

SEASONAL ABUNDANCE OF THE OLEANDER APHID *APHIS NERII* BOYER DE FONSCOLOMBE (HOMOPTERA, APHIDIDAE) IN RELATION TO THE PRIMARY AND HYPER-PARASITOIDS ON DURANTA IN EGYPT.

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ABSTRACT

*Seasonal abundance of the oleander aphid, *Aphis nerii* Boyer de Fonscolombe and its associated parasitoids on duranta plants were studied in Zagazig and Mansoura during the three seasons 2004/05, 2005/06 and 2006/07. Obtained data revealed that:*

**A. nerii* infestation of duranta started by late September and early October, respectively. It continued to late March in the three seasons. The aphid numbers ranged between 10.88-48.04, 9.40-38.16 and 8.44-39.52 individuals/leaf, respectively in Zagazig during the three seasons. While, in Mansoura the infestation started earlier in the first half of September. It continued to early March. The aphid numbers ranged between 16.08-52.16, 15.72-37.56 and 14.00-41.00 individuals/leaf, respectively during the three seasons.*

In Zagazig, the aphid abundance showed three peaks in the three seasons of study. The mean numbers of aphids/leaf was 25.64, 25.04 and 22.75, respectively during the three seasons, meanwhile in Mansoura the aphid abundance showed three peaks in first season, four peaks in second season and two peaks in third seasons. The mean numbers of aphids/leaf were 26.63, 24.91 and 24.83, respectively during the three seasons.

*Five hymenopterous parasitoids, *Diaeretiella rapae* (M'Intosh), *Aphidius* sp. (Aphidiidae), (primary parasitoids) *Pachyneuron* sp. (Pteromalidae), *Alloxysta* sp. (Cynipidae) and *Aphidencyrthus* sp. (Encyrtidae) (Hyper parasitoids) were recorded..*

**D. rapae* was the most dominant one, where it occupied 86.68 and 79.57 %, while, *Aphidius* sp. was 13.32 and 20.43 % in Zagazig and Mansoura, respectively during the three seasons of study.*

**Pachyneuron* sp. occupied 52.13, 61.62 %, while *Aphidencyrthus* sp. was 26.95, 21.4% and *Alloxysta* sp. was 20.92 and 16.97 % in Zagazig and Mansoura, respectively during the three seasons of study.*

*Total means of parasitism rates of primary parasitoids; *D. rapae* and *Aphidius* spp. were 9.77, 8.69, 12.66 % and 3.39, 7.32, 7.34 % in Zagazig and Mansoura during the three seasons, respectively.*

Key words: Seasonal abundance, oleander aphid, *Aphis nerii*, boyer de fonscolombe, homoptera, aphididae, duranta, Egypt.

INTRODUCTION

The oleander aphid, *Aphis nerii* Boyer de Fonscolombe, (Homoptera: Aphididi) (milkweed aphid), host range includes several genera of Asclepiadaceae (*Gomphocarpus*, *Asclepias*, and *Calotropis*) and Apocynaceae (*Nerium* and *Vinca*) (Sandra *et al.*, 2004). *A. nerii* can occasionally be found infesting plants from families Compositae, Convolvulaceae, and Euphorbiaceae as well on sunflower plants (Elliott *et al.*, 1994), wax plant *Hoya carnosae*, citrus (Stoetzel 1994), soybean plants (George *et al.*, 2004). It presents in large colonies on the terminal shoots, stems and undersides of leaves of milkweed. Also, the upper surfaces of the leaves become shiny and sticky with deposits of honeydew.

In addition, the growing terminals can be deformed. Of more concern to nursery managers, is the potential for stunted plant growth due to repeated heavy infestation throughout the year. This aphid is able to transmit several viruses including sugarcane mosaic potyvirus and papaya ring spot potyvirus (Rothschild *et al.*, 1970; Hall and Ehler, 1980 and Groeters, 1989 and 1993). It fortifies its cornicle secretions with these bitter, poisonous chemicals. Its bright aposematic (warning) coloration and possession of toxins protects it from predation by certain species of birds and spider (Malcolm, 1986). These cardiac glycosides appear not to harm the parasitoids and generalist insect predators associated with oleander aphid (Sandra *et al.*, 2004).

