

ECOLOGICAL STUDIES ON THE LEPIDOPTEROUS AND COLEOPTEROUS INSECTS ATTRACTED TO A LIGHT TRAP IN BOTANICAL GARDEN AT ASWAN PROVINCE, EGYPT

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ABSTRACT

During a two years survey for the real pests that attack different plant species of botanical garden at Aswan province, many insect species of orders Lepidoptera and Coleoptera had been recorded.

Uthesia pulchella L. and *Lasiocampa decolorata* Klug. of family Arctiidae and Lasiocampidae, respectively, and the most dominant species of Noctuidae was *Spodoptera exigua* (H.b) followed by *Clytia soneta*, *Agrotis spinifera* and *A. ipsilon*.

However *Clytia hiaifae*, *Earias insulana* Bosid and *Heliothis armigera* (Hb.) constituted only 1.63, 1.22 and 0.3 % respectively, of the total catch of lepidopterous during both seasons. Two species belonging to family Sphingidae, *Daphnis nerii* L. and *Delephila livarnica* Esp, were recorded during present study.

Coleoptera was found to be represented by four species, belonging to four genera and two families. These species were *Agrypnus notodonta* Latr., *Limnogeton fieberi*; *Adoretus clypeatus* Buneister and *Scarabeus sacer* which belonging to families Elateridae and Scarabaeidae, respectively.

Population dynamics of some species under these two orders as well as dominance and abundance degree of all insect species were investigated.

INTRODUCTION

The botanical garden of Aswan is one of the most rare garden of the world, situated on an island in the middle of the Nile front to Aswan city. The area of the garden is about 17 feddans, cultivated with many different tropical and subtropical plants. This garden considered as natural park and as a botanical research center. The garden contains a numerous varieties of plants including fruit, oil and wood trees beside certain medicinal and odoriferous plants. There is also a collection of very rare species of palm Trees.

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The present manuscript is an extension of studies carried out on the survey and abundance of Lepidopterous and Coleopterous species in the Aswan botanical garden by Abdel - Wahab and El - Akkad (1998a) .

The aim of the present study was carried out to give some information on Lepidopterous and Coleopterous insects attracted to Robinson mercury vapour light trap at botanical garden of Aswan. This work was initiated to study the following aspects:-

- 1- Survey of different insect species inhabited the different species of plants with special reference to Lepidopterous and Coleopterous insects to determine and identifying the different insect species at botanical garden.
- 2- Study the diversity and the seasonal abundance of certain insect pests to elucidate their economic importance on their rare collections of plants.

MATERIAL AND METHODS

Botanical garden in Aswan province, Egypt is considered to be one of the most research areas of tropical and subtropical plants. It contain an economic plants belonging to horticulture, medicinal and aromatic, fruit and forest plants. The present study was carried at the botanical garden, throughout two successive years (1997/1998 and 1998 / 1999).

In every locality one light trap of the Robinson type fitted with a 125 – watt mercury vapour lamp. These traps were situated in the botanical garden of Aswan governorate for collecting insects. The trap was operated daily from sunset to sunrise. The trap catch was collected every morning. The collected specimens of Lepidopterous and Coleopterous insects were isolated, sorted into species, counted and recorded to throw some light on the diversity and seasonal fluctuation of some insect species.

Dominance degrees (D) for the identified some insect species were calculated according to the formula adopted by Facylate (1971):-

$D = t / T \cdot 100$, where

t = Total number of each species during the collecting period.

T = Total number of all species collected during the collecting period.

The abundance (A) for some species collected during the whole sampling period was calculated according to the formula adopted by the same author (Facylate, 1971).

$A = n / N \cdot 100$, where

n: Total number of samples in each species appeared.

N: Total number of samples taken all over the season.

RESULTS AND DISCUSSION

1- Order: Lepidoptera:

Results represented in Table (1) show the different Lepidopterous families attracted to the light trap during the period of the experiments. These results clearly indicated that there are four families and the most dominant family was Noctuidae followed by Lasiocampidae, SpHINGidae and Arctiidae.

The monthly relative abundance of the whole Lepidopterous moths during this period of survey was shown in Table (1). Our results indicated that there are three peaks of abundance. The first peak was observed during July of 1997/ 98 and 1998 / 99 years; the second peak was during September of both years and the third ones was during April of 1997 / 98 and during May of 1998 / 99. The total catch of Lepidopterous insects was 7508 and 5926 moths during 1997 / 98 and 1998 / 99, respectively. Many investigators have been surveyed Lepidopterous insects in different localities of Egypt (Andres, 1912, Hanna *et al.*,1975, Badr *et al.*, 1985b and Abdel – Wahab and El – Akkad 1998b).

