

Impact of Environment on the Diversity of Lepidopterous Insects In Three Egyptian Governorates

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ABSTRACT

Ecological and geomorphological factors that control the distribution of Lepidopterous insects were thoroughly examined in three different areas of Egypt. These areas are Senoris, Fayoum Governorate; Al-Arish, North Sinai Governorate; and Kharga Oasis, New Valley Governorate. One hundred and ninety two species belonging to 143 genera represent in 23 families were recorded. The study of similarity between the three areas was carried out using Sørensen equation. The results indicated that there are significant differences between these areas. Similarity in species composition nonetheless, is the highest among Fayoum and Al-Arish areas (70%), followed by Fayoum and Kharga Oasis (64%). The least similar areas were Al-Arish and Kharga Oasis (57%). Al-Arish has the highest number of characteristic species (41 species) forming 42.27% of the total number of the recorded characteristic species; while Fayoum has the least number of characteristic species (20 species) comprising 20.62% of the total. New Valley has 36 species representing 37.11%. Eleven new-recorded species were collected during this study, one belongs to family Elachistidae "*Leucoptera scitella* Zeller", five belongs to family Noctuidae "*Acontia hortensis* Smith, *Clytei syriaca* (Bugnion), *Agrotis sordzeana* Brondt; *Nola harouni* Wiltshire, *Eulocastra diaphora* Staudinger", one belongs to family Pieridae "*Colias hyale* L.", and four belonging to family Pyralidae "*Staudnigeria yerburii* Bulter, *Hypotia colchicalis* H.-Sch., *Parastenia daradis* (Chretien), and *Synaphe marbidalis* Guenée".

Key words: Al-Arish, biodiversity, Fayoum, Lepidoptera, New Valley, Noctuidae.

INTRODUCTION

Order Lepidopterous in general and family Noctuidae in particular will remain attractive to entomologists due to their economic importance for the whole world specially Egypt. Many Lepidopterous species are very destructive to crop fields and cultivated plants, other species are serious pests to stored products, and other species have minor harm effect on agriculture activities. Meanwhile, certain species are considered beneficial insects, acting as parasites and predators attacking scale insects, and mainly bugs.

Lepidopterous insects of three different governorates were studied for two years using different types of collection techniques such as light traps and hand nets. Many authors used light traps to study the population density and other attributes of Lepidoptera in different areas of Egypt (Hosney, 1953; Hassanein, 1956; Hosney and Khattab, 1960; Nazmi, 1963; El-Sherif, 1965; Hanna and Atris, 1969a & b; Hanna and Atris, 1970; Hassanein *et al.*, 1971; Hamad, 1972; El-Saadany and Rizk, 1973a & b; Hanna and Hamad, 1975; Hanna *et al.*, 1975; El-Kady *et al.*, 1980; El-Sheikh, 1983; Hamad *et al.*, 1983; Badr *et al.*, 1985a & b; El-Sayed, 1987; Semida *et al.*, 1988; Salem *et al.*, 1989; Ali, 1996; Abdel-Wahab and El-Akkad, 1998; Marguerite and Abd El-fattah, 2001, Mahbob, 2002; Abd El-Fattah, 2005). Many other authors studied the activity of the insects collected by light traps (Frost, 1952; Graham, 1964; Glick and Graham, 1965; Abdel-Badi, 1977).

However, in this study, the new taxonomic taxa (Scoble, 1995; Adfored, 1999; Heppner, 2001) were

used and the new recorded species were sent to the British Museum for identification.

The main objective of this work is to study the effects of ecology and geomorphology on the distribution of lepidopterous insects in three different areas.

MATERIALS AND METHODS

Collection and identification of lepidopterous insects

Different collecting techniques were used in order to get a good representation of adult lepidopterous insects. Robinson light trap and white pieces of cloth were used for collecting nocturnal Lepidoptera, while a hand nets were used to collect the diurnal ones during two successive years "January 2001 to December 2002".

Specimens were identified to species level at the Entomological collection of the Department of Entomology, Faculty of Science, Cairo University. Unknown specimens were sent to the British Museum for identification.

