

Ecological Studies on Certain Insects Infesting Guava Orchards and their Predatory Insects at Mansoura District.

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ABSTRACT

Field experiments were conducted at a guava orchard belonging to the center Experimental Research, Faculty of Agriculture, Mansoura University for two successive years 2000 and 2001 to survey and study the population density of the most important insect pests infesting guava trees and their associated predatory insects. The obtained data indicated that twelve insect species belong to the two orders: Homoptera and Diptera were recorded. These insects were namely: *Coccus hesperidum* L., *Pulvinaria psidii* Mask; *Ceroplastes floredensis* Comst; *Coccus elongatus* Sign; *Hemiberlesia lataniae* Sign; *Icerya seychellarum*; *Icerya aegyptiaca* Dougl; *Empoasca lybica* De Berg; *Empoasca discipiens* Paoli; *Aphis gossypii* Glov.; *Ceratitis capitata* Weid and *Bacterocera zonata* (Sounder). The dominant species was *C. hesperidum*. Nine predatory insect species were recorded associated with these injurious insects infesting guava trees. Population densities of major insect pests infesting guava orchards and their associated predatory insects were studied for two years. The temperature and relative humidity had showed correlation degrees varied from highly significant positive to significant negative on the population densities of the injurious insects and their predators during the two years of the study.

Key Words: Ecological studies, insect pests, guava orchards, predatory insects Egypt

INTRODUCTION

Guava orchards are infested by many injurious insect species. Numerous entomologists in different parts of the world recorded the injurious insects attacking guava orchards (Hall, 1922; El-Minshawy *et al.*, 1971; Moursi, 1974; Ismail *et al.*, 1989; Hill and Waller, 1990 and Saafan, 2002). These injurious insects are attacking by numerous predatory insects (Priesner and Hosny, 1940; Tranfaglia, 1974; Abd-Allah, 1988 and Prasad, 1990).

Population density of the common injurious and predatory insects were studied by many investigators (Salama and Salem, 1970; El-Minshawy *et al.*, 1976; Liu *et al.*, 1985; Chiu and Chu, 1986; El-Shouny, 1987; Hashem *et al.*, 1987; Vargas *et al.*, 1990; Shahein *et al.*, 1991; Jalaluddin *et al.*, 2001 and Saafan, 2002).

The effect of some weather condition factors on the population density of injurious insects attacking guava trees and their predatory insects were previously investigated by Rana *et al.* (1992).

Therefore, this investigation was proposed aiming to study the effect of certain ecological factors on the population density of injurious insect species infesting guava and their associated predatory insects at Mansoura district.

MATERIALS AND METHODS

1. Surveying of the injurious and associated predatory insect species:

The study was carried out in a guava orchard (about one feddan) located at Mansoura district for two successive years 2000 and 2001. Guava trees (variety Baladi) were about 10 year-old. No insecticides were applied in the orchard for the two years of investigation. Biweekly, 125 leaves, five branches and twigs were collected randomly and examined. In addition, 20 fruits were also inspected biweekly when they were available. Existed insects were identified and recorded. Identifications were made by the aid of the Taxonomy Department, Plant Protection Research Institute, ARC, Giza, Egypt.

2. Population density of injurious and associated predatory insect species:

Five trees of the same age and size were chosen at random for sampling and served as replicates during the course of this study. Twenty-five guava leaves were collected from each tree i.e., 125 leaves were picked biweekly. Obtained leaves were kept inside polyethylene bags, and transferred to the laboratory of Economic Entomology Department, Faculty of Agriculture, Mansoura University for examination. Alive nymphs and adults of mealy bugs and scale insects, except the first nymphal instar (crawlers) were counted on both surfaces of the guava leaves using a binocular microscope. Daily records of temperature and relative

humidity during the period of the study were obtained from the Meteorological Station, Ministry of Defense at Shawa Air Base Station (about 5 km from Mansoura).

The correlation coefficient between weather parameters and the number of the dominant insect pests infesting guava trees and their beneficial were computed. Also, the numerical relation among these variables was calculated for the key weather factors, using regression coefficient.

RESULTS AND DISCUSSION

1. Survey of major insect pests infesting guava trees:

Table (1) shows the total number of major insect pests and their percentages to the total catch on guava trees during the two seasons of study 2000 and 2001. Obtained data indicated that twelve insect species belonging to the orders; Homoptera and Diptera were recorded. Order Homoptera was represented by ten species belong to five families; Coccidae, Diaspididae, Margarodidae, Aphididae, and Jassidae. From the data given in Table (1), it can be noted that the dominant species was *C. hesperidum*, during the two years of study as it formed 28.31 and 26.68% of the total number of insects in the first and second season, respectively.

Two species namely: *Ceratitis capitata*, Weid., and *Bactrocera zonata* (Saunders) were recorded from order Diptera, belonging to the families: Trypetidae and Tephritidae, respectively. These results are in agreement with those obtained by Hall (1922), Moursi (1974), El-Nagar *et al.* (1987), Hashem *et al.* (1987) and Vargas *et al.* (1990).

