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

Youssef M. Zayeid; Othman B. H. Aldaikh and Soha A. Bomadas

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 than 19 species have been reported for the first 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-Akhdar 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 aforementioned 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-Mukhtar 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 specimens), while the least in number was (43 specimens) 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; Tortricidae; Gelechiidae and Arctiidae. 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 vegetables 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          |                   |                                               |                          |                                                          |
| Subfamily       |                   |                                               |                          |                                                          |
| Acherontia atropos Linnaeus,1758. | Death's Head Hawk moth | Noctua connuba Hubner,1822 , Noctua innuba Treitschke,1825 , Noctua hogeig Herrih-Schaffer,1861 , Noctua nigra Krausse,1912, Noctua nec Piesz,1908 Noctua decolorata Turati,1923. | Sphingidae Sphinginae Oleaceae – : UK , India , Saudi Arabia ; Cany Islands , Azores Lamiaceae – : Europe, Asia, Africa, Australia and New Zealand. |
| Subfamily       |                   |                                               |                          |                                                          |
| Agrius convolvuli Linnaeus,1758. | Convolvulus Hawk moth. | Sphinx convolvuli Linnaeus , 1758, Protoparce orientalis Butler, 1876 Herse convolvuli Clark, 1922. | Macroglossinae |                                                        |
| Subfamily       |                   |                                               |                          |                                                          |
| Daphnis nerii Linnaeus, 1758. | Oleander Hawk moth. | Sphinx nerii Linnaeus, 1758. | Apocynaceae – | Europe, Asia, Africa, Australia and New Zealand. |
| Subfamily       |                   |                                               |                          |                                                          |
| Family          |                   |                                               |                          |                                                          |
### 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**             |                              |                                               |                   |                                                          |
| **Subfamily**          |                              |                                               |                   |                                                          |
| **Hippotion celerio**  | Vine Striped Hawk moth.      | *Hippotion tisiphone* Linnaeus, 1758 ,         | Onagraceae –      | *Africa*, *India*, *Sri Lanka*, *southen Europe* and *Australia*. |
| **Hippotion inquimus** |                               | *Hippotion phoenix* Oken, 1815 ,             | Rubiaceae.        |                                                          |
|                        | Harris, 1780 ,               | *Hippotion ocys* Hubner, 1819               |                   |                                                          |
|                        | *Hippotion albolineatus*     | Montrousier, 1864.                           |                   |                                                          |
| **Hyles euphorbiae**   | Spurge Hawk moth.           | *Sphinx euphorbiae* Linnaeus, 1758 ,          | Euphorbiaceae –   | *Sweden*, *Denmark*, *Switzerland*, *Belgium*, *Poland*, |
| Linnaeus, 1758.         |                               | *Sphinx esulae* Hufnagel, 1766 ,              | Onagraceae –      | *Slovakia*, *UK*, *Germany*, *France*, *Austria*,         |
|                        | *Deilephila esulae* Boisduval, 1834 | *Celerio euphorbiae* Rothschild & Jordan, 1903 | Polygonaceae –   | *Hungary*, *Italy*, *Spain*, *Portugal*, *Romania*,  |
|                        |                               | *Hyles koechlini* Fuessly 1781 ,             | Vitaceae.         | *Greece*, *Bulgaria*, *Croatia*, *Bosnia and Turkey.*   |
|                        |                               | *Hyles tasienuica* Oberthur, 1916 ,          |                   |                                                          |
|                        |                               | *Hyles saharae* Gehlen, 1932 ,               | Onagraceae –      |                                                          |
|                        |                               | *Hyles malgassica* Denso, 1944               | Polygonaceae –    |                                                          |
|                        |                               | *Hyles renneri* Eitchberger, Danner & Surholt, 1998 | –                  |                                                          |
| **Hyles livornica**    | Striped Hawk moth.          | *Sphinx alecto* Linnaeus, 1758 ,             | Rubiaceae –       | *Africa*, *southern Europe*, *Poland*, *central and east* |
| Esper, 1780.            |                               | *Sphinx cretica* Boisduval, 1827             | Vitaceae.         | *Asia*.                                                  |
|                        |                               | *Theretra freyeri* Kirby, 1892.              |                   |                                                          |
| **Theretra alecto**    | Levant Hunter Hawk moth.    | *Sphinx alecto* Linnaeus, 1758 ,             | Theaceae –        | *Romania*, *Turkey*, *Cyprus*, *Bulgaria*, *Greece and*   |
| Linnaeus, 1758.         |                               | *Sphinx cretica* Boisduval, 1827             | Actinidiaceae –   | *Macedonia*.                                             |
|                        |                               | *Theretra freyeri* Kirby, 1892.              | Dilleniaceae –    |                                                          |
| **Macroglossa**        | Eurasian Humming Bird Hawk moth. | *Sphinx stellatarum* Linnaeus, 1758.          | Rubiaceae –       | *Portugal*, *Japan*, *southern Europe*, *North Africa* , |
| stellatarum**          |                               |                                               | Onagraceae.       | *Spain*, *Alps and Russia*                               |
| Linnaeus.              |                               |                                               |                   |                                                          |