Description of the studied areas

The difference in certain climatic conditions such as temperature, relative humidity, and wind velocity were recorded in table (1). Kharga Oasis (New Valley) has the highest temperature during most of the year compared to Senoris (Fayoum) and Al-Arish, which have the highest wind velocity and the highest relative humidity, respectively.

(1) Fayoum

Fayoum area occupies a circular deep depression at the northern part of the western desert between

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Table (1): Meteorological records of the three studied areas*.

	Temperature (°C)			Relative humidity (%)			Wind velocity (Km/h)		
	Fayoum	Al-Arish	New valley	Fayoum	Al-Arish	New valley	Fayoum	Al-Arish	New valley
2001									
Jan.	13.8	13.7	14.16	60.6	72.3	37.9	3.8	1.9	2
Feb	15	14.1	14.1	60	68.4	38	4	1.8	2
Mar	16.3	14.3	16	58	67.3	34.1	3.2	2.6	3.1
Apr.	19.2	15.9	23.3	56.6	58.2	21.7	3.9	2.1	2.7
May.	25.9	21.4	28.8	52.5	70.1	15.5	3.4	2.1	1.4
June	27.9	25.5	31.6	52	71.1	13.2	3.4	3.2	3.5
July	29.1	26.6	31	62.4	65.4	13.6	3.2	1.1	2
Aug.	25.9	27.9	33.8	62	67.1	11.6	3	1.2	1.4
Sep.	24.8	24.9	25.9	61.8	72	43.3	3.6	2.8	7.7
Oct.	21.4	22.4	26.8	62.4	70.3	41.1	5.7	3.4	5.4
Nov.	15.2	15.8	20.6	63.8	72.7	52.7	5.8	3.3	3.3
Dec.	14.3	14.8	14.5	73.3	75	56	5.2	5.5	5.8
2002									
Jan.	14.4	12.7	13.5	65.7	76	53.6	7	6	4.4
Feb	15.3	13.6	15.3	65.2	76	49.6	5.8	4.9	5.1
Mar	18.4	15.9	18.8	56.1	57	40	11.5	9.7	5.7
Apr.	28.9	24.2	31.6	53.5	51	25	11.5	4.5	4.6
May.	27.1	21.2	32.6	62.2	71	23	6.9	2.8	6.4
June	30.3	25.4	32.8	55.3	66	26	8.7	3.3	6.4
July	28.9	26.3	33.1	58.1	67	24	2.9	1	1.7
Aug.	30	28	34.8	57.6	74	18	2.8	1	2.5
Sep.	31.1	27	33.8	56.2	67	23	3	1.3	2.9
Oct.	27.8	24.1	27.2	55.8	62	29	2.7	1.3	2.3
Nov.	21.5	19.5	21.1	58.7	72	40	5.8	3	4.3
Dec.	15.3	14.4	14	58.4	63	47	7.8	6.4	5.3

* = Monthly newsletters of "the agricultural weather forecast", Ministry of Agriculture and land reclamation, Giza, Egypt.

longitude 30° 20' and 31° 15' E, and latitudes 29° 05' and 29° 35' N. It lies about 10-25 km to the west of the River Nile. The area consists of highly fertile cultivated land. It is usually covered with different seasonal plant species. Certain medicinal plants are planted in this area such as Heban (*Seetzenia lanata*) and Hanzal (*Citrullus colocynthis*). Some weeds, such as Nigeel (*Panicum* sp. and *Paspalum* sp.), Halfa (*Imperata cylindrica*) and Hagana (*Phragmites australis*) are common in the area. In cultivated places, winter crops such as wheat, barley, Egyptian clover, bean, onion, cabbage, and tomatoes are grown. In summer, cotton, cucumber, maize and rice are the dominant cultivated crops. Meanwhile, alfalfa is cultivated all over the year. Trees of date palm, olive, and citrus fruits are quite common. The system of irrigation depends upon the fresh Nile water reaching via Bahr Yousef through Lahoun Barrage.