Family: Arctiidae;

Data presented in Table 2. shows the number of each Lepidopterous species attracted to the light trap during the period of studies. Family Arctiidae is represented by only one species *uthesia pulchella* (L). which representing 0.12 and 0.10% of the total Lepidopterous catches during successive years 1997 / 98 and 1998 / 99 , respectively. Abdel – Wahab and El - Akkad (1998b) reported that this species representing 0.08 and 0.156% in the same locality during two successive years 1994 / 95 and 1995 / 96, respectively.

Family Lasiocampidae:

Lasiocampa decolorata was found all over the period of investigation which representing 1.14 and 0.81%, at the two successive years, respectively, and these findings are disagree with those obtained by Badr *et al.*, 1988 who reported that this species is widely distributed. On the other hand, Abdel - Wahab and El Akkad (1998b) came to the same results and findings obtained in the present studies.

Family Noctuidae:

Data presented in Table (1) showed that the population of noctuid has three peaks and the lowest number of trapped noctuid moths was recorded during February of the same period of studies 413 and 248 moths during the first and second year, respectively , and the highest peak was recorded in April. Our results were in full agreement with those obtained by, Rashad 1967, and Abu Hshish *et al.*, 1989. This family is represented by 7 species belonging to 5 genera as shown in Table (2).

Data presented in Table 2 showed that the most dominant species of Noctuidae was *Spodoptera exigua* followed by *Clytia soneta*, *Agrotis spinifera* and *A. ipsilon*. On the other hand, Abdel – Wahab and El – Akkad (1998b) found that *Clytia spp* was the most dominant species.

Our results presented in table 3 revealed that the population of *S. exigua* is fluctuated in relatively high numbers to reach its maximum 162 moths during October, 15 of the first year, and 175 moths during July, 8 of the second one, and these results finding are confirmed by of Nasr *et al.*, 1980 and Hassanein *et al.*, 1995 who found that the population of this pest was high during July.

Our results indicated that the individuals. of *Clytia soneta* were the most active during the whole period of studies except one week during each year (the last week of December, 1997/ 98 and the last week of March 1998 / 99 . Concerning the monthly catch, it is clear that this species has four peaks during each year as shown in table (3).

Data obtained in Table (4) shows the seasonal fluctuations of *A. spinifera*. During the period of study, this pest was present all ones the year except during the last week of March of 1998 / 99. The highest numbers were recorded in July, 1 and 15 of 1997 / 98 and 1998 / 99, respectively, and the lowest weekly caught number was recorded in the last week of October, in the last two weeks of March of 1997 / 98, and in the last week of January and in the second week of March of 1998 / 99.

As shown in Table (5) the population of *Agrotis ipsilon* was the lowest one, as compared with the three above mentioned species. The highest number of weekly catch was 11 and 6 moths occurred in May 11 of 1997 / 98 and in June, 15 of 1998 / 99, respectively.

Two species belonging to family Spingidae were recorded and these two species are *Daphnis nerii* L. and *Delephila livarnica* Esp. This family is represented by 10 and 12 individuals during 1997 / 98 and 1998 / 99, respectively.

Dominnace and abundance degrees of Lepidopterous species are summarized in tables (6 & 7). It is clear from these results that the highest dominant species were *S. exigua* followed by *A. soneta*, *A. spinifera* and *A. ipsilon*: Their dominance degrees were 48.83, 23.53, 5.56 and 1.91 % during 1997 / 98, respectively, and 42.45, 26.33, 11.39 and 1.80 % during 1998 / 99, respectively. The most abundant species were *A. spinifera*; *S. exigue* and *A. soneta*, where there abundance degrees were 100 and 98.08 ,98.11 and 98.09; and 98.08% during 1997 / 98 and 1998/99 years, respectively.

The high abundance degrees of *C. hiaifae* which are found in low numbers indicate that this species are potential and it could be occasional as key pest, if the ecological situation changed in favour of it.

