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POPULATION DYNAMICS OF MANGO FRUIT FLIES *BACTROCERA* SPP.

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ABSTRACT

Population dynamics of fruit flies *Bactrocera dorsalis* Hendel and *B. correcta* Bezzi were studied in mango ecosystem at Veppalampatti location in Krishnagiri district of Tamil Nadu from October 2017 to September 2018. The fluctuations in the occurrence of adult fruit flies were assessed by methyl eugenol trap catches at fortnight intervals in fixed locations. The results revealed that *B. dorsalis* reached the first peak (116.00 flies/ trap) in first fortnight of June, 2018. Relatively, the initial counts of *B. correcta* was maximum and the first peak (195.00 flies/ trap) was observed during first fortnight of October, 2017. Correlation of trap catches with weather parameters revealed that *B. dorsalis* trap catches were influenced to an extent of 63%, whereas *B. correcta* occurrence was correlated with rainfall only.

Key words: *Bactrocera dorsalis*, *B.correcta*, mango, trap catches, peaks, weather parameters, correlation coefficients, regression

Mango is one of the most popular fruit crops, it is considered as the national fruit of India (Mukherjee, 1958). Tephritid fruit flies represent the most economically important group of polyphagous dipterous pests, affecting the production and marketability of mango (Robinson, 1989). The Oriental fruit fly *Bactrocera dorsalis* Hendel and the guava fruit fly *Bactrocera correcta* Bezzi are the two main fruit fly species in mango ecosystem in India (Kapoor, 1993). Both these are attracted to the para-pheromone, methyl eugenol which is used in traps for monitoring and management (Verghese et al., 2006). In Karnataka, the more common species of fruit fly infesting mango fruits are *B. dorsalis*, *B. correcta* and *B. zonata* Saunders (Verghese and Sudha Devi, 1998). Among abiotic factors, weather parameters influence the pest population. Prediction of fruit fly incidence in advance helps the farmers to schedule the management strategies (Jayanthi and Verghese 2011). Such studies on the population dynamics of fruit flies in mango with focus on *B. dorsalis* had been done (Gajalakshmi et al., 2011). The present study is on the peak activity of fruit fly in relation to local weather factors in representative mango growing tracts in Krishnagiri district of Tamil Nadu.

MATERIALS AND METHODS

The study was taken up on Bangalora variety in a mango orchard at Veppalampatti village of Krishnagiri District from first fortnight of October 2017 to the second fortnight of September 2018. The fruit flies caught using two methyl eugenol traps (standard white jar traps- 15 cm high x 10 cm dia) supplied by Sun Agro Biotech Research Centre, Chennai) were assessed with traps placed in two locations. The study focused on the two common species *B. dorsalis and B. correcta*. Two traps were hung in outer and lower branches of the selected mango trees, with a distance of 50 m between each trap at about 2 m height above the ground. The fruiting period of mango in Veppalampatti village was from April to August. The species collected from each trap were identified as per the taxonomic key provided by David and Ramani (2011). The counts obtained at fortnightly intervals were analysed for correlation with weather parameters viz., maximum and minimum temperature (°C), rainfall (mm) as per

statistical methodology detailed in Gomez and Gomez (1983).

RESULTS AND DISCUSSION

The results on the trap catches revealed the occurrence of *B. dorsalis* and *B. correcta,* showing considerable variation from October 2017 to September 2018. The initial *B. dorsalis* catch during 1st fortnight of October 2017 was 22.00 flies/ trap; this decreased further (8.00 flies/ trap) in 2nd fortnight of October 2017 and reached its lowest level (1.50 flies/ trap) during second fortnight of March, 2018. Thereafter the adult catches showed significant increase from first fortnight of April, 2018 (15.00 flies/ trap) which reached a first peak (116.00 flies/ trap) in first fortnight of June, 2018. The catches declined gradually (105.50 flies/ trap) from second fortnight of June, 2018 and reached the lowest level (17.00 flies/ trap) during second fortnight of September, 2018 (Fig. 1). These results are in conformity with the findings of Gajalakshmi et al. (2011) who observed a peak of *B. dorsalis* during June. Bansode and Patel (2018) also reported similar trend from South Gujarat, while Verghese and Sudhadevi (1998) observed peak occurrence in June and August. The present observations agree with those of Nair (1995) on *B. dorsalis* that peak was during June to July; and those of Ravikumar and Viraktamath (2006) and Ranjitha and Viraktamath (2006) who observed that *B. dorsalis* occurred in mango orchard at Dharwad, during late July.

