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Influence of weather parameters on mango fruit fly, *Bactrocera dorsalis* H.

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Abstract
The investigations on the seasonal incidence of mango fruit fly, *Bactrocera dorsalis* (Hendel) was carried out at the mango orchard, College of Agriculture, N.A.U., Bharuch during 2012-13 to 2014-15. The three year pooled data revealed that the fruit fly, *Bactrocera dorsalis* was active throughout the year on the mango orchard. The fruit fly population fluctuates at various time interval and range between 4.47 to 128.60 fruit flies per trap with maximum catches (128.60 fruit flies/trap) recorded in 28th standard meteorological week (SMW) *i.e.* 9th to 15th July, while minimum catches (4.47 fruit flies/trap) recorded in 3rd standard meteorological week (SMW) *i.e.* 15th to 21st January. The pooled analysis of all the three years showed that significant positive correlation was observed between minimum temperature, morning relative humidity, evening relative humidity, wind velocity and rainfall with fruit fly population while, it had significant negative correlation with sunshine hours.

Keywords: Mango, fruit fly, *Bactrocera dorsalis*, correlation coefficient

Introduction
Mango is one of the most important fruit crops grown in India. Besides mango hopper, it is severely damaged by fruit flies. Most common species attacking the mango crop is *Bactrocera dorsalis* (Verghese and Devi, 1998) [9]. The incidence of fruit fly not only reduces the yield and quality but also cause considerable economic loss. In India, it has been reported to cause crop loss up to Rs. 29,460 million per annum in mango, guava, sapota and citrus (Mumford, 2001; Mishra *et al.*, 2012) [5, 4]; whereas in south Gujarat, damages to the tune of 16 to 40 and 4 to 2 per cent have been reported in mango and sapota, respectively (Patel and Patel, 2005) [7]. The population build of any insect is very intimately associated with weather parameters prevailing during preceding and corresponding periods. The pest status does not remain static throughout the year but changes accordingly based on abiotic factors like temperature, humidity, rainfall and sunshine *etc*. Information on seasonal population fluctuation and peak activity of fruit fly in relation to weather factors are essential, so as to evolve schedule for its effective and timely control. For the effective management of any pest it is very essential to know its seasonal incidence so that accordingly the IPM of that pest is planned. Considering the importance of the fruit flies in mango the present experiment was designed.

Materials and methods
The investigations were carried out at the Mango orchard, College of Agriculture, N. A. U., Bharuch during 2012-13 to 2014-15. Ten pheromone traps (Nauroji- stone house fruit fly trap) per ha were installed for monitoring fruit fly population in Mango orchard at Bharuch. Observations on number of fruit fly trapped were recorded at weekly interval. Mean fruit flies per trap worked out. The data on trapped flies were correlated with weather parameters.

Results and discussion
The three year pooled data presented in table 1 and fig 1 revealed that the fruit fly, *Bactrocera dorsalis* was active throughout the year on the mango orchard. The fruit fly population fluctuates at various time interval and range between 4.47 to 128.60 fruit flies per trap with maximum catches (128.60 fruit flies/trap) recorded in 28th standard meteorological week (SMW) *i.e.* 9th to 15th July. The various correlation coefficients were also worked out between fruit fly and abiotic factors. The pooled analysis of all the three years (Table 2) showed that significant positive correlation was observed between minimum temperature (r=0.475), morning relative humidity (0.385), evening relative humidity (r= 0.459), wind velocity