Table (1): Total number of injurious insect species and their percentages to the total catches on guava trees at Mansoura district during 2000 and 2001 seasons.

| Species | Seasons | 2000 | | 2001 | |
|---------------------------------------|---------|-------|-------|-------|-------|
| | | Total | (%) | Total | (%) |
| 1. Order Homoptera: | | | | | |
| 1. Fam.: Coccidae: | | | | | |
| <i>Coccus hesperidum</i> L. | | 22815 | 28.31 | 21685 | 26.68 |
| <i>Pulvinaria psidii</i> Mask., | | 6613 | 8.21 | 7078 | 8.71 |
| <i>Ceroplastes floredensis</i> Comst. | | 6793 | 8.43 | 7079 | 8.71 |
| <i>Coccus elongatus</i> Sign. | | 5194 | 6.45 | 5030 | 6.19 |
| 2. Fam.: Diaspididae: | | | | | |
| <i>Hemiberlesia latania</i> Sign. | | 3196 | 3.97 | 3157 | 3.88 |
| 3. Fam.: Margarodidae | | | | | |
| <i>Icerya seychellarum</i> | | 5215 | 6.47 | 6345 | 7.81 |
| <i>Icerya aegyptiaca</i> Dougl. | | 2959 | 3.67 | 2141 | 2.63 |
| 4. Fam.: Aphididae: | | | | | |
| <i>Aphis gossypii</i> Glover. | | 15402 | 19.11 | 16417 | 20.20 |
| 5. Fam.: Jassidae | | | | | |
| <i>Empoasca lybica</i> DeBerg, | | 7448 | 9.24 | 7276 | 8.95 |
| <i>Empoasca discipiens</i> Paoli | | 4364 | 5.42 | 4440 | 5.46 |
| 2. Order: Diptera: | | | | | |
| Fam.: Trypetidae: | | | | | |
| <i>Ceratitis capitata</i> , Weid. | | 338 | 0.42 | 373 | 0.46 |
| Fam.: Tephritidae: | | | | | |
| <i>Bactrocera zonata</i> (Saunders) | | 246 | 0.30 | 257 | 0.32 |
| Total | | 80583 | 100 | 81278 | 100 |

2. Survey of predatory species associated with insect pests infesting guava trees:

Table (2) shows abundance number and percentages of the predatory insects found associated with major insect pests on guava trees during the two years of study. As shown in the table, nine predatory insects belonging to four orders with a total number of 4834 individuals in 2000 and 4849 individuals in 2001 were recorded.

Order Coleoptera, represented by six species, was the most dominant order in the two years of the study as it formed (78.83%) of the total catch in 2000 and (78.78%) in 2001. *Chilocorus bipustulatus* was the most

abundant species (33.00% in 2000 and 30.42% 2001) during the two years of the study. As shown in the table, order Neuroptera, Diptera and Hemiptera were represented only by one species each.

Table (2): Total number of predatory insect species and their percentages to the total catches on guava trees at Mansoura district during 2000 and 2001 seasons.

| Species | 2000 | | 2001 | |
|--------------------------------------|-------------|------------|-------------|------------|
| | Total | (%) | Total | (%) |
| 1. Order Coleoptera: | | | | |
| Fam.: Coccinellidae: | | | | |
| <i>Chilocorus bipustulatus</i> L. | 1595 | 33.00 | 1475 | 30.42 |
| <i>Rodolia cardinalis</i> Muls. | 1256 | 26.00 | 1564 | 32.25 |
| <i>Scymnus syriacus</i> Mars. | 771 | 15.95 | 586 | 12.08 |
| <i>Coccinella undecimpunctata</i> L. | 99 | 2.05 | 98 | 2.02 |
| <i>Cydonia vicina isis</i> Gr. | 90 | 1.86 | 97 | 2.00 |
| Fam.: Staphylinidae: | | | | |
| <i>Peaderus alferii</i> Koch. | 43 | 0.89 | 42 | 0.87 |
| 2. Order: Neuroptera: | | | | |
| Fam.: Chrysopidae | | | | |
| <i>Chrysoperla carnea</i> (Steph.) | 605 | 12.5 | 558 | 11.51 |
| 3. Order: Diptera: | | | | |
| Fam.: Syrphidae: | | | | |
| <i>Metasyrphus corollae</i> Fabr. | 268 | 5.54 | 321 | 6.62 |
| 4. Order: Hemiptera: | | | | |
| Fam.: Anthocoridae | | | | |
| <i>Orius albidipenis</i> Reut. | 107 | 2.21 | 108 | 2.23 |
| Total | 4834 | 100 | 4849 | 100 |

2.1. Population density of insect pests infesting guava trees at Mansoura district:

1. Soft brown scale, *Coccus hesperidum* L.:

Data in Fig. 1 revealed that *C. hesperidum* had two major peaks per year by mid-August and mid-October in year 2001 and by early August and late October in year 2002. The highest population of the peak (1896 individuals / 125 leaves) was found by mid-August in 2000 when the temperature reached 31.8°C and R.H. 67.93% and by early August (1761 individuals / 125 leaves) in the second year, 2001, when the temperature reached 29.01°C and R.H. 71.86%. The pest population decreased from mid-November till early January in both years of the study. These results are disagreed with those of Shahein *et al.* (1991) at Sharkia, who recorded three peaks a year for *C. hesperidum* at each region. Metwally *et al.* (1994) and Hendawy (1999) reported that the highest population of this soft brown scale insect occurred in June.

