

ECOLOGICAL STUDIES ON CERTAIN HOMOPTEROUS INSECTS INFESTING SOME CITRUS TREES IN EGYPT

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Abstract

The present work was conducted during 1996/1997 and 1997/1998 seasons to survey and study seasonal abundance of some dominant species of homopterous insects (aphids, leafhoppers and planthoppers) infesting citrus trees (Balady orange, Mandarin, Navel and Valencia orange). Moreover, the effects of some climatic factors on the population density of these insect pests have been studied during the course of this investigation in different regions of Sharkia Governorate, Egypt.

The following aphid species were collected; *Aphis gossypii* Glover, *Aphis craccivora* Koch, *Aphis citricola* v.d. goot and *Myzus persicae* (Sulzer). During the years of investigation, two peaks of *Aphis gossypii* were recorded at mid of March and the end of July, respectively. *Aphis citricola* had one peak at the end of March, while *Aphis craccivora* had also one peak at the end of February on Balady orange and Valencia orange.

The collected leafhopper species were; *Empoasca decedens* (Pao-li), *Empoasca decipiens* and *Cicadulina chinai* (Ghauri). Three peaks of *Empoasca decedens* were recorded at the end of October, end of May and at the end of September. *Empoasca decipiens* had one peak at the end of May, while *Cicadulina chinai* had two peaks at the end of October and at mid of September, respectively.

The collected plant hopper species were; *Sogatella farcifera* (Horv.) and *Sogatella vibix* (Haupt), which had two peaks. The first was at mid of October and the second peak was at the end of September.

The statistical analysis indicated that the effect of maximum and minimum temperature on the population of the studied insects was more than the effect of relative humidity.

INTRODUCTION

Citrus orchards are subjected to attack by large numbers of insect pests through the growing season. Among these pests, certain homopterous insects such as aphids, leafhoppers and planthoppers, which cause serious damage either directly by sucking plant juice or indirectly as vectors of plants pathogenic agents.

In Egypt, several studies have been done to survey these homopterous insects on citrus trees in different regions. However, inspite of the different studies reported by many authors, limited information on these insects in citrus orchards (Hegab *et al.* 1987 and El-Nagar *et al.* 1983)

MATERIALS AND METHODS

Experimental areas: The present work was carried out at different locations in Diarb Nigm district, Sharkia Governorate, Egypt, planted with certain varieties of citrus trees during the two successive seasons of 1996 / 1997 and 1997 / 1998.

Sampling: Since the insects under investigation differed in their living habits, activities and distribution on various parts of the host plants, it was necessary to use different sampling methods for each group of tested insect pests.

a. Aphids (Aphididae: Homoptera): To survey the aphid species on different varieties of citrus trees, the following three procedures of sampling were followed:

1. Plant samples: Five trees were chosen randomly from each variety of citrus trees (Mandarin, Navel orange, Balady orange and Valencia orange). From each tree five leave were taken randomly and weekly (25 leaves/sample) from different varieties of citrus trees between October and September during two successive seasons of 1996 /1997 and 1997/1998. The leaves were placed in paper bags and transported to the laboratory in the same day.

A sample apparatus was used for this purpose, which consisted of a wooden desk, a white card board paper divided into 4 cm a part of columns was put in the bottom, on which a glass plate was placed and the upper surface of the glass plate was allowed to be wet with fine droplets of water to reduce the movement of the counted aphids (Hegab *et al.* 1987 and 1988).

The plants were carefully shaken off on to the plate and aphid insects were counted using a small brush in each column. The numbers of individuals of each stage (alatae form, apterous and nymphs) were separately counted using a hand lens.

2. Using of yellow sticky board traps: Traps of 35 x 25 cm yellow paper boards coated with sticky material and hung on a branch of the citrus tree.

3. Using of Yellow pan traps: Traps of 24 cm diameters and 10 cm deep yellow pan filled with water as trapping liquid. These traps were hanged on wood rods in the

orchard.

Ten traps from both yellow sticky and yellow pan traps were used for these investigations. The traps were used to collect aphid species on citrus trees for both surveying and activity studies.

The weekly counts of captured aphid species were recorded for each trap. Specimens of aphids were counted, preserved in 70 % ethyl alcohol and identified according to the work of Habib and El-kady (1961) and Muller (1975).

b. Leafhoppers and planthoppers: In order to survey the leafhopper and planthopper insects infesting citrus trees, the following three procedures of sampling were followed:

1. The sweeping nets, (30 cm diameter and 60 cm deep), were used to take the randomized samples during the period of study. Each sample consisted of 200 strokes.
2. The yellow sticky traps.
3. The yellow pan traps.

Specimens of leafhoppers and planthoppers collected by the aforementioned different methods were killed by cyanide, then sorted into species and identified according to the work of (Ribaute, 1952; Nielson, 1968; Johnson, 1989) and recorded.

Climatic factors (Temperature and relative humidity): Daily records of both maximum and minimum temperature along with relative humidity were obtained from the Agrometeorological station at Zagazig city during 1996-1997 and 1997-1998 seasons. The relationship between the weekly mean number of collected homopterous insects and the corresponding weekly means of maximum and minimum temperatures and relative humidity were estimated. Partial regression was applied to show the effect of each climatic factor on population density of each leafhoppers, planthoppers and aphids under investigation. The results concerning number of insects in relation to prevailing temperature (maximum and minimum) and relative humidity were statically analyzed. Correlation coefficients, explained variances and partial regression values were estimated by explain variance.

RESULTS AND DISCUSSION

1. Aphids, leafhoppers and planthoppers surveyed on citrus trees

1-1. Aphids: Four aphid species were surveyed by the three methods of collections i.e. plant samples, sticky board traps and yellow pan traps, Table 1. .

These four aphid species were found on the different citrus trees (Mandarin, Navel, Balady and Valencia orange) and are namely;

- | | |
|--------------------------------------|----------------------------------|
| 1. <i>Aphis citricola</i> V.D. Goot. | 2. <i>Aphis gossypii</i> Glover. |
| 3. <i>Aphis craccivora</i> Koch. | 4. <i>Myzus persicae</i> (Sulz). |

It is to be mentioning that, plant samples proved to be efficient for collecting such aphid species.

