ECOLOGICAL STUDIES ON THE MEDFLY, *CERATITIS CAPITATA* IN APRICOT ORCHARDS IN RELATION TO NEIGHBOURING CITRUS ORCHARDS

M.H. SAAFAN AND A.W. TADROS

Plant Protection Research Institute , Agricultural Research Centre, Dokki, Egypt.

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Abstract

The population fluctuation of the Mediterranean fruit fly, *Ceratitis capitata* (Wied.) (Diptera : Tephritidae) was studied in apricot orchards in relation to the neighbouring summer citrus orchards for three successive seasons (1992 , 1993 and 1994) at Kalubia Governorate. In the meantime, the rate of larval infestation in apricot fruits was estimated in apricot orchards compared with those in adjacent citrus ones. Data of trap catches indicated that medfly population was higher in summer citrus orchards than in apricot orchards through the period from early March to mid-May / early June; then adults migrate to apricot orchards giving rise to high population until late July. Medfly male catches per trap per day "CTD" ranged 0.008 - 2.31,0.02 - 3.84 and 0.03-5.64 males in summer citurs orchards, while it ranged 0.0-5.24, 0.0-6.76 and 0.0 - 12.32 in apricot orchards during the three seasons respectively. The percentages of larval infestation in apricot orchards were higher in those near to citrus orchards than in far away ones during the three successive seasons. Mean percentages of medfly infestation in apricot fruits ranged 2.13 - 19.06, 1.64 - 27.55 and 12.63-77.38% in apricot orchards neighbouring to citrus orchards compared with 0.58 - 8.17, 0.87 - 11.21 and 0.79 - 19.73% in apricot orchards far away from citrus orchards during the three successive seasons, respectively.

INTRODUCTION

The Medfly, *Ceratitis capitata* (Wiedemann) is a major pest allover the world on as many as 200 tropical and subtropical fruit species (Christenson and Foote, 1960). In the Mediterranean basin the pest attacks citrus, deciduous fruits (mainly

stonefruits) and other cultivated hosts. Crop production is extremely affected and fruit infestation is as high as 80% (Cramer, 1967).

In Egypt, the medfly causes economic damage in apricot, peach, guava, mango, fig and citrus fruits (Awadallah et al., 1974; Saafan, 1986 and Hashem et al., 1992).

Through control studies on *C.capitata* in apricot orchards carried out by Saafan et al., (1993), fruits were subjected to severe infestation especially in those near or close to citrus ones.

The aim of the present investigation is to study the migration of medfly from summer citrus orchards to apricot ones, the population dynamics of adults and rate of larval infestation in apricot fruits neighbouring and those far away from citrus orchards.

MATERIALS AND METHODS

Studies were carried out in Tokh district, Kalubia Governorate where dense plantations of apricot orchards (about 2900 feddans) exist . Also, neighbouring summer citrus orchards (Valencia orange) were subjected to the same studies.

1. Population Studies :

Population studies were conducted for three successive seasons (1992, 1993 and 1994) on the basis of trap catches in apricot orchards and neighbouring summer citrus orchards.

One hundred and fifty sticky traps (described by Harris et al., 1971) were distributed in a hundred and twenty apricot orchards and thirty summer citrus orchards neighbouring to apricot orchards at a rate of one trap per one orchard). Starting from early March to late July of the three successive years, traps were suspended on tree branches in shaded area at a height of 2-3 m. Traps were baited weekly with the sex attractant "trimedlure", inspected, male catches were counted and the sticky inserts were substituted each week. The mean catch per trap per day "CTD" was calculated.

To smooth down the frequency distribution curves to an almost normal form, the 3-reading running means were worked out.

2. The Rate of Fruit Infestation:

Five apricot orchards situated among apricot plantations and another five apricot orchards in the neighbourhood of summer citurs orchards were subjected to study the rate of fruit infestation during the period from early May to the end of fruit harvesting of the three successive seasons (1992, 1993 and 1994). One thousand apricot fruits (fallen or harvested) from each orchard were examined weekly and percentages of larval infestation on fruits were estimated.