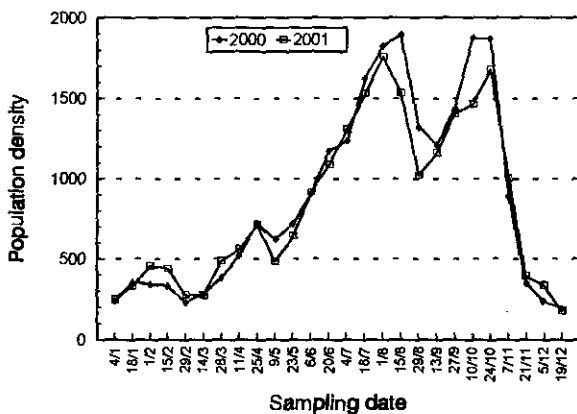


Fig. (1): Population density of *Coccus hesperidum* L. on 125 guava leaves at Mansoura district during 2000 and 2001 seasons.

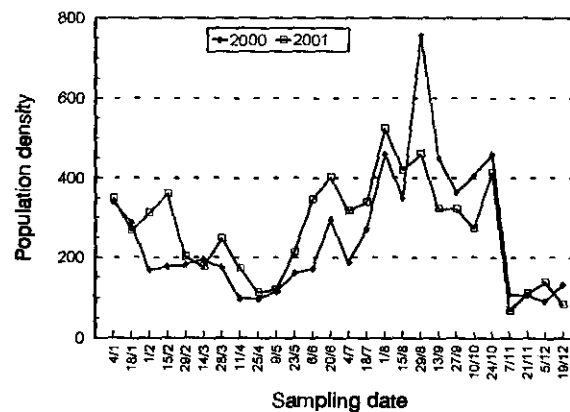


Fig. (2): Population density of *Pulvinaria psidii* Mask on 125 guava leaves at Mansoura district during 2000 and 2001 seasons.

2. Guava mealy scale, *Pulvinaria psidii* Mask:

Data in Fig. 2 revealed that *P. psidii* had three peaks per year in the two years of the study. The highest peak was found by late August (758 individuals / 125 leaves) in 2000, when the temperature reached 29.9°C and R.H. 64.76% and by early August (524 individuals / 125 leaves) in the second year of the study, when the temperature reached 29.01°C and R.H. 71.86%. The other two peaks were recorded by early January and the end of October in both years of study. These findings agree with those of Salama and Salem (1970), who recorded two generations of *P. psidii* on guava trees. While, Moursi (1974) and Hendawy (1999) recorded three generations for the pest in August, October and November.

3. Florida wax scale, *Ceroplastes floridensis* Comst:

Data in Fig. 3 revealed that *C. floridensis* had three peaks per year in the two years of the study. The highest peak was found by early June (531 and 657 individuals / 125 leaves) in both years of study, when the temperature reached 25.82, 25.48°C and 54.47, 60.73% R.H., respectively. The other two peaks were recorded by mid-January and the end of November in both years. These findings agree with those of Salem and Hamdy (1987), who recorded three generations of *C. floridensis* on guava trees at Qalubia province in Egypt.

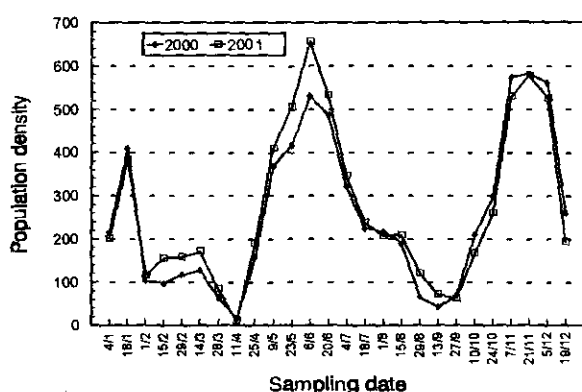


Fig. (3): Population density of *Ceroplastes floridensis* Comst on 125 guava leaves at Mansoura district during 2000 and 2001 seasons.

