Survey of Some Lepidopterous Species Attracted to Light Traps in the Middle of Al-Jabal Al-Akhdar Region, Libya

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ABSTRACT

The current study was carried out to identity 18 species of order lepidoptera belonging to 17 genera, 10 subfamilies and 6 families from Al-Jabal Al-AKhdar, Libya.The survey of these species were conducted in 12 regions during the period from January to December 2018, The percentage of the presence of each species in the studied regions has been determined. The species global distribution, synonyms, common names and hosts plant also were given.

Keyword: Lepidoptera, Light traps, Al-Jabal Al-AKhdar, Libya, Species, Survey.

INTRODUCTION

The order Lepidoptera comprises the moths and butterflies, is one of the largest insect order, with 175,000 species represented in 128 families and 47 super families worldwide (Kristensen and Skalski 1999). The members of this order are surprisingly alike with respect to their food source, nearly all of which are green plant feeders. The great majority of larvae chew up leaves, many pore tunnel inside leaves, some bore into stone fruits and seeds while others visit flowers for nectar (ACSAD, 1981). More than19 species have been reported for the frist time in Libya, Al-Jabal Al-AKhdar area, at El-kof National park (Zavattari, 1934).

Lepidoptera is one of the most common economically, important and wide spread orderes of the insects, while moths represent one of the most heterogeneous groups (Devoto *et .al*, 2011 and Le Croy *et .al*, 2013). The study on some Lepidoptera species by El-Megrhabi (2001) suggested 26 species, 15 of these reported for the first time in Benghazi Libya. In this paper additional information about Lepidopteron fauna of Al-Jabal Al-AKhdar, Libya was given.

MATERIALS AND METHODS

A survey of Lepidoptera order was conducted in North, Southern, Eastern and Western El-Bieda, Al-Jabal Al-Akdar region. As all survey area were located in Al-Jabal Al-Akhdar (Massah, Sidi Abdel Wahed , Omar al-Mukhtar, Al-Abraq, Qarnada, Al- faidia, Al-wasita, Al-haniya, Al-hamama, Shahat, Al - Mansoura and Susa), they all experienced similar climatic conditions of precipitin humidity and temperature. The study represented sea- levels rise scales ranged from 20 to 500 m.

From January to December 2018 samples were collected from the forementioned regions using light traps and white sheet reflects light and acts as structure for insect to land on from different plant, (forest and fruits trees as well as several crops and weeds).

In this paper taxonomic notes, Terminology and abbreviation are provided according to several authors (Wiltshire, 1948; Karsholt and Razowski, 1996; Heppner, 1998; Scudder and Cannings, 2007; and Bader, 2014). Specimens were deposited in Entomology museum collection, plant protection department. Faculty of Agriculture,Omar Al-Mukthar University.

RESULTS

The data in Table (1) show the species that were collected in the study, along with the families to which they belong and sub families, as well as the global distribution, synonyms, common names and hosts plants. The current study showed 18 species belonging to 17 genera, 10 subfamilies and 6 families.

Table (2) shows the species that were recorded and also the number of specimens collected to all species in the study regions, where Massah region recorded the highest number of 165 specimens, while the lowest number of specimens was recorded in Susa region (126), the most dominant species in the study regions, *Tuta absoluta* (246 speacimens), while the least in number was (43 speacimens) *Acherontia atropos*.

DISCUSSION

Field survey was conducted during the period of 2018 in twelve regions in the middle of Al- Jabal Alkhdar they were Massah, Sidi Abdel Wahed, Omar al-Mukhtar, Al-Abraq, Qarnada, Al- Fadia, Alwasita, Al-haniya , Al-hamama, Shahat, Al-Mansoura and Susa.

The data obtained in the study indicated that the greatest family found in the study area, the highest

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number of recorded species was family Sphingidae with eight species, and six species from family noctuidae while one species from each of Cossidae; Torticidae; Gelechiidae and Artciidae. Several authors throughout the world have been studied and discussed the various aspects of the order Lepidoptera, In Libya, fragmentary and often incomplete studies were made on this order there has been only one extensive Libyan faunal work on all orders of insects including order Lepidoptera by Zavattira (1934) and Damiano (1961). In addition Kemal and Kocak (2007) gave detailed account on some families belong to order Lepidoptera at North Africa including Libya. General survey carried out by revising the main reference on Lepidoptera in Libya by Turati and Kruger (1936); ACSAD (1981); Amin *et.al*. (1998); El-Meghrabi (2001); El-Meghrabi and Amin (2007). as well as Mohamed and Shaurub (2010).