2- Order Coleoptera:

Coleoptera was found to be represented by four species belonging to four genera and two families. These two families were Elateridae and Scarabaeidae as shown in Tables (8& 9)

From our results one can clearly indicated that Coleoptera has two peaks during each year in the present study. Those two peaks were during September and May of 1997 / 98 and during July and August of 1998 / 99. Many authors have dealt with survey of Coleopterous as a whole or dealt with survey of a certain families (Pic, 1911; Hanna, 1973, Amin *et al.*, 1986 and Gergis *et al.*, 1991). Abdel – wahab and El- Akkad (1998a) studied the seasonal abundance of Coleopterous insect at kima region and reported that the same families were found at this region and the Scarabidae was the most dominant.

Family: Elateridae: This family is represented by two species, *Agrypnus notodonta* and *Limnogeton fieberi*. The total catch of this family was 209 during two years of study, represented by 67 and 142 insects during the first and the second year, respectively, which constituted 19.14 and 40.57% of the total catch.

Limnogeton fieberi was found to be the most dominant Coleopterous species. The highest number of weekly catch was 11 and 5 individuals, recorded during the third week of September of 1997 / 98 and during the first week of August of 1998 / 99, respectively.

Family Scarabaeidae:

This family was represented by two species, *Adoretus clypeatus* and *Scarabeus sacer*. Of the 141 caught insects; 37 and 104 for the first species and the second one, constituted 10.57 and 29.72% from the total catch of Coleopterous species, respectively, during two successive years (Table, 9).

Data illustrated in Figs (1 A, B) clearly indicated that the highest number of weekly caught *A. clypeatus* was 3 and 2 individuals occurred during the second and third week of April of 1997 / 98 and 1998 / 99, respectively. Also the highest number of monthly caught insect was occurred in April of two years.

The highest number of monthly caught *Scarabeus sacer* was 24 and 11 insects during May, 1997 / 98 and during July, 1998 / 99, respectively. Also, the highest number of weekly catch was occurred during the same two months is shown in Figs (2A,B).

Dominance and abundance degrees obtained in Tables (10 & 11) showed that the four species of Coleoptera can be arranged descendingly according to their dominance and abundance whereas, the dominance was synchronized with abundance degrees as follows: *Limnogeton fieberi*, *Scarabeus sacer*, *Agrypnus notodonta* and *Adoretus clypeatus*.

Generally, it is clear from our studies that the Coleopteraous species have low dominance degrees and a relatively low abundance degree.

REFERENCES

- Abdel – Wahab, H.M., and El – Akkad, M. K. (1998a):** Diversity and abundance of insect in the Botanical Island and Kima area, in Aswan, Egypt. I- Order: Coleoptera. J. Egypt. Ger. Soc. Zool., 25 (E): 209-229.
- Abdel – Wahab, H.M., and El – Akkad, M. K. (1998b):** Diversity and abundance of insect in the Botanical Island in Aswan, Egypt. II- Order: Lepidoptera (moths). *Ibid.*, 25 (E) : 179- 194.
- Abu Hashish, T. A., El- Sadany, G. B., Shoukary, A., and Hassan, S. M. (1989):** contribution to the study of the insect fauna at Ismailia, Egypt. V. the population dynamics and seasonal abundance of *Agrotis spinifera* [*A. biconia*] Hubm., (Lepidoptera, Noctuidae) . Bull. Soc. Entomol. d’Egypte, 68: 13-21.
- Andres, M. A. (1912):** Notes bibliographiques sur troils travaux Lepidoptrolore latifs la faune Egypt ienno. *Ibid*: 87-97.
- Amin, A. H. , Assagaf, A. I., And Robai, A.S. (1986):** Survey and relative abundance of some Coleopterous insects attracted to a light trap in Jeddah, Saudi Arabia. Bull. Soc. Entomol. D’Egypte, 66: 299 – 317.
- Badr, M. A., All –Gamal, M. M., and Hussein, H.r. (1988):** Classification of the Egyptian Lasiocampidae and Lemoniidae 9 Lepidoptera. J. Agric. Res. And Develop. 66 (1): 111 – 120.
- Badr, M. A., Salem, M. M., Hussein, H.R., El-Samni ,M.A., and Rizk ,M. A. (1985a):** Existence and fluctuations of Lepidopterous moths as indicated by a light –trap at Dakahlia, Egypt. Minia J. Agric. Res. And Develop., 7 (2): 641-657.
- Badr, M. A., Salem, M. M., El-Said, L. M., and Abdel-Azim, M. (1985b):** Occurrence and fluctuation of moths in Beni - Suef as indicated by a light-trap. Proc. 6th Arab Pest. Conf., Tanta Univ., 2 :159-167.
- Facylate, K. K.(1971) :**Field studies of soil invertebrates. 2nd edition Vishia Shkoola Press, Moscow . USSR.
- Gergis, G., El-Sebay ,Y., and Helal, H. (1991):** Ecological studies on mulberry wood bores in Egypt-Fourth Arab Congress of Plant Protection, Cairo: 466-474.
- Hammad, S.M., Kadous, A.A., and Ramadan ,M.M. (1982):** Seasonal abundance of the scale, *Aonidiella orientalis* (News.) on Risez variety of date palm in El-Qatif, Saudia Arabia. Proceeding of the First Symposium on Date Palm in Saudi Arabia: 314-318.