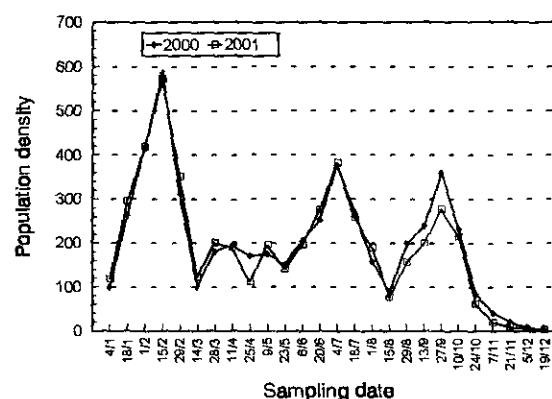


Fig. (4): Population density of *Coccus elongatus* on 125 guava leaves at Mansoura district during 2000 and 2001 seasons.

4. *Coccus elongatus* Sign:

Data in Fig. 4 revealed that *C. elongatus* had three peaks in 2000 and in 2001. The highest peak was found by mid-February (586 and 571 individuals / 125 leaves) in both years of the study, when the temperature reached 12.7, 13.41°C and R.H. 58.9, 53.73%, respectively. The other two peaks were recorded during early July and late September in both years. These findings agree also with those of Moursi (1974).

5. *Icerya sychellarum*:

Data in Fig. 5 revealed that *I. sychellarum* had two peaks in every year of the study. The highest peak was found by the end of August (529 and 573 individuals / 125 leaves) in both years of the study, when the temperature reached 29.9, 28.5°C and R.H. 64.76 and 70.30%, respectively. The second peak was recorded by the end of March.

6. *Empoasca lybica* Foli:

Data in Fig. 6 revealed that *E. lybica* had four peaks in each year of the study. The highest peak was found by the end of April (580 and 445 individuals / 125 leaves) in both years of study, when the temperature reached 28.0, 21.59°C and R.H. 56.6 and 61.0%, respectively. The other three peaks were recorded by mid-July, mid-August and during the second week of October in the both years.

7. *Aphis gossypii* Glov.:

Data in Fig. 7 revealed that *A. gossypii* had two peaks in 2000 and 2001. The highest peak was found by mid-May (5108 individuals/125 leaves) in 2000, when the temperature reached 24.22°C and R.H. 56.04% by the end of April (3525 individuals / 125 leaves) in the second year of investigation, when the temperature reached 21.59°C and R.H. 61.0%. The second peak was found by mid-September in 2000 and 2001.

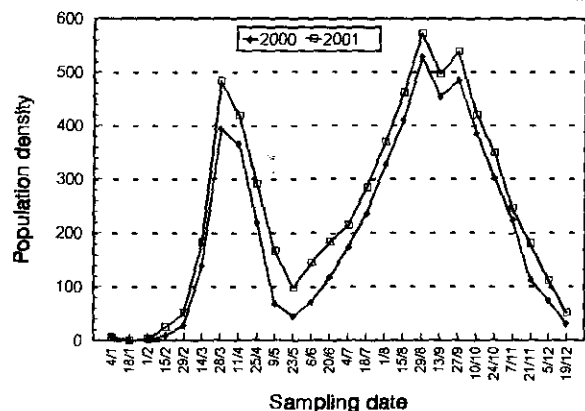


Fig. (5): Population density of *Icerya eychellarum* on 125 guava leaves at Mansoura district during 2000 and 2001 seasons.

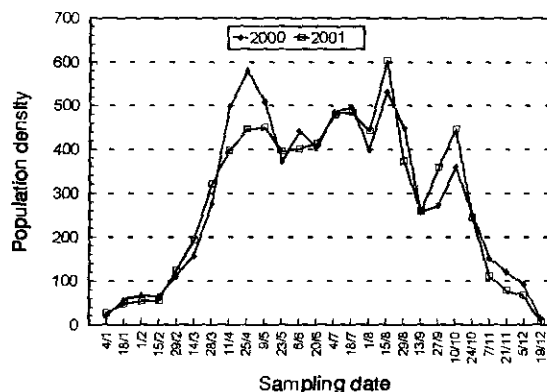


Fig. (6): Population density of *Empoasca lybica* Faoli on 125 guava leaves at Mansoura district during 2000 and 2001 seasons.

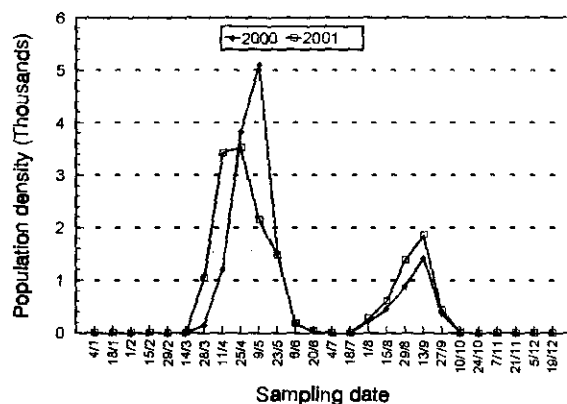


Fig. (7): Population density of *Aphis gossypii* on 125 guava leaves at Mansoura district during 2000 and 2001 seasons.