Aphids defend themselves against enemies in one of four ways: By relying on attendant ants, being alert and actively moving away from enemies, remaining motionless and relying on crypsis or actively attacking enemies (Dixon, 1958 & 1985 and Hajek and Dahlstein, 1987). The role of density dependent parasitism in aphid population dynamics has been examined in a number of studies. Results have been variable, leading to no general consensus. Parasitism of aphids has been shown to be density dependent (Walker *et al.*, 1984; Murphy and Volkl, 1996 and Colfer and Rosenheim, 2001), inversely density dependent (Walker *et al.*, 1984 and Zhang and Chen, 1993) and density independent (Zhang and Chen, 1993; Ferguson and Stiling, 1996 and Murphy and Volkl, 1996), varying with the species and system under study. Kavallieratos *et al.* (2001) in Greece showed that the most common species of parasitoids attacking the oleander aphid *A. nerii* were the braconid wasps, *Aphidius colemani* Viereck, *binodoxys angelicae* Hal. *Diaeretiella rapae* (M'Intosh) and *Praon volucre* Hal. *D. rapae* is an important primary parasitoid of a wide range of aphid species in the world and Egypt, including major aphid pests such as cabbage aphid *Brevicoryne brassicae*, green peach aphid *Myzus persicae*, Russian wheat aphid *Diuraphis noxia*, cotton aphid, *Aphis gossypii*, broad bean aphid *Aphis craccivora*, bird cherry-oat aphid *Rhopalosiphum padi* and corn leaf aphid *Rhopalosiphum maidis* and oleander aphid, *A. nerii* (Elliott *et al.*, 1994; Pike *et al.*, 1999 and Saleh 2000 & 2004).

The present work was planned by the aim of studying as follows:

- 1- Survey and seasonal abundance of *A. nerii* and its associated parasitoids as well as the relationship between primary and hyperparasitoid on oleander plants.

- 2- Percentages of parasitism of the aphid for the three seasons in two districts in Egypt.

MATERIALS AND METHODS

A. nerii population were estimated on the oleander plant, *Nerium oleander* at two district Zagazig, Sharkia Governorate and Mansoura, Dakahlia Governorate, Egypt. From September 2004 to March 2007, random samples of twenty five leaves infested with aphids were taken weekly and transferred to the laboratory in tight closed plastic bags. The collected aphid specimens and the number of mummies per sample were recorded. Aphids were fed on their host plant and kept in Petri dishes (50 aphid/Petri dish) until formation of mummies. The mummies were collected and kept in small glass tubes until emergence of adult parasitoids. The emerged parasitoids were mounted, laboratory rearing of the host insect *A. nerii* was maintained to determine both the total percentage of parasitism and the relationship between primary and hyper parasitoids. The percentage of parasitism was calculated according to Farrell and Stufkens (1990) and El-Maghraby (1993).

$$\text{Percentage of parasitism} = \frac{A + B}{A + B + C} \times 100$$

Where:

A = Number of mummified host counted at the date of inspection

B = Number of mummified host appeared during the laboratory rearing

C = No. of unparasitized aphids.

Percentage of hyper parasitism was calculated according to El-Heneidy *et al.*

$$(2002). \% \text{ Hyper parasitism} = \frac{A}{B} \times 100$$

Where: A = No. of secondary parasitoid individuals, B = Total no. of parasitoid individuals.

Daily records of both minimum and maximum temperatures along with relative humidity were obtained from the agrometeorological station at Zagazig and Mansoura regions during 2004-05, 2005-06 and 2006-07 seasons. The relationship between the weekly average numbers of aphid individuals and the corresponding weekly mean of temperatures were recorded. Obtained data were statistically analyzed using ANOVA.

RESULTS AND DISCUSSION

1- Seasonal abundance of *Aphis nerii* Boyer de Fonscolombe in Zagzaig and Mansoura districts.

In Zagazig district:

Data presented in Table 1 revealed three peaks in the three seasons (2004 – 05, 2005 –06 and 2006-07), during the activity period of oleander aphid.

During the first season (2004 –05), the infestation started to appear on 4th week of September (25.27 °C and 64.5 % R.H.) with a mean number of 41.8

Table 1 : Mean numbers of *Aphis nerii* Boyer de Fonsconombe on oleander plants at Zagazig district, during the three seasons 2004-05, 2005-06 and 2006-07.