(2) Al-Arish

Sinai Peninsula is biogeographically rather complex. Although Al-Arish is a desert, some parts of it are newly reclaimed and others are rather cultivated. It lies between longitude 33° 40' and 34° E, and latitude 31° and 31° 9' N. The area is covered with different wild plant species, the most common are Athel (*Tamarix* sp.) and acacias (*Acacia* sp.). Date palm exists in many places. Certain wild medicinal plants such as Heban (*Seetzenia lanata*), Datoura (*Datura* sp.), and Hanzal (*Citrullus colocynthis*) are grown in the area. Some weeds, such as Nigeel (*Panicum* sp. and *Paspalum* sp.), Halfa (*Imperata cylindrica*) and Hagana (*Phragmites australis*) are common in the area.

In cultivated areas, winter crops such as Egyptian clover (*Trifolium alexandrinum*), bean (*Vicia faba*), cabbage and tomatoes are grown. In summer, cucumber and maize are dominantly cultivated. Meanwhile, alfalfa (*Medicago sativum*) is cultivated all over the year. Trees such as date palm, olive, citrus, guava, and grapes are largely grown in the area. The system of irrigation depends on groundwater wells but the Nile water reaches the cultivated lands by the newly dug Canal of El-Salam.

(3) New Valley

This governorate covers most of the Western Desert of Egypt. It is located between longitudes 30° and 31° E, and latitudes 24° and 26° N. The New Valley constitutes a depression that has an average elevation of 100m a.s.l and is surrounded by a plateau ranging between 300-400m a.s.l. The area is covered with different species of the wild plants; the most common are acacia, Athel (*Tamarix* sp.), and Dome palm (*Hyphaene thebaica*), while date palms exist in some places. Certain wild medicinal plants grow in the area such as Datoura (*Datura* sp.), Oshar (*Calotropis procera*), and Hanzal (*Citrullus colocynthis*). Some weeds, such as Halfa and Hagana are common in the area. In cultivated areas, winter crops such as wheat, barley, and Egyptian clover are grown. In summer, cucumber, maize, peanut and rice are the dominant cultivated crops. Meanwhile, alfalfa is cultivated all over the year. Trees such as date palm, olive, and citrus are grown. The system of irrigation depends upon water supply pumped from groundwater wells at a depth of about 250-800 m.

Statistical analysis

Sørensen equation (Looman and Campell, 1966) was used to calculate the quotient of similarity (QS):

$$QS = 2j / (a + b)$$

Where **j** is the number of species found in both habitats, **a** is the total number of species found in the first habitat, and **b** is the total number of species found in the second habitat. [When the QS = 1 the two habitats are considered similar, but when the QS = 0 the two habitats are considered completely different].

RESULTS

There are many factors that discriminate the three studied areas including the geographic location, climatic conditions (table 1), cultivated plants, wild plants, and type of land, in addition to pest control measures.

Table (2) shows that, 192 species were recorded belonging to 143 genera within 23 families from the different areas. Eleven species were recorded for the first time in the Egyptian fauna. These new recorded species were determined by Dr. K. Goodger and Dr. M. Shaffer at the British Museum. One species belongs to family Elachistidae; *Leucoptera scitella* Zeller, from Kharga Oasis. Five species belong to family Noctuidae; *Acontia hortensis* Smith, Acontiinae, *Clytei syriaca* (Bugnion), Catocalinae, *Euloastra diaphora* Staudinger and *Nola harouni* Wiltshire, Nolinae, from Kharga Oasis and *Agrotis sordzeana* Brondt, Noctuidae from Al-Arish. One species belongs to family Pieridae *Colias hyale* L. from Al-Arish and four other species belong to family Pyralidae; *Staudnigeria yerburii* Bulter, Phycitinae and *Hypotia colchicalis* H.-Sch. Pyralinae and *Synaphe marbidalis* Guenée, Pyralinae from Al-Arish; *Parastenia daradis* (Chretien), and Pyralinae from Kharga Oasis.