ECOLOGICAL STUDIES ON THE LEPIDOPTEROUS

- Hanna, H. M. (1973):** The nocturnal flight of certain tiger beetles as indicated by three light-traps (Coleoptera:Carabidae). Bull. Soc. Entomol. d' Egypte, 57: 335-344.
- Hanna, H. M. Hamed, N.E.F.,and Nazmi,N.H.(1975):** Seasonal abundance of certain species of nocturnal Lepidoptera at different levels. *Ibid.*, 59: 1-16.
- Hassanein, N.H. (1956):** Nocturnal activity of insects as indicated by light-traps. Bull. Soc. Entomol. d' Egypte, 40: 463-479.
- Hassanein, S.S.M., Metwally, E.M., Helaly, M.M., Desuky, W.M.H., and Al-Shannaf, H.M.H. (1995):** Relative abundance of some cotton pests and the simultaneous effect of certain weather factors on their activity in Zagazig region, Egypt. Zagazig J. Agric., Res., 22 (1): 159-174.
- Nasr, E.S.A.,Badr, N.A., Hamad, M.A., and Ahmed, M.A. (1980):** Population density and flight activity of the adult stage of the spiny bollworm, *Earias inuslana* Boisd. Agric. Res. Rev., 58 (1): 167-197.
- Pic, M. (1911):** Sur divers Coleopteres d' Egypte plus ou moins interessants et en partie nouveaux. Bull Soc. Entomol. d' Egypte, II: 11-13.
- Rashad, .F.F.M. (1967):** Studies on semi-loopers from order Lepidoptera. M.Sc. thesis, Fac. Agric., Alex. Univ.

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Table (1): Population fluctuations of Lepidopterous families and Lepidopterous individuals as a total recovered by light trap from Botanical Garden , Aswan, during (July, 1997-June, 1999).

Month	Lepidopterous families									
	Arctiidae		Lasiocampidae		Noctuidae		Sphingidae		Total	
	97/98	98/99	97/98	98/99	97/98	98/99	97/98	98/99	97/98	98/99
July	0	1*	2	7	861	838	0	0	863	846
Aug.	0	0	10	6	604	528	0	1	614	535
Sep.	0	0	9	6	832	746	0	1	841	753
Oct.	2	3	8	4	650	551	1	0	661	558
Nov.	2	0	7	2	561	377	0	1	570	380
Dec.	0	2	2	4	552	318	1	5	555	329
Jan.	0	0	2	2	425	327	0	0	427	329
Feb.	0	0	8	3	413	248	2	0	423	251
Mar.	0	0	6	3	481	297	5	2	492	302
Apr.	1	0	8	3	776	410	1	0	786	413
May.	3	0	16	5	763	640	0	2	682	647
June.	1	0	8	3	485	580	0	0	494	583
	9	6	86	48	7403	5860	10	12	7508	5926
%	0.12	0.10	1.15	0.81	98.60	98.89	0.13	0.20		

* Monthly total numbers.

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Table (2): Population of individuals of each Lepidopterous species recovered by light trap from Botanical Garden, Aswan, during (July 1997 – June, 1999).

