Eco. Env. & Cons. 20 (1) : 2014; pp. (365-368)
Copyright@ EM International
ISSN 0971–765X

Seasonal incidence of fruit flies, *Bactrocera* spp. (Diptera: Tephritidae) in relation to abiotic factors

Nishant S. Ukey[1], Ajit G. Chandele[2], Rajendra S. Jadhav[1] and Shrirang S. Wagh[1]

[1]Department of Agricultural Entomology, Post Graduate Institute, MPKV, Rahuri 413 722, Dist. Ahmednagar (Maharashtra), India
[2]Associate Dean, College of Agriculture, Pune 411 005, (Maharashtra), India

(Received 15 January, 2014; accepted 10 February, 2014)

ABSTRACT

The seasonal incidence of *Bactrocera* spp. was recorded in guava orchard by installing methyl eugenol and cue lure traps. The incidence of *Bactrocera* spp. was noticed from first week of June immediately after the installation of traps. The activity of guava fruit flies was at its peak in the month of June and July. The next peak activity was recorded in the month of October and November coinciding with harvesting season of guava. Lowest activity was found in the month of January.

Key word *: Bactrocera* spp., *Methyl eugenol, Cue lure, Guava fruit flies, Seasonal incidence*

Introduction

The seasonal incidence of any insect is associated with prevailing weather parameters. The pest status changes accordingly based on abiotic factors like temperature, relative humidity, rainfall etc. It was thought worthwhile to know the factors affecting fruit fly population for effective management of the pest, hence present investigation was undertaken.

Material and Methods

The seasonal incidence studies were made in the guava orchard of the Mahatma Phule Krishi Vidyapeeth, Rahuri, from June 2010 to May 2011. Four methyl eugenol and cue lure traps each were installed by maintain 3 meter distance from ground level and 40 meter apart from each other. Fruit flies collected from each trap were pooled for each week throughout the study period and identified using taxonomical keys of Dr. C.A. Viraktamath and Dr. K.J. David, UAS, GKVK, Bangalore. The meteorological data was procured from the Department of Horticulture, MPKV Rahuri and trap catches were correlated with the weather parameters viz. weekly minimum and maximum temperature, relative humidity and rainfall.

Results and Discussion

Four species of fruit flies namely, *Bactrocera dorsalis, Bactrocera correcta, Bactrocera zonata* and *Bactrocera verbascifoliae* were recorded in methyl eugenol traps while, *Bactrocera cucurbitae* was recorded in cue lure traps.

Population of *B. dorsalis* which was 94.25 fruit fly /trap/week during 23rd standard week of June. In 2010, the population of *B. dorsalis* was recorded throughout the year. The population of *B. dorsalis* increased rapidly and recorded the highest level of population in 48th standard week of November with trap catches of 232.25 fruit flies/trap/week. The findings are in agreement with reports of Shukla and Prasad (1985); Vargas *et al.* (1989); Dong *et al.*

***Corresponding author's email:** mr.nishantukey@gmail.com

(1995) and Clarke *et al.* (2001); Zhi *et al.* (1995) concluded that peak period and number of adult occurrence differed yearwise. The incidence of *B. dorsalis* in June was recorded by Makhmoor and Singh (1998) at Jammu and Kashmir. Dale (2002) and Chaudhary and Jamal (2002) recorded the incidence of *B. dorsalis* coinciding with maturity of guava under various environmental condition in Pakistan. Similar results were obtained by Viraktamath and Sureshbabu (2004); Ravikumar and Viraktamath (2006).

The highest population of *B. zonata* was observed during June and July 2010. However, the highest number of *B. zonata* was trapped during the 28th standard week of July with catches of 149.25 fruit flies/trap/week. Thereafter the catches decline rapidly at 30th week of July reaching at 34.25 fruit flies/trap/week. The present result confirms the findings of Agrawal *et al.* (1999); Jalaluddin *et al.* (1999); Ravikumar and Viraktamath (2006). However, Khalid Mahmood and Mishkatullah (2007) showed low population of *B. zonata* in the month November to February.

During the entire season, population of *B. correcta* varied from 4.25 to 52.25. The population of *B. correcta* was at a level of 26.25 fruit flies /trap/week during the 23rd standard week of June. In September the population increased gradually and reached at highest level 52.25 during 44th standard week of October. Present results are in line with the reports of Jalaluddin *et al.* (2001); Clarke *et al.* (2001) who recorded peak catches of *B. correcta* from July-August. Ravikumar and Viraktamath (2006) recorded unimodal pattern of *B. correcta* population with peak incidence from June- September in guava.

The population of *B. verbascifoliae* was at lower level throughout the study period with recording maximum number of fruit flies 16.25 fruit flies/trap/week during 11th standard week of March. Thereafter, the population declined reaching the next higher peak of 14.25 fruit flies /trap/week during 20th standard week of May 2011. Such low population of *B. verbascifoliae* indicates that guava is not preferred host at Ahmednagar District. However, Madhura and Viraktamath (2003) have recorded *B. verbascifoliae* attracted to methyl eugenol trap.