Members of twenty-three lepidopterous families were recorded during this study from all areas. Fourteen families were represented in all areas (forming 60.87% from all recorded families), while the other families (9 families) were recorded in two or at least one area (3 and 6 families, forming 13.04% and 26.09%, respectively). Twenty families were recorded from Kharga Oasis; in addition to 18 families from Al-Arish and 16 families from Fayoum. Four families were recorded from Kharga Oasis only, two families from Al-Arish only; meanwhile, no families were recorded from Senoris.

Fifty-seven species (29.69% of all recorded species) were recorded from all areas. Ninety-seven species (50.52%) were recorded from one area only (characteristic) while 38 species from two areas (19.79%). Kharga Oasis has the highest number of species (124) forming 64.58% from all recorded species followed by Al-Arish (118) forming 61.46% while the area with least number of species is Senoris (104) forming 54.17%. Al-Arish has the highest number of characteristic species (41= 42.27% of all characteristic

Table (2): List of lepidopterous insects collected from the investigated three areas. S = Senoris, A = Al-Arish, K = Kharga Oasis, and # = New Record.

ARCTIIDAE	<i>Utetheisa pulchella</i> (Linnaeus); S, A, K.
COLEOPHORIDAE	Coleophorinae <i>Coleophora euryaula</i> Meyrick; K. <i>Coleophora versurella</i> Zeller; S, A.
COSMOPTERIGIDAE	Cosmopteriginae <i>Cosmopterix mimetes</i> Meyer; A, K. <i>Pyroderces simplex</i> (Wals.); S.
COSSIDAE	Cossinae <i>Paropta paradoxa</i> Herris & Sch.; A.
Zeuzerinae	<i>Phragmataecia castanea</i> Hübner; K. <i>Zeuzera pyrina</i> Linnaeus; S.
ELACHISTIDAE	# <i>Leucoptera scitella</i> Zeller; S, A, K.
GELECHIIDAE	Anacampsininae <i>Approaerma anthyllidella</i> (Hübner); S.
Aristorelinae	<i>Sitotroga cerealella</i> (Oliver); S, A, K.
Chelariinae	<i>Anarsia acaciae</i> Walsingham; S, A, K.
Gelechiinae	<i>Mirificarma fluvella</i> Duponchel; S, K. <i>Phthorimaea operculella</i> (Zeller); A, K. <i>Scrobipalpa ocellatella</i> (Boyd); A. <i>Stomopteryx mitrella</i> Walsingham; A.
Pexicopiinae	<i>Pectinophora gossypiella</i> (Saun.); S, A, K.
GEOMETRIDAE	Hemitheinae <i>Erionota thrax</i> Linnaeus; K. <i>Hemidremadis affinis</i> Wiltshire; S, A.
Geometrinae	<i>Chlorissa faustinata</i> (Millière); S, K. <i>Tephрина disputaria</i> Guenée; K.
Larentiinae	<i>Eupithecia ultimaria</i> Boisduval; A. <i>Gymnoscelis pumilata</i> (Hübner); S. <i>Gymnoscelis rufifaciata</i> (Haworth); S. <i>Lithostega fissurata</i> Mabille; A. <i>Tephрина disputaria</i> Guenée; A.
Sterrhinae	<i>Idaea mareotica</i> Draudt; A. <i>Idaea sordidior</i> Wiltshire; A. <i>Rhodometra sacaria</i> (Linnaeus); S, A, K. <i>Scopula donovani</i> Distant; S, A, K. <i>Scopula luridata</i> Zeller; K. <i>Scopula ochroleucaria</i> (H.S.); A.
GRACILLARIIDAE	Catoptiliinae <i>Acrocercops conflua</i> Meyrick; S
HESPIRIDAE	Hesperiinae <i>Borbo barbonica</i> Lederer; S, A, K. <i>Gegenes nostrodamus</i> Fabricius; S, K.
LASIOCAMPIDAE	<i>Anadiasa undata</i> Klug; K. <i>Anadiasa obselata</i> Klug; K. <i>Dendrolimus alfieri</i> Anders-Seituz; K. <i>Lasiocampa serrula</i> Guenée; A.
LYCAENIDAE	Lycainaeninae <i>Lycaina phlaeas phlaeas</i> Linnaeus; S, K. <i>Lycaina thersamon omphal</i> Klug; S, A, K.
Polyommattinae	<i>Freyeria trochylus trochylus</i> Freyer; S, K. <i>Iolana alfieri</i> Wiltshire; A, K. <i>Lampides boeticus</i> Linnaeus; S, A, K. <i>Leptotes pirithous</i> Linnaeus; S. <i>Polyommatus icarus zelleri</i> Verity; S. <i>Tarucus balkanicus</i> Freyer; S, A, K. <i>Tarucus mediterranea</i> B.B.; S, A, K.