Lepidopterous species	Population of individuals during				Total	
	1997 / 98		1998 / 99		No.	%
	No.	%	No.	%		
<i>Uthesia pulchella</i> *	9	0.12	6	0.10	15	0.11
<i>Lasiocampa decalorata</i> **	86	1.14	48	0.81	134	1.00
<i>Agrotis ipsilon</i> ***	171	2.27	125	2.11	296	2.20
<i>Agrotis spinifera</i> ***	497	6.61	793	13.38	1290	9.60
<i>Clytia hiafae</i> ***	142	1.89	77	1.30	219	1.63
<i>Clytia soneta</i> ***	2103	28.01	1833	30.93	3936	39.30
<i>Earias insulana</i> ***	111	1.47	53	0.90	164	1.22
<i>Heliothis armigera</i> ***	16	0.21	24	0.40	40	0.30
<i>Spodoptera exigua</i> ***	4363	58.10	2955	49.87	7318	54.48
<i>Daphnis nerii</i> ****	4	0.05	3	0.05	7	0.05
<i>Delephila livarnica</i> ****	6	0.08	9	0.15	15	0.11
Total	7508	100.00	5926	100.00	13434	100.00

*Fam: Arctiidae

*** Fam : Noctuidae

** Fam: Lasiocampidae

**** Fam: Sphingidae

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Table (3): Population density of *Clytia soneta* collected by light trap from Botanical Garden, Aswan during (July, 1997 – June, 1999).

Sampling Date	Weekly catch during		Monthly catch during		% of grand total during	
	1997/98	1998/99	1997/98	1998/99	1997/98	1998/99
1/7/97	62	-				
8	72	88				
15	46	63	277*	211*	13.17	11.51
22	38	29				
29	59	31				
5/8	55	28				
12	64	35				
19	42	51	193*	161	9.18	8.78
26	32	47				
2/9	64	75				
9	50	69				
15	39	17	238*	221*	11.32	12.06
22	34	23				
29	51	37				
7/10	59	55				
15	42	54				
22	22	27	142	172	6.75	9.38
29	19	36				
5/11	55	29				
12	43	37				
19	32	21	157	121	7.47	6.60
26	27	34				
3/12	49	27				
10	42	24				
17	36	17	154	96	7.32	5.24
24	27	13				
31	0	15				

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Table (3) Cont.

Sampling Date	Weekly catch during		Monthly catch during		% of grand total during	
	1997/98	1998/99	1997/98	1998/99	1997/98	1998/99
7/1/98	50	35				
14	37	32				
21	35	28	146	116	6.94	6.33
28	24	21				
4/2	52	26				
11	39	26	151	85	7.18	4.64
18	38	22				
25	22	11				
3/3	48	39				
10	36	31				
17	35	28				
24	27	13	170	111	8.08	6.05
31	22	0				
7/4	65	45				
14	43	43				
21	47	26	191*	135	9.08	7.37
28	36	21				
4/5	39	77				
11	44	53				
18	34	33	141	191*	6.71	10.42
25	24	28				
1/6	48	20				
8	25	71				
15	25	50	143	213*	6.80	11.62
22	28	37				
29	17	35				
Total			2103	1833	100.00	100.00

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Table (4): Population density of *Agrotis spinifera* H. collected by light trap from Botanical Garden, Aswan during (July, 1997 – June, 1999).

Sampling date	Weekly catch during		Monthly catch during		% of grand total during	
	1997/98	1998/99	1997/98	1998/99	1997/98	1998/99
1/7/97	27	-				
8	18	35				
15	18	51	94	148	18.91	18.66
22	16	38				
29	15	24				
5/8	16	28				
12	24	31				
19	19	22	76	114	15.29	14.38
26	17	33				
2/9	11	23				
9	9	34				
15	12	39	55	157	11.07	19.80
22	12	28				
29	11	33				
7/10	4	22				
15	3	18				
22	3	29	12	91	2.42	11.48
29	2	22				
5/11	4	11				
12	5	12				
19	3	9	16	43	3.22	5.42
26	4	11				
3/12	3	5				
10	3	5				
17	4	6	19	28	3.82	3.53
24	5	7				
31	4	5				

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Table (4) Cont.

Sampling Date	Weekly catch during		Monthly catch during		% of grand total during	
	1997/98	1998/99	1997/98	1998/99	1997/98	1998/99
7/1/98	5	3				
14	4	3				
21	4	4	17	12	3.42	1.51
28	4	2				
4/2	4	2				
11	3	4				
18	3	3	13	13	2.62	1.64
25	3	4				
3/3	3	3				
10	3	2				
17	5	3	15	11	3.02	1.39
24	2	3				
31	2	0				
7/4	21	14				
14	17	12				
21	19	11	69	47	13.88	5.39
28	12	10				
4/5	22	18				
11	18	12				
18	23	11	76	55	15.29	6.93
25	13	14				
1/6	11	11				
8	9	18				
15	6	18	35	74	7.04	9.33
22	5	10				
29	4	17				
Total			497	793	100.00	100.00

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Table (5): Population density of *Agrotis ipsilon* H. collected by light trap from Botanical Garden, Aswan during (July, 1997 – June, 1999).