(r=0.306) and rainfall (r=0.171) with fruit fly population while, it had significant negative correlation with sunshine hours (r= -0.297). So, looking to the relationship of abiotic factors on overall population, it may be concluded that fruit fly population was directly influenced by minimum temperature, relative humidity (morning and evening), wind velocity and rainfall. This implies that the increase in temperature, relative humidity, and rainfall and wind velocity also increases the fruit fly population and vice- versa. This interpretation is sustained by the fact that fruit fly oriented fruit infestation or damage was higher from April to August during 2012-13 to 2013-14, which coincided with fruiting and harvesting periods of mango fruit, when temperature and relative humidity were also gradually increasing. These results are in agreement with those of Patel *et al* (2013) [6] and Bansode and Patel (2018) [1] according to him maximum population of *Bactrocera* spp. was observed during the month of April to July which coinciding with fruiting period of mango and fly population positively correlated with temperature (maximum, minimum and average), relative humidity (maximum, minimum and average), rainfall and wind velocity. Similar observation also recorded by Johnson *et al* (2015) [2] according to him fruit fly incidence was positively correlated with maximum and minimum temperature. The results are also accordance with Khan and Naveed (2017) [3] who revealed that the highest mean population of fruit fly remained at 499 in the month of August and decline afterwards and remained at 348 in the month of September. While the lowest population was recorded during November, December, January and February, They also reported that the population of the fruit fly was positively correlated with the temperature and availability of the mango ripened fruits. Sumathi *et al* (2019) [8] also reported that that fruit fly trap catches was high, 839.1 fruit flies per trap during July followed by August (563.8 fruit flies /trap) while the fruit fly population was low during January to April.

Table 1: Population dynamics of fruit fly in mango orchard

Standard Meteorological week (SMW)		Mean fruit fly population/ trap			
		2012-13	2013-14	2014-15	Pooled
	Period				
14	02nd to 08th April	15.60	10.20	45.20	23.67
15	09th to 15th April	16.80	14.20	46.40	25.80
16	16th to 22nd April	21.20	26.80	51.40	33.13
17	23rd to 29th April	27.00	35.60	54.20	38.93
18	30th April to 06th May	17.60	26.20	58.40	34.07
19	07th to 13th May	17.00	20.60	41.20	26.27
20	14th to 20th May	11.00	14.80	37.20	21.00
21	21st to 27th May	10.80	14.60	65.40	30.27
22	28th May to 03rd June	15.60	7.80	70.80	31.40
23	04th to 10th June	24.60	6.40	78.40	36.47
24	11th to 17th June	31.60	12.40	75.80	39.93
25	18th to 24th June	16.20	13.80	82.80	37.60
26	25th June to 01st July	18.40	16.40	55.20	30.00
27	02nd to 08th July	148.00	20.80	192.40	120.40
28	09th to 15th July	184.20	34.00	167.60	128.60
29	16th to 22nd July	119.00	71.20	123.00	104.40
30	23rd to 29th July	148.00	74.20	99.20	107.13
31	30th July to 05th August	126.80	95.80	82.00	101.53
32	06th to 12thAugust	113.20	65.20	54.20	77.53
33	13th to 19th August	99.80	29.20	33.40	54.13
34	20th to 26th August	84.20	15.20	18.40	39.27
35	27th August to 02nd September	104.60	14.80	38.60	52.67
36	03rd to 09th September	76.80	5.60	39.60	40.67
37	10th to 16th September	69.40	5.00	57.60	44.00
38	17th to 23rd September	54.80	4.60	31.60	30.33
39	24th to 30th September	30.60	2.80	24.60	19.33
40	01st to 07th October	25.20	5.20	24.00	18.13
41	08th to 14th October	21.00	5.00	31.80	19.27
42	15th to 21st October	19.80	4.40	22.80	15.67
43	22nd to 28th October	18.20	5.00	38.80	20.67
44	29th October to 04th November	50.80	4.60	44.00	33.13
45	05th to 11th November	59.00	8.40	41.00	36.13
46	12nd to 18th November	19.20	9.20	17.80	15.40
47	19th to 25th November	10.60	8.20	12.00	10.27
48	26th November to 02nd December	10.40	14.40	10.40	11.73
49	03rd to 09th December	8.00	16.60	8.20	10.93
50	10th to 16th December	6.40	13.60	5.40	8.47
51	17th to 23rd December	6.00	17.80	5.80	9.87
52	24th to 31st December	7.40	14.60	6.80	9.60
1	01st to 07th January	6.80	5.20	8.20	6.73
2	08th to 14th January	5.00	4.80	7.80	5.87
3	15th to 21st January	5.80	3.20	4.40	4.47
4	22nd to 28th January	5.20	5.40	5.80	5.47