- Tarucus rosaceus* Austaut; S, K.
Teracolus protomedia Klug; A.
Zizeeria karsandra karsandra Trim; S, A, K.
- Theclinae**
Deudorix livia Klug; S, A, K.
- LYMANTRIIDAE**
Cosama flavipalpata Staudinger; A.
- NOCTUIDAE**
- Acontiinae**
 # *Acontia hortensis* Smith; K.
Acontia lucida Hufnagel; K.
Euplemma cochyloides Guenée; K.
Euplemma ostrina (Hübner); A, S, K.
Euplemma gayneri (Roth.); K.
 # *Eulocastra diaphora* Staudinger; K.
- Amphipyriinae**
Amphipira tetra Fabricius; A.
Athetis atriluna Guenée; S, A, K.
Athetis clavipalpis; A.
Athetis melanura Staudinger; K.
Autophila cerealis Staudinger; A.
Autophila pauli Boursin; A.
Propsalta coptica Wiltshire; S.
Sesamia cretica Lederer; S, A, K.
Sesamia nonagrioides Lefebvre; S.
Sesamia waltshieri Rungs; S, A.
Spodoptera cilium (Lederer); S, A, K.
Spodoptera exigua (Hübner); S, A, K.
Spodoptera littoralis (Boisduval); S, A, K.
- Catocalinae**
Acanthlipes circumdata Walker; K.
Clytei benenotata (Warren); S.
Clytei haifae Habitach; S, A.
Clytei sancta Hübner; K.
 # *Clytei syriaca* (Bugnion); K.
Grammodes bifascata (Petagna); S, A.
Grammodes geometrica F.; S, A, K.
Mitoponris costiplaga Warr.; A.
Ophiura tirhaca (Cramer); S, A, K.
Pericyma squalens (Walker); S.
- Chloephorinae**
Earias insulana Boisduval; S, A, K.
- Hadestinae**
Discestra trifolii (Hufnagel); S, A, K.
Hecatera spinaciae Vieweg; A.
Mythimna consanguis (Guenée); S, A, K.
Mythimna loreyi (Duponchel); S, A, K.
Mythimna unipuncta Haw; A.
Mythimna zea (Duponchel); S, K.
- Heliiothinae**
Helicoverpa armegira Hübner; S, A, K.
Heliiothis nubigera (H.Sch.); S, A, K.
Heliiothis peltigera (D. & Sch.); S, A, K.
Protoscania scutosa Denis & Sch.; A.
- Hypeninae**
Rhynchina eremialis Swinhoe; S.
- Noctuinae**
Agrotis herzogii Rebel; S.
Agrotis ipsilon (Hufnagel); S, A, K.
Agrotis puta Hübner; A, K.
Agrotis segetum (Denis & Sch.); S, A, K.
Agrotis biconica (Kollar); S, A, K.
 # *Agrotis sordzeana* Brondt; A.
Agrotis trux (Hübner); S, K.
Euxoa canariensis (Boursin); S, K.
Noctua pronuba Linnaeus; S, A, K.
Ochropleura imperator Bang-Haas; A.
Ochropleura melanuroides leucomelas Boursin; A.
- Nolinae**
 # *Nola harouni* Wiltshire; K.
- Plusiinae**
Autographa gamma (Linnaeus); S, A, K.
Chrysodeixis chalcites (Esper); S, A, K.
Syngrapha circumflexa (L.); S, A, K.
Trichoplusia daubei (Boisduval); S, A, K.
Trichoplusia orichalcea F.; S, A, K.
Trichoplusia circumscripta (Fre.); S, A, K.
