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Seasonal Fluctuations of Melon Fruit Fly in Cucumber

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Abstract Seasonal fluctuations of fruit fly (*Bactrocera cucurbitae* Coq.) were monitored on cucumber using methyl eugenol-baited traps during 2008-10 in Raichur. Adults were captured from September to April months. Peak fruit fly population was noticed during 48th Standard week in 2008 and 49th Standard week in 2009. In both years gradual increase of population was observed from September to December month and there after decreased with lowest population in February month. The fly population was positively correlated with maximum temperature, minimum temperature, rainfall and evening relative humidity and it had negative relationship with morning relative humidity, however, the values of correlation coefficients were non-significant.

Keywords Seasonal incidence, Fruit flies, Cucumber.

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Introduction

Melon fly, *Bactrocera cucurbitae* (Coquillett) is a serious pest and a major limiting factor in the production of gourds,cucumber, melon and other cucurbits [1]. Yield loss varies from 30-100% depending on cucurbit species and season [2]. Adult females are directly involved in initiating and causing the damage in the growing fruits by ovipositing on tender shoots, flowers and flower buds while maggots feed on fleshy part of fruits causing decay and in some cases premature dropping. The use of pheromones for monitoring is the key to effective management of this pest. The Cuelure with methyleugenol have been reported to attract *B. cucurbitae* and *B. dorsalis* males. Owing to their powerful attractancy, parapheromones play an important role in current control programs of tephritid pests, both in detecting incipient population outbreaks and eradicating already established populations via male annihilation. The fruit fly activity varies a lot depending mostly on the prevailing climatic conditions and the diversity of other hosts in a particular agro-ecosystem. Hence, it is necessary to have basic information on the incidence of the pest in relation to weather parameters which help in determining appropriate time of action and suitable method of control. Monitoring pest population round the year provides basic information regarding the occurrence and peak incidence of the pest and also helps in formulating management strategies. Keeping this in view the present investigation on seasonal fluctuations of fruit fly population was studied.

Materials and Methods

Experiments were conducted at Horticulture Orchard , UAS, Campus, Raichur from 2008-2010.Cucumbers were sown once a month on a 300 m^2 plots. Experimental plots were surrounded by plantation crops viz., sapota, mango, citrus and fig. No pesticides were applied during the course of study and only regular cultural practices were carried out [3]. Adult fly populations were monitored with methyl eugenolbaited traps obtained from Pest Control India (PCI). This parapheromone-cuelure attracts *B. cucurbitae* males and *B.dorsalis* males. No insecticide was used to kill trapped adult flies as trapped flies were incapable of escaping until starving to death. Such four traps were installed in cucumber plots. The wooden blocks were replaced once in a month and the trapped flies were removed and observations were recorded at weekly intervals. Mean number of flies trapped were counted and used for analyzing seasonal fluctuations of fruit fly. Pooled mean of fruit flies trapped was counted and its correlation was computed with weather parameters viz., mean temperature (°C) (maximum and minimum), relative humidity (%) and rainfall (mm). Weather data was obtained from MARS, Raichur.

Results and Discussion

Adult fly activity was noticed throughout the study period. The seasonal incidence of melon fly was studied for two years from September, 2008 (36th SW) to April , 2010 (17th SW) (Table 1). The population of fruit fly, *B. cucurbitae* during 2008-09 increased from 36th standard week (SW) and upto 49th SW and thereafter decreased. The daily catches of fly population varied from 177.25 ± 0.48 (Mean ± SEM) to 73.50 ± 0.29 flies/week/trap with a peak catches of 73.50 ± 0.29 flies/trap/week during 48th SW and lowest population recorded during 8th SW with 17.25 ± 0.48 flies per trap. Similar trend was noticed during second year of study. During 2009-10 the activity of fruit fly was recorded from 36th SW to 17th SW wherein, daily catches increased from 36th SW to 49th SW with the highest trap catches recorded during 49th SW, 72.50 ± 0.29 flies and later and the population decreased from 49th SW. The lowest flies catches was recorded during 7th SW with 15.75 ± 0.25 flies trapped. The mean incidence obtained during two consecutive years revealed similar trend recording peak activity at 48th and 49th SW. During summer months fly activity reduced drastically. The active period of *B. cucurbitae* in India on different cucurbitaceous hosts has been reported to be from February to November with peak activity of fruit flies in August, September and October. In the present study the fruit fly activity reduced in January and February month which was due to low temperature as evidenced by correlation studies and also might be due cessation of breeding activities by adults due low temperature. Furthermore, many other workers

Table 1. Seasonal fluctuations of melon fruit fly. * Mean of 4 traps.