5	29th January to 04th February	12.00	8.40	6.80	9.07
6	05th to 11th February	16.60	9.80	9.80	12.07
7	12th to 18th February	17.40	8.80	10.60	12.27
8	19th to 25th February	15.40	12.20	19.20	15.60
9	26th February to 04th March	9.20	13.80	19.60	14.20
10	05th to 11th March	8.80	17.80	24.60	17.07
11	12th to 18th March	5.00	36.80	29.60	23.80
12	19th to 25th March	4.20	41.20	32.80	26.07
13	26th March to 01st April	8.60	36.60	38.20	27.80

Table 2: Correlation coefficient of Mango fruit fly with weather parameters

Sr No	Weather parameter	Fruit fly			
		2012-13	2013-14	2014-15	Pooled
1	Maximum Temp.(MXT)	-0.204	-0.071	0.326*	0.075
2	Minimum Temp. (MIT)	0.456*	0.283*	0.679*	0.475*
3	Morning relative humidity (MRH)	0.566*	0.242	0.442*	0.385*
4	Evening relative humidity (ERH)	0.746*	0.375*	0.427*	0.459*
5	Wind velocity (WV)	0.362*	0.189	0.504*	0.306*
6	Bright Sunshine hour (BSS)	-0.761*	-0.464*	0.224	-0.297*
7	Rain fall(RF)	0.465*	0.121	0.275*	0.171*
8	Evaporation(EP)	-0.170	-0.066	-0.009	0.009

* Significant at 5 % level

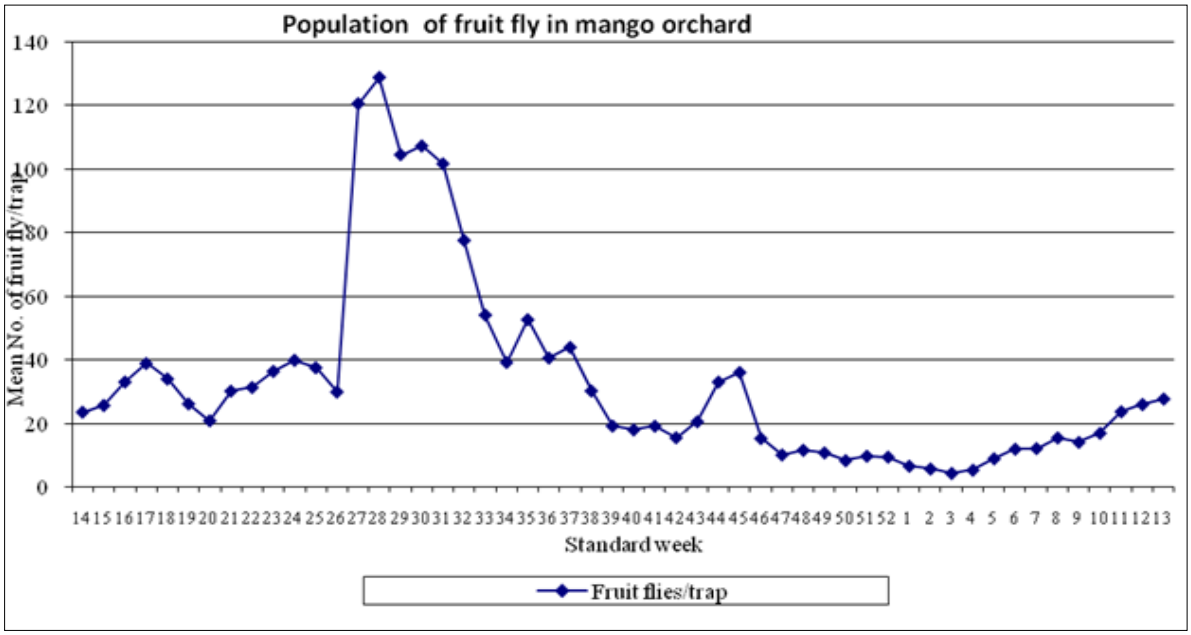

Fig 1: Population of fruit fly in mango orchard

Conclusion

Studies on population dynamics of fruit fly indicated that, the fruit fly population prevailed throughout the year in mango orchard. However, its maximum activity was found during April to August months. The significant positive correlation was observed between minimum temperature, morning relative humidity, evening relative humidity, wind velocity and rainfall with fruit fly population while, it had significant negative correlation with sunshine hours.

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