Trichoplusia ni (Hübner); S, A, K.
- Sarrothripinae**
Charocoma nilotica Rogenhofer; K.
- NYMPHALIDAE**
- Danainae**
Danaus chrysippus chrysippus L.; S, A, K.
- Nymphalinae**
Cynthia cardui Linnaeus; S, A, K.
Junonia lintingensis cebrene Tri.; S.
Vanessa atalanta Linnaeus; S, A, K.
- Satyrinae**
Pseudotergumia pisidice Klug; A.
- PIERIDAE**
- Coliadinae**
Colias croceus Fourcroy; S, K.
 # *Colias hyale* Linnaeus; A.
Colotis halimede (Klug); A.
Colotis liagore Klug; A, K.
Madias fausta fausta Oliver; S.
- Pierinae**
Pieris rapae Linnaeus; S, A, K.
Pontia daplidice daplidice L.; S, K.
Pontia glaucanome Klug; S, A, K.
- PLUTELLIDAE**
- Plutellinae**
Plutella xylostella (Linnaeus); S, A, K.
- PSYCHIDAE**
- Oiketinae**
Amicta amictoides, K.
- PTEROPHORIDAE**
- Pterophorinae**
Emmelina momodactyla L.; K.
- PYRALIDAE**
- Crambinae**
Bazaria fulvofasciata Denis & Sch.; A.
Euchromius cambridgei (Zeller); S, A, K.
Euchromius ocellus (Haworth); S, A, K.
- Evergestinae**
Cornifrons ulceralis Lederer; A.
- Galleriinae**
Arenipses nitidicostella Hampson; K.
Arenipses sabella Hampson; S.
Lamoria anella Denis & Sch.; A, K.
- Glaphyriinae**
Hellula undalis Fabricius; K.
- Phycitinae**
Ancylosis faustinella Ragonot; A.
Ancylosis hellenica (Staudinger); S, K.
Anerastia nitidicostella Ragonot; A, K.
Cadra cautella (Walker); S, K.
Ephestia kuehniella (Zeller); S, A, K.
Etiella zinckenella Treitschke; S, A, K.
Euzophora osseatella Treitschke; A, K.
Hypogryphia uncinatella Ragonot; A.
Phycita potriella (Zeller); A.
Staudingeria fratifasciella Ragonot; A.
 # *Staudingeria yerburii* Butler; A.
Raphimetophus oblutella Zeller; K.
- Pyralinae**
Antigastra catalaunalis Dup.; K.
Chilo agamemnon Bleszynski; S.
Clorissa faustinata K.
Dattia myalis Rothschild; K.
 # *Hypotia colchicalis* H.Sch.; K.
 # *Parastenia daradis* (Chretien); A.
Pyralis farinalis (Linnaeus); S, A, K.
Pyralis galactalis Haworth; K.
Schoenobin niloticus Zeller; S.
 # *Synaphe marbidalis* Guenée; A.
Uresiphita polygonalis k.
- Pyraustinae**
Achyra nudalis (Hübner); A.
Herpetogramma licarsisalis W.; S, A, K.
Noctuella floralis Hübner, S, A, K.
Nomophila noctuella (D. & Sch.); S, A, K.
Palpita unionalis Hübner; S, A, K.
Plodia interpunctella Hübner; S, K.
Pseudoschima ulceratalis Lederer; K.
Pyrausta aurata Scopoli; K.
Pyrausta incoloralis Duponchel; S, A, K.
Oeobia ferrugalis Hübner, A.
Ostrina nubilalis Hübner; S, A, K.
Spolodea recurvalis (Fabricius); S, K.