2.2. Population density of predatory insect species associated with guava insect pests:

2.2.1. Coleopterous predators:

1. *Chilocorus bipustulatus* L.:

Numbers of *C. bipustulatus* were generally low during winter and summer months (Table 3). Two peaks were recorded by early June and mid-October in 2000; another two peaks were attained in 2001 by late April and October. Obtained results agree with those of Metwally (1993), who reported two peaks per year for this predator.

2. *Rodolia cardinalis* Muls.:

Four peaks of *R. cardinalis* were recorded by mid-March, mid-July, the second week of October and in the first week of November (Table 3).

3. *Scymnus syriacus* Mars.:

Three peaks of *S. syriacus* were recorded during the years of the study by mid-February, mid-June 2000 and early June in 2001. The third peak was recorded by mid-July in 2000 and early August in 2001 (Table 3).

4. *Coccinella undecimpunctata* L.:

Four peaks of *C. undecimpunctata* were recorded by mid-February, mid-April, early August and early October (Table 3).

5. *Cydonia vicina isis* Gr.:

Four peaks of *C. vicina isis* were recorded by mid-March, by the end of April, early July, and by mid-September (Table 3).

Table (3): Population density of coleopterous predatory insect species inhabiting guava trees and the average temperature and relative humidity at Mansoura district during 2000 and 2001 seasons.

| Sampling dates | C. <i>bipustulatus</i> | | R. <i>cardinalis</i> | | S. <i>syriacus</i> | | C. <i>undecimpunctata</i> | | C. <i>vicina isis</i> | | P. <i>alferii</i> | | Average temperature (°C) | | Average relative humidity (%) | |
|----------------|------------------------|------|----------------------|------|--------------------|------|---------------------------|------|-----------------------|------|-------------------|------|--------------------------|-------|-------------------------------|-------|
| | 2000 | 2001 | 2000 | 2001 | 2000 | 2001 | 2000 | 2001 | 2000 | 2001 | 2000 | 2001 | 2000 | 2001 | 2000 | 2001 |
| 4/1 | 26 | 25 | 24 | 26 | 15 | 16 | 5 | 2 | 2 | 2 | 2 | 2 | 13.9 | 16.16 | 69.8 | 63.73 |
| 18/1 | 22 | 26 | 25 | 21 | 22 | 8 | 6 | 5 | 4 | 4 | 3 | 2 | 14.3 | 15.41 | 66.2 | 69.93 |
| 1/2 | 31 | 18 | 22 | 22 | 17 | 9 | 3 | 6 | 4 | 5 | 2 | 2 | 14.13 | 14.86 | 64.4 | 63.53 |
| 15/2 | 28 | 29 | 21 | 25 | 17 | 19 | 8 | 8 | 4 | 4 | 3 | 3 | 12.7 | 13.41 | 58.9 | 53.73 |
| 29/2 | 38 | 45 | 28 | 22 | 11 | 9 | 4 | 4 | 6 | 2 | 2 | 2 | 13.5 | 15.02 | 61.4 | 64.00 |
| 14/3 | 58 | 37 | 30 | 26 | 23 | 22 | 3 | 5 | 4 | 8 | 2 | 2 | 14.21 | 16.63 | 63.9 | 74.40 |
| 28/3 | 79 | 48 | 21 | 42 | 31 | 23 | 6 | 7 | 3 | 4 | 2 | 2 | 17.52 | 21.54 | 67.7 | 69.53 |
| 11/4 | 76 | 75 | 19 | 49 | 48 | 35 | 12 | 11 | 10 | 9 | 1 | 1 | 22.62 | 17.77 | 57.6 | 66.53 |
| 25/4 | 97 | 115 | 16 | 57 | 68 | 30 | 12 | 8 | 14 | 17 | 2 | 2 | 28.00 | 21.59 | 56.6 | 61.00 |
| 9/5 | 114 | 107 | 15 | 48 | 77 | 32 | 4 | 6 | 3 | 3 | 2 | 2 | 24.22 | 23.02 | 56.04 | 62.13 |
| 23/5 | 123 | 111 | 22 | 66 | 77 | 58 | 3 | 3 | 2 | 2 | 2 | 3 | 25.02 | 38.01 | 55.25 | 65.80 |
| 6/6 | 124 | 89 | 4 | 77 | 81 | 73 | 2 | 2 | 4 | 2 | 2 | 2 | 25.82 | 25.48 | 54.47 | 60.73 |
| 20/6 | 99 | 105 | 13 | 68 | 89 | 58 | 2 | 2 | 2 | 2 | 3 | 2 | 24.69 | 26.83 | 51.67 | 68.13 |
| 4/7 | 74 | 80 | 67 | 66 | 27 | 27 | 3 | 2 | 2 | 2 | 2 | 2 | 27.10 | 27.9 | 63.13 | 69.80 |
| 18/7 | 78 | 78 | 94 | 83 | 34 | 24 | 2 | 2 | 2 | 2 | 3 | 2 | 30.54 | 29.00 | 66.6 | 70.00 |
| 1/8 | 56 | 54 | 68 | 83 | 31 | 34 | 2 | 2 | 3 | 3 | 2 | 3 | 28.52 | 29.01 | 64.53 | 71.86 |
| 15/8 | 68 | 63 | 81 | 71 | 21 | 29 | 3 | 3 | 2 | 2 | 3 | 3 | 31.8 | 30.03 | 67.93 | 72.92 |
| 29/8 | 69 | 67 | 89 | 99 | 26 | 25 | 2 | 2 | 3 | 3 | 2 | 2 | 29.9 | 28.5 | 64.76 | 70.30 |
| 13/9 | 71 | 58 | 115 | 94 | 10 | 18 | 2 | 2 | 2 | 2 | 2 | 2 | 28.18 | 26.93 | 61.6 | 67.73 |
| 27/9 | 53 | 46 | 112 | 113 | 6 | 6 | 2 | 3 | 2 | 2 | 1 | 1 | 27.16 | 29.25 | 60.27 | 67.33 |
| 10/10 | 60 | 46 | 115 | 123 | 7 | 5 | 3 | 3 | 2 | 2 | 0 | 0 | 26.43 | 26.5 | 59.87 | 66.87 |
| 24/10 | 45 | 58 | 64 | 38 | 8 | 4 | 2 | 2 | 2 | 2 | 0 | 0 | 24.37 | 24.84 | 66.53 | 73.27 |
| 7/11 | 28 | 37 | 77 | 117 | 9 | 8 | 2 | 2 | 2 | 2 | 0 | 0 | 22.1 | 21.19 | 61.7 | 68.13 |
| 21/11 | 35 | 25 | 45 | 61 | 4 | 3 | 2 | 2 | 2 | 3 | 0 | 0 | 20.2 | 20.2 | 64.3 | 70.20 |
| 5/12 | 22 | 17 | 22 | 22 | 10 | 7 | 2 | 2 | 2 | 2 | 0 | 0 | 18.3 | 18.3 | 67.6 | 65.30 |
| 19/12 | 21 | 16 | 47 | 45 | 2 | 4 | 2 | 2 | 2 | 2 | 0 | 0 | 17.7 | 17.7 | 67.5 | 63.15 |

