

Full Length Research Paper

The first report of preliminary list of the insect fauna of the Elkharağa city, New Valley, Egypt

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The present paper gives a preliminary account of the entomofauna of the New Valley. It has a complex composition; the species are a heterogeneous group with diverse distribution patterns. The account does not lay to completeness. It is chiefly based on the insects collected in a short period of time; it comprised 111 species in 95 genera, belonging to 53 families and pertaining to 13 orders namely: Coleoptera, Lepidoptera, Diptera, Hymenoptera, Orthoptera, Odonata, Dictyoptera, Dermaptera, Hemiptera, Neuroptera, Homoptera, Thysanura and Isoptera. The presence of 33 families of insects in El-Monira village site 1, 45 families in the Nasser tourist well site 2 and 21 families in staff campus farm site 3, were recorded. El-Monira village, Nasser tourist well and campus of staff farm contained diverse forms of insects. The diversity, distribution, frequency, abundance and habitat association of these insect, were investigated using different traps during the different seasons.

Key words: Insect fauna, diversity, new valley.

INTRODUCTION

On account of the scarcity of knowledge regarding the entomofauna of the New Valley, it was decided at the beginning of the first author's stay in the country, that a general survey should be carried out. Most of the faunastic work carried out in the New Valley earlier workers was no more than mere fragment and scattered work (El-sherif and kasshef, 1973; Saleh, 1974; Alfieri, 1976; El-Hemesy, 1976; Sayed, 1984; Ahmed, 1991; Al Gamal et al., 2001; Fadel, 2001; Abd el-Dayem, 2003; Mahbob, 2005.

Meanwhile, little work had been carried out to study the survey and abundance of insects in the New Valley, expect those reported on 2001 by AL Gamal et al. (2001). However, the study of insect diversity of various species have been recorded at different parts in Egypt: El-Morsy et al. (2001), Abdel-Wahab and El-Akkad (1998a) on Coleoptera, and by El-Akkad (1998b) on Lepidoptera and by some authors in different parts of the world (Yasnosh,

1995; Carver and Reid, 1996; Wen et al., 1997; Ripka et al., 1998; Ripka, 1999; Emam, 1999; El-Sayad, 2000; Jacobs and Schoender, 2001; Aydagnhum, 2007; Hawkins and Porter, 2003; Huffaker and Gutierrez, 1999; Sreaknmar and Balakrishnan, 2001; Prince, 1997)..

The New Valley governorate is the largest governorate in the Arab Republic of Egypt from space in terms of area of around 440098, representing about 44% of the total area of the Arab Republic of Egypt. New Valley governorate has a desert climate that is hot and dry. There is no report or study about the diversity of insect in the New Valley governorate.

The aim of the present work was to study the insect fauna structure in EL Kharga city, New valley, Egypt, to get the basic (preliminary) information about the most important pests. The present study dealt with the insect community in El kharga city. It is a compendium of insect fauna of El-Kharga city is also presented.

MATERIALS AND METHODS

The present survey was carried out at the New Valley by different collecting means, that is light traps, sweeping net, hand collecting and ground traps, etc during the period from January 2009 till December 2010 and covered the following area: El- Kharga oases, Al-Monera, Nasser tourist well and campus of the staff farm. Captured insects were sorted out into species, identified and recorded, then listed in alphabetical order according to orders, families, genera and species. Identification of species was carried out in the insect classification and survey Research Department, Plant Protection Research Institute, Dokki, Giza, Egypt. Several references and catalogues were used in identification and preparation of this work, among which we used those of Alfieri (1953) for Hemiptera; Steyskal and Elbially (1967) for Diptera; Borror and Delong (1970), and Borror and White (1970) for different orders; Alfieri (1976) for Coleoptera; Larsen (1979 to 1985) for several orders; Larson and Larsen (1980), Pittaway (1980) and Larsen (1984) for Lepidoptera and the key of Borror et al. (1992). Besides, the books, different drawings of insects, and specimens of insects in museums were used as means of identification of insects collected in the field.

Description of the area of study

The New Valley area is located in the western desert and lies between longitudes 25° and 37° east and between latitudes 22° and 27° north. The total area of the New Valley is 6 million feddans; forms a depression in the desert located below the surrounding plateau which is at altitude ranged between 300 to 400 m. Mean while, the valley area is about 100 m above the sea level.

