PUBLISHED ON 29TH FEB 2012

EFFECT OF ABIOTIC FACTORS ON POPULATION FLUCTUATION OF MELON FLY, *Bactrocera cucurbitae* Coquillett

F. K. CHAUDHARY AND G. M. PATEL

KRUSHI VIGYAN KENDRA

SARDARKRUSHINAGAR DANTIWADA AGRICULTURAL UNIVERSITY

DEESA - 385 535 GUJARAT, INDIA

fk_43@yahoo.co.in

ABSTRACT:

Population of male melon fly fluctuated throughout the year with peak population during July – September and February – March. During the hot (May) and cold (January) months of the year, its population was quite low. Correlation coefficient values indicated that all the weather parameters (except sunshine hours) showed positive influence having very profound effect in the multiplication and outbreak of the melon fly during different months of the year whereas, sunshine hours has detrimental effect on population build up male melon fly.

INTRODUCTION:

Melon fly, *Bactrocera cucurbitae* coquillett belonging to family Tephritidae order Diptera is the most important pest of cucurbitaceous fruits and vegetables. Due to its close association with cucurbitaceous vegetables like gourd and melon, it is commonly known as "Melon fly or Cucurbit fruit fly". Presently, there are 199 species of fruit flies known to occur in India. Among these, *Bactrocera cucurbitae* Coquillett., *Bactrocera zonata* (Saunders), *Bactrocera dorsalis* (Hendel), *Bactrocera diversa* Coq., *Bactrocera correcta* (Bezzi), *Bactrocera tau* (Walker), *Dacus ciliatus* Loew, *Carpomya vesuviana* Costa and *Mylopardalis pardilana* Bigot are common one (Kapoor, 1970). In India, more than 50 per cent of cucurbits were partially or completely damaged by the fruit fly (Narayanan and Batra, 1960). Cucurbits are more preferred and the losses vary from 40-80 per cent (Mote, 1975). About 30 to 40 per cent damage by the cucurbit fruit fly, *B. cucurbitae* have been recorded by Dhandapani and Vedamutha (1992) in the Palani hills of Tamil Nadu. In south Gujarat, the damage in little gourd (1 to 48 %) was recorded at Navsari (Patel, 1994). From these reports, it is evident that the attack of melon fly is a key factor in reducing the quality and quantity of the cucurbitaceous vegetable. It is essential to know the peak period of occurrence of this pest in view of getting higher yield of cucurbitaceous vegetables. Keeping these facts in mind, it was thought worthwhile to conduct investigations on population fluctuation and effect of abiotic factors to evolve an effective and economical strategy of management of this pest.

MATERIALS AND METHODS:

This experiment was conducted at Horticulture Instructional Farm, C. P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar from september, 2002 to August, 2004. To study the population fluctuation male of *B. cucurbitae,* six Patel Fruit Fly Traps were installed in the cucurbits field. The trap was prepared as described by (Patel and Patel, 1996) by cementing a plastic funnel of 7.5 cm diameter with a tubular passage of 2.5 cm length and 0.7 cm internal diameter, one each on inner side of lid as well as bottom. The funnels were fixed inside the body of jar using a synthetic resin fevicol (Plate I). Nuwood block (5.0 cm x 5.0 cm x 0.8 cm) impregnated with 4 drops of Cue-lure(sex pheromone) was kept in each fruit fly trap. The Nuwood block was charged with Cue lure at one month interval throughout the study tenure. Traps were hanged horizontally on an iron rod inserted in soil such that the trap remained one feet high over the cucurbit crop in the field. The observations on total number of male flies of *B. cucurbitae* trapped were recorded at weekly interval. The correlation with the various abiotic factors was worked out to study their effects on population build-up.

RESULTS AND DISCUSSION:

The results presented in table 1 indicated a good deal of fluctuation in adult population of *B. cucurbitae*. Based on mean of two years' results it was evident that the male fly catches attained the first peak during 38th standard week (297.5 males), second peak during 8th standard week (117.5 males), third peak during 32nd standard week (390 males). Thus, two peaks of its activity were observed during July to September, while third peak was during February to March. These findings are very close to that reported by Wen (1985).

During the hot month of May and cold month of January, the male fly population was quite low during both the years under study. Chawla (1966) reported the light activity of *B. cucurbitae* during the hot months of April to June, but increased in July with the starting of rainy season up to October. Sivankar and Dumbre (1985) reported the maximum activity of *B. cucurbitae* during July, September and October, while minimum during December – January. These reports are also in accordance with the present findings.

Male fly catches of the *B. cucurbitae* recorded during the two years indicated the role of some abiotic factors on the population fluctuation of this pest. Results presented in table 2 showed the relationship between the number of male flies trapped and different weather parameters. The relationship of all the abiotic parameters with number of male fly trapped was significant (except maximum temperature). Perusal of correlation coefficient values further suggested that all the parameters (except sunshine hours) showed positive influence on the population of *B. cucurbitae* having very profound effect in the multiplication and outbreak of the pest during different seasons

of the year. During course of study, it was observed that whenever there was rainfall, the fly catches increased abruptly. The male fly population of *B. cucurbitae* was negatively correlated with sunshine hours and such correlation was highly significant. The decrease in sunshine hours increased the activity of *B. cucurbitae* and vice-a-versa or conversely the cloudy weather led to increase in the activity of *B. cucurbitae*. The results also indicated that minimum temperature rather than maximum temperature governed population fluctuation of *B. cucurbitae*.

