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Studies on Seasonal Cyclicity of *Bactocera correctus* Bezzi in Mango and Sapota Orchards Using Methyl Eugenol Trap

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ABSTRACT

This paper provides an analysis of data on seasonal incidence of *Bactocera correctus* Bezzi (Tephritidae : Diptera) infesting Mango and Sapota orchards, recorded during 1992-94 using Methyl Eugenol as sex attractant (a naturally occurring chemical in 'black Tulsi') in South Gujarat at Agricultural Experimental Station, Gujarat Agricultural University, Paria, District Valsad, Gujarat. Fruit flies were traped throughout the year in experimental Mango and Sapota orchards. In Mango, maximum trappings were recorded during second fortnight of April (453 fruit flies/trap) and during second fortnight of May (483 fruit flies/trap), thereafter, it declined gradually. Major activity of the pest occurred from March to June coinciding with the fruiting period of the crop. The population variations were positively correlated with temperatures (maximum, minimum and average) and other factors did not show any significant impact on population variation. In Sapota, major activity of the pest was noticed from April to September coinciding with fruiting period of the crop. The highest peak was noticed during first fortnight of June (580 fruit flies/trap) and the minimum during second fortnight of December. The trapped population variations exhibited significantly positive correlation with temperatures (minimum and average), relative humidities (Evening and average) and negative with Sun shine hours.

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INTRODUCTION

Mango, *Mangifera indica* Linn. is extensively grown in Gujarat occupying 26000 hectares, of which 70 per cent of area and 85 per cent of production is concentrated in Valsad district. Similarly, Chiku (Sapota) *Manilkera achraes* (Mill) (Forsberg) occupies 4700 hectares in Gujarat State, of which 80 per cent of area is in Valsad disrict. Thus, these two fruit crops are economically important fruit crops paying very good revenue in this region. Mango trees are prone to the attack of more than 350 species of insects, 8 species of mites and 13 species of nematodes reported from all over the world (Anonymous, 1985, Tandon and Verghese, 1985). Over 175 species of insects have been reported damaging Mango trees in India, however, insects which cause serious losses are hoppers, mealy bugs, fruit flies, shoot and stem borers, scale insects, stone weevil, gall midge and termites (Butani, 1979). Similarly, Chiku trees are attacked by about 25 insect pests, of which Chiku bud borer, fruit flies, scales and mealy bugs are important pests (Butani, 1979).

Fruit fly, *Bactocera Dacus correctus* (Bezzi) is a serious pest of Mango and Chiku causing qualitative loss (Shah and Vora, 1974). Since, in South Gujarat, separate as well as mixed plantation of Mango and Chiku orchards are there, the pest survives throughout the year particularly on Chiku trees having continuous habit of flowering and fruit bearing. Before developing insect pest management programme for specific agroecosystem, it is necessary to have the basic information on abundance and distribution of pest in relation to weather paremeters, as it helps in determining appropriate time of action and suitable effective method of control. It was therefore felt necessary to study the population rythms if this pest throughout the year with regards to abiotic factors in the region.

MATERIALS AND METHODS

The plastic bait traps (Length 25 cm : Diameter 15 cm.) containing Methyl Eugenol and Fenthion (Lebaycid) in petri dishes were used for the fruit fly survey. A piece (3 x 3 cm) of synthetic sponge was wetted with 2-3 drops of each chemical and it was placed in glass petri dish (5 cm diameter). Five such traps were placed separately in Mango and Chiku orchards and trap to trap distance was kept 100 metres. The total number of fruit flies were recorded at regular interval of 15 days during 1992-94. The traps were replenished after each observation. In order to study the instantaneous effect of weather parametres viz., maximum temperature (X_1), minimum temperature (X_2), average temperature (X_3), morning relative humidity (X_4), evening relative humiduty (X_5), average relative humidity (X_6), Sun shine (X_7), rainfall (X_8) and rainy days (X_9) as independent variables on population of the pest. Correlation coefficients were worked out by taking average population as dependent variable (Y). Meteorological data were recorded from meteorological observatory at Agriculture Experimental Station, Paria during the period under study.

