultural Ecosystems. 2003;9(2):93-6.
17. Nath P, Bhushan S. Screening of cucurbit crops against fruit fly. Annals of Plant Protection Sciences. 2006;14(2):472-3.