During the study period the population of *Bactrocera cucurbitae* was increased gradually up to 28th standard week of July with recorded catches of 15.25 fruit flies/trap/week. Slight decline in population was observed in the 29th standard week with the catches of 12 fruit flies /trap/week. The total population of *B. cucurbitae* obtained was 199.25/trap with the mean population of 3.83 fruit flies/ trap/ week. The present findings are in conformity with Laskar and Chatterjee (2010) who recorded the incidence of *B. cucurbitae* from June, July and August and low population in December, January and February.

When the total number of fruit flies was considered, species *Bactrocera dorsalis* was found dominant over all other species recording highest population throughout the year followed by *B. zonata*, *B. cucurbitae* and *B. correcta* in descending order. The similar findings were reported by Dale (2002), Chaudhary and Jamal (2002) and Ravikumar and Viraktamath (2006).

There was strong positive correlation between population of *B. zonata* at maximum and minimum temperature. The population of *B. zonata* showed positive correlation with morning relative humidity. Similar trend was found with total rainfall having positive and significant correlation with fruit infestation. The results confirmed the findings of Gupta and Bhatia (2000), Viraktamath and Sureshbabu (2004) and Ravikumar and Viraktamath (2006).

B. dorsalis had positive correlation with minimum temperature however, maximum temperature

Table. Correlation coefficient of trap catches with weather parameter in guava orchard of Ahmednagar district

Fruit fly species	Temperature (°C)		Relative humidity (%)		Rainfall (mm)
	Maximum	Minimum	Morning	Afternoon	
Bactrocera zonata	0.402974**	0.576459**	0.343204*	0.191313	0.328788*
Bactrocera dorsalis	0.042984	0.341746*	0.109959	0.216535	0.112489
Bactrocera correcta	0.261011	0.006739	-0.13604	-0.33886*	-0.20417
Bactrocera verbascifoliae	0.457356**	0.084947	-0.13058	-0.38013**	-0.1634
Bactrocera cucurbitae	0.3599**	0.5655**	0.3459*	0.2273	0.3269*

n = 52 and Table 'r' values at 5 % is 0.273 and at 1 % is 0.354

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

showed positive but non-significant correlation. Similarly, Positive but non-significant correlation was observed between populations of *B. dorsalis* of relative humidity at morning and afternoon. The results are in agreement with Makhmoor and Singh (1998) who found significant positive correlation with temperature, relative humidity and rainfall in *B. dorsalis*.

Trap catches of *B. correcta* showed a non significant positive correlation with maximum and minimum temperature. However, relative humidity at morning and at afternoon showed negative correlation with population. Rainfall had non-significant negative correlation with population of *B. correcta*. The present findings are in conformity with Viraktamath and Sureshbabu (2004) who reported negative correlation with morning relative humidity in *B. correcta*. However, present results are in contrary with reports of Ravikumar and Viraktamath (2006) who reported positive correlation with temperature, relative humidity and rainfall.

Trap catches of *B. verbascifoliae* had a high significant positive correlation with maximum temperature however; minimum temperature had non-significant positive correlation with population.

The *B. cucurbitae* showed strong positive correlation with maximum and minimum temperature while relative humidity at morning was positively correlated however, evening relative humidity shown positive but non-significant correlation. Rainfall also showed a significant positive correlation with population of *B. cucurbitae.* The present findings are in agreement with Kate *et al.* (2009) and Laskar and Chatterjee (2010) who found positive correlation with temperature, relative humidity and rainfall in *B. cucurbitae*.

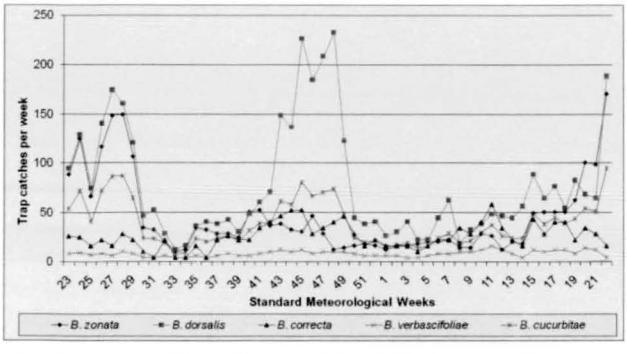

Fig. 1. Seasonal incidence of fruit fly trap catches from June 2010- May 2011 in guava orchard of Ahmednagar district

Conclusion

Highest population of fruit flies was observed during rainy season with some peaks in winter but in summer the fruit fly population was at lower levels. *B. dorsalis* was dominant than other trapped species of fruit flies. The highest population in July may be due to the end of mango season and the flies from mango orchard diverted towards guava as being alternate host. The correlation between populations of guava fruit flies indicated significant and positive correlation between maximum and minimum temperature with guava fruit flies. In case of relative humidity at morning and afternoon incidence of *B. zonata, B. dorsalis* and *B. cucurbitae* was positively correlated however, significant negative correlation with relative humidity was found in case of *B. correcta* and *B. verbascifoliae* while, *B. correcta* and *B. verbascifoliae* showed non-significant negative correlation with total rainfall though, the significant and positive correlation was found between total rainfall and *B. zonata* and *B. cucurbitae*.