RESULTS AND DISCUSSION

Population dynamics

It can be seen from Table 1 and figure 1 that the fruit fly population in Mango and Chiku orchards in South Gujarat remained considerably high during April, May and June. In case of Mango, the fruit fly was trapped throughout the year, but its population remained considerably higher during March to June exhibiting highest peak in second fortnight of May (483.50 fruit flies/trap), thereafter, it declined gradually. Similarly, in Chiku also fruit flies were trapped throughout the year. But, population started increasing considerably from first fortnight of April and reached to the peak in first fortnight of June (580 fruit flies/trap) and afterwards a decreasing trend in later period of the year was observed. It was observed that the flies were concentrated in higher numbers in Mango orchard than in Chiku orchard during March to May. While they were higher in Chiku orchard than in Mango orchards during June to December which were the ripening periods of respective crops in the region. There are few reports available on seasonal incidence of fruit fly in Mango as well as Mango Chiku mixed plantation. Patel (1973) and Jhala (1989) made similar observation on seasonal incidence of *D. correctus* and *D. dorsalis* respectively in mixed plantation (Chiku and Mango), wherein they also found major active period of the pest coinciding with ripening period of the fruit.

TABLE 1

Population of *Bactocera correctus* (Bezzi) during different months in Mango and Sapota orchards (1992-94).

Month	Fortnight	Average number of fruit flies per trap					
		Mango			Sapota		
		1992-93	1993-94	Pooled	1992-93	1993-94	Pooled
Jan.	II	18	22	20	16	19	17.50
	IV	34	36	35	19	26	22.50
Feb.	II	41	43	42	23	33	28
	IV	46	50	40	26	36	31
March	II	66	63	64	43	48	45.50
	IV	131	159	145	45	51	48
April	II	384	364	374	148	164	156
	IV	501	405	453	285	301	293
May	II	435	405	420	285	434	359.50
	IV	456	481	483.50	389	476	432.50
June	II	471	284	377.50	589	571	580
	IV	286	290	288	322	422	372
July	II	210	178	194	178	184	181
	IV	130	94	112	163	166	164.50
August	II	83	66	74.50	146	140	143
	IV	74	64	69	132	130	131
Sept.	II	28	23	25.50	130	129	127
	IV	36	36	36	89	78	82.50
Oct.	II	39	43	41	56	58	57
	IV	44	49	46.50	45	47	46
Nov.	II	43	53	48	40	39	39.50
	IV	28	37	32.50	40	30	34.50
Dec.	II	23	23	23	21	24	22.50
	IV	17	19	18	14	17	15

