

MONITORING OF THE MEDFLY *Ceratitis capitata*(WIEDEMAN) (DIPTERA: TEPHIRTIDAE) ACTIVITY BY CERALURE TRAPS IN NAVEL ORANGE ORCHARDS.

**Mahmoud, M. A. ; I. L. Ibrahim ; S. F. Hafez and S. A. El-Anani
Dept. of Plant Protection, Fac. Agric., Al-Azhar University**

ABSTRACT

The experiment was conducted throughout two successive and seasons (2007. 2008) from early September to late December. The aim was to study the population fluctuation of medfly *Ceratitis capitata* wied.insect adults, and the relationship between two weather factors (namely mean temperature and relative humidity) and the population density of this insect. The mean number of caught insects by ceralure during 2007 reached its peak in 4th of November averaged 11.8 insects/trap, while, the mean number peak of the insects was 12.0 adults/trap in 2008 season. No significant difference between the mean number of insects/trap in 2007 and 2008 seasons ($P= 0.058$).

The mean number of male and female insects/trap ($P=0.0001$) was significantly different in the two successive seasons. The relationship between the daily mean temperature and insects was positive significant in 2007 and 2008 seasons, Mean whiles, the relationship was positive insignificant between the insect pest and the relative humidity in both seasons. The explained variance was 37.06% in 2007 and 62.99% in 2008 season, respectively.

INTRODUCTION

The mediterranean fruit fly *Ceratitis capitata* (Wiedeman) causes serious damage to crops in tropical and subtropical areas. In Egypt, this pest causes a considerable damage which inflicts, significantly, economic losses to peach, apricot, guava, mango, figs and citrus crops around most the Governorates of Egypt (Awadallah *et al* 1974). In spite of partial bait spray and killing bags used for controlling the med fly on citrus, peach and apricot (Hashem *et al*, 1987). The fight against this pest in generally, carried out by aerial bait of protein attractants. Area wide spraying of the broad-spectrum insecticides is the cause of protests by local inhabitants and ecological groups (Batkin, 1995). More environmentally safe methods based on the use of attractants and low toxicity compounds are recently being studied as well as the sterile insect technique proposed by Knipling (1979), including the use of bait spray with phototoxic insecticides (Liquido *et al*,1995) or auto sterilization by using traps baited with sterilants and specific attractants (Casana-Giner *et al.*, 1999a, 1999b). Good attractants of *C. capitata* males are available including trimedlure (Beroza *et al.*, 1961) ceralure (McGovern and Cunningham 1988) and another bait attractants. The insects of *C. capitata* monitored by traps baited with male lures, such as ceralure which is a new potent and persistent for the medfly adults (Avery *et al.*, 1994). The traps are usually placed in fruit trees at a height of about 2 meters above

ground and male lure should be used to monitor and spread continuously. The lure may remain effective for few weeks (Niccoli *et al.*, 1991 and Drew 1982).

The aim of this investigation is to monitor *C. capitata* activity by using lure traps.

MATERIAL AND METHODS

Studies were conducted throughout two successive seasons 2007 and 2008 from early September to late December, to evaluate the effectiveness of the control of medfly *C. capitata* by ceralure on navel orange trees in Nobaria district, Beihera Governorate. The navel orange trees orchard of about ten Kerats in Nobaria district was chosen to study the medfly population fluctuation by using five ceralure traps baited with trimmed lure. Traps placed on the upper level of the citrus trees. The traps were inspected weekly and caught insects sexed and counted. The mean number of the caught insects/trap was recorded. The weekly mean temperature (°C) and relative humidity (%) were obtained from the Meteorological Station, Agricultural Research Center to recalculate these factors a week earlier than inspection date. Simple correlation and partial regression were used to evaluate the effect of recorded abiotic factors on the population of *C. capitata* adults. The difference between the insect population activity in citrus orchard in 2007 and 2008 was statistically analyzed using the student t- distribution (Morony, 1957) for testing the significance of difference between means of the insects pest in the two successive seasons.