Tegostoma baphialis Staudinger, S, K.

SESIIDAE

Aegeriinae

Synanthedon myopaeiformis (Bork.); A.

SPHINGIDAE

Macroglossinae

Daphnis nerii (Linnaeus); A.

Hippotion celerio (Linnaeus); S, A, K.

Hyles lineata Fabricius; K.

Hyles livornica (Esper); A, K.

Macroglossum stellatarum (L.); K.

Theretra alecto (Linnaeus); S, K.

Sphinginae

Acherontia atropos (Linnaeus); S, A.

Agrius convolvuli (Linnaeus); S, A, K.

TINEIDAE

Scardiinae

Episcaridia lardatella Lederer; A.

Tineinae

Niditinea fuscella (Linnaeus); S.

Trichophaga abruptella Wollaston; S, A.

TORTRICIDAE

Olethrutinae

Bactra lancea Hubner; A, K.

Cirriphora pharaonana (Koller); A.

Cydia phaulomorpha Merrik; A.

species); while Senoris has the lowest number (20 characteristic species only forming 20.62% of the total). Kharga Oasis has 36 characteristic species (forming 37.11%).

Similarity among study areas:

(a) Senoris - Al-Arish

The species recorded in Senoris were 102 species compared to 118 species at Al-Arish. Seventy seven species were recorded in both areas, while 25 species were only recorded in Senoris area and 41 species were characteristic of Al-Arish area. The calculated (QS) value is 0.70.

(b) Senoris - Kharga Oasis

The number of species recorded in both areas is 72. The number of species exclusive either to Senoris or to Kharga Oasis is 30 and 52 respectively. The number of species identified in Kharga Oasis nonetheless, is 124. The calculated (QS) value is 0.64.

(c) Al-Arish - Kharga Oasis

Sixty-nine species were recorded in both Al-Arish and Kharga Oasis. Al-Arish is distinguished by 49 species compared to 55 ones in Kharga Oasis. The calculated (QS) value is 0.57.

Figure (1) indicates that the most similar areas are Senoris and Al-Arish (70%), and the least ones are Al-Arish and Kharga Oasis (57%).

DISCUSSION

The differences among the studied areas might have been caused by their characteristic features, such as climate, agricultural practices, and planted crops. Al-Arish lies in Sinai Peninsula where it has relatively cold climate and somewhat rainy weather. On the other hand, Kharga Oasis lies in the Western Desert of Egypt with very hot climate and very rare rain. The cultivated Land of Al-Arish is recently reclaimed and insect

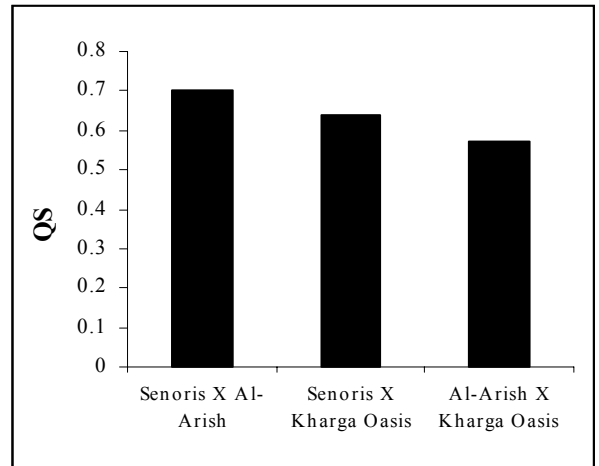


Figure (1): Shared species among the three studied areas.

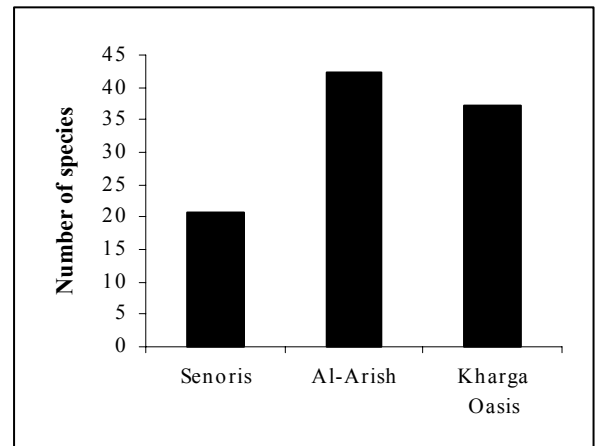


Figure (2): The total number of characteristic species recorded from the three studied areas during the present study.