Data in Table 1 reveal that plant samples, yellow pan and yellow sticky board traps were efficient to collect aphid species during the two successive seasons of investigation 1996/1997 and 1997/1998. These results are in agreement with the finding of Hegab *et al.* (1985) who showed that plant samples seemed to be the most efficient method to collect aphid species in fruit trees orchards in Egypt. These results were also obtained by Ismail *et al.* (1986).

It is worth to mention that the most severe infestations by *A.citricola* were recorded on Balady, Navel, Valencia orange and mandarin trees, also higher total numbers of *A.gossypii* were recorded on mandarin, Balady, Navel orange and Valencia orange trees. It was found also, that Balady orange and Valencia orange trees harbored high populations of *A.craccivora* followed by Navel orange and mandarin trees. Similar results were obtained by Attia and El-Kady (1986).

1.2 Leafhoppers and planthoppers: The data presented in Table 2 show the total number of the leafhopper and planthopper species collected by the aforementioned different techniques, i.e. sweeping nets, yellow sticky board and yellow pan traps in the investigated areas from each host.

Three leafhopper species and two planthopper species occurred on citrus trees (Mandarin, Navel, Balady and Valencia orange trees). Leafhoppers species can be arranged, descendingly according to their abundance: as follows: *Empoasca decipiens* and *Cicadulina chinai*. These leafhopper species were the most abundant species on citrus trees during 1996/1997 and 1997/1998 seasons.

Two planthoppers species were collected from citrus trees in the investigated orchards; *Sogatella furcifera* and *Sogatella vibix*. *S. furcifera* was the most abundant. S.

vibix was captured by sticky board and yellow pan traps.

The yellow sticky board and yellow pan trap had a remarkable selectivity for attracting certain leafhopper and planthopper species.

The aforementioned planthopper species were abundant on citrus trees during 1996/1997 and 1997/1998 seasons.

These findings agreed with Hegab (1981), Hegab *et al.* (1987), El-Zohairy *et al.* (1989) and Soliman, (1993).

| Species | 1996/1997 | 1997/1998 | 1998/1999 | 1999/2000 | 2000/2001 | 2001/2002 | 2002/2003 | 2003/2004 | 2004/2005 | 2005/2006 | 2006/2007 | 2007/2008 | 2008/2009 | 2009/2010 | 2010/2011 | 2011/2012 | 2012/2013 | 2013/2014 | 2014/2015 | 2015/2016 | 2016/2017 | 2017/2018 | 2018/2019 | 2019/2020 | 2020/2021 | 2021/2022 | 2022/2023 | 2023/2024 | 2024/2025 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| <i>Trialeurodes vaporariorum</i> | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 105 | 110 | 115 | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | 245 | 250 | 255 | 260 | 265 | 270 | 275 | 280 | 285 | 290 | 295 | 300 | 305 | 310 | 315 | 320 | 325 | 330 | 335 | 340 | 345 | 350 | 355 | 360 | 365 | 370 | 375 | 380 | 385 | 390 | 395 | 400 | 405 | 410 | 415 | 420 | 425 | 430 | 435 | 440 | 445 | 450 | 455 | 460 | 465 | 470 | 475 | 480 | 485 | 490 | 495 | 500 | 505 | 510 | 515 | 520 | 525 | 530 | 535 | 540 | 545 | 550 | 555 | 560 | 565 | 570 | 575 | 580 | 585 | 590 | 595 | 600 | 605 | 610 | 615 | 620 | 625 | 630 | 635 | 640 | 645 | 650 | 655 | 660 | 665 | 670 | 675 | 680 | 685 | 690 | 695 | 700 | 705 | 710 | 715 | 720 | 725 | 730 | 735 | 740 | 745 | 750 | 755 | 760 | 765 | 770 | 775 | 780 | 785 | 790 | 795 | 800 | 805 | 810 | 815 | 820 | 825 | 830 | 835 | 840 | 845 | 850 | 855 | 860 | 865 | 870 | 875 | 880 | 885 | 890 | 895 | 900 | 905 | 910 | 915 | 920 | 925 | 930 | 935 | 940 | 945 | 950 | 955 | 960 | 965 | 970 | 975 | 980 | 985 | 990 | 995 | 1000 |

Table 1. Total numbers of aphid species infesting different citrus trees, Sharkia Governorate, Egypt and collected by using of plant samples, yellow sticky board and yellow pan traps during 1996/1997 and 1997/1998 seasons.

| Aphid species | Host plant | Total number of aphids/sample | | | | | |
|------------------------|-----------------|-------------------------------|----------|-----------|----------|----------|-----|
| | | 1996-1997 | | 1997-1998 | | Y. B. T. | |
| | | Plant S. | Y.S.B.T. | Plant S. | Y.S.B.T. | | |
| <i>Aphis citricola</i> | Mandarin orange | 4021 | 843 | 117 | 2800 | 110 | 210 |
| | Navel orange | 6320 | 710 | 122 | 4304 | 997 | 158 |
| | Balady orange | 7608 | 895 | 98 | 10012 | 912 | 117 |
| | Valencia orange | 4825 | 999 | 123 | 4794 | 1050 | 146 |
| <i>Aphis gossypii</i> | Mandarin orange | 13147 | 1200 | 250 | 11807 | 1220 | 310 |
| | Navel orange | 3010 | 1440 | 247 | 3536 | 1510 | 297 |
| | Balady orange | 10635 | 1310 | 215 | 7523 | 1415 | 215 |
| | Valencia orange | 2814 | 1105 | 197 | 5509 | 1987 | 195 |
| <i>Aphis cracivora</i> | Mandarin orange | 210 | 57 | 17 | 197 | 97 | 29 |
| | Navel orange | 225 | 48 | 15 | 158 | 65 | 25 |
| | Balady orange | 680 | 178 | 31 | 728 | 147 | 54 |
| | Valencia orange | 505 | 186 | 45 | 842 | 174 | 49 |
| <i>Myzus persicae</i> | Mandarin orange | 114 | 47 | 37 | 95 | 58 | 66 |
| | Navel orange | 125 | 28 | 49 | 105 | 37 | 57 |
| | Balady orange | 97 | 49 | 35 | 87 | 45 | 48 |
| | Valencia orange | 88 | 55 | 58 | 115 | 42 | 75 |

Plant S.: plant sample.
 Y.S.B.T.: yellow sticky board traps.
 Y.P.T.: yellow pan traps.