Many of the established species in the Libyan fauna were firstly introduced to the country with several exported crops such as vegitables and fruits. It seems from our survey that the important species (about 21 species). Gelehiidae is one of the most important families under study although only one species was recorded (*Tuta absoluta*) but considered one of the most serious pests on tomato plant. It was recorded in Libya 2009 (Moussa *et al.* 2013 and Salama *et al.* 2015). Utilization of insecticides and quarantine measures are strongly requested to prevent any new aphids introduced to Libya.

Table 1. The species that the study regions, were collected and some data related to them.

Species	Common name	Synonyms	Host plant family	Global distribution
Family			Sphingidae	
Subfamily			Sphinginae	
1 *Acherontia atropos* Linnaeus,1758.	Death's Head Hawk moth	*Noctua connuba* Hubner,1822 , *Noctua innuba* Treitschke,1825 , *Noctua hoegei* Herrih-Schaffer,1861 , *Noctua nigra* Krausse,1912, *Noctua nec* Piesz,1908 *Noctua decolorata* Turati,1923.	Oleaceae – Solanaceae – Caprifoliaceae – Lamiaceae – Amaranthaceae – Apocynaceae - Cannabaceae- Bignoniaceae – Rosaceae – Adoxaceae .	UK , India , Saudi Arabia ,Canary Islands , Azores ,Eurasia and Mediterranean region
2 *Agrius convolvuli* Linnaeus,1758.	Convolvulus Hawk moth.	*Sphinx convolvuli* Linnaeus , 1758 , *Protoparce orientalis* Butler, 1876 *Herse convolvuli* Clark, 1922.	Convolvulaceae – Fabaceae – Asteraceae – Polygonaceae.	Europe, Asia, Africa, Australia and New Zealand.
Subfamily			Macroglossinae	
3 *Daphnis nerii* Linnaeus, 1758.	Oleander Hawk moth.	*Sphinx nerii* Linnaeus, 1758.	Apocynaceae – Leguminosae – Sterculiaceae.	Norway , Sweden, Finland, Denmark , Russia, Ukraine, UK, Ireland, Belgium, Switzerland , France, Corsica ,Germany, Poland , Austria, Slovakia , Romania , Hungary ,Portugal , Spain, Italy, Malta , Cyprus , Slovenia , Croatia , Bosnia ,Serbia , Kosovo , Albania , Macedonia, Bulgaria , Greece and Turkey.

Cont. Table 1. The species that the study regions, were collected and some data related to them.

Species		Common name	Synonyms	Host plant family	Global distribution
Family				Sphingidae	
Subfamily				Macroglossinae	
4	*Hippotion celerio* Linnaeus,1758.	Vine Striped Hawk moth.	*Hippotion tisiphone* Linnaeus,1758 , *Hippotion inquilinus* Harris,1780 , *Hippotion phoenix* Oken,1815 , *Hippotion ocys* Hubner, 1819 *Hippotion albolineatus* Montrousier,1864.	Onagraceae – Rubiaceae.	Africa ,India, Sri Lanka, southern Europe and Australia.
5	*Hyles euphorbiae* Linnaeus, 1758.	Spurge Hawk moth.	*Sphinx euphorbiae* Linnaeus, 1758 , *Sphinx esulae* Hufnagel, 1766 , *Deilephila esulae* Boisduval, 1834 *Celerio euphorbiae* Rothschild & Jordan, 1903.	Euphorbiaceae – Onagraceae – Polygonaceae – Vitaceae.	Sweden , Denmark , Switzerland , Belgium , Poland , Slovakia , UK , Germany, France , Austria , Hungary, Italy, Spain , Portugal ,Romania , Greece , Bulgaria , Croatia , Bosnia and Turkey.
6	*Hyles livornica* Esper,1780.	Striped Hawk moth.	*Hyles koechlini* Fuessly1781 , *Hyles tatsienluica* Oberthur,1916 , *Hyles saharae* Gehlen,1932 , *Hyles malgassica* Denso,1944 *Hyles renneri* Eitchberger,Danner& Surholt,1998.	Onagraceae – Polygonaceae - Asphodelaceae – Rubiaceae – Vitaceae.	Africa , southern Europe , Poland , central and east Asia .
7	*Theretra alecto* Linnaeus, 1758.	Levant Hunter Hawk moth.	*Sphinx alecto* Linnaeus, 1758 , *Sphinx cretica* Boisduval, 1827 *Theretra freyeri* Kirby, 1892.	Theaceae – Actinidiaceae – Dilleniaceae – Leeaceae – Rubiaceae – Vitaceae.	Romania , Turkey , Cyprus , Bulgaria , Greece and Macedonia .
8	*Macroglossa stellatarum* Linnaeus.	Eurasian Humming Bird Hawk moth.	*Sphinx stellatarum* Linnaeus, 1758.	Rubiaceae – Onagraceae.	Portugal , Japan , southern Europe , North Africa , Spain, Alps and Russia.

