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COMPARATVE STUDY ON THE IMPACT OF FIVE HOST FRUITS ON POPULATION DYNAMICS OF CERATITIS CAPITATA WIED. IN NORTH GAZA STRIP.

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ABSTRACT

The present field study was carried out to assess the effect of the five host fruits (guava, celementine, Shammoty orange, grapefruit and Valencia orange) as well as the total area on population dynamics of the Mediterranean fruit fly *Ceratitis capitata*, Wied. The population fluctuation of adult the Medfly by Jackson traps in above host fruits during three seasons (2001-2004) was monitored. The captured males per trap (Jackson) for every ten days was counted and then recalculated per day (CTD) to use it's as a measure of fly abundance. Data showed significant differences in the population of Medfly (CTD) in host fruits groves in three seasons, in season's sequence and within season (dates of inspections). In addition the influence of host fruits species on Medfly population dynamics the (CTD) was observed. The average of three seasons (2001-2004) showed that Shammoty orange (CTD=3.47), guava fruits (CTD=3.0) was the highest effect on CTD'S among the host fruits. Similar results were observed for December (CTD=5.2), November (CTD=4.74), July (CTD=4.44) and August (CTD=4.24), respectively were the highest effect on CTD'S for all host fruits. Also the interaction effect between host fruits and months on the population fluctuation Medfly was recorded.

In all cases of host fruits groves most population peak numbers of Medfly were observed shortly after the period of end maximum host fruit repining and there was a relationship between population dynamics, fruit infestation the Medfly and fruit maturity. The Medfly is available a long a year but it decrease and increase during the season depending on host fruit availability and climatic condition. More than two population peaks were found in a particular every host fruit. One of these peak appeared in fruit repining period and the others were related to the ripen period of neighboring host fruits. The temperature had a clear effect on the daily activity period of the Medfly during summer and autumn seasons. The Highest mean percentage of Medfly infestation was observed in guava (46%-48.5%) during October & November, in grapefruit (28.5%-50%) during January and in Valencia (17.5%-49%) during June. The study suggests that further research is needed to study the seasonal abundance, host susceptibility of Medfly and evaluation new techniques of controlling friendly environment which will help us in planning IPM program for reducing and suppressing this insect in groves.

Keywords: Host fruits, Population dynamics, Mediterranean fruit fly, *Ceratitis capitata* Wied. and North Gaza Strip

INTRODCTION

The Mediterranean fruit fly *Ceratitis capitata* Wied. is the most dangerous agricultural insect pest of family Tephritidae. It damages more than 250 different types of fruit particularly and even vegetables (Liquido *et al.*, 1991, Putruele, 1996 and Allwood, *et al.*, 1999). The most susceptible host plants belong to families Mytraceae, Rosaceae and Rutaceae (Orono, *et al.*, 2001). It is recognized by some experts as the worst pest of citrus fruit (Eskafi, 1990 and Teresa, *et al.*, 2002). Because of its wide distribution over

the world (Anonymous, 1988), its ability to tolerate cooler climates is better than most other species of tropical fruit flies (Conti, 1988, Mavrikakis, *et al.*, 2000 and Qulici & Duyck, 2002).

The population fluctuation dynamics and seasonal occurrences of *C. capitata* have been studied extensively in the tropics and, to a lesser extent, in the Mediterranean region. Most tropical studies were conducted on adult trapping in different environments (Harris & Olalquiaga, 1991, Harris *et al.* 1993, Nikluase-Ruiz & Basedow, 1997 and Penaloza, 2001). These studies concluded that the phenology and abundance of the fly in the tropics are determined by rainfall, humidity, and host fruits availability. In addition, it was found that temperature is not a limiting factor in population establishment and persistence in tropics (Bateman, (1972). On the other hand, studies from Mediterranean countries including the neighboring ones have been focused on population dynamic of Medfly in different host fruits. These studies were conducted by Saafan and Korashy, (2001), Saafan, *et al.*, (2000), Saafan & Tadrous, (1996), Hashem, *et al.*, (1987) in Egypt, Mustafa & Abdel –Jabbar, (1996) in the central highlands of Jordan, Ahmad & Mofleh, (2003) in the Coastal region of Syria, Harris, *et al.*, (1975) in Tunisia, Mazih, (2004) in Marocco, Niccoli *et al.*, 1991 in Italy and Katsoyannos ,*et al.*, (1998), Papadopoulos, *et al.* (2001), Katsoyannos & Papadopoulos, (2004) in Greece. Up to my Knowledge, no studies on the impact of host fruits on population dynamics of *C. capitata* in the Mediterranean region were carried out. However, the influence of the neighboring hosts on the population density of different host fruits orchards was observed (Castro, *et al.* 2001, Saafan & Tadros, 2001 & 1996 and Saafan & Korashy, 2001).