Sampling date	Weekly catch during		Monthly catch during		% of grand total during	
	1997/98	1998/99	1997/98	1998/99	1997/98	1998/99
1/7/97	0	-				
8	1	2				
15	1	3	3	8	1.75	6.40
22	1	1				
29	0	2				
5/8	1	2				
12	1	0				
19	1	1	3	5	1.75	4.00
26	0	2				
2/9	1	3				
9	2	2				
15	2	2	7	12	4.09	9.60
22	2	3				
29	0	2				
7/10	3	5				
15	2	5				
22	2	5	10	18	85.85	14.40
29	3	3				
5/11	4	2				
12	3	3				
19	4	1	14	8	8.19	6.40
26	3	2				
3/12	5	1				
10	4	2				
17	2	2	21	5	12.28	4.00
24	4	0				
31	6	0				

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Table (5) Cont.

Sampling Date	Weekly catch during		Monthly catech during		% of grand total during	
	1997/98	1998/99	1997/98	1998/99	1997/98	1998/99
7/1/98	4	0				
14	3	1				
21	3	1	14	3	8.19	2.40
28	4	1				
4/2	3	0				
11	3	1				
18	2	1	11	3	6.94	2.40
25	3	1				
3/3	2	1				
10	2	1				
17	3	2	8	4	4.68	3.20
24	1	0				
31	0	0				
7/4	8	4				
14	9	5				
21	9	4	34	18	19.88	14.40
28	8	5				
4/5	9	4				
11	11	5				
18	9	3	37	17	21.64	13.60
25	8	5				
1/6	1	5				
8	2	5				
15	3	6	9	24	5.26	19.20
22	1	5				
29	2	3				
Total			171	125	100.00	100.00

Table (6): Dominance and abundance degrees of Lepidopterous species recovered by light trap from Botanical Garden, Aswan during (July, 1997 – June, 1998)

Month & Year	Total Catch	Total number of Samples	Number of samples in which the Lepidopterous species appeared during (July, 1997 – June, 1998)										
			1*	2	3	4	5	6	7	8	9	10	11
July, 1997	1004	5	0	2	3	4	5	6	7	8	9	10	11
Aug.	779	4	0	4	3	4	4	5	0	1	4	0	0
Sep.	1010	5	0	4	4	5	5	3	3	1	5	0	0
Oct.	752	4	1	3	4	4	4	4	4	1	4	0	1
Nov.	634	4	0	4	4	4	4	4	4	0	4	0	0
Dec.	587	5	0	2	5	5	5	4	4	0	4	0	0
Jan, 1998	455	4	0	2	4	4	4	4	4	0	4	0	0
Feb.	445	4	0	4	4	4	4	4	4	0	4	1	1
Mar.	546	5	0	3	4	4	5	5	4	1	5	1	3
Apr.	986	4	1	3	4	4	4	4	4	2	4	4	0
May.	1052	4	2	4	4	4	4	4	4	4	4	0	0
June.	686	5	1	5	5	5	5	5	4	3	5	0	0
Total	8936	53	6	40	48	53	51	52	39	13	52	4	5
	Dominance %		0.10	0.96	1.91	5.56	1.59	23.53	1.24	0.18	48.83	0.05	0.07
	Abundance %		11.32	75.47	90.57	100.00	96.23	98.11	73.59	24.53	98.11	7.55	9.43

- 1- *Uthestia pulchella*
- 5- *Clytia hialfae*
- 9- *Spodoptera exigua*

- 2- *Lasioampa decolorata*
- 6- *Clytia sonata*
- 10- *Daphnis nerii*

- 3- *Agrotis ipsilon*
- 7- *Earias insulana*
- 11- *Delilephila larnica*

- 4- *Agrotis spinifera*
- 8- *Heliothis armigera*

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Table (7): Dominance and abundance degrees of Lepidopterous species recovered by light trap from Botanical Garden, Aswan during (July, 1998 - June, 1999).