Cont. Table 1. The species that the study regions, were collected and some data related to them.

Species		Common name	Synonyms	Host plant family	Global distribution
Family		Noctuidae			
Subfamily		Noctuinae			
9	*Agrotis ipsilon* Hufnagel,1766.	Dark Sword Grass moth.	*Agrotis suffuse* Denis&Schiffermuller ,1775 , *Agrotis idonea* Cramer,1780 , *Agrotis spinula* Esper,1786 *Agrotis spinifera* Villers,1789.	Solanaceae– Chenapodiaceae - Asteraceae - Poaceae – Solanaceae.	Canada , Australia and Newzealand .
10	*Agrotis segetum* Denis&Schiffermuller,1775.	Turnip moth.	*Agrotis fucosa Butler*; *Agrotis segetis Hübner* , *Euxoa segetum* Denis & Schiffermüller , *Feltia segetum* Denis & Schiffermüller, *Noctua segetum* Denis & Schiffermüller *Scotia segetum* Denis & Schiffermüller.	Brassicaeae – Liliaceae – Malvaceae – Cucurbitaeae – Asteraceae – Chenapodiaceae – Fabaceae – Solanaceae – Theaceae – Vitaceae – Poaceae.	Turkmenistan , Lebanon , Syria , Iraq , Afghanistan , Russia , Turkey, Armenia , Caucasus , Egypt ,Cyprus ,Mongolia , Jordan and Iran
11	*Noctua pronuba* Linnaeus,1758.	The large yellow under wing.	*Noctua connuba* Hubner,1822 , *Noctua innuba* Treitschke,1825 , *Noctua hoegei* Herrih-Schaffer,1861, *Noctua nigra* Krausse,1912 , *Noctua nec* Piesz,1908 *Noctua decolorata* Turati,1923.	Asteraceae – Solanaceae – Solanaceae – Rosaceae – Poaceae – Amaranthaceae- Polygonaceae – Vitaceae – Lridaceae – Apiaceae – Violaceae – Caryophllaceae.	North Africa , Canary Islands , Turkey, Iraq ,Iran,Afghanistan ,India and Russia.
Subfamily		Hadeninae			
12	*Spodoptera littoralis* Boisduval,1833.	Cotton leaf worm.	*Spodoptera retina* Freyer,1845 , *Spodoptera testaceoidn* Guenee,1852 *Spodoptera metriodes* Bethune - Baker,1911.	Highly polyphagous.	Spain, France, Italy and Greece, Syria and Turkey .

Cont. Table 1. The species that the study regions, were collected and some data related to them.