RESULTS AND DISCUSSION

The population fluctuation of *C. capitata* adults insects.

The results obtained in Table (1) showed that the first appearance of medfly insects in lure traps was at the beginning of September 2007 averaged 14 insect/trap (13.2 male and 0.8 female insects/trap) at 21.1°C and 68.3 RH%. The population fluctuated till the highest mean number, 11.8 adults/trap in the 4th of November (10.8 male and 1.5 female insects/trap) at mean temperature of 23.6°C and 62.1 R.H.%. The mean number of insect population recorded at the end of the seasons, 7.4 adult insects/trap, (6.6 male and 0.8 female/trap) at temperature and RH 15.5°C and 67.1% respectively.

The data in Table (2) showed that the caught insects/trap in the second season (2008 season) was higher than 2007 season. The mean numbers of the medfly insects *C. capitata* in the beginning of 2008, season was 11.0 adult insects/trap (10 male and 1.0 female insects/trap) when temperature was 23°C and RH 69.2%.

The insect population fluctuated to record the highest mean number in the 7th of October, 12.0 adult insects/trap, (11.2 male and 0.8 female insects/trap) at the mean temperature 23.7°C RH 65%. The mean number of the insect pest at the end of the season was 8.2 insects/trap (7.4 male and

0.8 female insects/trap) at 16.2 °C and 64.7 % RH. No significant differences between caught insects/trap in 2007 and 2008 seasons ($p=0.058$).

Table (1): The weekly mean number of the medfly *C. capitata* adults with corresponding weather factors prevailing in Nobarria district in 2007 season.

Date	<i>C. capitata</i>		Total of adult/ trap	Temp. °C.	R.H.%
	Adult male/trap	Adult female/trap			
02/09/2007	13.2	0.8	14	21.1	68.3
09/09	11.1	0.9	12	24.5	68.3
16/09	6.2	0.8	7.0	21.9	67.4
23/09	10.1	0.9	11.0	23.4	67.5
30/09	10.2	0.4	10.6	23.1	68
07/10	10.2	0.8	11.0	23.4	66.2
14/10	9.2	0.6	9.8	22.7	66.7
21/10	9.4	0.4	9.8	22.2	65.2
28/10	8.8	0.8	9.6	21.7	65.6
04/11	10.8	1.0	11.8	23.6	62.1
11/11	8.0	0.2	8.2	20.2	64.1
18/11	7.6	0.4	8.0	19.8	63.4
25/11	7.4	0.6	8.0	18.2	67.2
02/12	10.6	0.4	11	18.7	66.3
09/12	7.8	0.6	8.4	17.1	60.2
16/12	7.0	0.6	7.6	16.1	65.5
23/12/2007	6.6	0.8	7.4	15.5	67.1
Mean	9.0705	0.647	9.717	-	-

L.S.D = 0.05

P= 0.0001

Table (2): The weekly mean number of the medfly *C. capitata* adults with corresponding weather factors prevailing in Nobarria district in 2008 season.

Date	<i>C. capitata</i>		Total of adult/trap	temperature	R.H%
	Adult/male trap	Adult/female trap			
02/09/2008	10.1	0.9	11.0	23.0	69.2
09/09	10.6	0.6	11.2	23.1	69.8
16/09	10.4	0.8	11.2	23.2	65
23/09	11.2	0.4	11.6	23.6	66.6
30/09	11.0	0.2	11.2	23.4	64.2
07/10	11.2	0.8	12.0	23.7	65
14/10	11.0	0.8	9.8	21.7	67.7
21/10	8.5	0.9	9.4	21.1	69.5
28/10	8.0	0.8	8.8	20.6	69.5
04/11	10.0	0.6	10.6	22.7	64.3
11/11	8.2	0.6	8.8	21.1	65.5
18/11	7.6	0.4	8.0	20.7	66
25/11	7.0	0.8	7.6	19.2	60.9
02/12	8.0	0.4	8.2	19.1	64.3
09/12	7.8	0.4	8.0	19.0	61.9
16/12	9.0	0.6	9.6	16.8	67.2
23/12/2008	7.4	0.8	8.2	16.2	64.7
Mean	9.235	0.635	9.717	-	-