2. Seasonal abundance of the dominant species of leafhoppers, planthoppers and aphids infesting different citrus trees

2.1 On mandarin orange trees

2.1.1 Leafhoppers (Cicadellidae): The obtained results in Table 3 clear that *Empoasca decedens* population has three peaks on mandarin at the end of October with a total number of 345 and 1213 individuals / 200 strokes, at the mid of May with a total number of 155 and 104 individuals / 200 strokes and at the end of September with a total number of 2550 and 2610 individuals /200 strokes during 1996/1997 and 1997/1998 seasons, respectively. While *E. decipiens* had one peak at the end of May with a total number of 529 and 209 individuals / 200 strokes, *C. chinai* had two peaks, the first at the end of October with a total number of 95 and 74 individuals / 200 strokes and the second at the mid of September with a total number of 186 and 196 individuals / 200 strokes during the two seasons, respectively.

These results partially agree with the findings of Aboul-Atta (1983) and disagreed with Soliman (1993) who mentioned that *E. decipiens* and *E. decedens* has three and two generations, respectively on certain cruciferous and solanaceous vegetable Plants during winter plantation. Variations in results may be attributed to localities of investigations and host plant, which may differ in the environmental conditions prevailing during execution of these experiments.

2.1.2 Planthoppers (Delphicidae): Results of studies on the population density of planthoppers, *S. furcifera* and *S. vibix* on mandarin orange trees, Table 3 show clearly that, *S. furcifera* had two peaks. The first peak occurred at the mid of October with a total number of 122 and 215 individuals/200 strokes and the second at the end of September with a total number of 536 and 667 individuals/200 strokes during 1996/1997 and 1997/1998 seasons, respectively. While *S. vibix* has two peaks, the first at the mid of October with a total number of 583 and 568 individuals/200 strokes and the second at the end of September with a total number of 1382 and 1286 individuals/200 strokes for the two seasons, respectively. These results are in agreement with the findings of Aboul-Atta (1983).

2.1.3 Aphids: The obtained results in Table, 3 show that the population density of *A. gossypii* has two peaks on mandarin orange trees. The first peak occurred at the mid of March, with a total number of 2067 and 2710 aphids/sample and at the end of July, with a total number of 2175 and 1640 aphids/sample) In 1996/1997 and 1997/1998 seasons, respectively. While *A. citricola* has one peak at the end of March with a total

Table 2. Total numbers of leafhopper and planthopper species collected from different citrus trees, Sharkia Governorate, Egypt, during 1996/1997 seasons by using of sweeping nets, yellow sticky board and yellow pan traps.

| Leafhopper and planthopper species | Host plant | No. leafhopper and planthopper species/sample | | | | | | | | | |
|------------------------------------|-----------------|---|----------|--------|------|-----------|--------|------|----------|--------|--|
| | | 1996-1997 | | | | 1997-1998 | | | | | |
| | | S.N. | Y.S.B.T. | Y.B.T. | S.N. | Y.S.B.T. | Y.B.T. | S.N. | Y.S.B.T. | Y.B.T. | |
| <i>Erposca decedens</i> | Mandarin orange | 6636 | 4110 | 210 | 7425 | 3530 | 257 | | | | |
| | Navel orange | 6613 | 2070 | 237 | 8670 | 2710 | 197 | | | | |
| | Balady orange | 2339 | 2030 | 198 | 5053 | 3900 | 180 | | | | |
| | Valencia orange | 2566 | 3194 | 157 | 4059 | 2366 | 175 | | | | |
| <i>Erposca decipiens</i> | Mandarin orange | 1603 | 2512 | 110 | 959 | 1108 | 117 | | | | |
| | Navel orange | 1303 | 1380 | 127 | 1045 | 980 | 128 | | | | |
| | Balady orange | 1987 | 2024 | 190 | 775 | 1138 | 130 | | | | |
| | Valencia orange | 1370 | 1357 | 135 | 847 | 1167 | 97 | | | | |
| <i>Cicaodulina chinai</i> | Mandarin orange | 650 | 125 | 95 | 679 | 377 | 90 | | | | |
| | Navel orange | 761 | 110 | 88 | 818 | 186 | 87 | | | | |
| | Balady orange | 570 | 231 | 98 | 549 | 97 | 97 | | | | |
| | Valencia orange | 392 | 508 | 77 | 413 | 442 | 102 | | | | |
| <i>Sogatella furcifera</i> | Mandarin orange | 2911 | 0 | 0 | 2805 | 0 | 0 | | | | |
| | Navel orange | 2252 | 0 | 0 | 2767 | 0 | 0 | | | | |
| | Balady orange | 1631 | 0 | 0 | 1582 | 0 | 0 | | | | |
| | Valencia orange | 1710 | 0 | 0 | 1946 | 0 | 0 | | | | |
| <i>Sogatella vibix</i> | Mandarin orange | 1239 | 325 | 57 | 1422 | 371 | 83 | | | | |
| | Navel orange | 1000 | 395 | 68 | 1165 | 285 | 65 | | | | |
| | Balady orange | 776 | 423 | 79 | 799 | 259 | 47 | | | | |
| | Valencia orange | 978 | 911 | 80 | 659 | 371 | 58 | | | | |

S.N.: sweeping net
 Y.S.B.T.: yellow sticky board traps.
 Y.P.T.: yellow pan traps.