Citriculture is a relatively old economic activity in the North Gaza strip region; in addition other fruits including grape, fig, guava and date are of less economical value. According to the Palestinian Ministry of Agriculture, (2004) the area under cultivation with citrus and other fruit trees in 2000-2001 was approximately 4846.1 ha. The Medfly (Tephritidae) is described as the most important pest in Gaza strip citriculture (Saleh and Abdel-aziz, 2003).
In the districts of the Gaza Strip, the insect is being controlled in citrus and guava orchards by wide-area Bait Application Technique to save the annual loss of US $ 365 million in Jordan and Palestine (Enkerlin, W. &J. Mamford, 1997).

In the Gaza Strip, studies on the impact of host fruits on the population dynamics of *C. capitata* associated with groves are scarce. The present field study aims to evaluate the diversity of *C. capitata* occurring in five main cultivated host fruits (Valencia, Shammoty, grapefruit, celementine and guava) in North Gaza Strip and to assess the impact of these host fruits on the population dynamics of the insect and its relation to the host fruit infestation.

MATERIAL AND METHODS

1) Study Area and Climate

The current study was carried out in the North Gaza Strip during 2001-2004 seasons. Its area is approximately 180 Km^2. Dense plantation of Valencia orange, Shammoty orange, celementine, grapefruit, and guava

groves is prevalent in the area forming 92.9 % of host fruits of *C. capitata* and 56.5% of fruit plants (Ministry of Agriculture, (2004)). Orchards of Northern parts of the Gaza Strip are characterized by mixed crop system with area of 4-60 ha. However, there is no isolated host fruit farm. In the same farm and for every host fruit there are other neighboring host and nonhost fruits of *C. capitata*. Orchards of host fruits contain Valencia orange *(Citrus aurantum)*, Shammoty orange (*Citrus sp.*), celementine (*Citrus mitis*), grapefruit (*Citrus paradisis)*, guava (*Pisidium guajava* L.), vineyard (*Vitis vinifera)*, fig (*Ficus carica* L.*)*, plum and pome fruit trees. The nonhost fruits include olives (*Olea europea* L.) and almond (*Prunus amygdalus* L.).

The climate of the North Gaza Strip is characterized by warm, dry summer (24 -26C°) and wet winter with low temperature (13-14.1C°). The average relative humidity is 63-70 %. (Ministry of Transportation and Communication, (2004). The fruiting period is the whole year for host fruits of *C. capitata*.

2) Experimental sites:

To achieve the aim of this study, six experiments were carried out. The first experiment was conducted in all area of groves in three Governorates. The second, third, fourth, fifth and sixth experiments were conducted in Valencia orange, Shammoty orange, celementine, grapefruit, and guava groves on twelve farms as follows: El-Shawa (about 10ha), El-Basha (about 65ha), El-Rays (about 12 ha), Abu-Madeen (about 5 ha), Abu-Saleem (about 4 ha), Matar (about 4ha), El-Ghusaan (about 3ha), El-Booji (about 3ha), El-Basher (about 3 ha), El-Rayatii (about 3 ha), El-Salgawii (about 4 ha) and Abu-Hooli (about 4 ha) farms. There was no isolated orchard in the region of this study i.e. mixed host fruits.

3) Techniques of the study:

A) Monitoring of adult Medfly population in the host fruit groves

The CTD in the six experiments was taken as a measure to evaluate the impact of host fruits on the adult Medfly population. To determine the adult fly population, Jackson sticky traps (Harris, *et al.*, 1971) were baited ten days round with male attractant trimedlure. It was imported from International Atomic Energy Agency (Vienna), offered from USDA- APHIS. The traps were distributed in selected host fruits groves from August, 2001 to August, 2004 in North Gaza, Gaza city, and Middle Governorates. A total of 364 traps were used in the first experiments. The number of traps used in second, third, fourth, fifth, sixth experiments for Valencia orange, Shammoty orange, celementine, grapefruit, and guava groves were 17, 6, 5, 2 and 5, respectively. The number of traps was related to the density of host fruits. The effectiveness and suitability of pheromone traps in capturing and monitoring the populations' male of adult Medfly were described and discussed by many researchers (Harris *et al.*, 1971 Shepard & Young, 1985, Kapoor, *et al.* 1987, El-Sayed *et al.*, 1992, and Mogahed, 1999). Traps were suspended on tree branches in shaded areas at a height 1.5 – 2.5 m. Traps were baited 15 – 20 days with the male attractant trimedlure. The traps were inspected three times per month. The number of flies captured by the sticky