RESULTS AND DISCUSSION

Medfly population, represented by the mean male catch per trap per day "CTD", was studied in apricot orchards far from summer citrus orchards and in summer citrus orchards neighbouring to apricot orchards at Kalubia Governorate throughout the three successive seasons of 1992, 1993 and 1994.

The percentages of apricot fruits infested with medfly larvae in apricot orchards far away and neighbouring to summer citrus orchards were determined during the same three seasons.

1. Population Fluctuation :

Figure (1) shows the "CTD" of male catches of medfly in apricot orchards far away from summer citrus orchards and in summer citrus orchards neighbouring to apricot orchards during the three successive seasons of 1992, 1993 and 1994.

Data indicated that medfly population was much higher during the 3rd season (1994) than the 1st (1992) and 2nd (1993) seasons in apricot orchards or in summer citrus orchards.

During the three seasons of study medfly population was higher in apricot orchards neighbouring to summer citrus orchards than in those orchards far away from summer citrus orchards from early March to mid-June, 1992 (CTD : 0.008 - 1.26 and 0.0 - 1.17), early June, 1993 (CTD : 0.02 - 1.72 and 0.0 - 1.35) and mid-May, 1994 (CTD : 0.03 - 0.13 and 0.0 - 0.11), respectively.

From mid-June, 1992, early June, 1993 and mid-May, 1994 to late July, opposite situation was noticed where the medfly population was higher in apricot orchards than in citrus orchards, where the recorded CTD was 0.80 - 5.24 and 0.52 - 2.31; 3.16 -6.76 and 1.52 - 3.84; and 0.23 - 12.32 and 0.12 - 5.64, respectively.