In Zagazig district											
2004/2005				2005/2006				2006/2007			
Sample dates	Mean number of aphids/ leaf	Mean of		Sample dates	Mean number of aphids/ leaf	Mean of		Sample dates	Mean number of aphids/ leaf	Mean of	
		Temp.	R.H %			Temp.	R.H %			Temp.	R.H %
29/9/2004	41.8	25.27	64.50	3/10/2005	33.72	27.99	61.63	25/9/2006	31.16	27.65	61.86
6/10/	48.04	24.64	54.65	10/10	36.84	28.34	63.29	2/10	36.12	28.63	58.27
13/10	39.92	24.29	57.57	17/10	31.56	27.18	60.29	9/10	32.96	26.86	61.36
20/10	40.2	27.58	60.93	24/10	27.12	24.79	61.93	16/10	39.52	28.22	67.50
27/10	46.68	26.58	63.36	31/10	38.16	24.05	59.50	23/10	26.60	24.72	60.93
3/11	38.96	21.48	61.24	7/11	31.24	20.73	60.79	31/10	25.28	24.65	63.43
10/11	29.12	19.02	60.33	14/11	25.68	21.18	62.65	6/11	23.24	23.07	57.59
17/11	23.00	18.95	60.29	21/11	28.20	20.65	62.11	13/11	24.44	21.57	61.00
24/11	29.48	19.04	59.00	28/11	32.44	20.75	59.57	20/11	24.2	20.25	62.43
1/12	35.72	16.63	59.11	5/12	29.40	21.79	60.79	27/11	27.80	21.00	61.84
8/12	24.04	13.81	63.93	12/12	23.36	20.07	69.29	4/12	23.44	19.93	63.05
15/12	20.92	14.63	66.93	19/12	25.08	18.12	65.65	11/12	24.52	18.00	59.86
22/12	25.00	13.52	59.65	26/12	28.36	17.89	63.08	18/12	22.24	18.00	62.22
29/12	21.2	16.27	70.79	2/1/2006	21.8	18.60	68.00	25/12	18.28	16.79	67.08
5/1/2005	24.28	16.65	63.60	9/1	18.60	15.25	61.00	1/1/2007	30.29	13.86	62.36
12/1	22.00	15.89	65.14	16/1	24.48	13.45	68.00	8/1	29.4	13.45	64.25
19/1	24.00	16.04	65.79	23/1	27.80	15.25	64.75	15/1	19.84	14.42	66.17
26/1	26.00	16.32	61.01	30/1	21.00	13.7	47.50	22/1	25.76	14.71	61.50
2/2	19.28	20.54	53.00	6/2	28.52	16.08	62.25	29/1	19.88	14.51	61.13
9/2	20.76	13.78	59.57	13/2	23.68	18.35	49.75	5/2	18.08	13.52	65.13
16/2	18.2	12.58	62.15	20/2	20.04	16.5	65.25	12/2	23.84	16.00	68.25
23/2	11.88	18.78	61.57	27/2	13.80	17.88	26.50	19/2	12.36	15.07	65.07
2/3	13.4	12.66	61.60	6/3	19.60	17.84	71.14	26/2	11.76	19.79	62.07
9/3	10.88	19.97	66.07	13/3	15.00	20.91	57.79	5/3	12.84	19.60	60.75
16/3	13.00	16.44	60.86	20/3	9.40	20.13	58.00	12/3	14.12	18.21	59.10
23/3	11.96	17.82	61.86	27/3	11.56	22.59	52.29	19/3	9.28	20.07	58.00
30/3	12.68	16.28	59.22					26/3	8.44	21.34	53.86
Total	692.4			Total	701.16			Total	614.21		
Mean	25.64			Mean	25.04			Mean	22.75		

aphids/leaf. Then, the aphid numbers fluctuated to record four peaks; on 1st week of October, 3rd week of October, 1st week of December and 4th week of January. The mean numbers of aphid for these peaks were 48.04, 46.68 and 35.72 aphids/leaf, respectively. The correspondent means of temperature and relative humidity were

24.64 °C and 54.65 R. H. %, 26.58 °C and 63.36 R.H. %, 16.63 °C and 59.11 R.H. % and 16.32 °C and 61.01 R.H. %, respectively. The mean number of aphids/leaf in the whole season was 25.64.

During the second season (2005 –06), the aphid infestation appeared late about four days as compared with the first one, showing 33.72 aphids/leaf on 1st week of October at means of 27.99 °C and 61.63 R.H. %. Three peaks were recorded 38.16, 27.8 and 19.6 aphids/leaf on 4th week of October, 4th week of January and 1st week of March, respectively. The correspondent means of temperature and relative humidity were 24.05 °C and 59.5 R.H. %, 15.25 °C and 64.75 R.H. % and 17.84 °C and 71.14 R.H. %, respectively. The mean number of aphids in this season was 25.04 aphids/leaf.

During the third season (2006 –07), the infestation started to appear on 4th week of September (27.65 °C and 61.86 R.H. %) with a mean number of 31.16 aphids/leaf. Then, the aphid numbers fluctuated to record three peaks on 3rd week of October, 4th week of January and 2nd week of February. The mean number of aphid of these peaks were 39.52, 25.76 and 23.84 aphids/leaf, respectively. The correspondent means of temperature and relative humidity were 28.22 °C and 67.50 R.H. %, 14.71 °C and 61.50 R.H. % and 10.25 °C and 68.25 R.H. %, respectively. The mean number of aphids/leaf in whole season was 22.75 (Table 1).

In Mansoura district:

Data presented in Table 2 revealed the three peaks in the first season (2004 – 05), four peaks in second season (2005 – 06) and two peaks in third season (2006 – 07). During the first season (2004 – 05), the infestation appeared on 1st week of September (28 °C and 72.63 R.H. %) with mean number of 43.88 aphids/leaf. The aphids recorded three peaks in 1st week, 4th week of September and 1st week of February. The mean numbers of aphids of these peaks were 43.88, 52.16 and 23.96 aphids/leaf, respectively. The correspondent means of temperature and relative humidity were 28 °C and 72.63 R.H. %, 26.0 °C and 64 % R.H. and 12.49 °C and 61.88 R.H. %, respectively. The mean number of aphids/leaf in the whole season was 26.63. During the second season, (2005 – 06), the infestation appeared in 2nd week of September (24.69 °C and 69.5 R.H. %) with a mean number of 37.56 aphids/leaf. Four peaks were recorded with mean numbers of 35.96, 30.4, 31.16 and 26.0 aphids/leaf in 4th week of September, 4th week of October, 4th week of November and 3rd week of January, respectively. The correspondent means of temperature and relative humidity were 25.30 °C and 63.2 R.H. %, 20.50 °C and 62.0 R.H.%, 19.8 °C and 73.0 R.H. and 13.07 °C and 66.50 R.H., respectively. The mean number of aphids/leaf in the whole season was 24.91. During the third season, (2006 – 07), the infestation started to appear in 2nd week of September showing 29.48 aphids/leaf (20.29 °C and 66.14 R.H. %). Two peaks were recorded with mean numbers of 41.0 and 28.68 aphids/leaf, respectively. The correspondent means of temperature and relative humidity were 17.75 °C and 65.75 R.H. % and 11.57 °C and 69.08 R.H. %, respectively. The mean number of aphids/leaf in the whole season was 24.83 (Table 2). The results are in agreement with those of Sandra *et al.* (2004). Overall abundance in one year may be influenced by abundance in the previous year. Aphid populations observed in this

Table 2 : Mean numbers of *Aphis nerii* Boyer de Fonsconombe on oleander plants at Mansoura district, during the three seasons 2004-05, 2005-06 and 2006-07.

In Mansoura district											
2004/2005				2005/2006				2006/2007			
Sample dates	Mean number of aphids/ leaf	mean of		Sample dates	Mean number of aphids/ leaf	mean of		Sample dates	Mean number of aphids/ leaf	mean of	
		Temp.	R.H %			Temp.	R.H %			Temp.	R.H %
5/9/2004	43.88	28.00	72.63	0/9/2005	37.56	24.69	69.50	14/9/2006	29.84	27.00	66.14
12/10	35.96	24.67	69.32	17/9	32.48	24.26	67.84	21/9	32.60	24.96	67.22
19/10	37.80	24.97	67.21	24/9	35.96	25.30	63.20	28/9	41.00	24.19	65.75
26/9	52.16	26.00	64.00	1/10	30.68	25.67	65.88	5/10	36.32	24.89	62.93
3/10	41.72	25.25	65.50	8/10	28.08	24.95	66.31	12/10	33.36	24.15	62.86
10/10	38.92	23.00	64.00	15/10	26.00	24.67	65.38	19/10	30.00	21.83	66.43
17/10	31.84	24.75	62.00	22/10	30.40	20.50	62.00	26/10	27.32	20.18	65.42
24/10	27.52	24.25	70.50	29/10	21.48	17.50	61.00	2/11	28.08	18.82	69.22
31/10	28.20	24.00	74.50	5/11	25.16	18.00	69.00	9/11	26.96	18.07	66.64
7/11	20.00	22.50	66.50	12/11	23.76	18.30	69.00	16/11	23.44	17.93	68.86
14/11	26.00	24.00	72.50	19/11	22.00	14.50	63.00	23/11	28.68	17.68	69.08
21/11	27.00	15.00	69.00	26/11	31.16	19.80	73.00	30/11	22.00	14.50	69.10
28/11	24.00	16.75	64.00	3/12	24.24	16.00	69.00	7/12	27.68	15.97	70.29
5/12	20.32	17.25	47.25	10/12	23.24	17.50	73.00	14/12	24.00	16.65	72.72
12/12	23.96	6.50	55.63	17/12	25.00	18.80	72.00	21/12	22.76	14.15	67.14
19/12	19.84	14.25	54.63	24/12	18.12	11.50	70.00	28/12	20.88	12.25	73.22
26/12	21.16	13.39	55.00	31/12	23.12	12.50	65.00	4/1/2007	23.20	13.00	72.33
2/1/2005	23.40	14.57	69.63	7/1/2006	25.76	13.10	60.70	11/1	24.76	12.65	69.86
9/1	17.20	13.25	69.10	14/1	16.80	12.19	69.64	18/1	19.12	12.00	71.22
16/1	18.80	14.29	72.29	21/1	26.00	13.07	66.50	25/1	21.80	12.11	65.43
23/1	21.00	12.64	55.07	28/1	16.52	11.89	71.38	1/2	19.60	11.79	70.05
30/1	16.28	14.14	61.13	4/2	20.28	14.93	67.14	8/2	20.00	11.65	73.29
6/2	23.96	12.49	61.88	11/2	19.00	13.08	69.36	15/2	16.80	14.75	71.75
13/2	20.44	10.99	76.08	18/2	15.72	16.36	73.23	22/2	15.40	15.80	69.10
20/2	22.96	16.09	63.00	25/2	24.32	15.57	71.75	1/3	16.36	15.90	68.35
27/2	18.68	14.70	67.95					8/3/2007	14.00	15.70	67.00
6/3	16.08	18.75	54.92								
Total	719.08			Total	622.84			Total	645.6		
Mean	26.63			Mean	24.91			Mean	24.83		

study showed no evidence of population regulation; however, if this population was observed on a yearly time scale, evidence of population regulation may be seen.