cardboard located inside the trap was counted and then the cardboard strips were renewed. The CTD was calculated for every date of inspection during three seasons (2001-2004). This estimation was used as a measure for determination of the impact of five host fruits species on population dynamics of *C. capitata* and fly abundance.

B) Fruit sampling and examination:

A total number of 2674 Valencia orange, Shammoty orange, celementine, grapefruit, navel orange, poppy, peach, fig, apple and apricot samples were collected. Each sample was distributed homogeneously. The samples were subjected to study of the fruit infestation by insect during the period maturity of the two successive seasons 2002-2003 and 2003-2004. The collected samples were weighed, measured and then stored separately in the laboratory in plastic cages (30 cm diameter). The cages were covered with fine gauze to prevent entry of other flies and ants. Then the fruits were placed on a plastic sieve and the emerged larvae were allowed to change to pupae in sand placed at the bottom of cages or plastic sieve. Pupation mostly took place for a period of 5-14 days after the fruits had started rotting. Pupae were then removed and stored in plastic vials covered with fine gauze, and then were incubated until the adult flies emerged and then identified. The infested fruits were counted and then the percentage of infestation fruits was calculated. *Ceratitis capitata* is the only species of this genus in the Gaza Strip and it is easily identified by using keys, atlas and original descriptions. These methods are based on Niklause–Ruiz & Basedow, (1997) and Saafan *et al.*, (2000).

4) Statistical Analysis

Data obtained in six experiments were statistically analysed using Analysis of Variance (ANOVA) and least significant differences (LSD) tests, performed by Genstat 5 computer program.

RESULTS AND DISCUTION

Impact of five host fruits on *C. capitata* population:

The number of captured flies was counted and then calculated as captured males per trap per day (CTD). The CTD Medfly in five host fruits is presented in Table 1 & 2 and Figures 1, 2 and 3.

Data presented in Table 1 shows the impact of guava, celementine, Shammoty orange, grapefruit, Valencia orange and total mixed crops on the CTD of Medfly in three seasons (2001-2002, 2002-2003 and 2003-2004). In general, there were significant differences between CTD'S in the mentioned five host fruits and total mixed crop during these three seasons. The mean CTD for guava groves (CTD=4.54) in season 2001-2002 was the highest compared to other host fruits. In the following seasons (2002-2003 and 2003-2004), the highest adult Medfly population was observed in Shammoty orange groves (CTD=3.5 and 3.74, respectively).

Table 2 presents the average CTD for the three seasons indicating that host fruits species have been statistically effective on the Medfly

population level (CTD) in fruit groves. Shammoty orange (CTD=3.47), guava fruits (CTD=3.0) and grapefruit (CTD=2.8) showed the highest and significant effect, whereas the total area (CTD=1.75) exhibited the lowest effect on *C. capitata* population among host fruits. Similar results were obtained by Hashem *et al.*, (1987), Mustafa & Abdel-Jabbar, (1996), Papadopoulos, *et al.*, (2001) and Ahmed & Mofleh, (2003) for the same host fruit and other. Variation in Medfly population in host fruits may be due to the effect of species in term of chemistry, shape, size, color fruits (Nakagawa *et al.*, (1978), Katsoyannos, (1987) & (1989), Guilici & Rivry, (1996) and Katsoyannos, *et al.* (1997)) and odor of the fruits (Gulici, 2004) as well as location of neighboring host fruits (Saafan & Tadros, 1996, Saafan & Korashy, 2001 and Castro, *et al.*, 2001). Levinson & Muller, (1990) reported that there is an influence of some olfactory and optical properties of fruits on host location by Medfly.

Table 1: The mean number of captured males for thirty six dates of inspection in Jackson traps per trap per day (CTD) of *Ceratitis capitata* in five host fruits and total area of North Gaza Strip.