Table (3): Total number of leafhopper, planthopper and aphid species infesting Mandarin orange trees collected by sweeping net, Sharkia Governorate, Egypt, during 1996/1997 and 1997/1998 seasons.

| Date | Leafhoppers | | | | | | Planthoppers | | | | | | Aphids | | | |
|--------------|--------------------|-------------|---------------------|------------|------------------|------------|-----------------|-------------|---------------------|-------------|--------------------|--------------|---------------------|-------------|--|--|
| | <i>E. decedens</i> | | <i>E. decipiens</i> | | <i>C. chinai</i> | | <i>S. vibix</i> | | <i>S. turcifera</i> | | <i>A. gossypii</i> | | <i>A. citricola</i> | | | |
| | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | | |
| October | 180 | 1089 | 31 | 27 | 50 | 35 | 122 | 215 | 538 | 568 | 0 | 110 | 0 | 0 | | |
| November | 345 | 1213 | 15 | 36 | 95 | 74 | 34 | 37 | 217 | 211 | 0 | 112 | 0 | 0 | | |
| December | 190 | 506 | 27 | 29 | 33 | 31 | 7 | 6 | 28 | 20 | 0 | 155 | 0 | 0 | | |
| January | 197 | 274 | 12 | 19 | 31 | 30 | 4 | 2 | 13 | 24 | 0 | 123 | 0 | 0 | | |
| February | 32 | 73 | 3 | 8 | 2 | 8 | 3 | 1 | 4 | 3 | 0 | 47 | 0 | 0 | | |
| March | 11 | 10 | 1 | 3 | 4 | 1 | 0 | 2 | 6 | 3 | 0 | 0 | 0 | 0 | | |
| April | 12 | 5 | 0 | 0 | 3 | 0 | 2 | 0 | 2 | 0 | 15 | 0 | 10 | 26 | | |
| May | 2 | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 99 | 62 | 45 | 135 | | |
| June | 8 | 3 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 208 | 226 | 131 | 308 | | |
| July | 4 | 5 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 335 | 564 | 642 | 487 | | |
| August | 5 | 16 | 6 | 9 | 0 | 0 | 0 | 2 | 0 | 2 | 2067 | 2710 | 934 | 1128 | | |
| September | 14 | 43 | 27 | 52 | 1 | 2 | 1 | 5 | 1 | 10 | 283 | 657 | 720 | 330 | | |
| October | 4 | 44 | 72 | 129 | 1 | 5 | 5 | 15 | 3 | 13 | 68 | 227 | 192 | 81 | | |
| November | 2 | 155 | 325 | 191 | 0 | 3 | 9 | 8 | 4 | 6 | 10 | 0 | 66 | 35 | | |
| December | 4 | 122 | 529 | 209 | 6 | 6 | 6 | 2 | 10 | 8 | 35 | 47 | 15 | 0 | | |
| January | 2 | 98 | 46 | 83 | 2 | 4 | 4 | 1 | 14 | 4 | 821 | 250 | 0 | 0 | | |
| February | 4 | 53 | 24 | 22 | 1 | 8 | 1 | 0 | 2 | 0 | 1113 | 710 | 0 | 0 | | |
| March | 2 | 11 | 7 | 14 | 4 | 17 | 2 | 0 | 7 | 0 | 2085 | 937 | 0 | 0 | | |
| April | 4 | 44 | 12 | 13 | 4 | 44 | 6 | 0 | 9 | 3 | 2175 | 1640 | 0 | 0 | | |
| May | 2 | 276 | 199 | 62 | 21 | 43 | 7 | 3 | 16 | 7 | 1807 | 785 | 0 | 0 | | |
| June | 4 | 342 | 423 | 19 | 13 | 57 | 76 | 17 | 85 | 16 | 610 | 95 | 0 | 0 | | |
| July | 2 | 1940 | 579 | 22 | 31 | 186 | 414 | 439 | 589 | 621 | 95 | 0 | 0 | 0 | | |
| August | 4 | 2550 | 2610 | 56 | 45 | 148 | 536 | 667 | 1382 | 1286 | 110 | 0 | 0 | 0 | | |
| Total | 6636 | 7425 | 1603 | 959 | 650 | 679 | 1239 | 1422 | 2911 | 2805 | 13147 | 11807 | 4021 | 2800 | | |

* 2 : the second week of the month.

**4 : the fourth week.

number of 1446 and 1128 aphids/sample, during the two seasons, respectively.

These results are in agreement with El-Nagar *et al.* (1983), Attia and El-Kady (1986) and Ismail *et al.* (1986), who revealed that *A. gossypii* has two peaks, while *A. citricola* has only one peak on mandarin orange trees.

2.2 On navel orange trees

2.2.1 Leafhoppers (Cicadellidae): The obtained results, Table 4 indicate that, the population of *Empoasca decedens* has three peaks on navel orange trees. The first peak occurred at the end of October with a total numbers of 395 and 2217 individuals/200 strokes; the 2nd at the mid of May with a total number of 98 and 316 individuals/200 strokes and the 3rd at the end of September with a total number of 2535 and 1982 individuals/200 strokes during 1996/1997 and 1997/1998 seasons, respectively. While *E. decipiens* has one peak at the end of May with a total number of 429 and 170 individuals/200 strokes and. *C. chinai* has two peaks, the first at the end of October with a total number of 117 and 141 individuals/200 strokes and the second at the mid of September with a total numbers of 212 and 145 individuals /200 strokes during the two seasons, respectively. The present results are in agreement with the findings of Aboul-Atta (1983) and Soliman (1993).

2.2.2 Planthoppers (Delphacidae): The obtained results on the population density of planthoppers *S. furcifera* and *S. vibix* on Navel orange trees, Table 4 show clearly that both of planthoppers has two peaks. The first peak occurred at the mid of October with a total number of 928 and 902; 297 and 331 individuals/200 strokes and the second peak occurred at the end of September with a total number of 489 and 848; 356 and 349 individuals/200 strokes for 1996/1997 and 1997/1998 seasons, respectively. These results are in agreement with the findings of Aboul-Atta (1983) Hegab *et al.* (1987 and 1988).