Survey of oleander aphid parasitoids

Out of 158 samples collected from oleander plants infested with aphids in the two oleander districts in Egypt (Zagazig and Mansoura) during the three seasons, a

total of 4990 parasitoid adults emerged from *A. nerii*. 4711 (94.41%) and 279 (5.59 %) individuals were primary and secondary parasitoid species, respectively.

The following is a list of hymenopterous primary and secondary parasitoid species emerged during the study:

Primary parasitoids:

Diaeretiella rapae (M'Intosh), *Aphidius* spp.

Secondary parasitoids:

Cynipidae: *Alloxysta* (= *Charips*) spp.

Pteromalidae: *Pachyneuron* spp.

Encyrtidae: *Aphidencyrtus* spp.

According to what reported by Kavallierators *et al.* (2001) and Saleh (2004) that parasitic hymenoptera species associated with *A. nerii* were also found on *B. brassicae*. *D. rapae* and *A. colemani* (primary parasitoids) and *Pachyneuron* sp., *Alloxysta fuscicornis* (Ashmead) and *Syrphophagus aphidivorus* (Mayr) (hyper parasitoids) were recorded on *A. nerii* by (Ibrahim and Fayad (1984) and Leticia *et al.* (2004).

Population densities of the parasitoids:

1. *Diaeretiella rapae* (M'Intosh)

In Zagazig district:

In the first season (Table 3 and Figure 1), the parasitoid species did not be detected from end of September to 1st week of December. *D. rapae* was found in very high density (100 %) during the period extended from 2nd week of December to the 1st week of January. The correspondent means of temperature were 13.81-16.65 °C. Up to the first week of March, *D. rapae* remained relative in high density (85.71 – 92 %), at the ranges of 15.89 – 12.66 °C and 65.14 – 61.6 % R.H. The mean density of the parasitoid in this season was 88.45 %.

During the second season (Table 4 and Figure 1) the was detected first in 2nd week of December. Similar trend was noticed, where *D. rapae* was the most dominant species representing 93.33 – 100 % of the total parasitoids during the period from 2nd week of December to late December. The ranges of temperature during this period were 17.89 – 20.07 °C, and 63.08 – 69.29 % R.H.. *D. rapae* remained in high relative density (90.67 – 91.67) at the ranges of 16.5 – 17.88 °C and 65.25 – 62.5 R.H. The mean number of the parasitoid in whole season was 84.63 %. In the last season (Table 5 and Figure 1), the parasitoid appeared first in 3rd week of November, *D. rapae* was found in very high density (100 %) during late November to 3rd week of December. The ranges of temperature during this period were 21.0-18.0 °C and 61.84 - 62.22 % R.H. The mean of the parasitoid in the whole season was 86.95 %.

In Mansoura district:

In the first season (Table 6 and Figure 1), *D. rapae* was found in high density (100 %) during the period from 1st week to 2nd week of November. The correspondent ranges of temperature were 22.5 – 24 and 66.5 – 72.5 % R.H. The lowest density of the parasitoid (57.89 %) was recorded on 3rd week of January (14.29 °C and 72.29 %

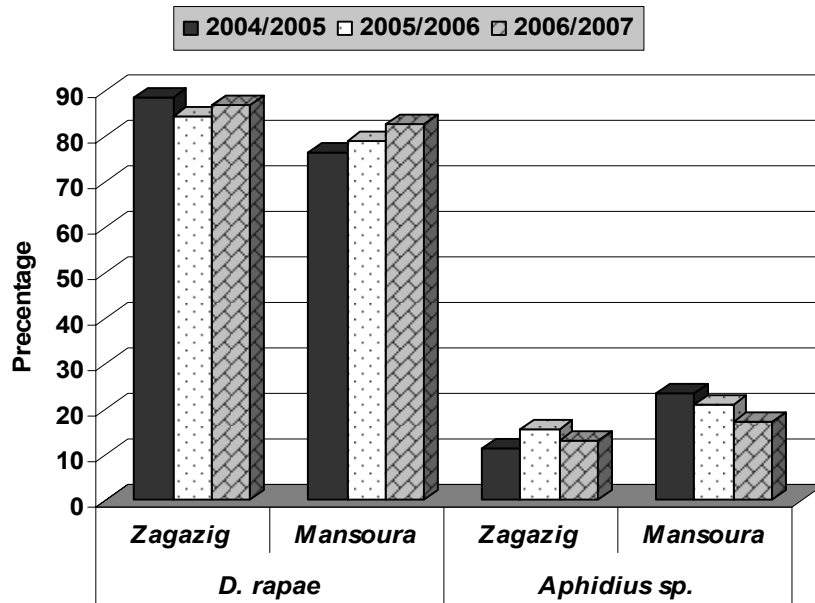


Figure 1 : Occurrence percentage of primary aphid parasitoid species on duranta plants infested with *A. nerii* at Zagazig and Mansoura districts during 2004-05, 2005-06 and 2006-07 seasons.