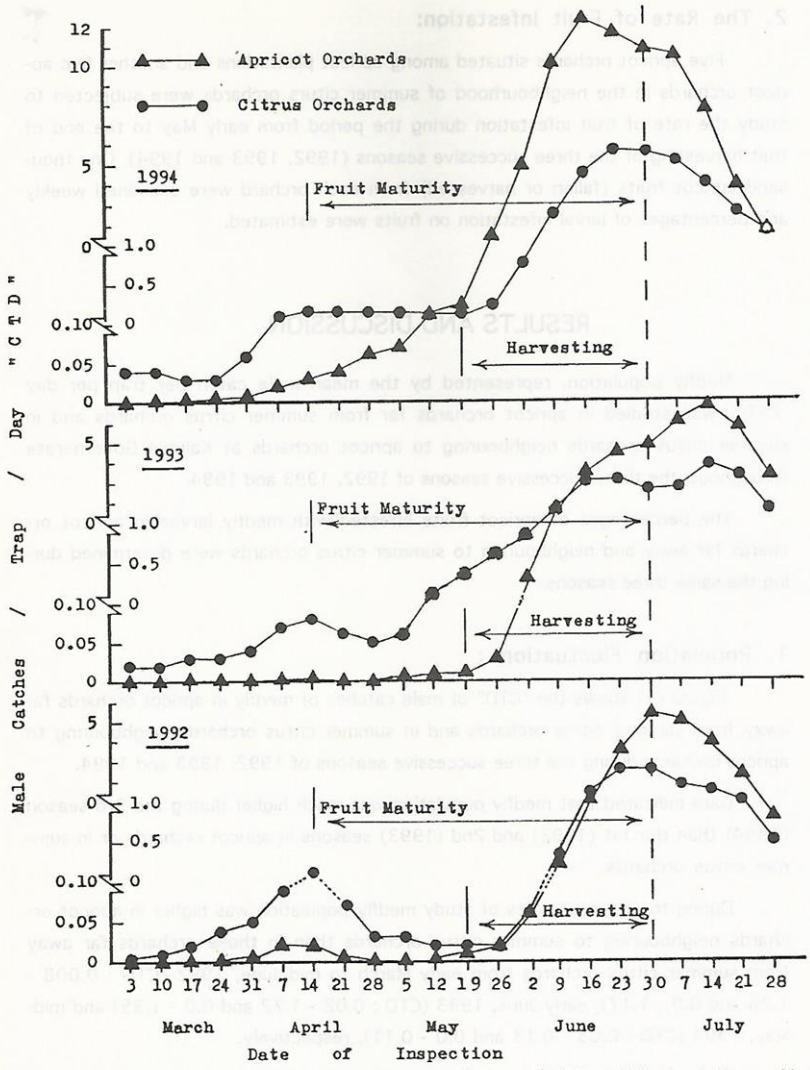

Fig. 1: Smoothed mean number of male catches / trap / day " CTD " of C. capitata in apricot and neighbouring citrus orchards at Kalubia Governorate during 1992, 1993 and 1994.

These results clarified the migration of medfly adults from summer citrus orchards neighbouring to apricot orchards even those not neighbouring to citrus orchards during the apricot fruit season (May and June) where the apricot fruits are the favourable host and, in the meantime, citurs fruits are lacking.

During July, and although apricot fruits were extremely harvested, medfly population was higher in apricot orchards. This is because of the existence of the sex attractants in the traps and the lack of other hosts in the area.

From the 2nd half of July, medfly population dispersed in all directions to search for other hosts whatever they may be, therefore the population decreased gradually during this period.

2. Rate of Fruit Infestation :

During the three successive seasons of 1992, 1993 and 1994, the percentages of apricot fruits infested with larvae of medfly were determined in two sets of apricot orchards, the first is neighbouring to summer citrus orchards, while the second is far away from citrus orchards and surrounded by dense apricot plantations.

From early May, medfly adults emigrate from summer citrus orchards to the neighbouring apricot orchards, then infest the early ripening apricot fruits. This early infestation on apricot fruits develop a new generation which campaign the mature apricot fruits during late May and June. As medfly adults are lazy, they prefer nearer apricot orchards, then the following generation which coincided with more favourable weather conditions in June actively move to dense apricot plantations. In some seasons, however, these movements occurred at the end of harvesting season, thus unremarkable degrees of infestation could be noticed.

Data in Table (1) and Figure (2) show the percentages of apricot fruits infested with medfly larvae in apricot orchards neighbouring and non-neighbouring to summer citrus orchards. Data indicated that during the three seasons of study, the percentages of infested fruits were higher in apricot orchards neighbouring to summer citurus orchards than in those far from citrus ones.

Ascending increase in infestation was noticed from 1992 to 1993 with remarkable increase in 1994.

During 1992 and 1993 seasons, infested apricot fruits were recorded two weeks earlier on early ripening fruits in orchards neighbouring to citrus orchards (2.13-2.84 % and 1.64 - 2.25 %, respectively) than in non-neighbouring ones (0.0

Table 1. Percentages of apricot fruits infested with medfly larvae in apricot orchards neighbouring (N) and non-neighbouring (NN) to citrus orchards at Kalubia Governorate during 1992, 1993 and 1994 fruit seasons.

Date of in spec-tion @	1 st season (1992) (%)				2 nd season (1993) (%)				3 rd season (1994) (%)			
	N orchards		NN orchards		N orchards		NN orchards		N orchards		NN orchards	
	Mean	range	Mean	range	Mean	range	Mean	range	Mean	range	Mean	range
May, 5	2.13	0.0-4.5	0.00	-	1.64	0.0-3.9	0.00	-	12.63	0.0-40.1	0.79	0.0-2.3
12	2.84	0.5-6.2	0.00	-	2.25	0.4-4.2	0.00	-	19.87	0.0-54.2	2.01	0.0-5.4
19	3.36	0.5-7.3	0.58	0.0-1.4	4.78	1.5-8.1	0.87	0.0-2.0	26.03	4.2-59.3	5.40	2.7-9.8
26	5.24	1.9-9.8	1.29	0.2-3.0	7.48	2.4-13.	2.11	0.0-3.8	37.53	14.72.2	6.31	3.3-11.
June, 2	6.63	2.7-12.	2.14	0.5-4.2	8.34	3.5-14.	2.95	0.9-4.5	49.15	24.80.5	8.96	5.9-14.
9	8.54	3.9-15.	3.56	2.5-6.4	10.39	4.6-18.	3.56	1.5-5.6	68.48	42.95.7	11.45	7.8-19.
16	10.52	4.1-17.	5.47	3.5-8.5	17.16	12.24.	6.38	2.7-10.	74.21	46.-100.	16.07	12.24.
23	19.06	13.24.	8.17	4.6-13.	27.55	20.35.	11.21	6.1-17	77.38	51.-100.	19.73	14.-27.
30	*		*		*		*		*		*	