Growing season	Guava	Celementine	Shammoty orange	Grapefruit	Valencia orange	Total groves
CTD*	4.54	3.0	3.16	4.36	2.64	1.94
2001-2002	X**	X**	X**	X**	XY**	X**
LSD at 0.05%	8.17	4.35	2.66	9.4	2.6	1.5
CTD*	2.3b	2.5	3.74	2.06	2.25	1.46
2002-2003	YZ	X	X	Y	Y	Y
LSD at 0.05%	2.44	3.4	3.44	5.88	1.86	0.675
CTD*	2.16	2.94	3.5	1.98	2.93	1.85
2003-2004	Z	X	X	ZY	X	X
LSD at 0.05%	2.6	3.65	4.06	2.77	1.07	1.08
LSD at 0.05%	0.593	0.573	0.611	0.875	0.45	0.338

*** Grand means CTD within thirty six of dates of inspection in a season are significantly deferent (LSD test at 0.05% Genstat 5 program)**

****Grand means CTD within a column sharing the same letters do not differ significantly at level 0.05 using LSD test Genstat 5 program.**

The monthly average of Medfly population (CTD) in the three seasons for the studied host fruits illustrated in Table 2. The CTD was peaked for Shammoty orange from middle November to the end of December (CTD=2.42-3.86), for guava groves from October to the end of December (CTD=6.22-10.35), for celementine groves from the beginning of November to the end of December (CTD=3.16-3.26), for grapefruit from October to the end of January (CTD=1.84-9.08), and for Valencia orange groves from the May first to the end of September (CTD=1.3-4.9). The CTD was of low level for the total area of the mixed crop from beginning January to May (CTD=0.49-0.8) and was of moderate level from May to the end of December (CTD=1.88-5.78) in comparison with CTD in host fruits. Differences in CTD peaks periods coincide with the end of the repining fruit season of a particular host fruit. This conclusion was indicated in Figures 1, 2 and 3. Other population peaks were also observed for shammoty orange from middle April to middle September (CTD=1.91-9.69), for celementine from the May first to the end of September (CTD=1.47-5.32), for grapefruit from the

May first to the end of August (CTD=1.61-3.40) and for Valencia orange groves from the end October to the end of December (CTD= 3.5-5.16) (Figure 1, 2 and 3). These population peaks probably coincide with repining of neighboring host fruits and suitable climatic conditions. These results are in agreement with those obtained by Saafan & Tadros, (1996), Saafan & Korashy, (2001) and Castro, *et al.* (2001) who reported that, there was influence of neighboring host fruits on the population dynamics of *C. capitata* in groves and also the percentage of larval infestation in apricot, citrus and Barbados cherry were higher in those near to other host fruits orchards than in far away ones (isolated orchards).

Table 2: The Average of three seasons (2001-2004) of means CTD *Ceratitis capitata* in five hosts' fruits of Northern Parts of Gaza strip during twelve months of the season.

No	Month	Guava	Celementine	Shammoty	Grapefruit	Valencia	Total area	Mean
1-	September	2.67cd*	1.47g*	2.61def*	1.61fg*	3.37cdef*	2.39c*	2.35f*
2-	October	6.22abc	0.69g	0.59i	1.84fg	1.76g	1.87defg	2.16fg
3-	November	10.35a	3.16cdef	3.86d	4.27b	3.5cde	3.32a	4.74ab
4-	December	9.02b	3.26cd	2.42efg	9.08a	5.16a	2.26cde	5.2a
5-	January	1.78d	0.82g	0.45i	2.96bcd	1.64gh	0.49ij	1.36fghi
6-	February	0.46d	0.34g	0.29i	0.67g	0.22j	0.31j	0.38i
7-	March	0.22d	0.48g	0.68hi	0.70g	0,50ij	0.55ij	0.52i
8-	April	0.50d	1.12g	1.91fgh	1.41g	0.81hij	0.80i	1.09ghi
9-	May	0.37d	3.23cde	3.00de	1.63fg	1.30ghi	1.35h	1.81fgh
10-	June	1.30d	4.56abc	7.64bc	3.60bcde	3.94bcd	2.19cdef	3.87bcde
11-	July	1.21d	5.10ab	9.69a	3.19bc	4.9ab	2.52bc	4.44abc
12-	August	1.89d	5.32a	8.42ab	2.67cdef	4.17bc	2.96ab	4.24abcd
	Mean**	3.0ab**	2.46bcde	3.47a	2.80abc	2.6bcd	1.75e	2.86

*** Means CTD'S within a columns sharing the same letters do not differ significantly at level 0.05 using LSD test Genstat 5 program.**