Species	Common name	Synonyms	Host plant family	Global distribution
Family Noctuidae Subfamily Plusiinae				
13 *Autographa gamma* Linnaeus,1758.	silver Y moth.	*Phalaena gamma* Linnaeus,1758 , *Autographa messmeri* Linnaeus,1758 , *Autographa volkeri* Linnaeus,1758.	Solanaceae – Oleraceae – Brassicaeae – Fabaceae – Chenapodiaceae – Linaceae.	North Africa ,Iceland, Greenland,and Finland .
Subfamily Catocalinae				
14 *Dysgonia torrida* Guenée, 1852.	The Jigsaw.	*Bastilla torrida* , *Ophiusa albivitta* , *Ophiusa festina* , *Ophiusa torrida* Guenée, 1852 *Parallelia torrida* .	Poaceae – Euphorbiaeae– Leguminasae – Salicaceae	Spain**,** Italy, Greece, Syria, Iran, Uzbekistan, India, SriLanka and Myanmar **.**
Family Cossidae Subfamily Zeuzerinae				
15 *Zeuzera pyrina* Linnaeus,1761.	Leopard moth.	*Zeuzera hypocastani* Poda,1761, *Zeuzera aesuli* Linnaeus,1767, *Zeuzera hilaris* Foureroy,1832 .	Caprifoliaceae – Fabaceae- Oleaceae – Rosaceae – Fagaceae – Moraceae – Ulmaceae – Ericaceae- Sapindaceae.	Algeria ,Egypt , Libya, Morocco,Taiwan , India, Iraq, Japan ,Korea ,Lebanon , Sri Lank , Syria and Turkey**.**
Family Arctiidae Subfamily Arctiinae				
16 *Ocnogyna loewii* Zeller,1846.	Spring Webworm.	*Trichosoma loewii* Zeller, 1846 *Ocnogyna clathrata* Leader, 1855.	Asteraceae – Fabaceae.	Egypt , Greece, Uzbekistan, Afghanistan , Iraq andRussia**.**
Family Tortricidae Subfamily Olethreutinae				
17 *Cydia pomonella* Linnaeus, 1758.	Codling moth	*Phalaena pomonella* Linnaeus, 1758 , *Phalaena tortrix* Villers, 1789, *Carpocapsa splendana* Rebel, 1; *Pyralis pomana* Fabricius, 1775 *Tortrix pomonana* Denis & Schiffermuller, 1775.	Rosaceae – Juglandaceae- Magnolioideae.	Australia , Newzealnd , Kazakhstan ,Japan , Brazil, Russia, south Africa,India , China ,USA and Canada.

Cont. Table 1. The species that the study regions, were collected and some data related to them.

Species	Common name	Synonyms	Host plant family	Global distribution
Family Gelechiidae Subfamily Gelechiinae				
18 *Tuta absoluta* Meyrick, 1917.	Tomato Leaf miner.	*Scrobipalpuloides absoluta* Povolny, 1987 , *Scrobipalpula absoluta* Povolny, 1964; Becker, 1984, *Gnorimoschema absoluta* Clarke, 1962 *Phthorimaea absoluta* Meyrick, 1917.	Solanaceae – Fabaceae.	Spain , Morocco , Tunisia , France, Italy, Canary Islands , Algeria, Albania , Bulgaria , Netherlands , Portugal , U K, Hungary , Turkey , Serbia, Sudan , Ethiopia , Niger and Senegal.

Table 2. Number of the species that were recorded in the study regions.

		Study regions												
	Species	Al-Abraq	Shahat	Qarnada	Al- Faidia	Omar al-Mukhtar	Massah	Sidi Abdel Wahed	Susa	Al- Mansoura	Alwasita	Al-hamama	Al-haniya	Total
1	*Acherontia atropos*	4	6	3	5	2	3	4	2	5	4	2	3	43
2	*Agrius convolvuli*	6	2	5	4	2	7	5	3	4	6	3	5	52
3	*Daphnis nerii*	4	5	4	6	5	5	6	3	4	6	4	3	55
4	*Hippoton celerio*	7	4	6	3	6	8	4	6	6	7	5	4	66
5	*Hyles euphorblae*	3	5	6	5	4	3	٥	4	3	6	3	2	49
6	*Hyles livornica*	8	6	4	7	5	9	6	5	5	7	4	5	71
7	*Macroglossum stellatarum*	5	6	6	4	6	7	5	4	5	6	5	5	64
8	*Theretra alecto*	7	4	3	5	6	5	3	5	4	6	5	4	57
9	*Agrotis ipsilon*	18	14	17	11	12	21	15	16	13	17	14	9	177
10	*Agrotis segetum*	15	17	22	18	16	14	16	17	15	19	18	14	201
11	*Autographa gamma*	14	16	18	12	14	15	12	16	13	17	14	16	177
12	*Dysgonia torrida*	7	5	10	6	8	12	4	6	9	6	5	7	85
13	*Noctua pronuba*	20	13	9	17	11	12	14	15	10	16	19	18	174
14	*Spodoptera littoralis*	17	23	19	16	20	18	15	12	21	14	17	19	211
15	*Cydia pomonella*	11	10	9	12	11	14	8	10	13	11	9	12	130
16	*Ocnogyna loewii*	13	9	8	10	7	12	11	9	12	11	8	7	117
17	*Tuta absoluta*	23	19	21	22	18	24	25	19	20	26	20	23	260
18	*Zeuzera pyrina*	10	12	10	11	9	8	8	9	6	9	11	12	115
Total		202	176	180	174	162	197	176	161	168	194	166	168	

Figure (1) shows the percentages of the speacimens recorded in each study regions, it is clean that the percentage was close to each other in all regions.