6. *Paederus alferii* Koch.:

Five peaks of *P. alferii* were recorded by mid-March, late April, mid-June, early August and by the end of September, in the first year of study, while respective dates were mid- February, mid-April, mid-June, early August and end of September in the second year of the study (Table 3)

2.2.2. Neuropterous predators:

1. *Chrysoperla carnea* (Steph.):

Three peaks of *C. carnea* were recorded by mid-May in 2000, and by the end of April 2001, the second peak was found by mid-July and the third peak was by mid-October (Table 4).

2.2.3. Dipterous predators:

1. *Metasyrphus corolla* Fabr.:

Four peaks of *M. corolla* were recorded by mid-January, mid-July, mid-October and early November in 2000. In 2001, four peaks also were recorded early January, mid-June, mid-August and early November (Table 4).

2.2.4. Hemipterous predators:

1. *Orius albidipennis* Reut.:

Two peaks of *O. albidipennis* were recorded by mid-April and mid-September (Table 4).

3. Evaluation of the role of the predators associated with insect pests of guava trees:

Evaluation of the role played by the predatory insect species naturally occurring associated with guava insect pests during the two years 2000 and 2001 was estimated. Seasonal fluctuations of both the predatory and injurious insects on guava trees are presented in Table (5). From the data, the population density of the insect pest species was low (962 individuals / 125 leaves) at the beginning of 2000, then increased gradually and reached its first peak during the last week of May. After that their numbers decreased until mid-June then increased gradually to reach their second peak by the end of August.

However, the population density of the predatory insects was found in relatively high numbers at the beginning of the first year, this is may be due to the migration of these beneficial insects from other crops. Then the population of the predators increased gradually and reached its peaks during the third week of July.

Table (4): Population density of neuropterous, dipterous and hemipterous predatory insect species inhabiting guava trees and the average temperature and relative humidity at Mansoura district during 2000 and 2001 seasons.