****Means CTD'S followed by the same letter within a row are not significantly different (LSD test at 0.05% Genstat 5 program.)**

Most of the recorded population peaks of Medfly were observed shortly after the maximum repining of host fruit. Valencia orange has the largest area and the wide range distribution in the region of the study and hence its peaks were accompanied to that of other host fruits (Figures 1, 2 and 3). These results are in agreement with those obtained by Mustafa & Abdul-Jabbar (1996) and Ahmed and Mofleh, (2003) who reported that the peak population, in the coastal region of Syria and Jordan was at the middle of citrus growing season (December), whereas when there were differences in host maturation (guava, peach and citrus), two peaks or more were observed. This result indicates that host fruit availability affects fruit fly population fluctuations. Jirón & Hedström, (1988) reported that there is relationship between occurrence of *Ceratitis* spp. and their host plant availability.

Data illustrated in Figures 1, 2 and 3 indicates that there is correlation between flies' numbers and host fruit species. Also, these Figures were showed that the Medfly is available, but it decreases to a very low level in all host fruits groves during months of winter and spring (from February to May). The insect probably hibernates during this period using grapefruit,

Shammoty, celementine and navel orange fruits. The Medfly dispersion was found to be closely related to host repining sequence. During summer and part of autumn (from June to August and from November to December), Valencia orange, guava, peach, fig and apple serve the insect population for breeding. Avidov and Harpaz, (1996) reported that *C.capitata* produced 4-5 generations in valleys of the interior 6-7 generations a year under normal and natural conditions in the coastal plain depending upon the type of citrus fruits. Mustafa, & Abdel-Jabbar, (1996) reported that 3 generations of *C.capitata* on peach were produced in Jordan. The first in early August, the second and third were in late August and mid October, respectively. Ahmed & Mofleh, (2003) showed that nine generations of fruit fly *C. capitata* per year were registered in the coastal region of Syria.

The influence of climatic conditions on CTD of Mdfly was illustrated in Tables 1 & 2 and Figures 1, 2 and 3. There are significant differences between CTD,s among the three seasons and within the same season in five host fruits and total area. The CTD was the highest in the season 2001-2002. This could be attributed to the high density of host fruits species in this season and suitable climatic condition. In addition, the average of the three seasons indicated that December (CTD=5.2), November (CTD=4.74), July (CTD=4.44), August (CTD=4.24) and June (CTD=3.87) have a high statistical effect on the insect population while February and March have the low effect among the average months of the three seasons (2001-2004).

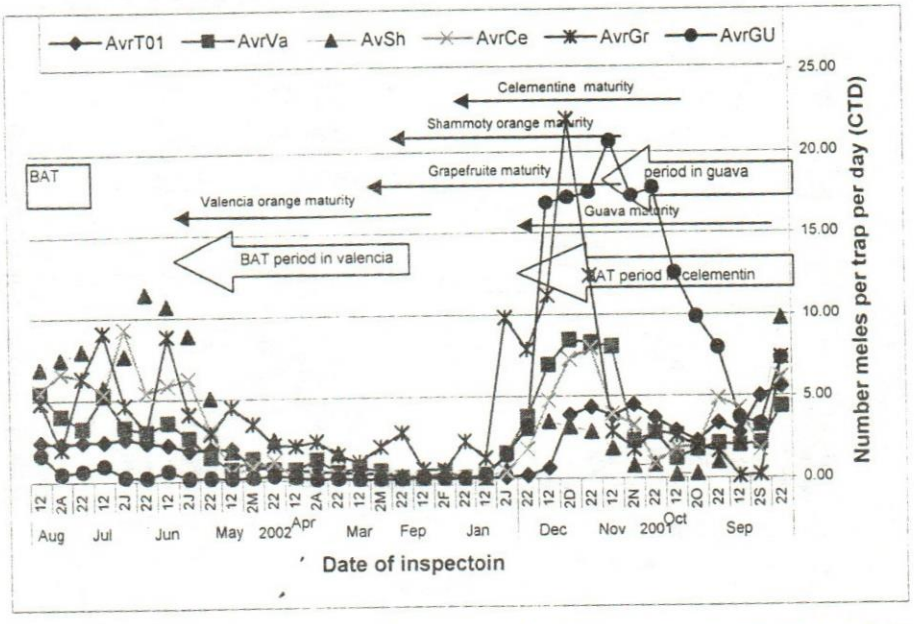

Figure 1: The mean number of captured *Ceratitis capitata* males per trap per day (CTD) in guava (Gu), Grapefruit (Gr), celementine (Ce), Shammoty(Sh), Valencia (Va) orange and all orchards of North Gaza Strip during the season 2001-2002.

