

Survey of the Most Common Insect Species on Some Foraging Crops of Honeybees in Dakhla Oasis, New Valley Governorate, Egypt

Mahmoud S. O. Mabrouk¹, and Mohamed Abdel - Moez Mahbob^{2,*}

¹ Bee keeping Res. Dept. Plant Protection Res. Institute, A.R. C., Egypt.

² Department of Zoology & Entomology, Faculty of Science, New Valley Branch, Assiut University, New Valley, Egypt.

Received: 21 Feb. 2016, Revised: 22 Mar. 2016, Accepted: 24 Mar. 2016.

Published online: 1 Jan. 2017.

Abstract: When studying the presence of beneficial insects and harmful on each alfalfa, Egyptian clover and faba bean fields at the New Valley Governorate, Egypt, it turned out to include 46 species belonging to 33 family that follow 9 orders divided in to three groups (pests – natural enemies – pollinators). The study result also showed that the largest number of species of insects recorded on the crop fields under study belong to the order Hymenoptera where 19 species belonging 12 families. On the other hand, a total of pollinators has ranked first in the number of insect species that have been counted during the experimental crops in this study, and the main pollinators of those crops in Dakhla Oasis, New Valley Governorate, were honeybees.

Keywords: Honeybees, alfalfa, faba bean, pests, pollinators

1 Introduction

Pollinators playing a big role of pollination specially in the cross pollination crops and increased the feddan production of seeds. In Dakhla Oasis, New Valley Governorate, there were more of the forage crops, which considered an important to the farmers.

Forage legumes play an essential role in the productivity and sustainability of the world production systems. Their symbiotic association with rhizobia makes the atmospheric nitrogen available for themselves and other crops in the rotation (Quagliotto et al., 2009). Alfalfa (*Medicago sativa* L.) is considered one of the major forage legume crops in Egypt. It covers the shortage of green feed in the country, particularly in the summer.

Alfalfa (*Medicago sativa*) is a perennial plant that is native to Southwest Asia. It has been cultivated for forage longer than any other crop. Not only does alfalfa have very high yield potential, but it is also one of the most palatable and nutritious forage crops. Because of its high protein and vitamin content, alfalfa is a primary component in the diet of dairy cattle, Alfalfa, *Medicago sativa* L., is among the most prized of forage . and is grown worldwide, It is a high quality forage and green manure crop; varieties are available and are being bred that are well-adapted to adapt, to reclaimed agriculture lands in Egypt. Currently there are 200-300,000 acres of alfalfa planted in Egypt, Alfalfa provide a large number of arthropods; some of them are pests but many have no effect on the crop. Alfalfa supports a diverse arthropod fauna; at least 1,000 species have

reported from alfalfa in the US, with perhap100-150 of these causing some degree of injury. Few of these, however, can be described as key pest species, the rest are of only local or sporadic importance, or are incidental herbivores, intomophagous (parasites and predators), or pollinators.

Egyptian clover (*Trifolium alexandrinum*) commonly known as barsem is an important winter annual fodder legume cultivated in Egypt, for the study, area (Dakhla) is considered a major crop of winter feed as much interest from farmers and the cast also cultivated large areas.

Faba bean (*Vicia faba*) is the most important food crop in Egypt, where most of the population depends up on the community because of the rise in its nutritional value containing a high proportion of vegetable protein up to about 30 %.

2 Material and Methods

The survey of the insect fauna of alfalfa (*Medicago sativa* L.), faba bean (*Vicia faba*) and Egyptian clover, (*Trifolium alexandrinum*) as the main crops were carried out in different areas of Dakhla Oasis, New Valley Governorate, Egypt. The samples insect species collected from different fields during blooming periods of the whole season of 2015-2016. An area of one feddan was cultivated with each crop, these areas received usual agriculture practiced but no chemical.