Vegetation

The major plants species of the El-monira village includes: *Juniperus procera*; *Acacia abyssinica*., *Corton macrystachyus*; *Eucloptus globules*, *Olea africana*; *prunus africanus*, *Sagertiathea*, *Cosaurina* spp, *Schinus molle*; *Cordial africana*, *Hagenia abyssinica*; *Iris germanica*; *Osyris quadriparta*; *Hyparrhenia* spp; *Cyndon* spp; *Rubus* spp; *Mytenus* spp and *Carduas* ssp. The vegetation of the Nasser well has great value in terms of fulfilling the recreational objective of the site. It is composed of large trees, grasses and herbaceous plants. The most commonly occurring plants were: *Ficus orata*; *podocarpus falcatus*; *Gravillea robusta*; *Mimosa pigra*, *phoenix reclinata*; *Eriobotrya Japonica*, *Spathodea nilotica*, *Rosa sinensis*; *Jacaranda mimsofolia*, *Ficus vasta*; *Cactus* spp; *Sedum* spp; *Rosa abyssinica*; *Acacia abyssinica*, *Croton marcostachycus* and several others.

Natural and geographical characteristics

Meteorological data

New Valley Governorate has, a desert climate which is hot and dry, and its elements can be illustrated as follows:

Temperature: The year is divided into two parts: The first part: warm period from month of April to September, Where temperatures range between 25 to 35° C and sometimes rises to between 40 to 45°C; The second part: period at least in the heat and starts from the month of October to March, where temperatures range between 2 to 22°C see Table 5 and 6.

Rain: Almost non-existent throughout the year.

Evaporation rates

It ranged from 16 to 21 mm /day during the warm period, and between 4 to 8 mm /day during at least temperatures.

Relative humidity

Ranges between 28 to 45% in summer and rarely exceed 60% in winter (Table 5 and 6).

Wind velocity

Ranges between 3 to 10 m s and blowing increases through the five-year period and to some extent raise sandstorms sometimes. The Governorate maintains a high temperature during the months of June, July and August. Amounting to a maximum height in the month of June, it also maintains low temperatures during the period between November and March and reached the maximum degree of reduction in the month of January.

The Governorate also maintains a remarkable activity for the sirocco laden hot air and dust during the month of March, of maximum velocity of wind velocity and less to the lowest rates during the period of December to February. Results in low relative humidity in the New Valley (between 28 and 60% usually); high evaporation rates may rise to 20 mm /day during the months of June and July (Table 5 and 6).

Environmental risks

The space of natural populated lows in the New Valley Governorate which witness agricultural, residential and tourist developmentally active, as it has natural resources, but these regions exposed to multiple natural, as it's desert nature with dry climate, here the most important risks: 1) Some regions are exposed to local rainstorms and 2) Sand dunes crawl. The aim of this work was to study the insect fauna structure and the sudden changes that happen to it in every specific period in the New Valley.

Materials

Materials used during the study included camera notebooks, rulers, data sheets, bionocular microscope, topographic maps, insect sweeping nets, woods, light traps insect collection, boxes, pins, and collecting jars.

Data analysis

Dominance and abundance degrees of some species: Dominance degrees (D) for identified some species were calculated using the formula of farcylate (1971):

$$D = \frac{t}{T} \times 100$$

Where, t = Total number of each species during the collecting period; T = Total number of all species collected during the collecting period.

The similarity of insects in different habitats was determined by:

$$\text{Jaccard index } (c_j) = j / (a + b + G - j)$$

Where, j = the number of families found in all sites; a = the number of families in site A; b = the number of families in site B; G = the number of families in site G.

Table 1. Check list of the insect species and subspecies collected from three different sites in Elkarga city, New Valley, Egypt.