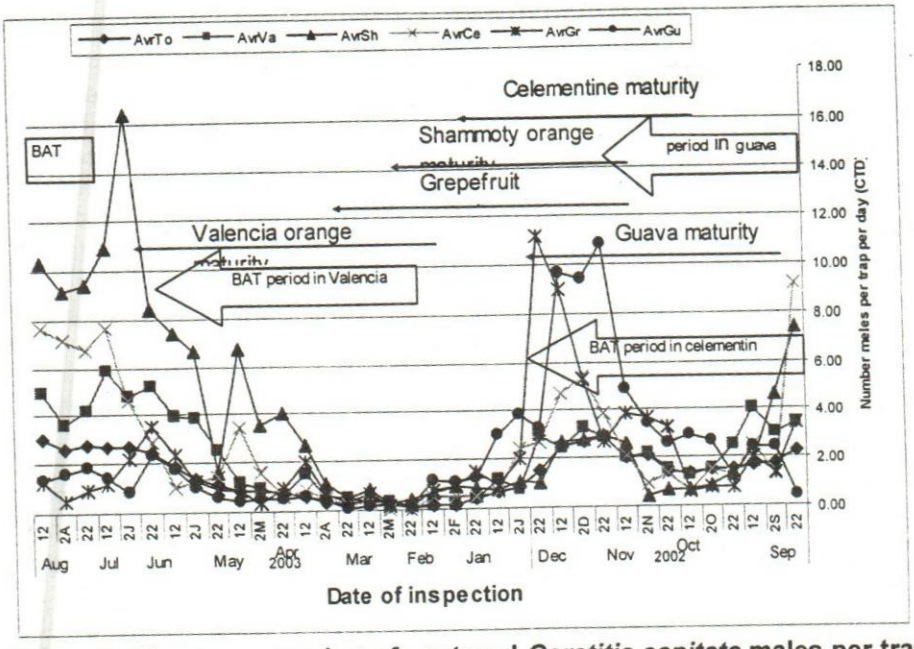

Figure 2: The mean number of captured *Ceratitis capitata* males per trap per day (CTD) in guava (Gu), Grapefruit (Gr), celementine (Ce), Shammoty (Sh), Valencia (Va) orange and all orchards of North Gaza governorates during the season 2002-2003.

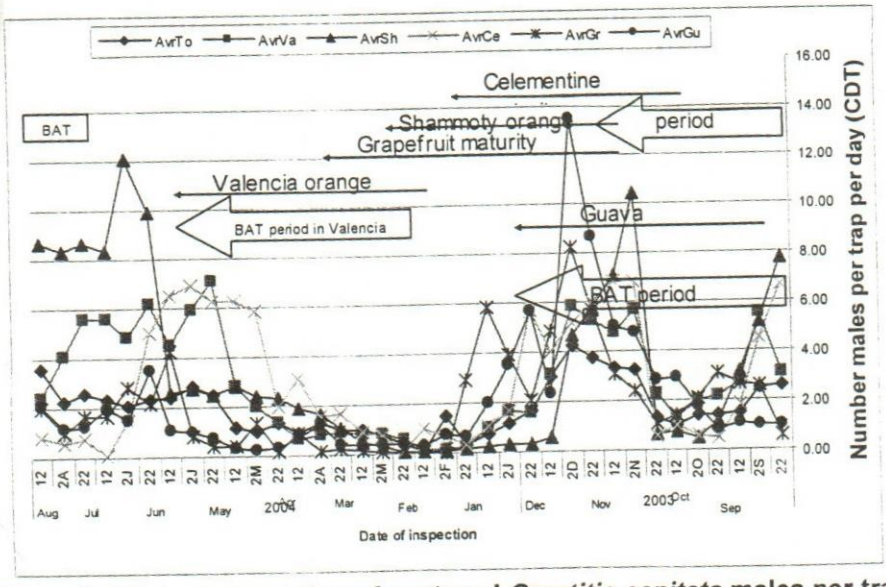

Figure 3: The mean number of captured *Ceratitis capitata* males per trap per day (CTD) in guava (Gu), Grapefruit (Gr), celementine (Ce), Shammoty (Sh), Valencia (Va) orange and all orchards of North Gaza Strip during the season 2003-2004.