Month & Year	Total Catch	Total number of Samples	Number of samples in which the Lepidopterous species appeared during (July, 1997 - June, 1998)											
			1*	2	3	4	5	6	7	8	9	10	11	
July, 1997	1023	4	1*	2	3	4	4	5	6	7	8	9	10	11
Aug.	658	4	0	4	3	4	4	3	4	0	4	4	0	0
Sep.	860	5	0	3	5	5	5	4	5	0	4	4	0	1
Oct.	661	4	2	3	4	4	4	4	4	4	3	2	0	0
Nov.	413	4	0	2	4	4	4	4	4	4	0	4	0	0
Dec.	367	5	2	3	3	3	5	4	4	4	0	4	0	1
Jan, 1998	334	4	0	2	3	3	4	3	3	2	1	1	0	0
Feb.	263	4	0	2	3	3	4	2	4	0	4	4	0	0
Mar.	331	5	0	2	3	3	4	4	4	4	4	4	1	1
Apr.	513	4	0	3	4	4	4	4	4	4	0	4	0	0
May	795	4	0	2	3	4	4	4	4	4	4	4	1	1
June	744	5	0	2	3	4	5	4	4	4	2	4	0	0
Total	6902	52	5	32	45	51	51	43	51	29	17	51	3	8
	Dominance %		0.09	0.69	1.80	1.11	1.11	0.76	0.76	0.35	0.35	42.45	0.04	0.13
	Abundance %		9.62	61.54	86.54	98.08	82.69	98.08	55.77	32.69	98.08	5.77	15.39	

2- *Uthestia pulchella*
6- *Clytia hiajfae*
9- *Spodoptera exigua*

2- *Lastocampa decolorata*
6- *Clytia soneta*
10- *Daphnis nerii*

3- *Agrotis ipsilon*
7- *Earias insulana*
11- *Delilephila lurnica*

4- *Agrotis spinifera*
8- *Heliothis armigera*

Table (8) Population fluctuations of Coleopterous families and Coleopterous insects as a total recovered by light trap from Botanical Garden, Aswan, during (July, 1997 – June, 1999).

Month	Coleopterous families									
	Elmidae		Scarabaeidae		Scarabaeidae		Scarabaeidae		Total	
	97/98	98/99	97/98	98/99	97/98	98/99	97/98	98/99	97/98	98/99
July:	12*	23	6	11	18	34	18	34	18	34
Aug:	19	19	2	9	21	28	21	28	21	28
Sept:	33	16	9	5	42	21	42	21	42	21
Oct:	8	10	6	2	14	15	14	15	14	15
Nov:	1	0	2	2	3	2	3	2	3	2
Dec:	1	0	3	2	4	2	4	2	4	2
Jan:	1	0	1	0	2	0	2	0	2	0
Feb:	1	1	1	0	4	1	4	1	4	1
March:	4	1	1	1	5	2	5	2	5	2
April:	2	1	1	8	17	9	17	9	17	9
May:	11	5	15	6	37	11	37	11	37	11
June:	11	13	26	10	35	23	35	23	35	23
Total	120	89	82	59	202	148	202	148	202	148
%	59.41	60.14	40.59	39.86						

* Monthly Total number

Table (9): Population of each Coleopterous species recovered by light trap from Botanical Garden, Aswan during (July, 1997 – June, 1999).

Coleopterous species	Population of individuals during				Total
	1997/98		1998/99		
	No.	%	No.	%	No.
<i>Agrypus notodonta</i> *	34	16.83	33	22.29	67
<i>Limnognathus fieberi</i> *	86	42.57	56	37.84	142
<i>Adonrus cyaneus</i> **	25	12.38	12	8.11	37
<i>Scarabaeus sacer</i> **	57	28.22	47	31.76	104
Total	202	100.00	148	100.00	350

* Fam. Elateridae
** Fam. Scarabaeidae

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Table (10): Dominance and abundance degrees of Coleopterous species recovered by light trap from Botanical Garden, Aswan during (July, 1997 – June, 1998).