control measures are practiced in some cultivated areas, the land of Kharga Oasis has been reclaimed for 50 years where insect control measures are not a common practice; though some clay and fertilizers from the Nile Delta have been mixed with its land which might have brought in some insects with it. The presence of weeds, particularly some specific medical weeds, in one area but not in the other might have played a role in determining the type of insects. Senoris is the nearest area to the River Nile and occupies a deep depression in the Western Desert. It is characterized by a highly fertile cultivated land with few types of wild plants. Eleven Lepidopterous species were identified as new records to Al-Arish (five species) and Kharga Oasis (six species) only, which could be attributed to many causes. One of these causes could be the use of many insect control management systems. In our opinion, the absence of any new records from Senoris could be simply related to the fact that many authors have studied the fauna of lower Egypt, the Nile Delta, and Fayoum compared to other areas. Al-Arish has the highest number of characteristic

species (41 species) forming 42.27% of the total number of characteristic species, followed by New Valley represented by 36 species (37.11%). The least area was Fayoum which is represented by 20 species representing 20.62% (Fig. 2).

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تأثير البيئة على تنوع الحشرات حرشفية الأجنحة في ثلاث محافظات مصرية

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المخلص العربي

تم إختيار ثلاث مناطق في محافظات مختلفة بيئياً تتباين في نوعية النباتات المنزرعة فيها بالإضافة إلى النباتات البرية، كما أنها تختلف في صفات التربة ومدى قرب وبعدها عن المناطق عن منطقة وادي النيل (هذه المناطق هي: سنورس وتتبع محافظة الفيوم، العريش وتتبع محافظة شمال سيناء، والواحات الخارجة وتتبع محافظة الوادي الجديد). وقد تم التركيز على مجموعة الحشرات التي تتبع رتبة حرشفية الأجنحة نظراً لأهميتها الاقتصادية ومدى تأثيرها على النباتات البرية والزراعية.

تم تسجيل 192 نوع تتبع 143 جنساً تحت 23 فصيلة، حيث تم دراسة درجة التشابه بين هذه المناطق تبعاً لمعادلة سورينسن. وقد أظهرت النتائج أن هناك إختلافاً كبيراً بين هذه المناطق الثلاث. وكانت منطقتا سنورس والواحات الخارجة هما الأقرب في درجة التشابه (70%) بينما كانت العريش والواحات الخارجة الأقل في درجة التشابه (57%) وكانت النسبة بين سنورس والعريش (64%).

كما أظهرت النتائج أن كل منطقة تتميز بوجود أنواع مميزة بها (Characteristic species) لم تسجل في المناطق الأخرى، ففي منطقة العريش وجد (41 نوعاً بنسبة 42.27%) بينما كانت الفيوم أقل هذه المناطق (20 نوعاً بنسبة 20.62%) أما الواحات الخارجة فاحتوت (36 نوعاً بنسبة 37.11%).

هذا وقد تم تسجيل 11 نوعاً جديدة لأول مرة في مصر: خمسة أنواع تتبع فصيلة نوكتويدي، وأربعة أنواع تتبع فصيلة بيرليدي و نوعاً واحداً لكل من فصيلة إلاكستيدي وبيريدي. وهذه الأنواع هي:

“*Acontia hortensis* Smith; *Clytei syriaca* (Bugnion); *Agrotis sordzeana* Brondt; *Nola harouni* Wiltshire; *Eulocastra diaphora* Staudinger” belonging to family Noctuidae; “*Staudnigeria yerburii* Bulter; *Hypotia colchicalis* H.-Sch.; *Parastenia daradis* (Chretien) and *Synaphe marbidalis* Guenée” belonging to family Pyralidae; “*Leucoptera scitella* Zeller”; belonging to family Elachistidae and “*Colias hyale* L.” belonging to family Pieridae.