AKNOWLEDGEMENT:

Authors are thankful to Shri H. S. Madhura, Indian Institute of Horticultural Research, Bangalore for identifying the specimens of fruit flies.

REFERENCES:

Chawla, S.S. (1966). Some critical observations on the biology of melon fly, *Dacus cucurbitae* Coquillet (Diptera : Trypetidae). *Res. Bull. Punjab. Univ. (N.S.) Sci.,* **17** (1-2) : 105-109.

Dhandapani, N. and Vedamutha, P.G.B. (1992). Trapping fruit fly in chow-chow. *TNAU News Letter,* Dec., 1992.

Kapoor, V.C. (1970). Indian Tephritidae with their recorded hosts. *Oriental Insects.,* **49** (2) : 207-251.

Mote, U.N. (1975). Control of fruit fly (*Dacus cucutbitae*) on bitter gourd and cucumber. *Pesticides.,* **9** (8) : 36-37.

Narayanan, E.S. and Batra, H.N. (1960). Fruit flies and their control. Indian Council of Agricultural Research, New Delhi. India. p. 64.

Patel, R.K. (1994). Bionomics and control of fruit fly, *Dacus ciliatus* Loew (Tephritidae : Diptera) infesting little gourd, *Coccinia indica* Wight and Arnott. Ph.D. Thesis, Submitted to Gujarat Agricultural University, Sardarkrushinagar.

Patel, R.K. and Patel, C.B. (1996). Eco-friendly fruit fly trap. *J. Appl. Zoo Res.,* **7** (2) : 124-125.

Shivankar, D.T. and Dumbre, S.K. (1985). Bionomics and chemical control of melon fly. *J. Maha. Agric. Univ.,* **10** (3) : 298-300.

Wen, H.C. (1985). Field studies on melon fly (*Dacus cucurbitae*) and attractant experiment in Southern Taiwan. *J. Agric. Res.* (China). **34** (2) : 228-235.

Table 1. Number of male flies of *B. cucurbitae* trapped during different period of the year

Months	Standard weeks	Number of male fly trapped*		Mean catches
		2002-2003	2003-2004	
September	36	331	128	**229.5**
	37	207	134	**170.5**
	38	129	465	**297.5**
	39	150	307	**228.5**
October	40	128	258	**193.0**
	41	98	165	**131.5**
	42	60	103	**81.5**
	43	57	88	**72.5**
	44	56	98	**77.0**
November	45	41	100	**70.5**
	46	33	111	**72.0**
	47	22	85	**53.5**
	48	8	70	**39.0**
December	49	3	42	**22.5**
	50	2	33	**17.5**
	51	1	12	**6.5**
	52	0	2	**1.0**
January	1	0	0	**0.0**
	2	0	0	**0.0**
	3	0	1	**0.5**
	4	2	0	**1.0**
	5	5	1	**3.0**
February	6	7	8	**7.5**
	7	203	13	**108.0**
	8	198	37	**117.5**
	9	133	45	**89.0**
March	10	78	88	**83.0**
	11	100	90	**95.0**
	12	98	55	**76.5**
	13	69	88	**78.5**
April	14	57	75	**66.0**
	15	28	58	**43.0**
	16	13	32	**22.5**
	17	8	11	**9.5**
	18	15	14	**14.5**
May	19	14	70	**42.0**
	20	8	33	**20.5**
	21	4	8	**6.0**
	22	5	7	**6.0**
June	23	3	138	**70.5**
	24	12	235	**123.5**
	25	342	115	**228.5**
	26	170	82	**126.0**
July	27	213	91	**152.0**
	28	455	104	**279.5**
	29	399	77	**238.0**
	30	451	75	**263.0**
	31	277	78	**177.5**
August	32	265	515	**390.0**
	33	170	314	**242.0**
	34	375	178	**276.5**
	35	250	165	**207.5**

*** Total of six traps.**

Table 2. Correlation between *B. cucurbitae* population and weather parameters

Weather Parameters / Year	Correlation coefficient (r)								
	Temperature (°C)			Relative Humidity (%)			Wind velocity (km/hr)	Sunshine (hours)	Rainfall (mm)
	Maximum	Minimum	Average	Morning	Evening	Average			
	(X_1)	(X_2)	(X_3)	(X_4)	(X_5)	(X_6)	(X_7)	(X_8)	(X_9)
Mean population of adult male fly (2002-03 and 2003-04)	0.0259 NS	0.5921 **	0.4010*	0.6899 **	0.7755 **	0.7638 **	0.3024*	-0.7200 **	0.7409 **

NS = Non-Significant.
* : Significant at 5 per cent level (r = 0.2839)
** : Significant at 1 per cent level (r = 0.4257)

Plate - I. Patel Fruit Fly Trap