Taxon	Site 1	Site 2	Site 3	Total	
Order: THYSANURA					
F: LEPISMATIDAE					
<i>Thermobia domestica</i> (Packard)	0	5	1	6	*
O: ORTHOPTERA					
F: ACRIDIDAE					
- <i>Acrida pellucida</i> Klug	3	2	0	5	*
- <i>Anacridium aegyptium</i> (Linnaeus)	5	3	0	8	*
- <i>Lacusta migratoria</i> (L.)	3	1	0	4	*
- <i>Schistocerca gregaria</i> Forsskal	3	6	1	10	*
- <i>Nymphus</i> sp	1	5	0	6	*
- <i>Duraneille lucasii</i> (B.)	0	3	1	4	*
- <i>Calephorus compressico</i> Mis (L.)	1	0	0	1	*
F. GRYLLIDAE					
- <i>Acheta domesticus</i> Linnaeus	13	0	1	14	*
- <i>Gryllus bimaculatus</i> (de Geer)	3	0	0	3	*
- <i>Oeconthus pellucens</i> Scopoli	0	6	1	7	*
F: GRYLLOTALPIDAE					
- <i>Gryllotalpa gryllotalpa</i> (L.)	13	6	2	21	*
F: TETTIGONIDAE					
- <i>Conocephalus conocephellus</i> (L.)	1	0	1	2	*
- <i>Phoneroptera reseta</i> walker	1	0	0	1	*
O: ODONATA					
S.O: ZYGOPTERA					
F: COENOGRIONIDAE					
- <i>Ischnura evansi</i> Morton	6	1	1	8	***
S.O: ANISOPTERA					
F: AGRONIDAE					
- <i>Ischnura semegelensis</i> (Rambur)	5	2	2	9	***
O: DICTYOPTERA					
S.O: BLATTARIA					
F: BLATTIDAE					
- <i>Heterogamia ursine</i> (Burmester)	0	3	0	3	****
- <i>Periplaneta americana</i> Linnaeus	22	16	53	91	****
S.O: MONTIDAE					
F: MONTIDAE					
- <i>Montidae religiasia</i> M.	0	10	5	15	***
- <i>Sphodromontis vividis</i> Forskel	3	0	0	3	***
O: ISOPTERA					
F: HODOTERMITIDAE					
- <i>Hodotermis ochroceaus</i> (Burmeister)	25	63	17	105	***
- <i>termes Anocothona ochraceaus</i> (Burmeister)	13	17	19	49	***
Several embid species was found among plants and under stones.					
O: DERMAPTERA					
F: LABIDURIDAE					
- <i>Labidura riparia</i> (palles)	5	13	10	28	***
F: LABIDIIDAE					
- <i>Labia minor</i> Pall	6	6	0	12	***

Table 1. Contd.

O: HEMIPTERA					
S.O: HETEROPTERA					
F: COREIDAE					
- <i>Amphibolus vcnotor</i> Klug	0	6	0	6	***
- <i>Liorhyssus hyolimus</i> F.	4	0	8	12	***
- <i>Loxocnemis dentottor</i> F.	4	5	0	9	**
F: PENTATOMIDAE					
- <i>Nezara viridula</i> (Linnaeus)	22	6	13	41	**
F: NABIDAE					
- <i>Nabis alternatus</i> (parshley)	16	5	3	24	**
O: HOMOPTERA					
F: CICADELLIDAE					
- <i>Goniagnothus polliatus</i> (L.)	4	1	3	8	**
- <i>Hecolus paykullis</i> (Stal.)	6	10	0	16	**
Endopterygota					
O: NEUROPTERA					
F: CHRYSOPIDAE					
- <i>Chrysopa vulgaris</i> (Schn)	6	4	1	11	***
- <i>Chrysopesla carnea</i> Stephens	4	9	0	13	***
O: COLEOPTERA					
S.O: ADEPHAGA					
F: CARABIDAE					
- <i>Anthia duodecimguttate</i> Boneli	4	7	3	14	*
- <i>Calasoma chlorostictunus</i> Klug	6	10	0	16	*
- <i>Egadroma marginats</i> (Dejem)	1	0	0	1	*
- <i>Tachys lucasi</i> (Duval.)	1	0	0	1	*
S.O: POLYPHAGA					
F: STAPHYLINIDAE					
- <i>Paederus affierii</i> Koch	11	7	0	18	*
- <i>Pionophilus aegyptiaus</i> Erichson	13	10	0	23	*
- <i>Trogophlaeus mnoniu</i> (Erichson)	1	1	0	1	*
F: SCARABAIDAE					
- <i>Adoretus sp</i>	2	1	1	4	*
- <i>A. graniceps</i> Reitter	1	1	0	3	*
- <i>Pentodon olgerinum</i> Herbst	1	0	1	1	*
- <i>Tropinata squalida</i> Scopoli	0	0	0	0	*
F: TENEBRIONIDAE					
- <i>Blaps polychresta</i> Forsskal	2	0	0	2	*
- <i>Adesmia catturnata</i> Forsskal	1	0	0	1	*
- <i>Ocnerna hispidae</i> Forsskol	0	1	0	1	*
- <i>Zoposis abbreviate</i> Solier	0	1	0	1	*
- <i>Anemia sardoa</i> Gene	1	0	0	1	*
- <i>Plana plana</i> F.	2	2	0	4	*
F: ELATERIDAE					
- <i>Agrypnus natodonta</i> Lateville	6	4	0	10	*
- <i>Hemicleus ferranteri</i> Buysson	13	2	0	15	*
F: DERMESTIDAE					
- <i>Trogoderma granarium</i> pic	5	2	0	7	*
F: COCCINELLIDAE					
- <i>Coccinella sptempunctata</i> Linnaciu	13	1	6	20	*
- <i>Coccinella undecimpunctata</i> L.	7	2	13	22	*
F: MELOIDAE					
- <i>Meloe sp.</i>	0	1	0	1	*