@ Date of inspection is + 1 day in 1992, the same day in 1993 and -1 day in 1994.

* The last date of harvesting.

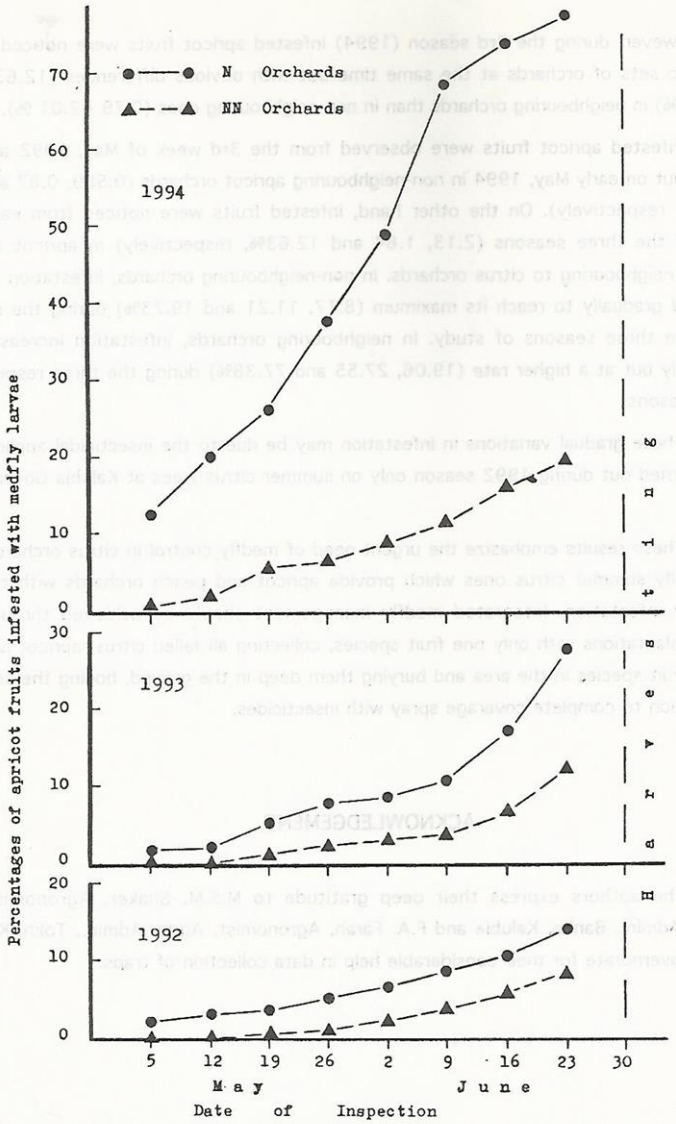

Fig. 2: Percentages of medfly larval infestation in apricot orchards neighbouring (N) and non-neighbouring (NN) to citrus orchards at Kalubia Governorate during 1992, 1993 and 1994.

%). However, during the 3rd season (1994) infested apricot fruits were noticed in the two sets of orchards at the same time but with obvious differences (12.63 - 19.87 %) in neighbouring orchards than in non-neighbouring ones (0.79 - 2.01 %).