2.2.3 Aphids: Data presented in Table 4 show that, the population density of *Aphis gossypii* had two peaks on Navel orange trees. The first peak was occurred at the mid of March with a total number of 687 and 818 aphids/sample and the second peak occurred at the end of July, with a total number of 705 and 495 individual /sample during 1996/1997 and 1997/1998 seasons, respectively. While *A. Citricola* has only one peak at the end of March with a total number of 2253 and 1869 aphids/sample, for the two seasons, respectively. These results are in agreement with El-Nagar *et al.* (1983), Attia and El-Kady (1986), and Ismail *et al.* (1986), who showed that *A. gossypii* had two peaks, while *A. citricola* had one peak on Navel orange trees during summer plantation.

Table 4. Total number of leafhopper, planthopper and aphid species infesting Naval oranges trees collected by sweeping net, Sharkia Governorate, Egypt, during 1996/1997 and 1997/1998 seasons.

| Date | Leafhoppers | | | | | | Planthoppers | | | | | | Aphids | | | | | |
|--------------|--------------------|-------------|---------------------|-------------|------------------|------------|-----------------|-------------|---------------------|-------------|--------------------|-------------|---------------------|-------------|--|--|--|--|
| | <i>E. decedens</i> | | <i>E. declipens</i> | | <i>C. chinai</i> | | <i>S. vibix</i> | | <i>S. fuscifera</i> | | <i>A. gossypii</i> | | <i>A. citricola</i> | | | | | |
| | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | | | | |
| October | 264 | 1063 | 24 | 90 | 65 | 57 | 297 | 331 | 928 | 902 | 25 | 0 | 0 | 0 | | | | |
| * 4 | 395 | 2217 | 18 | 67 | 117 | 141 | 134 | 194 | 317 | 531 | 0 | 0 | 0 | 0 | | | | |
| November | 263 | 912 | 38 | 74 | 15 | 16 | 16 | 27 | 34 | 29 | 0 | 0 | 0 | 0 | | | | |
| * 4 | 140 | 303 | 19 | 41 | 15 | 14 | 3 | 4 | 10 | 25 | 0 | 0 | 0 | 0 | | | | |
| December | 2 | 117 | 3 | 16 | 18 | 12 | 2 | 1 | 6 | 16 | 0 | 0 | 0 | 0 | | | | |
| * 4 | 6 | 12 | 1 | 8 | 7 | 4 | 3 | 0 | 4 | 4 | 0 | 0 | 0 | 0 | | | | |
| January | 2 | 6 | 1 | 2 | 3 | 0 | 0 | 2 | 6 | 0 | 12 | 0 | 107 | 17 | | | | |
| * 4 | 4 | 3 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 105 | 37 | 290 | 105 | | | | |
| February | 2 | 6 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 215 | 120 | 557 | 207 | | | | |
| * 4 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 491 | 570 | 924 | 320 | | | | |
| March | 2 | 6 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 687 | 818 | 1125 | 660 | | | | |
| * 4 | 10 | 8 | 5 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 322 | 677 | 2253 | 1869 | | | | |
| April | 2 | 39 | 8 | 10 | 4 | 2 | 1 | 7 | 3 | 2 | 175 | 215 | 757 | 857 | | | | |
| * 4 | 50 | 36 | 31 | 14 | 8 | 6 | 3 | 16 | 4 | 13 | 18 | 171 | 128 | 210 | | | | |
| May | 2 | 98 | 208 | 144 | 4 | 2 | 5 | 2 | 12 | 9 | 5 | 93 | 96 | 52 | | | | |
| * 4 | 47 | 16 | 429 | 170 | 5 | 3 | 0 | 0 | 18 | 3 | 0 | 0 | 43 | 7 | | | | |
| June | 2 | 42 | 199 | 106 | 14 | 8 | 0 | 0 | 2 | 0 | 0 | 0 | 14 | 0 | | | | |
| * 4 | 12 | 20 | 49 | 66 | 42 | 36 | 0 | 0 | 0 | 0 | 13 | 25 | 0 | 0 | | | | |
| July | 2 | 15 | 44 | 15 | 33 | 29 | 0 | 0 | 0 | 1 | 125 | 88 | 0 | 0 | | | | |
| * 4 | 142 | 47 | 12 | 5 | 15 | 22 | 1 | 1 | 7 | 4 | 705 | 495 | 0 | 0 | | | | |
| August | 2 | 491 | 15 | 14 | 24 | 80 | 3 | 2 | 13 | 16 | 77 | 186 | 0 | 0 | | | | |
| * 4 | 538 | 694 | 56 | 51 | 32 | 106 | 21 | 25 | 54 | 34 | 35 | 41 | 0 | 0 | | | | |
| September | 2 | 1482 | 64 | 64 | 212 | 145 | 155 | 204 | 343 | 328 | 0 | 0 | 0 | 0 | | | | |
| * 4 | 2535 | 1982 | 71 | 92 | 122 | 133 | 356 | 349 | 499 | 848 | 0 | 0 | 0 | 0 | | | | |
| Total | 6613 | 8760 | 1303 | 1054 | 761 | 818 | 1000 | 1165 | 2252 | 2767 | 3010 | 3536 | 6320 | 4304 | | | | |

* 2 : the second week of the month.

** 4 : the fourth week.

2.3 Balady orange trees

2.3.1 Leafhoppers (Cicadellidae): Data in Table 5 show that *Empoasca decedens* population has three peaks on Balady orange trees. The first peak occurred at the end of October with a total number of 340 and 680 individuals / 200 strokes, the second peak was recorded at the mid of May with a total number of 237 and 314 individuals / 200 strokes and the third peak was recorded at the end of September with a total number of 585 and 1322 individuals /200 strokes in 1996/1997 and 1997/1998 seasons, respectively. *E. decipiens* had one peak during the end of May with a total number of 831 and 133 individuals / 200 strokes and *C. chinai* has two peaks, the first peak occurred at the end of October with a total number of 112 and 98 individuals / 200 strokes and the second peak occurred at the mid of September with a total number of 107 and 122 individuals / 200 strokes) for the two seasons, respectively. These results are in agreement with the findings of El-Zohairy *et al.* (1989).