Table 1. Contd.

F: BRUCHIDAE					
- <i>Bruchus refimonus</i> L.	2	0	0	2	*
- <i>Bruchus trifoli</i> L.	0	0	1	1	*
F: ANTHICIDAE					
- <i>Anthicus crinitus</i> Loforte	6	1	0	7	*
F: ANOBIOLAE					
- <i>Xyletinus bucephalus bucephalus</i> Tigeer.	1	1	0	2	*
F: DESYTIDAE					
- <i>Melyries oblonga</i> F.	0	0	6	6	*
O: LEPIDOPTERA					
F: NOCTUIDAE					
- <i>Agrotis ipsilon</i> (Hufnagel)	30*	36	1	67	*
- <i>Agrotis spiniferera</i> (Hufnagel)	2	1	1	4	*
- <i>Athetis abriluma</i> Guen	1	0	0	1	*
- <i>Autographa gamma</i> L.	1	3	0	4	*
- <i>Characomba nilotica</i> Ray	3	2	0	5	*
- <i>Earias insulana</i> Boisd.	13	27	6	46	*
- <i>Spodoptera exigua</i> Boisd.	6	1	1	8	*
- <i>Spodoptera littorelis</i> Linnaeus	1	0	0	1	*
- <i>Syngrapha circumflexa</i> L.	1	1	0	2	*
- <i>Heliothis armigera</i> (Hb)	1	1	0	2	*
- <i>Sesamia cretica</i> L.	2	0	0	2	*
- <i>Trichoplusia oricholcea</i> F.	3	1	0	4	*
- <i>Ophiusa trihaco</i> (Gramer)	6	16	2	24	*
- <i>Heliothis peltigeraettigera</i> L.	1	2	1	4	*
- <i>Phytometera ni</i> Hbn.	3	0	0	3	*
F: PIERIDAE					
- <i>Pieris rapa</i> Linnaeus	3	16	16	35	*
- <i>Pontis glyiconoma</i> Kluy	5	6	7	18	*
F: NYMPHALIDAE					
- <i>Danaus chrysippus</i> L.	13	6	10	29	*
F: ARCTIIDAE					
- <i>Utetheisa pulchella</i> (L.)	4	1	0	5	*
F: GELECHIIDAE					
- <i>Pectinophora gassypiella</i> (S.)	5	1	1	7	*
F: GEOMETRIDAE					
- <i>Rhodometra sacaria</i> (L.)	3	0	0	3	*
F: HESPERIIDAE					
- <i>Gegenes nostrodomus</i> (Fab.)	0	6	0	6	*
F: PYRALIDAE					
- <i>Arenipses sabella</i> H.	1	2	0	3	*
- <i>Schoenobius nilotica</i> Z.	0	1	0	1	*
F: SPHINGIDAE					
- <i>Acherontia atropos</i> Linnaeus	5	2	1	8	*
- <i>Daphnis neri</i> Linnaeus	0	1	1	2	*
- <i>Hippotion celeria</i> Linnaeus	5	1	0	6	*
F: PYRAUSTIDAE					
- <i>Nomophila noctuella</i> (Disch)	3	1	0	4	*

Table 1. Contd.