Month & Year	Total Catch	Total number of Samples	Number of samples in which the Coleopterous species appeared during (July, 1997 – June, 1998)			
			1	2	3	4
July, 1997	1004	5	1	2	3	4
Aug.	779	4	1	1	3	4
Sep.	1010	5	3	3	3	5
Oct.	752	4	3	2	3	2
Nov.	634	4	0	2	0	1
Dec.	587	5	1	2	0	1
Jan. 1998	455	4	0	1	1	0
Feb.	443	4	0	1	0	2
Mar.	546	5	0	1	0	2
Apr.	986	4	4	3	0	2
May	1052	4	2	4	1	4
June	686	5	2	4	4	5
Total	8936	53	17	27	17	31
	Dominance %		0.28	0.65	0.39	0.97
	Abundance %		32.08	50.94	32.08	59.49

- 1- *Adoretus clypeatus*.
- 2- *Agrypinus notodontia*.
- 3- *Scarabaeus sacer*.
- 4- *Limnometon fieberti*.

Table (11): Dominance and abundance degrees of Coleopterous species recovered by light trap from Botanical Garden, Aswan during (July, 1998 – June, 1999).

Month & Year	Total Catch	Total number of Samples	Number of Samples in which the Coleopterous species appeared during (July, 1998 – June, 1999)				Total
			1	2	3	4	
July, 1998	1023	4	1	2	3	4	
Aug.	658	4	0	4	4	4	
Sep.	860	5	1	3	3	4	
Oct.	661	4	0	4	4	4	
Nov.	413	4	0	2	3	2	
Dec.	367	5	0	1	0	3	
Jan, 1999	334	4	0	2	0	0	
Feb.	263	4	0	0	0	0	
Mar.	331	4	0	0	0	1	
Apr.	513	4	4	1	0	1	
May	795	4	4	2	0	1	
June	744	5	3	2	0	3	
Total	6962	52	11	24	16	23	
	Dominance %		0.17	0.66	0.47	0.80	
	Abundance%		21.15	46.15	30.77	44.23	

- 1- *Adoverus chyparatus*.
- 2- *Agrypnus notodonta*.

- 3- *Scarabeus sacer*.
- 4- *Limnogeront feberii*.

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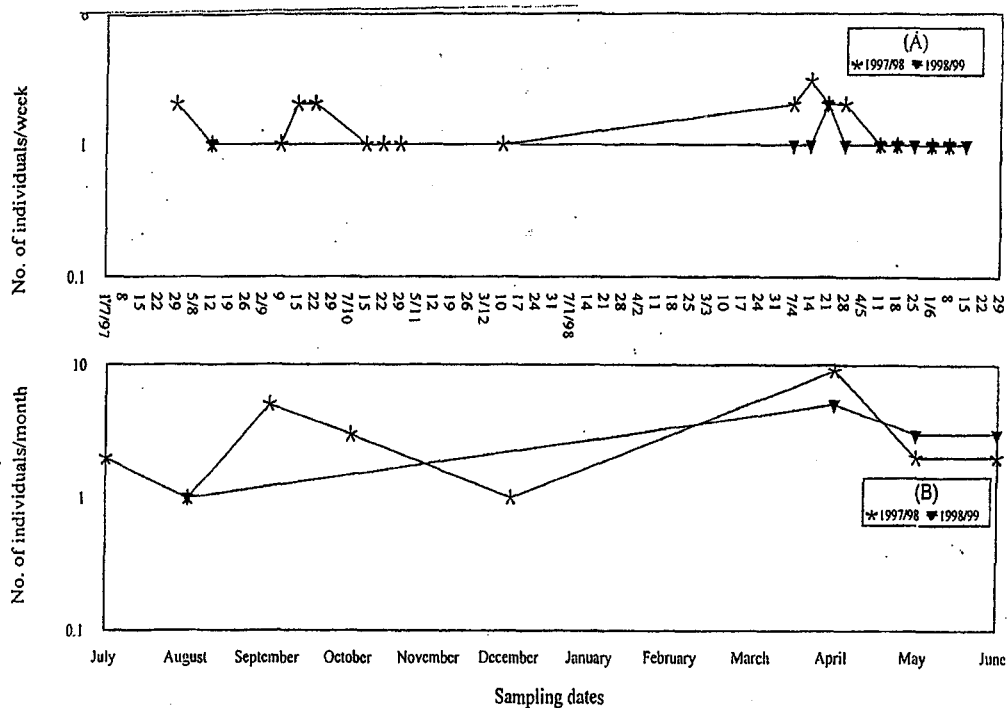


Fig. (1): Population fluctuations of *Adoretus clypeatus* Bwneister collected by light trap from Botanical Garden, Aswan during (July, 1997-June, 1999).

(A): Weekly catch

(B): Monthly catch