Figure (2) shows the percentages of the families recorded in the study regions,The highest percentage of Sphingidae and Noctuidae was 44% and 33%, respectively, and the lowest percentage of Cossidae was 5%.

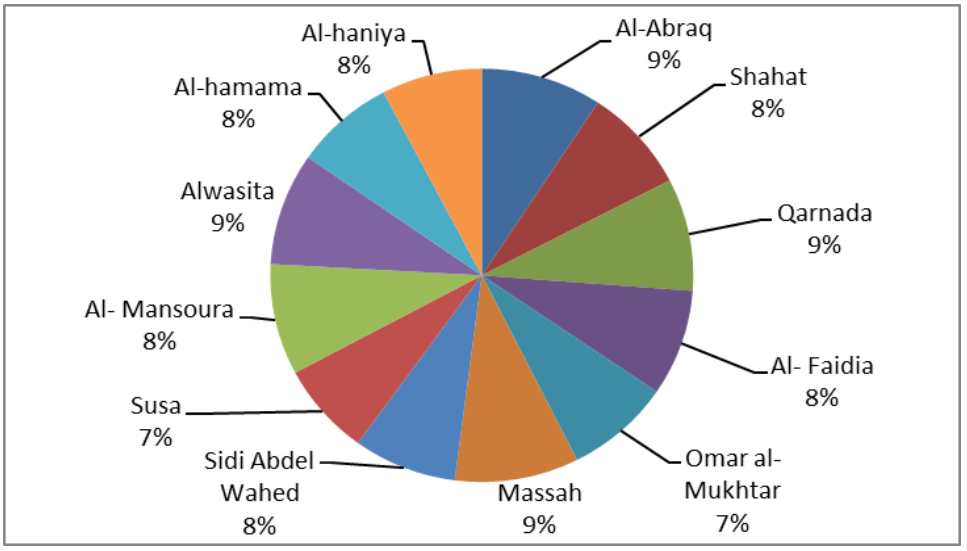

Figure 1. The percentage of abundance in the study regions.

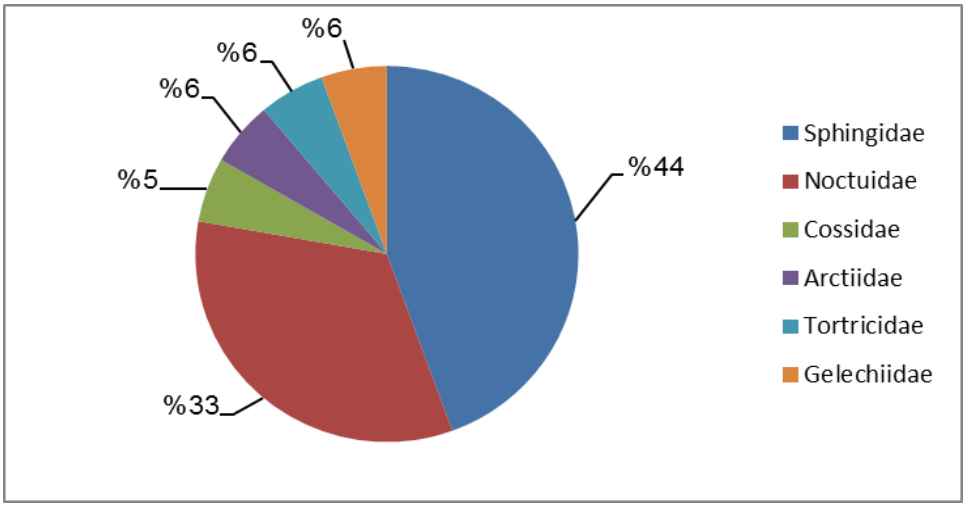

Figure 2. The percentage of families in the study regions.

REFERENCES

ACSAD. 1981. Studies project Kuf National Park (The study insects) Arab centre for the studies of Arid Zones and Dry Lands., pp: 199.