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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**   | **Agrotis suffusa**              | Solanaceae –     | Canada , Australia and Newzealand . |
| **Subfamily** | **Noctuinae**   | Denis & Schiffermüller,1775       | Chenopodiaceae – |                     |
| **9**       | **Agrotis ipsilon** | Hufnagel,1766.                   | Asteraceae –      |                     |
|             | Dark Sword Grass moth. |                               | Poaceae –        |                     |
|             |                  | **Agrotis idonea**              | Solanaceae.       |                     |
|             |                  | Cramer,1780                      |                   |                     |
|             |                  | **Agrotis spinula**             |                   |                     |
|             |                  | Esper,1786                       |                   |                     |
|             |                  | **Agrotis spinifera**            |                   |                     |
|             |                  | Villers,1789                     |                   |                     |
|             |                  | **Agrotis fucosa**              | Brassicaceae –    | Turkmenistan , Lebanon , Syria |
|             |                  | Butler;                        | Liliaceae –       | , Iraq , Afghanistan , Russia , |
|             |                  | **Agrotis segetum**             | Malvaceae –       | Turkey , Armenia , Caucasus , |
|             |                  | Hubner , Euxoa segetum          | Cucurbitaceae –   | Egypt , Cyprus , Mongolia , |
|             |                  | Denis & Schiffermüller,1879     | Asteraceae –      | Jordan and Iran      |
|             |                  | **Noctua pronuba**              | Chenopodiaceae    |                     |
|             |                  | Hubner,1822                      | Fabaceae –        |                     |
|             |                  | **Noctua innuba**               | Solanaceae –      |                     |
|             |                  | Treitschke,1825                  | Theaceae –        |                     |
|             |                  | **Noctua hoegei**               | Vitaceae –        |                     |
|             |                  | Herrih-Schaffer,1861, Noctua nigra |                   |                     |
|             |                  | Krausse,1912                     | Poaceae –         |                     |
|             |                  | **Noctua nec**                  | Amaranthaceae-Polygonaceae – |                     |
|             |                  | Piesz,1908                       | Vitaceae –        |                     |
|             |                  | **Noctua decolorata**           | Lridaceae –       |                     |
|             |                  | Turati,1923.                     | Apiaceae –        |                     |
|             |                  |                                 | Violaceae –       |                     |
|             |                  |                                 | Caryophyllaceae.  |                     |
| **11**      | **Noctua pronuba** | The large yellow under wing.     |                   | North Africa , Canary Islands , |
|             | Linnaeus,1758.   |                                  |                   | Turkey , Iraq , Iran, Afghanistan |
|             |                  |                                  |                   | , India and Russia. |
| **Subfamily** | **Hadeninae**   | **Spodoptera retina**            |                  | Spain , France , Italy and Greece, |
| **12**      | **Spodoptera littoralis** | Freyer,1845                      |                  | Syria and Turkey . |
|             | **Boisdhuval,1833.** | **Spodoptera testaceoidn**      |                  |                     |
|             |                  | Guenee,1852                      |                  |                     |
|             |                  | **Spodoptera metriodes**         |                  | Highly polyphagous.   |
|             |                  | Bethune - Baker,1911.            |                  |                     |
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** | **Species** | **Subfamily** | **Autographa gamma** | **Linnaeus,1758.** | **Phalaena gamma** | **Linnaeus,1758.** | **Solanaceae – Olacaceae – Brassicaceae – Fabaceae – Chenapodiaceae – Linaceae.** | **North Africa, Iceland, Greenland, and Finland.** |
| **Subfamily** | **Plusiinae** | **13** | **Autographa messneri** | **Linnaeus,1758.** | **Autographa volkeri** | **Linnaeus,1758.** | **** |
| **Family** | **Catocalinae** | **Dysgonia torrida** | **Gueneé, 1852.** | **Bastilla torrida** | **Ophiusa albivitta** | **Ophiusa festina** | **Ophiusa torrida** | **Parallelia torrida** | **Poaceae – Euphorbias – Leguminas – Salicaceae.** | **Spain, Italy, Greece, Syria, Iran, Uzbekistan, India, Sri Lanka, and Myanmar.** |
| **Subfamily** | **Zeuzerinae** | **15** | **Zeuzera hypostani** | **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 Lanka, Syria, and Turkey.** |
| **Family** | **Arctiidae** | **16** | **Trichosoma loewii** | **Zeller, 1846.** | **Ocnogyna clathrata** | **Leader, 1855.** | **** |
| **Subfamily** | **Arctiinae** | **Ocnogyna loewii** | **Zeller, 1846.** | **Spring Webworm.** | **Ocnogyna clathrata** | **Leader, 1855.** | **** |
| **Family** | **Tortricidae** | **17** | **Phalaena pomonella** | **Linnaeus, 1758.** | **Phalaena tortrix** | **Villers, 1789.** | **Carpocapsa splendana** | **Rebel, 1; Pyralis pomana** | **Fabricius, 1775** | **Tortrix pomonana** | **Denis & Schiffermuller, 1775.** | **Rosaceae – Juglandaceae – Magnolioidae.** | **Australia, New Zealand, 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            |                                               |                   |                                                                                      |
| Tuta absoluta| Meyrick, 1917.         | Tomato Leaf miner.                            |                   | 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.