2.3.2 Planthoppers (Delphicidae): Concerning the population density of planthoppers, *S. furcifera* and *S. vibix* on Balady orange trees it was found that, both of planthoppers has two peaks, Table 5. The first peak occurred at the mid of October with a total number of 212 and 553; 102 and 289 individuals/200 strokes and the second peak was occurred at the end of September with a total number of 940 and 316; 441 and 116 individuals/200 strokes for 1996/1997 and 1997/1998 seasons, respectively. These results are in agreement with the findings of Aboul-Atta (1983) and Hegab *et al.* (1987).

2.3.3 Aphids: Data presented in Table 5 show that the population density of *Aphis citricola* and of *A. craccivora* has one peak on Balady orange trees at the end of March (with a total number of 2575 and 3269 aphids/sample) and at the end of February (with a total number of 222 and 234 aphids/sample) during 1996/1997 and 1997/1998 seasons, respectively.

While *A. gossypii* had two peaks. The first peak was recorded at the mid of March with a total number of 2305 and 1445 aphids/sample and the second peak occurred at the end of July with a total number of 2731 and 1880 aphids/sample for the two seasons, respectively.

The obtained results are in agreement with the findings of El-Nagar *et al.* (1983), Attia and El-Kady (1986), and Ismail *et al.* (1986) who showed that *A. gossypii* has two peaks, while each of *A. citricola* and *A. craccivora* has one peak on Balady orange trees.

Table 5. Total number of leafhopper, planthopper and aphid species infesting Balady orange trees collected by sweeping net, Sharkia Governorate, Egypt, during 1996/1997 and 1997/1998 seasons.

| Date | Leafhoppers | | | | | | Planthoppers | | | Aphids | | | | |
|-----------|--------------------|-------|---------------------|-------|------------------|-------|-----------------|---------------------|--------------------|--------|---------------------|-------|----------------------|-------|
| | <i>E. decedens</i> | | <i>E. decipiens</i> | | <i>C. chinai</i> | | <i>S. vibix</i> | <i>S. furcifera</i> | <i>A. gossypii</i> | | <i>A. citricola</i> | | <i>A. craccivora</i> | |
| | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 |
| October | 236 | 455 | 66 | 55 | 29 | 23 | 102 | 289 | 212 | 553 | 0 | 0 | 0 | 0 |
| November | 340 | 680 | 61 | 50 | 112 | 98 | 84 | 269 | 166 | 532 | 0 | 0 | 0 | 0 |
| December | 51 | 106 | 21 | 38 | 12 | 14 | 9 | 2 | 23 | 7 | 0 | 0 | 0 | 0 |
| January | 20 | 31 | 6 | 20 | 4 | 5 | 6 | 1 | 16 | 4 | 0 | 0 | 0 | 0 |
| February | 25 | 11 | 15 | 7 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 37 | 12 |
| March | 55 | 4 | 14 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 23 | 16 | 50 | 187 |
| April | 62 | 5 | 17 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 228 | 150 | 260 | 865 |
| May | 31 | 5 | 10 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 550 | 356 | 837 | 710 |
| June | 37 | 3 | 9 | 4 | 1 | 2 | 0 | 0 | 0 | 0 | 1127 | 587 | 1150 | 965 |
| July | 45 | 16 | 20 | 16 | 1 | 7 | 0 | 0 | 0 | 3 | 2304 | 1445 | 1375 | 1040 |
| August | 70 | 37 | 27 | 17 | 6 | 2 | 1 | 4 | 2 | 6 | 810 | 780 | 2575 | 3269 |
| September | 99 | 36 | 831 | 133 | 15 | 7 | 2 | 0 | 10 | 14 | 394 | 412 | 848 | 2099 |
| Total | 2339 | 5053 | 1987 | 775 | 570 | 549 | 776 | 799 | 1631 | 1582 | 10635 | 7523 | 7608 | 10012 |

* 2 : the second week of the month.

**4 : the fourth week.

2.4 On valencia orange trees

2.4.1 Leafhoppers: (Cicadellidae): The obtained results, Table, 6 show that, the population density of *Empoasca decipiens* has one peak on Valencia orange trees which occurred during the end of May with a total number of 474 and 190 individuals / 200 strokes during 1996/1997 and 1997/1998 seasons, respectively. While *E. decedens* had three peaks at the end of October with a total number of 374 and 759 individuals / 200 strokes, at the mid of May with a total number of 133 and 487 individuals / 200 strokes and at the end of September with a total numbers of 474 and 556 individuals / 200 strokes) for the two seasons of study, respectively. *C. chinai* had two peaks. The first peak was recorded at the end of October with a total numbers of 56 and 53 individuals / 200 strokes and the second at the mid of September with a total number of 93 and 64 individuals / 200 strokes during the two seasons, respectively. These results are in agreement with the findings of Hegab *et al.* (1988).

2.4.2 Planthoppers (Delphicidae): Concerning the population density of planthoppers, *S. furcifera* and *S. vibix* on Valencia orange trees, the obtained results, Table, 6 show clearly that both of planthoppers species had two peaks on Valencia orange trees. The first peak occurred at the mid of October with a total number of 590 and 717; 101 and 317 individuals/200 strokes and the second peak at the end of September with a total number of 440 and 555; 610 and 112 individuals/200 strokes during 1996/1997 and 1997/1998 seasons, respectively. These results are in agreement with the findings of Aboul-Atta (1983) and Hegab *et al.* (1987 and 1988).

2.4.3 Aphids: Data in Table 6 show that the population density of *A. citricola* and *A. craccivora* has one peak on Valencia orange trees. The peak of *A. citricola* occurred at the end of March, with a total number of 2450 and 2342 Aphids/sample and of *A. craccivora* occurred at the end of February with a total number of 282 and 521 aphids/sample during 1996/1997 and 1997/1998 seasons, respectively. While *A. gossypii* had two peaks at the mid of March with a total number of 680 and 633 Aphids/sample and at the end of July with a total number of 521 and 2700 Aphids/sample) for the two seasons, respectively. These results are in agreement with the findings of El-Nagar *et al.* (1983), Attia and El-Kady (1986), and Ismail *et al.* (1986).