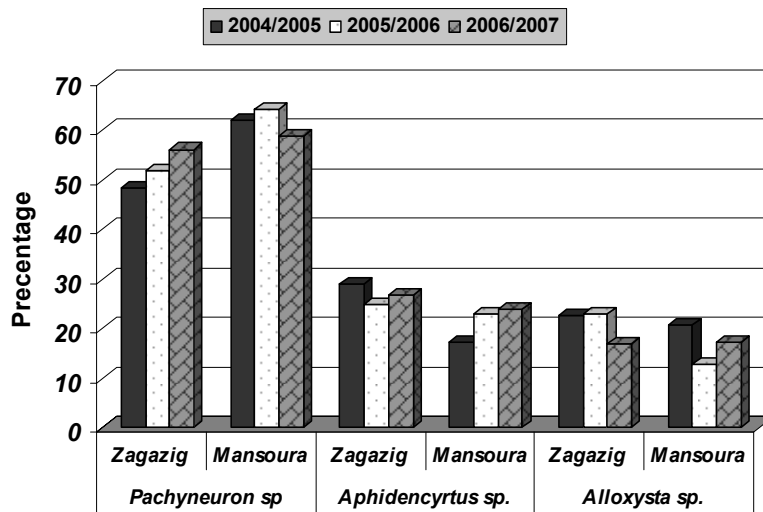


Figure 2 : Occurrence percentage of different hyperparasitoid species on primary parasitoids on duranta plants infested with *A. nerii* at zagazig and Mansoura districts during 2004-05, 2005-06 and 2006-07 seasons.

R.H.). The mean density of the parasitoid in this season was 76.68 %. During the second season (Table 7 and Figure 1), *D. rapae* was the most dominant species representing 86.67–100 % of the total parasitoids during the period from late November to 2nd week of December. The lowest density of the parasitoid (69.49 %) was recorded by late January (11.89 °C and 71.38 % R.H.). The mean density of the parasitoid in this season was 79.11 %. In the last season (Table 8), *D. rapae* was found in high density (100 %) during the period 3rd week of November to late November, the correspondent ranges of temperature were 17.93 – 14.5 °C and 68.86 – 69.1 R. H. %. The mean density of the parasitoid in the whole season was 82.68 %.

2. *Aphidius* spp.

In Zagazig district:

In the first season (Table 3 and Figure 1), *Aphidius* spp. started to appear on 2nd week of January (14.92 %) (15.89 °C and 65.14 R.H. %). The highest density of the parasitoid (16.42 %) was recorded in 3rd week of March (16.44 °C and 60.86 R.H. %) and the lowest (8.0 %) was recorded in 1st week of March (12.66 °C and 61.6 R.H. %). The means density of the parasitoid in this season was 11.55 %. During the second season (2005-06), *Aphidius* spp., appeared first in week 2nd of December. The highest density of the parasitoid (22.73%) was recorded on 3rd week of January (13.45 °C and 68.00 R.H. %) and the lowest (6.67 %) was recorded by late December (17.89 °C and 63.08 R.H. %). The mean density of the parasitoid in the whole season was 15.37 % (Table 4). In the last season (2006 - 07), *Aphidius* spp. appeared (12.5%) in 4th week of December (16.00 °C and 68.25 R.H. %). The highest density of the parasitoid (16.94 %) was recorded on 2nd week of March (18.21 °C and 59.10 R.H. %) and the lowest (9.41%) was recorded by late January (14.5 °C and 61.13 R.H. %). The mean density of the parasitoid in this season was 13.05 % (Table 5).

In Mansoura district:

In the first season (Table 6 and Figure 1), *Aphidius* spp. started to appear (18.75 %) in 3rd week of November (15.00 °C and 69.00 R.H. %). The highest density of the parasitoid (28.57 %) was recorded in 3rd week of December (14.25 °C and 54.63 R.H. %). The means density of the parasitoid in this season was 23.32 % (Table 6). During the second season (2005-06), *Aphidius* spp., appeared first in 4th of November. The highest density of the parasitoid (30.51%) was recorded in 4th week of January (11.89 °C and 71.38 R.H. %) and the lowest (11.11 %) was recorded in 1st week of December (16.00 °C and 69.00 R.H. %). The mean density of the parasitoid in the whole season was 20.89 % (Table 7). In the last season (2006-2007), *Aphidius* spp. appeared (16.28 %) in 2nd week of December (15.97 °C and 70.29 R.H. %). The highest density of the parasitoid (24.44 %) was recorded in 2nd week of December (16.65 °C and 72.72 R.H. %) and the lowest (12.12 %) was recorded in 2nd week of February (11.65 °C and 73.29 R.H. %). The mean density of the parasitoid in this season was 17.32 % (Table 8).

Percentage of parasitism

The total percentage of parasitism was estimated weekly on oleander leaves during the three seasons in the two districts, Zagazig and Mansoura.