Results presented in Figure 1, 2 and 3 also indicated that the average population of the Medfly decreased to a very low level in all host fruits groves from 22nd January to 22nd April (CTD=0.67-1.25). Cold weather and application protein partial bait spraying (BAT) in Valencia orange may stand behind this finding. The CTD increased gradually from 2nd May to the end of December (CTD=1.53-7.35) in all host fruits in spite of continuing the implementation of BAT. However, the highest CTD was found from middle November to middle December (CTD= 4.94-7.36). These results could be attributed to climatic changes particularly temperature. Similar results were obtained by Harris, (1975), Conti, (1990), Vadora, *et al.* (1993) and Terasa, *et al.* (2002) who reported that climatic conditions affect Medfly population in host fruits groves. The temperature had a clear effect on the daily activity period of the Medfly during summer season (CTD=3.87-4.44). *C.capitata* adult population decreased to a zero level during winter and remained at this level until spring (Israely *et al.* (1996).

Table 2 showed that there was an interaction effect between host fruits and months. Therefore the population dynamics of Medfly (CTD'S) were the highest and significant in guava groves during November (CTD=10.35), in Shammoty orange during July (CTD=9.69), in grapefruit during December (CTD=9.08), in guava during December (CTD=9.02) and in Shammoty orange during August (CTD=8.42), respectively. While the population dynamics of Medfly (CTD) was the lowest in Shammoty during December (CTD=2.42), guava during July, June and August (CTD=1.21, 1.3, 1.89), and Shammoty orange during October (CTD=0.59 respectively.

Infestation five host fruits with *C.capitata*:

The Medfly infestation percentages were 21-48% in guava, 15-38% in celementine, 13-41% in Shammoty orange, 13-23% in grapefruit and 14-49% in Valencia orange (Figure 4). The highest infestation percentage observed for guava (46%-48.5%) was in October and November, for grapefruit (28.5%-50%) it was in January and for Valencia (17.5%-49%) it was in June (Figure 4). It was also observed that the infestation percentages for other host fruits were as follow: 22-41% on fig, 0.0-50% on apricot and 12.5% on apple and 100% on poppy. These results are in agreement with those obtained by Mustafa and Abdel-Jabar (1996) who reported that infestation percentage of pear reached 90%, apple 52% and fig reached 35% in Jordan. Also Hashem *et al.* (1987) showed that the degree of Medfly infestation on the different host fruits was extremely heavy as it was ranged from 5.7% on Valencia orange to 74% on apricot in Egypt. The results indicate that there is a relationship between population peaks of *C. capitata*, repining five host fruits and the increasing rate of infestations of the host fruits with insect (Figures 1, 2, 3 and 4).

We can conclude that significant differences in population dynamics Medfly was found among five host fruits and months of the season. Therefore, host fruit and climatic condition affects on population dynamics *C. capitata* was found. Also, there were correlation between flies numbers and every fruit species and availability neighboring host fruits species. This study provides useful information used for integrated *C.capitata* management in the

Gaza Strip. Further research is needed to study the seasonal abundance, host susceptibility of Medfly and evaluation new techniques of controlling friendly environment which will help us in planning IPM programme for reducing and suppressing this insect in groves.

