



Plant Archives

Journal homepage: <http://www.plantarchives.org>

DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2025.v25.no.2.137>

MONITORING FRUIT FLY INCIDENCE IN CUCUMBER (*CUCUMIS SATIVUS* L.) USING PHEROMONE TRAPS IN RELATION TO CLIMATIC VARIABLES

Abhishek Gupta¹, Rajnish Kumar^{2*}, Sanjeet Kumar Singh¹, Amarendra Pratap Singh², Sushil Kumar² and Akhileshwar Vishwakarma³

¹Shri Murli Manohar Town Post Graduate college, Ballia 277001, Uttar Pradesh, India

²Department of Entomology Baba Raghav Das Post Graduate College, Deoria 274001, U.P., India

³ICAR-National Research Centre for Makhana, Darbhanga 846005, Bihar, India

*Corresponding author e-mail: sanjeetagri@gmail.com

(Date of Receiving-01-07-2025; Date of Acceptance-11-09-2025)

ABSTRACT

The present investigations were conducted during *Kharif* 2022 in Randomized block design with three replications at the experimental farm of Baba Raghav Das Post Graduate College, Deoria, Uttar Pradesh, India. It is evident from data that the incidence of male *B. cucurbitae* was commenced during 31st SW (August first week) with 95 adult male flies per trap per week. The number of trapped fly increased in subsequent weeks up to 33rd SW with mean trapped population of 148 fly/trap/week. Thereafter population decreased in subsequent week (34th SW), followed by an increasing trend was noticed up to 36th SW (September first week) when maximum population was trapped (234/fly/trap/week). The peak population of entrapped adult fly was coincided with maximum temperature, minimum temperature, maximum relative humidity, minimum relative humidity and rainfall as 32.8°C, 26.9°C, 87.2%, 66.7% and 137 mm, respectively. A declining trend in entrapped population of adult male fruit fly was noticed till 42th SW (October third week). Overall, during *Kharif* 2022-23 mean population of trapped fruit fly was fluctuated between 20 to 234 male flies/trap/week. The correlation coefficient established between weather parameters and entrapped adult fly/trap/week indicated that all the weather parameters viz., maximum temperature, minimum temperature, relative humidity, morning and rainfall showed positive correlation, while relative humidity maximum had negative correlation with adult fly activity.

Key Words: Fruit Fly, *Bactrocera cucurbitae*, Correlation, Temperature, Adult male fly, Monitoring, Pheromone trap.

Introduction

The cucumber (*Cucumis sativus* L.), a plant in the Cucurbitaceae family, was one of the first vegetable crops to be grown. Cucumbers are thought to have come from India and subsequently traveled to Asia, Africa, and Europe. The yield of cucumber has been affected by several factors, which include the infestation of insect pests. According to Mahato (2017), the main insect pests of cucumbers were the melon fruit fly, *Bactrocera umberae* Coquillett, aphids (*Aphis gossypii* Glover), jassids (*Empoasca kerri* and *Amrascabiguttulabiguttula* Ishida), whiteflies (*Bemisia tabaci* Gennadis), aphids

(*Aphis gossypii* Glover), thrips (*Thrips tabaci* Lind), and red pumpkin beetle (*Raphidopalpafoveicollis* Lucas). These insect pests have a negative impact on plant growth and lower the quality and quantity of cucumber fruits. Insect pest attacks negatively impact plant growth, and infected fruits become unfit for human consumption and, as a result, unmarketable. The most significant pest of cucurbitaceous crops is the fruit fly, which is a member of the Tephritidae family of the order Diptera. In tropical and sub-tropical regions, they predominate. According to Chaudhary and Patel (2012), there are currently 199 species of fruit flies known to exist in India. Depending on the season and the crop

species and varieties' susceptibility, the degree of damage caused by cucurbit fruit flies can range from 30% to 100%. Even before anthesis, it prefers to infest ovaries with soft skin. However, a variety of agricultural methods, including as pesticides, plant products, lures, diseases, etc., that can lessen the infestation of insect pests and favor the development of their natural foes without causing the least amount of environmental disturbance must be thoroughly evaluated. An essential part of integrated pest control is the creation of cucurbit pest-resistant cultivars. The absence of sufficient knowledge regarding the genetic variability and sources of resistance in the current genotypes, as well as the impact of these sources on the growth of pests, has hindered the development and cultivation of pest-resistant cucurbit cultivars. Finding the causes of resistance in cucumbers becomes crucial as a result. Cucurbit pest damage is mostly determined by the host diversity and current climatic conditions in a given agro-ecosystem. In order to determine the best period of action and management strategy, it is required to investigate the seasonal incidence of the pest species (Vignesh and Viraktamath, 2015).

Material and Methods

Monitoring of incidence of fruit fly through pheromone trap

Observation techniques:

The incidences of fruit flies were monitored by using pheromone trap installed just above the crop height in field trial. After installing pheromone trap (cue lure trap) the population of male adult fruit flies were recorded daily thereafter computed weekly basis.