2.5 Effects of certain climatic factors on the population density of the dominant homopterous insects: The effects of the maximum temperature, minimum temperature and relative humidity on the population density of the dominant leafhopper, planthopper and aphid species infesting citrus trees (Mandarin, Navel,

Table 6. Total number of leafhopper, planthopper and aphid species infesting Valencia orange trees collected by sweeping net, Sharkia Governorate, Egypt, during 1996/1997 and 1997/1998 seasons.

| Date | Leafhoppers | | | | | | Planthoppers | | | | | | Aphids | | | | | |
|--------------|--------------------|-------------|---------------------|------------|------------------|------------|-----------------|-------------|---------------------|------------|--------------------|-------------|---------------------|-------------|----------------------|------------|--|--|
| | <i>E. decedens</i> | | <i>E. declivens</i> | | <i>C. chinai</i> | | <i>S. vibix</i> | | <i>S. furcifera</i> | | <i>A. gossypii</i> | | <i>A. citricola</i> | | <i>A. craccivora</i> | | | |
| | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | 96/97 | 97/98 | | |
| October | 2 | 245 | 18 | 33 | 37 | 29 | 590 | 717 | 101 | 317 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| **4 | 374 | 759 | 23 | 39 | 56 | 53 | 232 | 468 | 41 | 108 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| November | 2 | 285 | 608 | 19 | 27 | 18 | 13 | 25 | 51 | 13 | 25 | 0 | 0 | 0 | 0 | 0 | | |
| 4 | 197 | 108 | 40 | 24 | 7 | 4 | 20 | 10 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| December | 2 | 92 | 43 | 13 | 5 | 7 | 4 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 4 | 32 | 34 | 11 | 8 | 1 | 0 | 1 | 3 | 2 | 0 | 20 | 0 | 5 | 12 | 0 | 0 | | |
| January | 2 | 30 | 32 | 6 | 4 | 0 | 0 | 0 | 0 | 0 | 55 | 19 | 17 | 55 | 6 | 0 | | |
| 4 | 44 | 24 | 7 | 3 | 5 | 0 | 0 | 0 | 0 | 0 | 87 | 69 | 35 | 105 | 27 | 42 | | |
| February | 2 | 52 | 24 | 5 | 2 | 4 | 3 | 0 | 1 | 2 | 90 | 80 | 176 | 241 | 85 | 175 | | |
| 4 | 92 | 15 | 2 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 121 | 337 | 305 | 295 | 282 | 521 | | |
| March | 2 | 14 | 14 | 0 | 5 | 0 | 1 | 0 | 0 | 1 | 680 | 633 | 850 | 54 | 64 | 55 | | |
| 4 | 30 | 23 | 3 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 276 | 512 | 2450 | 28 | 17 | 17 | | |
| April | 2 | 32 | 24 | 26 | 21 | 0 | 3 | 2 | 3 | 2 | 105 | 150 | 815 | 1071 | 10 | 15 | | |
| 4 | 60 | 71 | 21 | 94 | 2 | 1 | 11 | 18 | 4 | 5 | 12 | 95 | 147 | 116 | 3 | 8 | | |
| May | 2 | 133 | 487 | 121 | 113 | 8 | 9 | 44 | 20 | 15 | 175 | 87 | 25 | 17 | 0 | 0 | | |
| 4 | 103 | 94 | 474 | 190 | 16 | 8 | 31 | 16 | 6 | 2 | 167 | 65 | 0 | 0 | 0 | 0 | | |
| June | 2 | 88 | 18 | 400 | 75 | 10 | 27 | 31 | 2 | 0 | 186 | 60 | 0 | 0 | 0 | 0 | | |
| 4 | 22 | 9 | 69 | 56 | 7 | 21 | 24 | 1 | 0 | 0 | 47 | 105 | 0 | 0 | 0 | 0 | | |
| July | 2 | 15 | 13 | 10 | 33 | 3 | 15 | 10 | 2 | 0 | 115 | 299 | 0 | 0 | 0 | 0 | | |
| 4 | 24 | 40 | 8 | 8 | 5 | 16 | 3 | 2 | 3 | 2 | 521 | 2700 | 0 | 0 | 0 | 0 | | |
| August | 2 | 54 | 100 | 17 | 31 | 20 | 48 | 9 | 8 | 11 | 12 | 225 | 0 | 0 | 0 | 0 | | |
| 4 | 59 | 196 | 17 | 34 | 33 | 53 | 54 | 30 | 71 | 24 | 37 | 71 | 0 | 0 | 0 | 0 | | |
| September | 2 | 75 | 243 | 24 | 20 | 93 | 64 | 177 | 37 | 85 | 37 | 0 | 0 | 0 | 0 | 0 | | |
| 4 | 474 | 556 | 36 | 14 | 58 | 44 | 440 | 555 | 619 | 112 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Total | 2566 | 4059 | 1370 | 847 | 392 | 413 | 1710 | 1946 | 978 | 659 | 2814 | 5509 | 4825 | 4794 | 505 | 842 | | |

* 2 : the second week of the month.

**4 : the fourth week.

Table 7. Partial regression and simple correlation coefficients between maximum temperatures, minimum temperatures, relative humidity and total number of leafhoppers, planthoppers and aphids infesting some citrus trees, Sharkia Governorate, during 1996/1997 and 1997/1998 seasons.