Amin, A.H., A.A. Bataw and I.M. El-Ghariani. 1998. A preliminary study of insects associated with some weeds in El-Beida region in Libya. Mukhtar J. of Sciences., 5: 143-150.

Bader, K. A. 2014. Contribution to the Hawk Moths (Sphingidae: Lepidoptera) of Jorden. J. of Natural History. Vol.1: 59-82 .

Damiano, N.A. 1961. Elencodella specie di insettidannosiricordati per la Libia fino al 1960. Tipografia del governo, Nazirato dell Agricoltur.Tripoli, pp.27- 81.

Devoto, M., S. Bailey and J. Memmott. 2011. The night shift: nocturnal pollen-transport networks in a boreal pine forest. Ecological Entomology; 36: 25-35.

El-Meghrabi, M. S. 2001. List of the Lepidoptera insects captured in Benghazi area, their world distribution, host plants, and notes on taxonomy. Journal of Arts and Science., 6:336 - 349.

El-Meghrabi, M.S. and A.H. Amin. 2007. List of the Lepidoptera insects surveyed in El- Beida area, with their world distribution, host plants, and notes on taxonomy. J. of Science and Application, 1(2): 21–31.

Heppner, J.B. 1998. Classification of Lepidoptera. Part 1. Introduction. Holarctic Lepidoptera, 5 (Suppl. 1): 1–148.

Kemal, M. and A.O. Kocak. 2007. Second report on the temporary results of the Lepidoptera list of Africa continent based upon the info system of the Cesa. *Royel* Museum for Central Africa, pp: 21.

Karsholt, O. and J. Razowski. 1996. The Lepidoptera of Europe., Apollo Books, Stenstrup. 380 pp.

Kristensen, N. P. and A.W. Skalski. 1999. Phylogeny and paleontology. Pages 725 in: Lepidoptera: Moths and Butterflies. 1. Evolution, Systematics, and Biogeography. Handbook of Zoology Vol. IV, Part 35. N. P. Kristensen, ed. De Gruyter, Berlin and New York.

Le Croy, K.A., H.W. Shew and P.A. Van Zandt. 2013. Pollen presence on nocturnal moths in the Ketona Dolomite glades of Bibb County, Alabama. Southern Lepidopterists News; 35: 136-142.

Mohamed,W.F and E.H. Shaurub. 2010. A checklist of some recorded insects in Misurata, Libya. J. of King Saud University (Science).,22: 61-65.

Moussa, S., A. Sharma, F. Baiomy and F.E. El-Adl. 2013. The status of tomato leaf miner *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) in Egypt and potential effective pesticides. Academic J. of Entomology. 6: 110–115.

Salama, H.S.A., I.A. Ismail, M. Fouda, I. Ebadah and I. Shehata. 2015. Some Ecological and Behavioural Aspects of the Tomato Leaf Miner *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae). J. of Balkan Ecology .7: 35–44.

Scudder, G.G.E. and R.A.Cannings. 2007. The Lepidoptera Families and Associated Orders of British Columbia, 160: pp.

Turati, E and G. Kruger. 1936. Contributi Alia Fauna Cirenaica. Novitä Di Lepidoptterologia. - Mem.Soc.Ent.Ital., 15: 55-77.

Wiltshire, E. P. 1948. The Lepidoptera of the Kingdom of Egypt., Bull. Soc. Fouad. Ent., 32: 203-294.

Zavattari, E. 1934. Prodromodella fauna della libya.Tipografagia cooperative, pavia, pp: Vlll+1234.

الملخص العربي

حصر بعض الأنواع من رتبة حرشفية الأجنحة المنجذبة لمصائد الضوئية في المناطق الوسطى، لجبل الاخضر، بليبيا

يوسف موسى زايد، عثمان بوحويش الدايخ وسهى علي بومداس

هذه الدراسة تضمنت تسجيل ١٨ نوعاً من حشرات رتبة حرشفية الأجنحة تنتمي الى ١٧ جنساً و١٠ تحت الفصيلة و٦ فصائل من الجبل الاخضر بليبيا، جمعت هذه الأنواع من ١٢ منطقة من يناير الى ديسمبر ٢٠١٨، حددت نسبة تواجد كل فصيلة في مناطق الدراسة، كما أرفقت بالأسماء المرادفة والشائعة والعوائل النباتية والانتشار العالمي.