L.S.D 0.05

P= 0.0001

The results also cleared that the male insects caught was significantly higher than female insects in both season ($P=0.0001$). These data agreed with these of Beroza *et al.* (1961) and McGovern and Cunningham (1998) and who stated that ceralure and trimedlure traps are good attractants to the med fly males. The data also are in agreement with Avery *et al.* (1994) who stated that ceralure is a new potent and persistent attractant to male insects of the medfly *C. capitata* insects.

Effect of two weather factors on the population of medfly

The results of statistical analysis presented in Table (3) showed that there is a positive significant relationship between the daily mean temperature and the insect population in 2007 and 2008 seasons. Simple correlation coefficients were 0.608 and 0.793 respectively. On the other hand, the partial regression analysis showed a positive relationship between the daily mean temperature and the insect population and (b) values were 0.404 and 0.464 insects by decrease or increase of the tested factor (daily mean temperature) by one unit.

Table (3): Simple correlation and partial regression values between two weather factors and the medfly, *C. capitata* population during 2007 and 2008 seasons

Seasons	Weather factors	Simple correlation	Partial regression
		r	E.V%
2007	daily mean Temp.	0.608	37.06%
	Rh%	0.269	
2008	daily mean Temp.	0.793	62.99%
	Rh%	0.356	

r: simple correlation coefficient

E.V: explained variance

The relationship between the relative humidity and population fluctuation of the med fly insects showed a positive insignificant relationship in 2007 and 2008 seasons and the correlation coefficient (r) values were 0.269 and 0.356, respectively. However, the partial regression analysis, cleared that increase or decrease in relative humidity by one unit change the adult population by 0.1006 and 0.088. The explained variance (%) of the combined effect of the both environmental factors which affect the med fly adult population in 2007 and 2008 seasons were 37.06 and 62.99 %, respectively. From these results, the combined effect in 2008 season was higher than the combined effect in 2007 season for the two tested weather factors. These results are in agreement with findings of Mandal and Abdus Satter (2007) who stated that melon fruit fly infestation exhibited a significant positive correlation with minimum temperature, relative humidity and rainfall .