Fig.1 Meteorological data of AES Paria during 1992-94

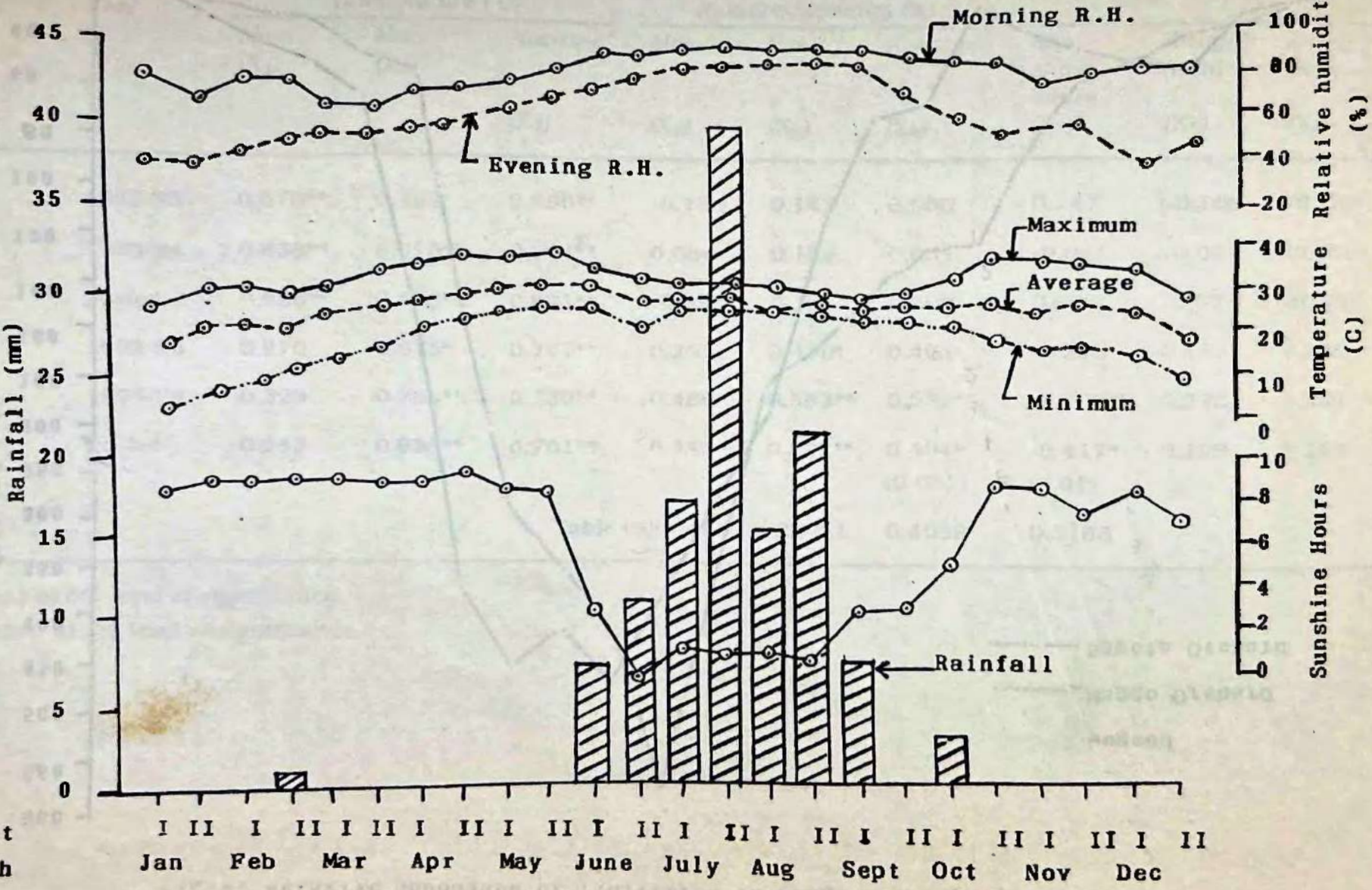

Fig.2. Relative abundance of fruitflies in Mango and Sapota Orchards.