O: DIPTERA					
F: CULICIDAE					
- <i>Culex pipiens</i> Forsskal	6	6	0	12	**
- <i>Anopheles</i> sp	4	2	0	6	**
F: MUSCIDAE					
- <i>Musca domestica</i> Macq	35	46	13	94	****
F: TRYPETIDAE					
- <i>Ceratitis capitata</i> L.	6	0	0	6	**
F: CALLIPHORIDAE					
- <i>Calliphora vicina</i> Robineaus	0	1	0	1	**
- <i>Lucilia sericata</i> (Meig)	0	3	0	3	**
F: BOMBYLIIDAE					
- <i>Anthrax lucidus</i> (Becker)	0	1	1	2	**
F: MILICHIIDAE					
- <i>Meaneura nitidivula</i> Collin	1	0	0	1	**
F: LONCHAEIDAE					
- <i>Lonchaera palposa</i> Zetterstedt	1	0	0	1	**
F: DROSOPHILIDAE					
- <i>Drosophila melanogaster</i> Merig	2	0	0	2	**
O: HYMENOPTERA					
S. O: APOCRITA					
F: APIDAE					
- <i>Apis mellifera</i> Linnaeus	40	13	33	86	***
- <i>Xylocopa oestuanus</i> Linnaeus	30	11	1	42	***
F: FORMICIDAE					
- <i>Cataglyphus bicolor</i> Linnaeus	9	3	5	17	***
F: VESPIDAE					
- <i>Vespa orientalis</i> Emery	26	33	2	61	***
- <i>Eumenes maxillatus</i> Linnaeus	18	2	0	20	***
Number of Species	86	78	42		

Site 1, El-Monira Village; Site 2, Nasser tourists well; Site 3 Staff campus farm; *pest (foliage – feeders); **pest (sap – suckers); ***predators; ****pollinators.

SPSS computer programme was used for Chi – square analysis to test the association of insects and their habitats. Variation in abundance of insects in different seasons of the study areas was computed by t test.

RESULTS AND DISCUSSION

Insect diversity in Elkharga city is shown in Table 1 and Figure 1. Based on the insects collected in a short period of January 2009 to December 2010, it comprised 111 species in 95 genera, belonging to 53 families and pertaining to 13 orders namely: Coleoptera, Lepidoptera, Diptera, Hymenoptera, Orthoptera, Odonata, Dictyoptera, Dermaptera, Hemiptera, Neuroptera, Homoptera, Thysanura and Isoptera. The highest number of species recorded in this study was for sites number 1, 4, and the lowest number was for site number 3. The sequence of

the sites according to the presence of insect species was for sites numbers: 1 >2> 3, respectively. The high percentage for sites 1, 2 may be due to the agricultural nature of El-Monira village and agricultural activities. The insect species were listed, systematically according to their taxonomy and also arranged according to their economic importance (injurious and beneficial insects).

Tables 2 and 3 and Figure 2 a and b show a list of the insect species recorded by different traps and by handing collection from different sites in the New Valley during 2009 and 2010 seasons. Data revealed the presence of 111 insect species belonging to 95 genera, 53 families and 13 orders. The maximum number of species were that of Lepidoptera (31) followed by Orthoptera and Coleopteran (4 each); Hemiptera and Diptera (3 each); Odonata and Neuroptera (2 each) and Dermaptera, Homoptera and Hymenoptera (1 each).