Months	Standard weeks	Trap catches (Mean ± SEm) 2008-09*	2009-10*
	36	26.75 ± 0.48	28.25 ± 0.25
	37	29.50 ± 0.65	31.75 ± 0.48
Sep	38	31.50 ± 0.65	35.00 ± 0.41
	39	38.25 ± 0.48	40.75 ± 0.25
	40	41.00 ± 0.71	43.75 ± 0.48
	41	44.50 ± 0.50	42.50 ± 0.65
Oct	42	44.75 ± 0.48	46.25 ± 0.25
	43	49.00 ± 0.41	50.50 ± 0.29
	44	55.00 ± 0.41	54.75 ± 0.48
	45	56.25 ± 0.25	51.75 ± 0.48
	46	60.75 ± 0.48	62.50 ± 0.29
Nov	47	62.00 ± 0.41	65.75 ± 0.48
	48	73.50 ± 0.29	68.25 ± 0.25
	49	70.00 ± 0.41	72.50 ± 0.29
	50	46.25 ± 0.25	40.75 ± 0.48
Dec	51	30.75 ± 0.63	26.50 ± 0.29
	52	26.75 ± 0.48	23.50 ± 0.65
	1	24.25 ± 0.48	19.75 ± 0.48
	2	21.75 ± 0.48	17.50 ± 0.29
Jan	3	19.50 ± 1.04	16.00 ± 0.41
	4	19.75 ± 0.48	17.25 ± 0.25
	5	18.50 ± 0.29	18.25 ± 0.48
	6	21.00 ± 0.41	16.50 ± 0.29
	7	19.50 ± 0.50	15.75 ± 0.48
Feb	8	17.25 ± 0.48	28.25 ± 0.25
	9	26.50 ± 0.50	24.25 ± 0.48
	10	31.25 ± 0.48	28.75 ± 0.25
Mar	11	33.50 ± 0.65	31.25 ± 0.48
	12	36.00 ± 0.41	33.50 ± 0.29
	13	36.75 ± 0.48	36.00 ± 0.41
	14	39.00 ± 0.41	41. 50 ± 0.29
	15	42.00 ± 0.41	41.75 ± 0.48
Apr	16	43.75 ± 0.48	43.50 ± 0.29
	17	48.50 ± 0.29	46.50 ± 0.29

Table 2. Correlation coefficient (*r*) of trap catches with weather parameters in orchard at UAS, Raichur.

Year	Temperature (°C) Maximum	Minimum	Relative humidity (%) Morning	Evening	Rainfall (mm)
2008-09	0.269	0.378	-0.247	-0.046	0.236
2009-10	0.086	0.210	-0.240	0.153	0.130

also reported peak activity of *B. cucurbitae* during different months of the year when the prevalent climatic condition was favourable. Maximum catches of fruit flies were recorded during November month and during April-May [4], from April to July [5] and mid-June to mid -November. from the present studies it is also evident the high fruit fly activity was noticed during November-December months and March-April months.

Data on trap catches was subjected to correlation and multiple regression analysis to find out the relationship between trap catchesof fruit fly (*B. cucurbitae*) and weather parameters such as total rainfall, maximum temperature, minimum temperature, morning and evening relative humidity. During 2008-09, cue lure trap catches of *B. cucurbitae* had a positive correlation with maximum (*r*=0.269) and minimum temperature (*r*=0.378) and rainfall (*r*=0.236) but had negative correlation with the morning (*r*=-0.247) and evening relative humidity (*r*=-0.046) (Table 2). There was no significant effect of maximum and minimum temperature on the fly catch in the trap. The role of other abiotic factors on the abundance of the fruit fly was non-significant. Similarly, during second year, trap catches and correlation with weather parameters shows that lure trap catches had positive correlation with maximum and minimum temperature, rainfall and evening relative humidity and had a non-significant negative relationship with the morning relative humidity. The multiple linear regression model fitted was $y = -50.93 + 2.299x_1 - 0.296x_2 + 0.363x_3 - 0.678x_4 + 0.298x_5$.

Where, y = Number of fruit flies trapped, x_1 =Maximum temperature (°C), x_2 = Minimum temperature (°C), x_3 = Morning relative humidity (%), x_4 =Evening relative humidity (%), x_5 = Total rainfall (mm).

All the parameters together contributed only 23.20%. Many earlier workers reported influence of weather parameters on the incidence of melon fly trap catches [6]. In the present studies temperature played a specific role in regulating the behavior of the fruit fly adults particularly on adult females with higher number of ovipositing females which might have contributed to population increase [7].

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