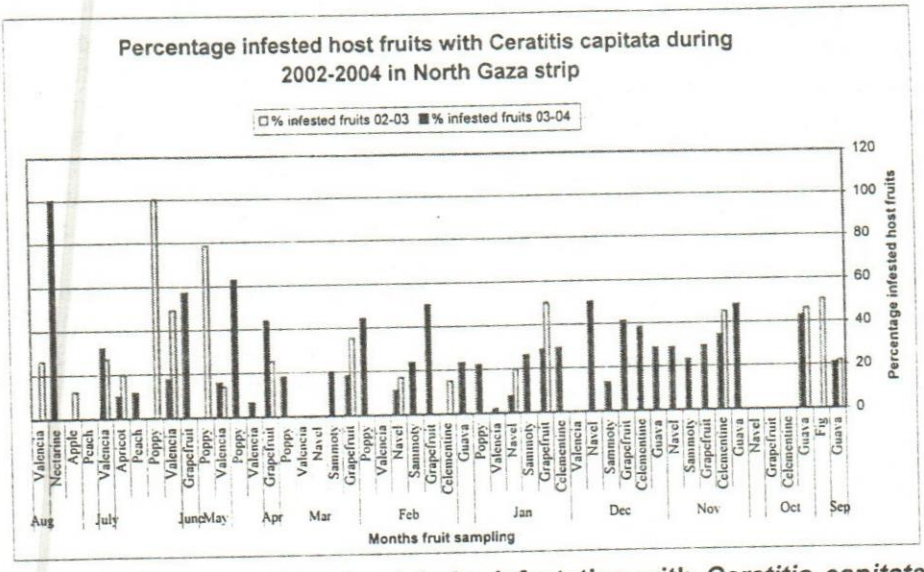

Figure 4: The percentage host fruits infestation with *Ceratitis capitata* during 2002-2004 in north Gaza Strip.

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دراسة مقارنة لتأثير خمسة عوائل على التغيرات العددية لذبابة الفاكهة في شمال قطاع غزة

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أجريت الدراسة الحقلية الحالية لقياس تأثير العوائل النباتية (الجوافة والكلمنتينا وبرتقال الشموطي والجريب فروت وبرتقال الفلنسيا) وإجمالي مساحة الحقول على التغيرات العددية لذبابة فاكهة حوض البحر الأبيض المتوسط. تم مراقبة التغير العددي لذبابة الفاكهة في عوائل بساتين الفاكهة الخمسة المذكورة سابقا في ثلاثة مواسم (٢٠٠١-٢٠٠٤). قدر عدد الذكور في المصيدة الواحدة(جاتكسون) لكل عشرة أيام ثم أعيد حسابها لكي تكون لليوم الواحد (CTD) وذلك لاستعمالها كمقياس يعبر عن تواجد هذه الحشرة في الحقل. أظهرت النتائج وجود فروق معنوية بين الكثافة العددية(CTD) في أنواع عوائل الفاكهة والمواسم وداخل الموسم الواحد (٣٦ قراءة مراقبة). إضافة إلى ذلك لوحظ التأثير المعنوي لأنواع العوائل على التغير العددي لذبابة الفاكهة. نتائج متوسط المواسم الثلاثة بينت أن أنواع برتقال الشموطي (CTD=3.47) والجوافة (CTD=3) كانت الأعلى تأثيرا من بين عوائل الفاكهة. كما لوحظت نتائج متشابهة لأشهر ديسمبر (CTD=5.2) ونوفمبر (CTD=4.74) ويوليو (CTD=4.4) وأغسطس (CTD=4.24) التي كان لهم أعلى تأثير على الكثافة العددية لذبابة الفاكهة في إجمالي العوائل النباتية. وقد بينت نتائج الدراسة أيضا تأثير الفعل المتداخل بين أنواع العوائل النباتية وشهور الموسم الواحد على التغير العددي لذبابة الفاكهة.

منحنيات التغير العددي لذبابة الفاكهة ظهرت في نهاية أقصى وفرة للثمار الناضجة بفترة قصيرة وذلك لجميع حالات عوائل بساتين الفاكهة المدروسة. وقد وجدت علاقة ما بين التغير العددي وإصابة الثمار بذبابة الفاكهة ونضج الثمار. ذبابة الفاكهة متواجدة على مدار السنة بأعداد متفاوتة حسب ظروف المناخ وتواجد العوائل النباتية. وقد وجد أكثر من منحنى لكل عائل نباتي، أحد المنحنيات ظهر في فترة نضج ثمار العائل، والمنحنيات الأخرى مرتبط ظهورها بمواعيد نضج ثمار العوائل المجاورة. تؤثر درجة الحرارة بشكل واضح على النشاط اليومي خلال موسمي الصيف والخريف. وقد لوحظ أن الجوافة تصاب بأعلى نسبة منوية للإصابة من ٤٦% إلى ٤٨% خلال أكتوبر ونوفمبر، وفي الجريب فروت من ٢٨،٥ % إلى ٥٠% خلال يناير وفي برتقال الفلنسيا من٥ ،١٧ % إلى ٤٩%في يونيو.

توصي الدراسة بأننا بحاجة لبحوث مستقبلية تعنى بدراسة التواجد الموسمي و تقدير قابلية الأنواع المختلفة من العوائل للإصابة بذبابة الفاكهة وتقييم تقنيات مكافحة جديدة رفيقة بالبيئة تساعدنا أثناء التخطيط لبرامج المكافحة المتكاملة لهذه الحشرة لتقليلها وإخماد تواجدها في بساتين الفاكهة.