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Short Note

Population dynamics of fruit flies, *Bactrocera* spp. (Diptera: Tephritidae) infesting mango in Himachal Pradesh

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The mango is fast emerging as a potential crop in low hills of Himachal Pradesh. The crop is attacked by many insect pests of which fruit flies are most devastating. Two fruit fly species, *Bactrocera dorsalis* (Hendel) and *B. zonata* (Saunders) have been recorded on mango in Himachal Pradesh (Bhatia and Gupta, 2003). The control of fruit flies is very difficult as larvae feed inside the fruits and the infestation is noticed only when the damage has already been done. Therefore, monitoring of fruit fly populations in an area is very important not only for management of pest but also for developing ecologically sound management practices. The traps baited with methyl eugenol have been used for monitoring fruit fly populations as well as for controlling fruit flies through male annihilation (Gupta *et al.*, 1990; Singh, 1997; Gupta and Bhatia, 2000; Suresh Babu and Viraktamath, 2003). The present studies were, therefore, undertaken to study the population dynamics of fruit flies in mango orchard in low hills of Himachal Pradesh and to study the role of meteorological factors in population build up, if any.

The studies were conducted in farmer's orchard at village Jalari in district Hamirpur falling in low hills of Himachal Pradesh. Locally made bottle traps containing 100 ml aqueous solution of 0.1 per cent methyl eugenol (a male attractant) and 0.05 per cent malathion were used for monitoring the population of fruit flies on 20-25 years old mango trees (cv. Dashehari). The traps were installed in mango orchard at the rate of 10 traps per hectare. The fruit fly catches were recorded at weekly interval form third week of March 2005 to end of May 2006 and solution in traps was replenished after each counting. The population of each species was monitored separately throughout the study period. The meteorological data in respect of maximum and minimum temperature, relative humidity and rainfall recorded at AWS, Hamirpur were used to work out the influence of weather parameters on fruit fly catches. For recording the field incidences a sample of 20 mango fruits was collected at weekly interval during 25th to 30th standard week from experimental orchard and examined in the laboratory for fruit fly infestation.

B. dorsalis was recorded as the predominant fruit fly species accounting for 66.4 per cent of the fruit flies trapped. The maximum catch (274.8 males/ trap) of *B. dorsalis* was recorded during 30th standard week (SW) (second fortnight of July) which also synchronized with ripening period of mango fruits in the area (Fig. 1). After attaining the peak, the population started declining and reached at its lowest (no catch) in the first week of January. Thereafter, the population again started rising with the rise in the temperature. Similar trend in mixed population of *B. dorsalis* and *B. zonata* has been recorded by Gupta and Bhatia (2000) in sub mountainous mango and guava orchards in Himachal Pradesh.

B. dorsalis was recorded as predominating species during all the observation weeks except 20-24 SWs during 2005 and 17-22 SWs during 2006, where the population of *B. zonata* was recorded higher than *B. dorsalis*. This higher population of *B. zonata* synchronized with ripening of peach crop in the adjacent area. In 2005, first peak (57.4 males/ trap) of *B. zonata* was recorded during 21st SW (fourth week of May) followed by second peak (79.0 males/ trap) during 27th SW (first week of July). The population of *B. zonata* declined, thereafter with no catch in first fortnight of January, 2006. The maximum catch (197.0 males/ trap) of *B. zonata* occurred during 18th SW of 2006. Suresh Babu and Viraktamath (2003) recorded peak activity of *B. zonata* during 21st and 22nd SWs in northern Karnataka, whereas, Anjum *et.al.*, (2000) reported peak activity of this species during first week of July in Pakistan. The trap catches of both the species had positive and significant correlation with maximum and minimum temperature (Table 1), thereby indicating the role

Table 1. Correlation coefficient (r) of trap catches of fruit flies with weather parameters in mango orchard (n=63), District Hamirpur, Himachal Pradesh

Fruit fly	Temperature		Relative humidity	Rainfall
	Minimum	Maximum		
Bactrocera dorsalis	0.677**	0.387**	0.514**	0.386**
B. zonata	0.361**	0.545**	-0.200	0.089
Total fruit fly population	0.717**	0.610**	0.265*	0.340**

* Significant at P=0.05, ** Significant at P=0.01

of temperature in population build up. These results are in agreement with Gupta and Bhatia (2000), who also observed positive and significant correlation of both the species with minimum and maximum temperature. Besides, *B. dorsalis* also showed positive and significant correlation with average relative humidity and rainfall. In low hills of Himachal Pradesh the mango crop ripens during rainy season when the relative humidity is high, which helped in population build up of *B. dorsalis*. These finding get support from Gupta and Bhatia (2000). *B. zonata* showed negative correlation with relative humidity and positive with rainfall, however, the values were non significant. The negative correlation of *B. zonata* with relative humidity and rainfall has earlier been observed by Agarwal and Kumar (1999) and Suresh Babu and Viraktamath (2003).

The fruit fly infestation in mango was first recorded during 27th SW with 10 per cent fruit infestation (Table 2). The infestation during the observation weeks ranged between 5 and 10 per cent. Gupta and Bhatia (2000) have also recorded 8-10 per cent fruit fly infestation in sub mountainous mango orchards. A positive and highly significant correlation (r=0.917) was worked out between trap catches and fruit fly infestation. Similar relationship in mango orchard has also been recorded by Suresh Babu and Viraktamath (2003) in northern Karnatka.

Table 2. Relationship of trap catches with fruit infestation in mango orchard during 2005

Standard week	Mean No. of males/ trap / week*	Per cent fruit infestation
25 (17 June - 23 June)	63.8	0.0
26 (24 June - 30 June)	127.4	0.0
27 (1 July -- 7 July)	219.8	10.0
28 (8 July - 14 July)	181.6	5.0
29 (15 July - 21 July)	169.0	5.0
30 (22 July - 28 July)	296.0	10.0

Correlation coefficient (r) of trap catches with per cent fruit infestation: 0.917 (significant at P=0.01) * Mixed population of *B. dorsalis* and *B. zonata*

These studies revealed that two fruit fly species viz., *B. dorsalis* and *B. zonata* are associated with mango in low hills of Himachal Pradesh with former being the major one. Further, the weather parameters along with ripening period of mango have important role in regulation of fruit fly population in the area.

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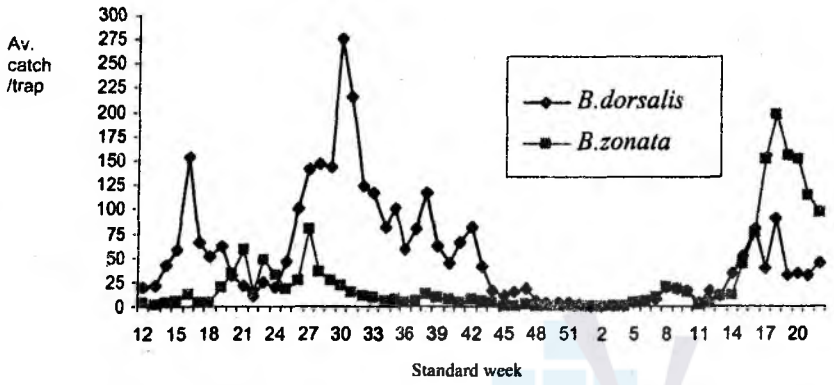


Fig. 1. Population fluctuation of fruit flies during 2005-06 on mango

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