In Zagazig district:

In the first season (2004–05), percentage of parasitism ranged between 1.16 and 34.01 % during the period from 2nd of December and 4th of February. The mean total percentage of parasitism in this season was 9.77 % (Table 3). During the second season (2005–06), percentage of parasitism ranged between 2.35 and 28.03 % during the period from 2nd of December and 4th of March. The mean total percentage of parasitism in the whole season was 8.69% (Table 4). Data in Table 5 shows, percentage of parasitism ranged between 0.58 and 45.69 %, during the period from 4th week of November and 3rd week of March. The mean total percentage of parasitism in the last season (2006–07) was 12.66 %.

In Mansoura district:

During the first season (2004–05), percentage of parasitism ranged between 1.8–10.28 % during the period from 1st week of November and 3rd week of February. The mean total of parasitism was 3.39 % in this season. In the season of (2005–06), it was between 3.72 and 22.11 % in the 4th of November and 2nd week of February. The mean total of parasitism was 7.32 % in the second season. (Tables 6 & 7). In the last season (2006 – 07) it was between 2.39 and 19.18 % in the 3rd week of November and 1st week of February. The mean total of parasitism was 7.34 % (Table 8). As in many aphid-parasitoid relationships (Walker *et al.*, 1984; Murphy and Volkl, 1996, and Volkl and Stechmann, 1998), parasitoids did not play a significant role in regulating population growth of *A. nerii* on *Asclepias* species. Aphid densities continued exponential growth up to the end of the growing season (Sandra *et al.*, 2004). Aphid parasitoids often exploit a small number of available hosts, and parasitism rates tend to range between 1 % and 10 % (Mackauer and Volkl, 1993). Although parasitism rates reached over 30 % on some host plants (*Asclepias* species) (Sandra *et al.*, 2004).

3. *Pachyneuron* sp.:***In Zagazig district:***

The first appearance of the hyperparasitoid, *Pachyneuron* sp. in the first season was (100 %) in last week of January. Then, it was fluctuated to record the lowest percentage 25.0 % in 1st week of March. In the second season, the first record of *Pachyneuron* sp. (100 %) was found in 1st week of December. Then, it was fluctuated to recorded the lowest activity with value (40 %). During late season 2007 the highest percentage was (100 %) in 1st and 2nd week of January but the lowest percentage (36.36 %) was in 1st week of March (Table 9).

In Mansoura district:

The first appearance of the hyper parasitoid. *Pachyneuron* sp. was (50 %) in 3rd week of January. Then, the highest percentage (100 %) was found in last week of Januray in the first season 2005. in the second season 2006. The first record of *Pachyneuron* sp. (100 %) was recorded in 2nd week of Januray. Then, it was fluctuated to record the lowest percentage (40 %) in the 4th week of February. During the last season 2007, the first appearance of *Pachyneuron* sp. (100 %) was in 1st week

of January. Then, the lowest percentage (33.33 %) was in the last week of January (Table 9 & Figure 2).

4. *Aphidencyrthus* sp.

In Zagazig district.

Aphidencyrthus sp. was found in very few numbers during the three investigated seasons. During the first season, the first appearance (50 %) was in 2nd week of February. The lowest percentage (16.67 %) in 2nd week of March. During the second season, the first record of *Aphidencyrthus* sp. (28.57 %) was in 3rd week of February. The lowest percentage (20 %) in last week of March. During the last season, the first record of *Aphidencyrthus* sp. (25.0 %) was in 4th week of January. The lowest percentage (14.29 %) was in the 3rd week of February (Table 9 & Figure 2).

In Mansoura district:

Also *Aphidencyrthus* sp. was found in very few numbers during the three season. In the first season, the first appearance was (33.33 %) in 1st week of February. The lowest percentage (20 %) was in 4th week of February. During the second season, the first appearance was (100 %) in 3rd week of January. In the last season 2007, the first appearance was (25 %) in 2nd week of February, then, it was fluctuated to record the highest percentage (44.44 %) in 1st week of March. Table (Table 9 & Figure 2).

5. *Alloxysta* sp.

In Zagazig district

The first appearance of the hyperparasitoid, *Alloxysta* sp. in the first season was (100 %) in 1st week of February. Then, it was fluctuated to record the lowest percentage (25.0 %) was in 1st week of March. During the second season, the first record of *Alloxysta* sp. (100 %) was in 4th week of January, the lowest percentage (12.5 %) was in 1st week of March. In the last season, the first appearance of hyper parasitoid *Alloxysta* sp. was (100 %) on 2nd week of January. Then, it was fluctuated to recorded the lowest percentage (10.0 %) was in the last week of March. (Table 9 & Figure 2).