Meteorological variables:

The daily meteorological parameters like Temperature (minimum and maximum), Relative humidity and Rainfall were recorded and then converted into weekly basis against standard meteorological weeks with corresponding weekly population of insect pests.



Plate 1: Experimental Field of Cucumber.

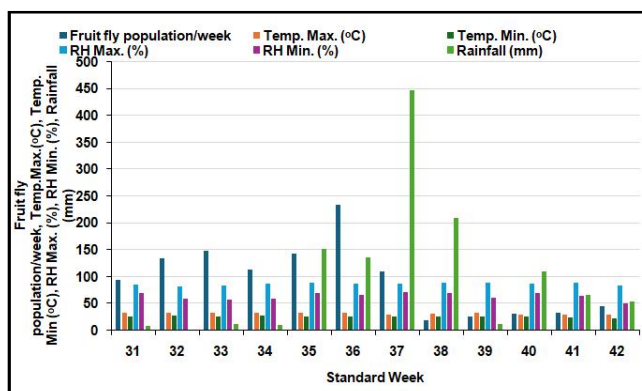


Fig. 1: Monitoring of adult fruit fly through pheromone trap.

Statistical analysis:

In order to find out the specific impact of meteorological parameters on insect pests of cucumber the data were correlated with the different meteorological parameters (*viz.* temperature, humidity and rainfall) recorded at standard meteorological weeks by 'timeanddate.com/weather/india/deoria/historic' website. The correlation and regression analysis has been determined by using 'Ms-excel' application software at the Department of Entomology, B. R. D. P. G. College Deoria.

Results and Discussion

Incidence of fruit fly monitored through pheromones trap.

It is evident from data presented in Table 2 and Fig. 1 that the incidence of male *B. cucurbitae* was commenced during 31stSW (August first week) with 95 adult male flies per trap per week. The number of trapped flies increased in subsequent weeks up to 33rdSW with mean trapped population of 148 fly/trap/week. Thereafter population decreased in subsequent week (34th SW), followed by an increasing trend was noticed up to 36th SW (September first week) when maximum population was trapped (234/fly/trap/week). The peak population of entrapped adult fly was coincided with maximum



Plate 2: Observation of the population of fruit fly on cucumber

Table 1: Weekly meteorological variables during study period (*Kharif*, 2022-23).

Standard Week	Period	Temp. Max. (R °C)	Temp. Min(R °C)	RH Max. (%)	RH Min.(%)	Rainfall (mm)
31	Aug I week	32.7	26.7	85.5	69.4	8
32	Aug II week	33.8	27.7	83.0	59.7	2
33	Aug III week	34.0	27.0	83.5	57.8	13
34	Aug IV week	33.5	27.5	88.2	58.7	10
35	Aug V week	32.7	26.2	89.5	70.2	152
36	Sept I week	32.8	26.9	87.2	66.7	137
37	Sept II week	30.1	25.5	87.4	72.5	447
38	Sept III week	31.7	26.4	88.5	69.7	210
39	Sept IV week	32.7	26.1	89.4	61.0	12
40	Oct I week	29.5	25.5	87.2	70.5	110
41	Oct II week	30.0	24.1	89.5	65.4	66
42	Oct III week	30.2	22.5	83.1	50.0	55

Table 2: Monitoring adult fruit fly through pheromone trap during *Kharif* 2022-23.

Standard week	Period	FRUITFLY (per week)	Temperature (R °C)		Humidity (%)		Rainfall (mm)
			Max.	Min.	Max	Min.	
31	Aug I week	95	32.7	26.7	85.5	69.4	8
32	Aug II week	134	33.8	27.7	83.0	59.7	2
33	Aug III week	148	34.0	27.0	83.5	57.8	13
34	Aug IV week	114	33.5	27.5	88.2	58.7	10
35	Aug V week	143	32.7	26.2	89.5	70.2	152
36	Sept I week	234	32.8	26.9	87.2	66.7	137
37	Sept II week	110	30.1	25.5	87.4	72.5	447
38	Sept III week	20	31.7	26.4	88.5	69.7	210
39	Sept IV week	26	32.7	26.1	89.4	61.0	12
40	Oct I week	31	29.5	25.5	87.2	70.5	110
41	Oct II week	33	30.0	24.1	89.5	65.4	66
42	Oct III week	45	30.2	22.5	83.1	50.0	55

temperature, minimum temperature, maximum relative humidity, minimum relative humidity and rainfall as 32.8°C, 26.9°C, 87.2%, 66.7% and 137mm, respectively. A declining trend in entrapped population of adult male fruit fly was noticed till 42thSW (October third week).

Overall during *Kharif* 2022-23 mean population of trapped fruit fly was fluctuated between 20 to 234 male flies/trap/week.