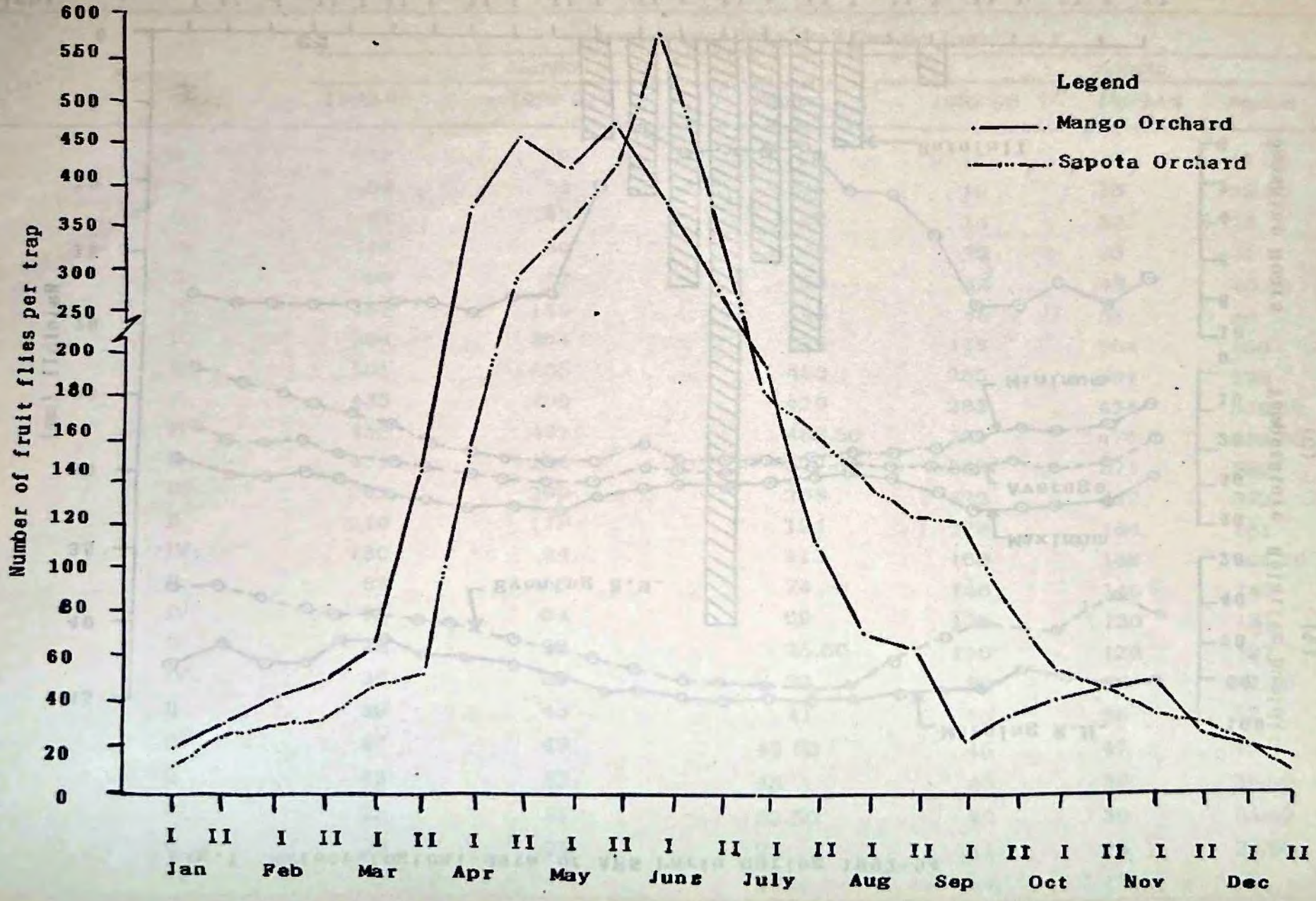

TABLE 2

Correlation between fruit fly population (Mango and Sapota) and weather factors.

Crop	Year	Correlation coefficient values (r)								
		Temperature (°C)			Relative humidity (%)					
		Max. (X_1)	Min. (X_2)	Average (X_3)	Mor. (X_4)	Eve. (X_5)	Average (X_6)	Sun shine hours (X_7)	Rainfall (mm) (X_8)	Rainy days (X_9)
Mango	1992-93	0.570**	0.499*	0.698**	-0.154	0.147	0.060	0.147	-0.108	-0.108
	1993-94	0.636**	0.615**	0.714**	0.064	0.159	0.031	-0.044	-0.060	-0.069
	Pooled	0.600**	0.553**	0.691**	-0.035	0.156	0.099	0.063	-0.074	-0.085
Sapota	1992-93	0.270	0.675*	0.747**	0.200	0.470*	0.403	-0.200	0.151	0.205
	1993-94	0.329	0.764**	0.739**	0.488*	0.563**	0.552**	-0.609**	0.213	0.362
	Pooled	0.265	0.696**	0.701**	0.342	0.542**	0.494*	-0.417*	0.198	0.297
							(0.05)	(0.01)		
					Table value of 'r' at 22 d.f.		0.4059	0.5168		

*Significant at 5% level of significance.

** Significant at 1% level of significance.

Influence of abiotic factors on incidence of fruit fly

The data presented in Table 1 and Table 2 indicated that dependent variable viz., fruit fly population in Mango (Y) had significant positive correlation with temperatures (Maximum and average). It is also evident that the average temperature during March to June (the period of higher activity of the pest) was on an average 28°C while during October to February (the period of low activity of the pest) it was on an average 22.97°C. Thus, when the temperature was more than 28°C the pest population was found to increase but when the temperature was decreasing below 22°C the pest population was found to decrease. Other factors showed no any significant impact on population variation. Similarly, in Chiku the pest population (Y) apart from showing positive correlation with temperatures (minimum and average) also showed significant positive correlation with relative humidities (Evening and average) and negative correlation with Sun shine hours. The pest population was maximum during second fortnight of June when the temperature (average) was 28.5°C and average relative humidity (84.25%) was considerably high. In Karnataka, higher population of *Dacus dorsalis* (Hendel) on Mango has been reported in the month of April-June and indicated positive correlation with maximum temperature during July 1975 to December 1978 (Bagle *et al.*, 1983). Seo *et al.*, (1982) also recorded almost similar pattern of incidence of Papaya fruit fly *D. dosalis* showing positive impact of temperature in Hawaii island.

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