In Mansoura district

Alloxysta sp. was found in very few numbers during the period of investigation. In the first season the first appearance (50 %) was in 3rd week of January. The lowest percentage (16.67 %) was in 3rd week of February. During the second season, the first record of *Alloxysta* sp. (100 %) was in 2nd week of January. Then, it was fluctuated to record the lowest percentage (10.0 %) was in 1st and 3rd weeks of February. In the last season 2007, the first record of *Alloxysta* sp. (100 %) was in 2nd week of January. Then, it was fluctuated to record the lowest percentage (16.67 %) was in 4th week of February. The recorded hyperparasitoid on *D. rapae* in Egypt were *Pachyneuron* sp., *Atrichoptilusnea avenues* Masi (Pteromalidae), *Alloxysta minuta* Horting (Cynepidae) and *Pachyneuron aphidis* Boch and *Alloxysta*

sp. (Hafez, 1965; Herakly and Abou El-Ezz, 1970; Ibrahim and Fayad, 1984; Kolaib, 1991 and El-Maghraby, 1993).

Hyperparasitism has traditionally been viewed in the context of applied ecology as being harmful and so it is believed to have usually a negative impact on beneficial primary parasitoids. There is a contrary speculation as to hyper parasitoids possible positive role in maintaining a proper balance between the primary parasitoids and their hosts by preventing an excessive build up of parasitoid numbers (Stary, 1970, May, 1973 and Van den Bosch *et al.*, 1979).

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التوزيع الموسمي لمن التفلة *Aphis nerii* Boyer de Fonscolombe وعلاقته بالطفيليات الأولية والثانوية على نباتات التفلة في مصر

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أجريت دراسات على الوفرة الموسمية لمن التفلة والطفيليات المرتبطة به على زراعات التفلة بمنطقتي الزقازيق والمنصورة خلال مواسم ٢٠٠٤-٢٠٠٥، ٢٠٠٥-٢٠٠٦، ٢٠٠٦-٢٠٠٧. وقد أوضحت النتائج أن:

الإصابة بالمن أظهرت مع نهاية شهر سبتمبر ويتراوح متوسط عدد المن/الورقة بين ١٠.٨٨ – ٤٨.٠٤ فرد في الموسم الأول، ٩.٤ – ٣٨.١٦ فرد في الموسم الثاني، ٨.٤٤ – ٣٩.٥٢ فرد خلال الموسم الثالث وذلك في منطقة الزقازيق بينما في منطقة المنصورة ظهرت الإصابة بالمن في بداية سبتمبر واستمرت الإصابة حتى بداية مارس في الموسم الأول والأسبوع الثانى من مارس خلال الموسم الثالث. بينما في الموسم الثاني استمرت حتى نهاية فبراير. وتراوح متوسط عدد المن/الورقة بين ١٦.٠٨ – ٥٢.١٦ فرد خلال الموسم الأول و ١٥.٧٢ – ٣٧.٥٦ فرد خلال الموسم الثاني و ١٤.٠ – ٤١.٠ فرد خلال الموسم الثالث.

اظهر تعداد الآفة في منطقة الزقازيق ثلاث قمم خلال الثلاث مواسم الدراسة وكان متوسط عدد المن على الورقة ٢٥.٦٤ و ٢٥.٠٤ و ٢٢.٧٥ خلال الثلاث مواسم على التوالي. بينما في المنصورة اظهر تعداد الآفة ثلاثة قمم في الموسم الأول وأربعة قمم في الموسم الثاني و قمتين في الموسم الثالث وكان متوسط عدد المن/الورقة ٢٦.٦٣ و ٢٤.٩١ و ٢٤.٨٣ على التوالي خلال الثلاث مواسم.

سجلت خمسة أنواع من الطفيليات المرتبطة بالآفة والتابعة لغشائية الاجنحة *Diaeretiella rapae* (M'Intosh), *Aphidius* sp. (Aphidiidae), *Pachyneuron* sp. (Pteromalidae), *Alloxysta* sp. (Cynipidae) and *Aphidencyrthus* sp. (Encyrtidae).

وجد أن الطفيل الأولى *D. rapae* أكثر انتشارا حيث يمثل ٨٦.٦٨ و ٧٩.٥٧% من اجمالى الطفيليات بينما يمثل الطفيل *Aphidius* sp ١٣.٣٢ و ٢٠.٤٣% من التعداد الكلى خلال مواسم الدراسة في منطقتي الزقازيق والمنصورة على التوالي.

يعتبر الطفيل الثانوي *Pachyneuron* sp أكثر انتشارا بالنسبة للطفيليات الثانوية حيث يمثل ٥٢.١٣% و ٦١.٦٢% بينما يمثل الطفيل *Aphidencyrthus* sp ٢٦.٩٥ و ٢١.٤٠% و يمثل الطفيل *Alloxysta* sp ٢٠.٩٢ و ١٦.٩٧% من التعداد الكلى خلال الثلاثة مواسم للدراسة في منطقتي الزقازيق والمنصورة.

وكان متوسط نسبة التطفل الكلى للطفيليات الأولية ٩.٧٧ و ٨.٦٩ و ١٢.٦٦% في منطقة الزقازيق، بينما كانت ٣.٣٩ و ٧.٣٢ و ٧.٣٤% في المنصورة خلال ثلاث مواسم على التوالي.