In case of *B. correcta*, the first peak was observed (195.00 flies/ trap) during first fortnight of October, 2017; then it decreased from second fortnight of October (76.00 flies/ trap) to first fortnight of March (0.00 flies/ trap). The catches increased again from second fortnight of March (2.50 flies/ trap) and reached a second peak during first fortnight of May, 2018 (9.00 flies/ trap), with further catches fluctuating between second fortnight of May (4.00 flies/ trap) to first fortnight of June (9.50 flies/ trap). The third peak was during second fortnight of June (15.00 flies/ trap) which declined from first fortnight of July (3.00 flies /trap) to reach the least numbers in second fortnight of September (1.00 flies/ trap) (Fig. 1). These findings are in line with those of Suresh Babu and Viraktamath (2003), and contradictory to those of Gajalakshmi et al. (2011) who reported that *B. correcta* peak occurrence was during May at Coimbatore, Kanyakumari and Paiyur. The match in peak with fruiting period in local mango crop was similarly reported by Sarada et al. (2001) with maximum fly catches from May to July coinciding with the fruit maturity period at Tirupati in Andhra Pradesh.

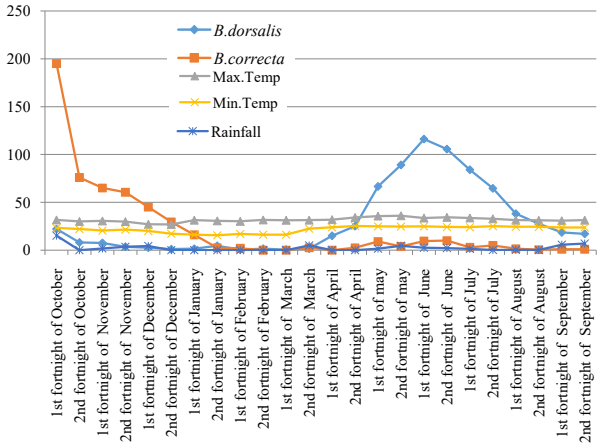

Fig. 1. Population dynamics of *B. dorsalis* and *B. correcta* in mango (2017-2018)

Trap catches of *B. dorsalis* showed a significant positive correlation with maximum (r = 0.742) and minimum temperature (r = 0.640), but not correlated with rainfall; the weather factors together influence the catches to the extent of 63% (Table 1). Agarwal et al. (1995) observed a significant positive correlation between trap catches of *B. dorsalis* and maximum and minimum temperatures. Correlation of *B. dorsalis* trap catches and weather parameters showed a significant positive relationship with maximum and minimum temperatures, and negative one with rainfall and relative humidity (Kannan and Rao, 2006). Deng et al. (2006) also found that temperature and rainfall had significant effects.

The trap catches of *B. correcta* revealed a significant positive correlation with rainfall (r = 0.533), but not with temperatures; weather factors together influence the trap catches to the extent of 53% (Table 1). These results are in line with those of Jalaluddin et al. (2001) who reported that *B. correcta* trap catches showed a significant positive correlation with minimum temperature and rainfall in guava ecosystem in Tamil Nadu. The present results corroborates with those of Sarada et al. (2001) and Hasyim et al. (2008) that rainfall exhibits a positive and highly significant correlation. The present results are not in agreement with those of Sushil Kumar et al. (1997) that *B. correcta* trap catches exhibited a positive correlation with maximum and minimum temperature, whereas, rainfall, sunshine hours and relative humidity had no significant effect. Variations in the relationship between trap catches and weather parameters point out that population of fruit flies mainly depends on the availability of host crop.

Table 1. Relations between weather parameters and trap catches of *Bactrocera* spp.

Fruit fly species	Correlation coefficient (r) Max. temp. (^{0}C) (X_1)	Min. Temp. (^{0}C) (X_2)	Rainfall (mm) (X_3)	Multiple linear regression equation (Y)	Coefficient of determination (R^2)
B. dorsalis	0.742**	0.640**	0.035 ^{NS}	$Y= -334.37+9.01X_1+3.75X_2-0.77X_3$	0.626
B. correcta	-0.245 ^{NS}	0.014 ^{NS}	0.680**	$Y= 156.64-4.37X_1-0.73X_2+8.70X_3$	0.529

X_1 = maximum temperature; X_2 = minimum temperature; X_3 = rainfall; Y = no. of fruit flies; **Significant p= 0.01; NS= Non significant

Similar results were also obtained by Shekrappa et al. (1998) and Madhura (2001).

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