REFERENCES

- Avery J.W Chambers, D.L.; Cunningham R.T; and Leonhardt, B.A. (1994): Use of ceralure and trimedlure in Mediterranean fruit fly mass - trapping tests. *J. of Entomol. Sci* 29,543-556
- Awadallah, A.M: Hashem A.G. and Foda S.M (1974): Trial for testing the sterile male technique as a mean of controlling the med fly *Ceratitidis capitata* (Wied.) in Egypt. *Agric; Res.,Rev.,Egypt*,52:41-59
- Batkin, T.A.(1995): Impact of the Mediterranean fruit fly *Ceratitidis capitata* (wiedemann) on California agriculture, pp.70-81 in J.R Heitz and K.R Downum [eds.] Light -activated pest control. American chemical society symposium series 616.ACS. Washington, DC.
- Beroza, M.; Green, N.; Gertler S.I.; Steiner L.F. and Miyashita D.H. (1961): Insect attractants : new attractants for the Mediterranean fruit fly. *J. Agric food chem.* 9:361-365.
- Casana -Giner, V.; Gandia-Balaguer, A.; and Primo -Yufer. E. (1999a): Field trail of an attractant mixture for Dipterous including the pest *Ceratitidis capitata* (Wiedemann) (Diptera: Tephritidae) in Valencia (Spain). *J. APPL. Entomol.*123:47-48
- Casana-Giner.; V.; Gandia-Balaguer A.; Mengod-Purta, C.; Primo-Millo, J.; and Primo-yufer, E. (1999b): Insect growth regulators as chemosterilants for *Ceratitidis capitata* (Dipteral: Tephritidae). *J. Econ. Entomol.* 92:303 -308.
- Drew. R.A.I.(1982): Fruit fly collecting. IN: economic fruit flies of the south pacific region (ed. by Drew. R..A.I Hooper G.H.S and Batman. M.A) PP 129-139. 2nd edition. Queensland Department of primary Industries, Brisbane, Australia.
- Hashem. A.G.; Harris E.J.; Saafan M.H. and Foda S.M Australia (1987): Control of the mediterranean fruit fly in Egypt with complete coverage and partial bait sprays. *Annals. Agric. Res Sci. Fac. Agric., Ain Shams Uni V. Cairo, Egypt,* 32(3):1813 -1825.
- Knipling E.F.(1979): IN the basic principles of insect population suppression and management, pp. 315 -394. In use of insects for self destruction USDA agric handb.512.
- Liquido, N.J.; McQuate, G.T., and Cunningham, R.T.(1995): Light-activated toxicity of phloxine B and uranine to Mediterranean fruit fly, *Ceratitidis capitata* (Wiedemann) (Diptera:Tephritidae),adults,pp.18-107.In J.R. Heitz and K.R. Downum [eds.] Light-activated pest control. ACS Symposiom series 616.ACS Woshington, DC.
- Mandal, S.K and Abdus Sattar.; A. (2007): A note of influence of weather parameters on the incidence of melon fruit fly in bitter gourd. *Indian agriculturist.* 51:1/2,79-81.
- McGovern. T. P. and Cunningham R.T.(1988): Persistent attractants for the Mediterranean fruit fly, the method of preparation and method of use U.S. pat. 4:764, 366, August 16.
- Morony, M. J.(1957): Facts from figures.(Penguin Books) Ltd.,3rd ed., Haromndsworth, Middlesex, 228pp.

Niccoli, A.; Sachetti, P.; and Lupi, E.(1999) Observation on the capture of *Ceratits capitata* in peach orchards in Italy. Redia 74,641-658.

تتبع نشاط حشرة ذبابة الفاكهة *Ceratitis Capitata* باستخدام مصائد سيرالور في بساتين البرتقال أبو سرّة
محمد عبدالغفار محمود ، إبراهيم لبيب إبراهيم ، شريف فاروق حافظ و
سالم عبدالحميد الغناني
قسم وقاية النبات - كلية الزراعة - جامعة الأزهر

تم إجراء التجارب خلال موسمي ٢٠٠٧/٢٠٠٨ لدراسة التذبذبات العددية لحشرة ذبابة الفاكهة وكذلك علاقة الارتباط بين متوسط درجة الحرارة والرطوبة النسبية وتعداد الحشرة خلال فترة الدراسة.

وصل تعداد الحشرة قمته في الرابع من نوفمبر ٢٠٠٧م بمتوسط ١١.٨ حشرة لكل مصيدة مقارنة بذروة تواجد الحشرة في ٢٠٠٨ والذي بلغ ١٢ حشرة لكل مصيدة في السابع من أكتوبر. لم توجد فروق معنوية لمتوسط الحشرة في المصيدة بين موسمي الدراسة ($p=0.058$). وجدت فروق معنوية بين الحشرات الذكور والإناث خلال عامي الدراسة فكان أعلى معنوية في الذكور عنه في الإناث ($p=0.0001$). وكانت علاقة الارتباط بين درجة الحرارة وتعداد الحشرة موجباً معنوياً في موسم ٢٠٠٧م، وموجباً معنوياً أيضاً في موسم ٢٠٠٨م بينما كان موجباً غير معنوي بين الرطوبة النسبية ومجموع الحشرة خلال موسمي الدراسة.

قام بتحكيم البحث

كلية الزراعة - جامعة المنصورة
كلية الزراعة - جامعة الأزهر

أ.د / عبد البديع عبد الحميد غانم
أ.د / حمدي احمد محمد