Our findings are in close conformity with that of Sawai (2013) who recorded peak activity of *B. cucurbitae* during 37th SW to 39th SW. Although maximum (249.67flies/trap) were noticed during 39th SW. Vignesh and Viraktamath (2015) revealed that the incidence of fruit fly was high (55.67 fruit flies/trap/week) on crop planted during *Kharif*, While it was low during *Rabi* season (19.67/trap/weak).

Correlation Studies between fruit fly and weather parameters monitored through pheromone trap:

Data represented in Table 3 revealed that all the weather parameters less are more correlated with the

male adult fruit fly captured from pheromone trap. Among them Maximum ($r=+0.573$) and minimum ($r=+0.528$) temperature showed moderately positive correlation with the fruit fly population. Relative humidity minimum and rainfall showed a weak positive correlation with r -value of +0.037 and +0.046, respectively. The population of fruit fly was negatively correlated to that of maximum RH with a r -value of -0.233. The findings of Medshikar *et al.*, (2023) partially supported the present findings who observed positive correlation between fruit fly population and maximum and minimum temperature. They found negative correlation between entrapped fruit fly and morning and evening humidity as well as with rainfall, did

Table 3: Correlation Studies between meteorological variables and trapped fruit fly during *Kharif* 2022.

Abiotic Factors	Correlation
Temp max	0.5730
Temp min	0.5279
RH max	-0.2331
RH min	0.0370
Rainfall (mm)	0.0459

not support the present findings. Raghuvanshi *et al.*, (2012) reported that fruit fly abundance had a positive correlation with temperature (min and max) while it was negatively correlated to that of morning and evening RH. The findings of Nahid *et al.*, (2020) stated that the abundance of fruit fly was positively correlated with mean temperature while it showed negative correlation with relative humidity and rainfall. Khan and Naveed (2017) observed weak positive correlation between fruit fly population and temperature and no correlation with rainfall. Similar to the present findings Kannan and Venugopala (2006) & Meena *et al.*, (2019) also reported positive correlation between fruit fly infestation and temperature. Devi and Mehta (2015) observed that correlation of fruit fly species were negatively correlated with maximum temperature while it showed positive correlation with minimum temperature and relative humidity.

Conclusion

When the activities of cucurbit fruit fly were monitored through pheromone trap the incidence was noticed from 31st SW and continued till 42rd SW. The fluctuation in entrapped population was between 20-234 adult male fly per trap per week. The peak activity (234fly/trap/week) was recorded during 36th SW (September 1st week). The correlation coefficient established between weather parameters and entrapped adult fly/trap/week indicated that all the weather parameters viz., maximum temperature, minimum temperature, relative humidity, morning and rainfall showed positive correlation, while relative humidity maximum had negative correlation with adult fly activity. All the weather parameters except RH

(max.) favoured the activity of adult of adult flies.

References

- Ingole, P., Mehta P.K. and Verma K.S. (2002). Seasonal occurrence of fruit fly, *Bactrocera cucurbitae* Coq. on cucumber in midhills of Himachal Pradesh. *Himachal Journal Agriculture Resource*, **28(1&2)**, 48-53.
- Kumar, N.K.K., Verghese K., Shivakumara B., Krishnamoorthy K.N and Ranganath H.R (2006). Relative incidence of *Bactrocera cucurbitae* (Coquillett) and *Dacus ciliatus* Loew on cucurbitaceous vegetables.
- Kate, A.O., Bharodia R.K., Joshi M.D., Pardeshi A.M. and Makadia R.R (2009). Seasonal incidence of fruit fly, *Bactrocera cucurbitae* (Coquillett) on cucumber. *Asian Sciences*. **4(1&2)**, 83-84.
- Mwatawala, M., Maerere A.P., Makundi R. and Meyer M.D. (2010). Incidence and host range of the melon fruit fly *Bactrocera cucurbitae* (Coquillett) in Central Tanzania. *Bulletin of Entomology Research*. **99(6)**, 629-641.
- Devi, Y.K. and Mehta P.K. (2015). Management of fruit flies infesting cucumber through pheromone trap in north-western Himalayas. *Journal of Insect Science*, **28(1)**, 77-84.
- Khan, R.A. and Naveed M. (2017). Occurrence and seasonal abundance of fruit fly, *Bactrocera zonata* Saunders (Diptera, Tephritidae) in relation to meteorological factors. *Pakistan Journal of Zoology*, **49**, 999-1003.
- Meena, D.S., Acharya V.S and Kumar D. (2019). Seasonal Incidence of Fruit Fly, *Bactrocera cucurbitae* on Bottle Gourd and their Correlation with Abiotic Factors *International Journal of Current Microbiology and Applied Science*. **8(12)**, 381-388.
- Nahid, S., Amin M., Haque M.M. and Suh S.J. (2020). Seasonal abundance and infestation of fruit fly on cucumber. *Journal of Agriculture sciences*. **18(2)**, 233-241.