| Sampling dates | <i>C. carnea</i> | | <i>M. corollae</i> | | <i>O. albidipennis</i> | | Average temperature (°C) | | Average relative humidity (%) | |
|----------------|------------------|------|--------------------|------|------------------------|------|--------------------------|-------|-------------------------------|-------|
| | 2000 | 2001 | 2000 | 2001 | 2000 | 2001 | 2000 | 2001 | 2000 | 2001 |
| 4/1 | 40 | 35 | 28 | 13 | 5 | 3 | 13.9 | 16.16 | 69.8 | 63.73 |
| 18/1 | 22 | 29 | 17 | 26 | 3 | 2 | 14.3 | 15.41 | 66.2 | 69.93 |
| 1/2 | 27 | 33 | 14 | 16 | 5 | 5 | 14.13 | 14.86 | 64.4 | 63.53 |
| 15/2 | 7 | 4 | 8 | 23 | 3 | 3 | 12.7 | 13.41 | 58.9 | 53.73 |
| 29/2 | 6 | 5 | 4 | 5 | 3 | 6 | 13.5 | 15.02 | 61.4 | 64.00 |
| 14/3 | 3 | 3 | 2 | 2 | 4 | 4 | 14.21 | 16.63 | 63.9 | 74.40 |
| 28/3 | 11 | 11 | 7 | 7 | 9 | 11 | 17.52 | 21.54 | 67.7 | 69.53 |
| 11/4 | 27 | 25 | 5 | 14 | 9 | 11 | 22.62 | 17.77 | 57.6 | 66.53 |
| 25/4 | 25 | 31 | 2 | 7 | 4 | 3 | 28.00 | 21.59 | 56.6 | 61.00 |
| 9/5 | 30 | 28 | 19 | 19 | 4 | 5 | 24.22 | 23.02 | 56.04 | 62.13 |
| 23/5 | 11 | 6 | 7 | 16 | 5 | 3 | 25.02 | 38.01 | 55.25 | 65.80 |
| 6/6 | 26 | 25 | 13 | 7 | 3 | 4 | 25.82 | 25.48 | 54.47 | 60.73 |
| 20/6 | 21 | 21 | 5 | 11 | 5 | 4 | 24.69 | 26.83 | 51.67 | 68.13 |
| 4/7 | 44 | 34 | 13 | 16 | 5 | 4 | 27.10 | 27.9 | 63.13 | 69.80 |
| 18/7 | 42 | 36 | 14 | 14 | 3 | 5 | 30.54 | 29.00 | 66.6 | 70.00 |
| 1/8 | 28 | 19 | 11 | 16 | 4 | 3 | 28.52 | 29.01 | 64.53 | 71.86 |
| 15/8 | 25 | 16 | 7 | 17 | 3 | 3 | 31.8 | 30.03 | 67.93 | 72.92 |
| 29/8 | 14 | 5 | 11 | 10 | 3 | 3 | 29.9 | 28.5 | 64.76 | 70.30 |
| 13/9 | 18 | 18 | 5 | 5 | 5 | 6 | 28.18 | 26.93 | 61.6 | 67.73 |
| 27/9 | 33 | 25 | 12 | 12 | 6 | 5 | 27.16 | 29.25 | 60.27 | 67.33 |
| 10/10 | 37 | 34 | 17 | 9 | 5 | 4 | 26.43 | 26.5 | 59.87 | 66.87 |
| 24/10 | 25 | 34 | 11 | 10 | 2 | 2 | 24.37 | 24.84 | 66.53 | 73.27 |
| 7/11 | 21 | 20 | 14 | 12 | 3 | 3 | 22.1 | 21.19 | 61.7 | 68.13 |
| 21/11 | 28 | 31 | 8 | 12 | 2 | 2 | 20.2 | 20.2 | 64.3 | 70.20 |
| 5/12 | 19 | 21 | 6 | 9 | 2 | 2 | 18.3 | 18.3 | 67.6 | 65.30 |
| 19/12 | 15 | 9 | 8 | 13 | 2 | 2 | 17.7 | 17.7 | 67.5 | 63.15 |

Table (5): Biweekly number of injurious insect species, their predatory insects and calculated predator prey ratio on guava trees at Mansoura district during 2000 and 2001 seasons.