References

Agarwal, M. L., Pramod Kumar and Vinod Kumar. 1999. Population suppression of *Bactrocera dorsalis* (Hendel) by *Bactrocera zonata* (Saunders) (Diptera: Tephritidae) in North Bihar. *Shashpa.* 6 (2): 189.

Chaudhary, M. M. and Jamal, A. Q. 2002. Effect of abiotic factors on population fluctuation of oriental and peach fruit flies at Rawalpindi, Pakistan. *Pakistan J. Zool.* 32 (2):182.

Clarke, A. R., Allwood, A., Chinajariyawong, A., Drew, R. A. I., Hengsawad,C., Jirasurat, M., Krong, C. K., Kritsaneepaiboon, S. and Vijaysegaran, S. 2001. Seasonal abundance and host use patterns of seven *Bactrocera* Macquart species 25 (Diptera: Tephritidae) in Thailand and Peninsular, Malaysia. *Raffles Bull. Zool.* 49: 207.

Dong, C. H., Chang, Q. Z., Yang, P. G. and Liang, G. Q. 1995. Seasonal population dynamics of melon and oriental fruit fly and pumpkin fruit fly in Guangzhou area. *Acta Phytophylacica Sinicia* 22 (4): 348.

Gupta, D. and Bhatia, R. 2000. Population fluctuation of fruit flies, *Bactrocera* spp. in sub mountainous mango and guava orchards. *J. Applied. Hort.* 2 (1): 47.

Jalaluddin, S. M., Natarajan, K. and Sadakathulla, S. 2001. Population fluctuation of the guava fruit fly *Bactrocera correcta* (Bezzi) in relation to hosts and abiotic factors. *J. Expt. Zool.* 4 (2): 323.

Jalaluddin, S. M., Natarajan, K., Sadakathulaa, S. and

Balasubramaniyam, S. 1999. Discovery of the guava fruit fly *Bactrocera correcta* (Bezzi). *Entomon.* 24 (2): 195.

Kate, A. O., Bharodia, R. K. Joshi, M. D. Pardeshi, A. M and Makadia, R. R. 2009. Seasonal incidence of fruit fly, *Bactrocera cucurbitae* (Coquillet) on cucumber. *Asian Sci.* 4 (1 & 2): 83.

Khalid Mahmood and Mishkatullah. 2007. Population dynamics of three species of genus *Bactrocera* (Diptera: Tephritidae: Dacinae) in BARI, Chakwal (Punjab). *Pakistan J. Zool.* 39 (2): 123.

Laskar, N and Chatterjee, H. 2010. The effect of meteorological factors on the population dynamics of melon fly, *Bactrocera cucurbitae* (Coq.) (Diptera: Tephritidae) in the foot hills of Himalaya. *J. Appl. Sci. Environ. Manag.*14 (3): 53-58.

Madhura, H. S. and Viraktamath, C. A. 2003. Efficacy of different traps in attracting fruit flies (Diptera: Tephritidae). *Pest Manag. Hort. Ecosys.* 9: 153.

Makhmoor, H. D. and Singh, S. T. 1998. Effective concentration of methyl eugenol for the control of guava fruit fly, *D. dorsalis* in guava orchard. *Ann. Plant Prot. Sci.* 6 (2): 165.

Ravikumar, C. H. and Viraktamath, S. 2006. Influence of weather parameters on fruit fly trap catches in Dharwad, Karnataka. *Pest Manag. Hort. Ecosys.* 12 (2): 143.

Shukla, R. P. and Prasad, V. G. 1985. Population fluctuations of the oriental fruit fly, *Dacus dorsalis* Hendel in relation to hosts and abiotic factors. *Tropical Pest Manag.* 31: 273.

Vargas, R. J., Stark, J. D. and Nishida, T. 1989. Abundance, distribution and dispersion indices of the oriental fruit fly and melon fly (Diptera: Tephritidae) in Kavai, Hawaiian Islands. *J. Econ. Entomol.* 82: 1609.

Viraktamath, S. and Sureshbabu, K. 2004. Species composition and population dynamics of fruit flies (Diptera: Tephritidae) on Guava. *South Indian Hort.* 52 (1-6): 317.

Zhi Ying, Z., Dayu, H. and Yuping, S. 1995. Population dynamics of oriental fruit fly in Yunnan Province. *Acta Phytophylacica Sinica.* 22 (3): 211.