| Species                  | Study regions |
|--------------------------|---------------|
|                          | Al-Ahraiq | Shabat | Qamudat | Al-Fatia | Omar Al-Mubarak | Salt Ash Shaded | Sisya | Al-Mansura | Al-Wasil | Al-Hamama | Total |
| Acherontia atropos       | 4         | 6      | 3       | 5        | 2            | 3                | 4     | 2          | 5        | 4         | 2     |
| Agrias convolvuli        | 6         | 2      | 5       | 4        | 2            | 7                | 5     | 3          | 4        | 6         | 3     |
| Daphnis nerii            | 4         | 5      | 4       | 6        | 5            | 5                | 6     | 3          | 4        | 6         | 4     |
| Hippoton celerio         | 7         | 4      | 6       | 3        | 6            | 8                | 4     | 6          | 6        | 7         | 5     |
| Hyles euphorbiae         | 3         | 5      | 6       | 5        | 4            | 3                | 4     | 3          | 6        | 4         | 3     |
| Hyles livornica          | 8         | 6      | 4       | 7        | 5            | 9                | 6     | 5          | 5        | 4         | 7     |
| Macroglossum stellatarum| 5         | 6      | 6       | 4        | 6            | 7                | 5     | 4          | 5        | 6         | 5     |
| Theretra alecto          | 7         | 4      | 3       | 5        | 6            | 5                | 3     | 5          | 4        | 6         | 5     |
| Agrotis ipsilon          | 18        | 14     | 17      | 11       | 12           | 21               | 15    | 16         | 13       | 17        | 14    |
| Agrotis segetum          | 15        | 17     | 22      | 18       | 16           | 14               | 16    | 17         | 15       | 19        | 18    |
| Autographa gamma         | 14        | 16     | 18      | 12       | 14           | 15               | 12    | 16         | 13       | 17        | 14    |
| Dysgonia torrida         | 7         | 5      | 10      | 6        | 8            | 12               | 4     | 6          | 9        | 6         | 5     |
| Noctua pronuba           | 20        | 13     | 9       | 17       | 11           | 12               | 14    | 15         | 10       | 16        | 19    |
| Spodoptera littoralis    | 17        | 23     | 19      | 16       | 20           | 18               | 15    | 12         | 21       | 14        | 17    |
| Cydia pomonella          | 11        | 10     | 9       | 12       | 11           | 14               | 8     | 10         | 13       | 11        | 9     |
| Ocnogyna loewii          | 13        | 9      | 8       | 10       | 7            | 12               | 11    | 9          | 12       | 11        | 8     |
| Tuta absoluta            | 23        | 19     | 21      | 22       | 18           | 24               | 25    | 19         | 20       | 26        | 20    |
| Zeuzera pyrina           | 10        | 12     | 10      | 11       | 9            | 8                | 8     | 9          | 6        | 9         | 11    |
| Total                    | 202       | 176    | 180     | 174      | 162          | 197              | 176   | 161        | 168      | 194       | 166   |

Figure (1) shows the percentages of the specimens 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%.
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الملخص العربي
حصر بعض الأنواع من رتبة حرشفية الأجنحة المنجذبة لمصائد الضوء في المناطق الوسطى، لجبل الأخضر، بليبيا
يوسف موسى زايد، عثمان بوحويش الدايخ وسهى علي بومداس

هذه الدراسة تضمنت تسجيل 18 نوعاً من حشرات رتبة حرشفية الأجنحة المنجذبة لمصائد الضوء في مناطق الجبل الأخضر بليبيا، جمعت هذه الأنواع من 12 منطقة من يناير إلى ديسمبر 2018، حددت نسبة تواجد كل فصيلة في مناطق الدراسة، كما أرفقت بالأسماء المرادفة والشائعة والعوائل النباتية والانتشار العالمي. و 6 فصائل من الجبل الأخضر بليبيا، جمعت هذه الأنواع من