| Sampling Date | 2000 season | | | 2001 season | | |
|---------------|-----------------------------------|----------------------------------|----------------------|-----------------------------------|----------------------------------|----------------------|
| | Total number of injurious insects | Total number of predator insects | Predator prey ratios | Total number of injurious insects | Total number of predator insects | Predator prey ratios |
| 4/1 | 962 | 147 | 1 : 6.54 | 990 | 124 | 1 : 7.98 |
| 18/1 | 1455 | 124 | 1 : 11.73 | 1403 | 123 | 1 : 11.41 |
| 1/2 | 1242 | 125 | 1 : 19.94 | 1492 | 121 | 1 : 12.33 |
| 15/2 | 1437 | 99 | 1 : 14.51 | 1769 | 133 | 1 : 13.30 |
| 29/2 | 1221 | 100 | 1 : 12.21 | 1421 | 103 | 1 : 13.79 |
| 14/3 | 1283 | 147 | 1 : 8.72 | 1437 | 111 | 1 : 12.94 |
| 28/3 | 2053 | 169 | 1 : 12.15 | 3327 | 156 | 1 : 21.32 |
| 11/4 | 3534 | 212 | 1 : 16.66 | 5782 | 239 | 1 : 24.19 |
| 25/4 | 6360 | 256 | 1 : 24.84 | 6239 | 270 | 1 : 23.11 |
| 9/5 | 7689 | 257 | 1 : 29.92 | 4749 | 250 | 1 : 18.99 |
| 23/5 | 3854 | 252 | 1 : 15.29 | 3866 | 266 | 1 : 14.53 |
| 6/6 | 3090 | 270 | 1 : 11.44 | 3269 | 289 | 1 : 11.31 |
| 20/6 | 3316 | 239 | 1 : 13.87 | 3354 | 277 | 1 : 12.11 |
| 4/7 | 3473 | 266 | 1 : 13.06 | 3595 | 253 | 1 : 14.21 |
| 18/7 | 3755 | 279 | 1 : 13.45 | 3758 | 249 | 1 : 13.89 |
| 1/8 | 4138 | 224 | 1 : 18.47 | 4360 | 253 | 1 : 17.23 |
| 15/8 | 4646 | 213 | 1 : 21.81 | 4652 | 270 | 1 : 22.47 |
| 29/8 | 4997 | 219 | 1 : 22.82 | 4739 | 216 | 1 : 21.94 |
| 13/9 | 4623 | 235 | 1 : 19.67 | 4674 | 213 | 1 : 21.94 |
| 27/9 | 3693 | 235 | 1 : 15.71 | 3655 | 230 | 1 : 15.89 |
| 10/10 | 3812 | 249 | 1 : 15.31 | 3250 | 229 | 1 : 14.32 |
| 24/10 | 3623 | 164 | 1 : 22.09 | 3329 | 152 | 1 : 21.87 |
| 7/11 | 2265 | 162 | 1 : 13.98 | 2205 | 218 | 1 : 10.11 |
| 21/11 | 1430 | 127 | 1 : 11.25 | 1477 | 139 | 1 : 10.62 |
| 5/12 | 1221 | 86 | 1 : 14.19 | 1263 | 82 | 1 : 15.40 |
| 19/12 | 673 | 99 | 1 : 6.79 | 564 | 93 | 1 : 6.06 |

The results obtained showed that the peaks of the predatory species were always following the presence of the insect pest peaks on guava trees.

From the obtained data, the predator prey ratio was 1: 6.54 in 2000 and 1: 7.98 in 2001 at the beginning of guava infestation season. Then this ratio reached 1:29.92 and 1: 24.19 by mid-May in 2000 and mid-April in 2001. Then this ratio narrowed to 1: 6.79 and 1: 6.06 by mid-December in the two years of study.

The previous results of Ghanim and El-Adl (1983) and El-Adl and Ghanim (1988) declared that when the predator prey ratio was under 1 : 40, the predators play an effective role in controlling the injurious insects in different field crops and could keep their abundance in low level, and when the ratio was higher than 1:40 the role of the predator is considered not effective. The statistical analysis revealed that there were a highly significant positive correlation ($r = 0.7952$ in 2000 and 0.7982 in 2001) between the biweekly catches of the injurious insects and the numbers of predatory species under natural conditions. The numerical relation between the predators in guava orchards at Mansoura district for the two years of study was calculated as follows:

$$y = 103.35946157 + 0.0284007013 x \text{ in 2000 and}$$

$$y = 87.6389 + 0.033711 x \text{ in 2001.}$$

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دراسات إيكولوجية على الآفات الحشرية الهامة التي تصيب بساتين الجوافة، والمفترسات المصاحبة لها
بمنطقة المنصورة في مصر

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تم إجراء تجارب حقلية بإحدى بساتين الجوافة، تقع في مزرعة التجارب البحثية بكلية الزراعة، جامعة المنصورة لمدة عامين متتاليين ٢٠٠٠ و ٢٠٠١ لحصر ودراسة كثافة تعداد معظم الآفات الحشرية الشائعة والمفترسات الحشرية المصاحبة لها على أشجار الجوافة في المنطقة. سجل إثني عشرة نوعا حشرياً، تتبع الرتبتيين متشابهة الأجنحة وذات الجناحين في منطقة العمل. هذه الأنواع هي: *Coccus hesperidum* L., *Pulvinaria psidii* Mask; *Ceroplasts floredensis* Comst; *Coccus elongatas* Sign; *Hemiberlesia latania* Sign; *Icerya seychellarum*; *Icerya aegyptica* Dogul; *Empoasca lybica* De Berg; *Empoasca discipiens* Paoli; *Aphis gossypii* (Glov.); *Ceratitidis capitata* Weid and *Bacterocera zonata* (Sounder). *C. hesperidum* هو النوع السائد. سجلت تسعة أنواع من المفترسات الحشرية مصاحبة للآفات الضارة التي تصيب أشجار الجوافة. درست الكثافة العددية للأنواع الحشرية الرئيسية والمفترسات المصاحبة لها خلال عامي الدراسة. أظهرت درجات الحرارة والرطوبة النسبية درجات ارتباطاختلفت تأثيراتها من الموجبة ذات المعنوية العالية إلى المعنوية السالبة للكثافات العددية للآفات الحشرية والمفترسات المصاحبة خلال عامي الدراسة.