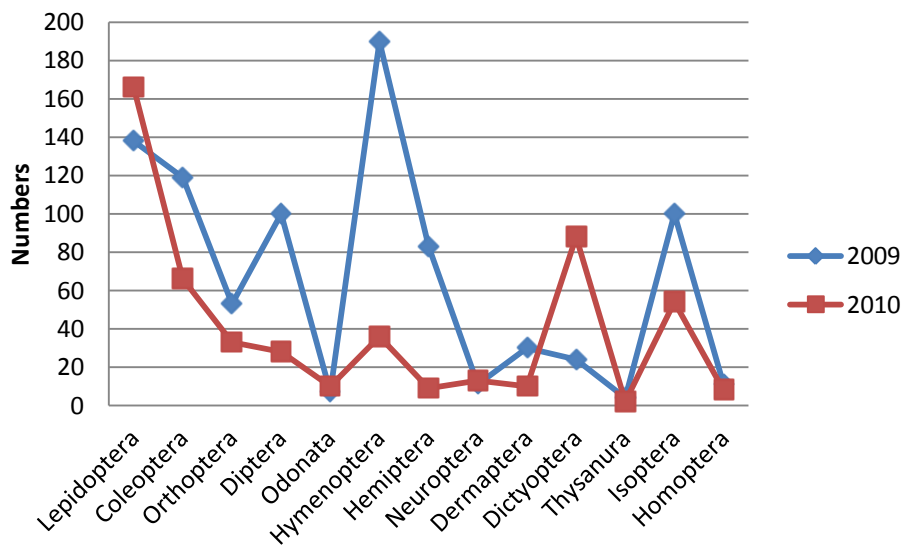


Figure 1. Distribution of insects orders between 2009 to 2010.

Faunal similarity between the three sites through years 2009 to 2010 is shown in Figure 3.

As shown in Table 4, the species were found to be pests (49 species were foliage feeders and 39 species were sapsuckers), whereas 111 species were beneficial (105 species were predators and 16 species were pollinators). Table 4 shows the list of the surveyed insects arranged alphabetically according to orders, families, genera and species. Number of insects orders were recovered by light traps, sweeping net and by hand collection according to taxonomic category and economic importance.

The obtained results also show that no parasitoid species were recorded during the period of the survey study; that does not mean that parasitoid did not exist in the area of study, but it may mean that the light trap method was not suitable for collecting parasites. Abou-Elhagag (1989) did not find any parasite species on some medicinal and aromatic plants in Assiut, Bahgat and Masoodi (1988) found that aphid, *Hyalopterus arundintis* was attacked by 10 predators and one parasitoid in plum, and Orchards, Also, Abou El-Hagag (1995) recorded only one parasitoid species on banana plants in Assiut .

In general, the present survey are in full agreement with those of Abdel-Wahab and El-Akkad (1998a , b) who surveyed Coleopterous and Lepidopterous species in the same locality.

Conclusions

The present survey recorded 123 insect species belonging to 120 genera of 53 families representing 13 insect orders (Coleoptera, Lepidoptera, Dictyoptera, Hymenoptera, Orthoptera, Odonata, Dictyoptera,

Dermaptera, Hemiptera, Neuroptera, Homoptera, Thysanura and Isoptera (Table 3).

Species of order Coleoptera were the most abundant and dispersed (32 species) followed by Lepidopterous species (28 species). Species of Orthoptera were 14, Diptera 12, Hymenoptera 6, Dictyoptera 4 and Hemiptera and Neuroptera 4 species each. Other orders were represented by less number of species.

The most abundant representative families were of Order Coleoptera (12 families) followed by Lepidoptera (10 families), Then, Diptera (9 families) and 4 families for each Hymenoptera and Orthoptera.

Table 2 indicate also that individuals were surveyed by the use of sweeping net (365), individuals by the use of light traps (317) and individuals by hand collecting (280).

On the other hand, family Sphecidae (Order: Coleoptera) included the largest number of species (32 species), family Noctuidae (Order: Lepidoptera) included 16 species, family Tenebrioni (Coleoptera) had 6 species, family Acrididae (Orthoptera) had 8 species, and family Cephalaridae (Diptera) 3 species. Other families included less number of species.

The survey also revealed that the largest number of species was collected during April, March and May (217, 188 and 134 species respectively). The lowest numbers were during December, January, July and August (28, 60, 66 and 34 species) respectively Table 3. Species of Coleoptera were the most representative species in all months during the period of the survey (Table 3).

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