| Insects | Simple correlation | | | | | | Partial regression | | | | | |
|----------------------|--------------------|--------|-------|-----------|--------|-------|--------------------|---------|-------|-----------|---------|---------|
| | 1996/1997 | | | 1997/1998 | | | 1996/1997 | | | 1997/1998 | | |
| | r12 | r13 | r14 | r12 | r13 | r14 | b1 | b2 | b3 | b1 | b2 | b3 |
| <i>A. gossypii</i> | 0.468 | 0.323 | 0.347 | 0.049 | 0.095 | 0.213 | -3.86 | 1.387 | 3.518 | -0.143 | 1.913 | 0.233 |
| <i>A. citricola</i> | 0.682* | 0.628* | 0.52 | 0.004 | 0.518 | 0.175 | -4.551* | 1.51 | 3.943 | 8.521 | -7.164 | -1.172 |
| <i>A. craccivora</i> | 0.971* | 0.813 | 0.28 | 0.495 | 0.373 | 0.334 | -1.463* | -4.465* | 4.53 | -2.17 | 0.042 | 0.501 |
| <i>E. decipines</i> | 0.744** | 0.731* | 0.353 | 0.767** | 0.864* | 0.342 | -1.363 | 5.226* | -1.9 | 2.084 | -2.930* | 1.099 |
| <i>E. decedens</i> | 0.270** | 0.355 | 0.193 | 0.126 | 0.327 | 0.459 | 2.327 | -2.110* | 0.458 | -1.541 | 0.593 | 1.877 |
| <i>C. chinai</i> | 0.744** | 0.731* | 0.353 | 0.441** | 0.612* | 0.052 | -1.363 | 5.226* | -1.9 | -2.106 | 2.622* | 0.667 |
| <i>S. furcifera</i> | 0.113 | 0.281 | 0.671 | 0.451 | 0.662 | 0.291 | -6.673 | 4.291 | 3.439 | -13.134 | 2.676 | -10.263 |
| <i>S. vibix</i> | 0.318 | -0.489 | 0.349 | 0.663 | 0.886 | 0.113 | -3.132 | 0.405 | 0.136 | 1.358 | -6.756 | -7.173 |

Table 8. Explain variance of the effects of maximum temperatures, minimum temperatures and relative humidity on the total number of leafhoppers, planthoppers insects infesting some citrus trees, Sharkia Governorate, Egypt, during 1996/1997 and 1997/1998 seasons.

| Insects | Explain variance of effects of weather factors | | | | | | | | | | |
|----------------------|--|-----------|-----------|------------|-----------|-----------|-----------|-----------|-----------|-----------|--|
| | % R | | | Max. temp. | | | Min.temp. | | | R. H. | |
| | 1996/1997 | 1997/1998 | 1997/1998 | 1996/1997 | 1997/1998 | 1997/1998 | 1996/1997 | 1997/1998 | 1996/1997 | 1997/1998 | |
| <i>A. gossypii</i> | 0.36 | 0.77 | 0.153 | 0.219 | 0.077 | 0.514 | 0.064 | 0.103 | | | |
| <i>A. citricola</i> | 0.60 | 0.73 | 0.008 | 0.35 | 0.15 | 0.71 | 0.091 | 0.01 | | | |
| <i>A. craccivora</i> | 0.594 | 0.52 | 0.201 | 0.125 | 0.462 | 0.101 | 0.007 | 0.218 | | | |
| <i>E. decipines</i> | 0.70 | 0.57 | 0.122 | 0.104 | 0.536 | 0.436 | 0.059 | 0.014 | | | |
| <i>E. decedens</i> | 0.64 | 0.58 | 0.188 | 0.279 | 0.161 | 0.162 | 0.2 | 0.229 | | | |
| <i>C. chinai</i> | 0.35 | 0.69 | 0.147 | 0.104 | 0.143 | 0.539 | 0.103 | 0.002 | | | |
| <i>S. furcifera</i> | 0.30 | 0.62 | 0.332 | 0.04 | 0.09 | 0.194 | 0.17 | 0.097 | | | |
| <i>S. vibix</i> | 0.34 | 0.88 | 0.059 | 0.084 | 0.247 | 0.789 | 0.013 | 0.032 | | | |

Balady, Valencia orange) were studied under field conditions. The results presented in Tables 7,8 clearly indicate that, significant and insignificant correlation was obtained between numbers of different insects species and maximum temperature and relative humidity during the two investigation seasons. These results indicate that the tested meteorological factors play a great role in regulating the population density and seasonal abundance of such insect pests. The statistical analysis indicate that the effect of maximum and minimum temperature on number of insects come first. In other words, thermal factors seemed to affect the population of insects under study at first, followed by relative humidity.

It is to be noticed that, similar findings were reported by Hegab *et al.* (1987, 1988) and Soliman (1993).

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دراسات بيئية علي بعض الحشرات متشابهة الاجنحه التي تصيب بعض اشجار الموالح في مصر

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أجريت هذه الدراسات خلال عامي ١٩٩٦ / ١٩٩٧ / ١٩٩٨ لحصر ومعرفة الوفرة الموسميه للانواع السائده من حشرات المن ونطاطات الاوراق ونطاطات النباتات التي تصيب اشجار الموالح علاوه علي دراسة تاثير بعض العوامل الجويه علي نشاط وتعداد هذه الحشرات وذلك في مناطق مختلفه من محافظة الشرقيه - مصر.

أوضحت الدراسات ان انواع المن التي تم حصرها هي من القطن ومن البقوليات - من الموالح - ومن الخوخ حيث سجلت قمتان من التعداد لحشرة من القطن، القمه الاولى في منتصف مارس والقمه الثانيه في اخر يوليو . كذلك سجلت قمه واحده للتعداد لحشرة من الموالح في نهايه مارس، بينما سجلت قمه واحده للتعداد لحشرة من البقوليات في اخر فبراير علي كل من البرتقال البلدي والبرتقال الصيفي، كما أظهرت الدراسه ان انواع نطاطات الاوراق التي تم حصرها هي و *C. shinai* و *E. decedens* و *E. decipiens* وسجلت ثلاث قمم نشاط ل *E. decedens* في نهاية كل من اكتوبر ومايو وسبتمبر.

كذلك سجلت قمه للتعداد واحده *E. decipiens* في نهاية شهر مايو، بينما سجلت قمتان لتعداد *C. shinai* في نهايه اكتوبر ومنتصف سبتمبر علي الترتيب .

كذلك اوضحت الدراسه ان انواع نطاطات النباتات التي تم حصرها هي *S. vibix* و *S. furcifera* وسجلت قمتان للتعداد لكل منهما في منتصف اكتوبر ونهاية سبتمبر.

وأوضح التحليل الاحصائي ان تاثير العوامل الحراريه يكون بدرجه اكبر علي تعداد الحشرات من تاثير الرطوبه النسبيه .