Infested apricot fruits were observed from the 3rd week of May, 1992 and 1993 but on early May, 1994 in non-neighbouring apricot orchards (0.589, 0.87 and 0.79%, respectively). On the other hand, infested fruits were noticed from early May of the three seasons (2.13, 1.64 and 12.63%, respectively) in apricot orchards neighbouring to citrus orchards. In non-neighbouring orchards, infestation increased gradually to reach its maximum (8.17, 11.21 and 19.73%) during the respective three seasons of study. In neighbouring orchards, infestation increased gradually but at a higher rate (19.06, 27.55 and 77.38%) during the three respective seasons.

These gradual variations in infestation may be due to the insecticidal application carried out during 1992 season only on summer citrus trees at Kalubia Governorate.

These results emphasize the urgent need of medfly control in citrus orchards, especially summer citrus ones which provide apricot and peach orchards with the primary infestation. Integrated medfly management should be achieved through dense plantations with only one fruit species, collecting all fallen citrus, apricot and other fruit species in the area and burying them deep in the ground, hoeing the soil, in addition to complete coverage spray with insecticides.

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دراسات إيكولوجية على ذبابة فاكهة البحر المتوسط على أشجار المشمش وعلاقتها بحدائق الموالح المجاورة

محمد حسن سعفان ، انطون ولسن تادرس

معهد بحوث وقاية النبات - مركز البحوث الزراعية - وزارة الزراعة - الدقى - مصر .

تعتبر ذبابة فاكهة البحر المتوسط من الآفات الخطيرة فى العالم نظرا لتعدد عوائلها والمدى الواسع لانتشارها . وفى مصر تسبب هذه الآفة خسائر فادحة لثمار المشمش بالاضافة الى الخوخ والجوافة والمانجو والتين والموالح وغيرها. اجريت دراسة على تذبذب تعداد ذبابة الفاكهة فى كل من حدائق المشمش غير المجاورة لحدائق الموالح الصيفى وكذا حدائق الموالح الصيفى المجاورة لحدائق المشمش فى منطقة طوخ بمحافظة القليوبية على مدار ثلاثة مواسم متتالية (١٩٩٢ ، ١٩٩٣ ، ١٩٩٤)، كما تم فى نفس الوقت تقدير نسبة الاصابة بالآفة فى ثمار المشمش في كل من حدائق المشمش الغير مجاورة لحدائق الموالح وحدائق المشمش المجاورة لحدائق الموالح . أظهرت قراءات المصايد أن تعداد الذبابة فى المواسم الثلاثة كان مرتفعا فى حدائق الموالح الصيفى عنه فى حدائق المشمش وذلك فى الفترة من أول مارس حتى منتصف مايو / أوائل يونية، ثم انتقلت الذبابة الى حدائق المشمش ليصبح التعداد بها أعلى وحتى نهاية يوليو من كل عام. وتراوح متوسط تعداد الذباب فى المصيدة الواحدة فى اليوم الواحد "CTD" ما بين ٠,٠٠٨ - ٢,٣١ ، ٠,٠٠٢ - ٣,٨٤ ، ٠,٠٠٣ - ٥,٦٤ ، صفر - ٦,٧٦ ، صفر - ١٢,٣٢ وذلك خلال الثلاث مواسم ، على التوالى. كذلك أوضحت الدراسة أن نسبة الاصابة بذبابة الفاكهة فى ثمار المشمش كانت أعلى فى حدائق المشمش المجاورة لحدائق الموالح عنها فى حدائق المشمش غير المجاورة لحدائق الموالح وذلك خلال المواسم الثلاثة حيث تراوح متوسط نسبة الاصابة فى حدائق المشمش المجاورة لحدائق الموالح ما بين ٢,١٣ - ١٩,٠٦ ٪ - ٢٧,٥٥٪ ، ١٢,٦٣ - ٧٧,٣٨ ٪ بينما فى حدائق المشمش غير المجاورة لحدائق الموالح فقد تراوحت النسبة ما بين ٠,٥٨ - ٨,١٧ ٪ ، ٠,٨٧ - ١١,٢١ ٪ ، ٠,٧٩ - ١٩,٧٣ ٪ وذلك خلال الثلاث مواسم ، على الترتيب.