The sampling technique was based on using sweep net, 50 full length double net strokes were done at 11.00 A.M., the samples were taken by cross distribution of the fields for

*Corresponding author e-mail: mahbobent@yahoo.com

two weeks during blooming periods, four replicates were done each of five days in tested crops . Catches were killed ordinary cyanide jar, then spread on a

Table (1): Percentage and Numbers of Pests, Natural enemies, and pollinators in alfalfa fields at Dakhla Oasis , New Valley Governorate, Egypt

Groups	Order	%	F.	%	Spp	%	No of Individuals	%
Pests	6	46.2	10	40	11	34.3	150	26.08
Natural Enemies	6	64.2	7	28	9	28.1	125	21.7
Pollinators	1	7.6	8	32	12	37.5	300	52.17
Total	13	100	25	100	32	100	575	100

Table 2: The most common insects in alfalfa fields (*Medicago sativa*) at Dakhla Oasis , New Valley Governorate, Egypt.

Groups	Order	Family	Species
Group 1 (pests)	Diptera	Musciidae	<i>Musca domestica</i>
	Hemiptera	Pentatomidae	<i>Nexara viridula</i>
	Lepidoptera	Lycaenidae	<i>Cosmlyce baeticus</i>
		Pieridae	<i>Pieris rapae</i>
Noctuidae		<i>Spodoptera littoralis</i> <i>Spodoptera exigua</i>	
Diptera	Calliphoridae	<i>Calliphora vicina</i>	
Hymenoptera	Aphididae	<i>Aphis gossbii</i>	
Coleoptera	Curculionidae	<i>Sitona lividipes</i>	
Lepidoptera	Bruchidae	<i>Bruchidius trifolii</i>	
Lepidoptera	Noctuidae	<i>Agrotis epsilon</i>	
Group 2 (natural enemies)	Diptera	Syrphidae	<i>Syrphus spp.</i> <i>Syrphus corolla</i>
	Hemiptera	Anthocoridae	<i>Orius spp.</i>
		Nabidae	<i>Nabis copsisiformis</i>
	Coleoptera	Coccinellidae	<i>Coccinella septempunctata</i> <i>Coccinella undecimpunctata</i>
	Neuroptera	Chrysopidae	<i>Chrysopa carnia</i>
Odonata	Agoniidae	<i>Ischenura senegalensis</i>	
Lepidoptera	Sphingidae	<i>Acherontia atropos</i>	
Group 3 (pollinators)	Hymenoptera	Apidae	<i>Apis mellifera L.</i>
		Andrindae	<i>Andrina ovatula</i>
		Anthophoridae	<i>Anthophora spp.</i>
		Xylocopidae	<i>Xylocopa spp.</i>
		Halictidae	<i>Halictus spp.</i>
		Megachilidae	<i>Megachile uniformis</i>
			<i>Megachile submucida</i>
			<i>Megachile muntusemina</i>
		<i>Osmia spp.</i>	
	<i>Chalcidoma siculum</i>		
Tricogrammatidae	<i>Tricogramma evanescens.</i>		
Andrenidae	<i>Andrena spp.</i>		

sheet of white paper for classified, each of them was kept in Ethyl alcohol 70 %, the catches was transferred to Department of Zoology, Entomology, Faculty of Science, New Valley Branch, Assiut University, and The collected species were identified to the possible lowest taxonomic level and examined using binocular microscope (National DC3-420T Digital Microscope) and a digital camera.

The following references were used in the identification:

Steel (1970); Slater and Baranowski (1990); Dindal (1990); Alford (1999); Choate (1999); Aalbu *et al.*(2002); Arnett *et al.* (2002); Erwin *et al.* (2004); Picker *et al.* (2004); Chinery (2007); Kaufman and Eaton (2007); Hangay and Zborowski (2010) and LaPolla *et al.* (2010).

This identification was confirmed by staff in Educational Museum of Egyptian Fauna at Zoology Department, Faculty of Science, Assiut University, Assiut, Egypt. The

catches were divided to three groups of insect (pests, natural enemies and pollinators).

3 Results and Discussion

The obtained results during this paper indicated the presence of beneficial insects and harmful on each alfalfa, Egyptian clover and faba bean fields at New Valley Governorate, Egypt, it turned out to include 46 species belonging to 33 families that follow 9 orders.

Data presented in Tables (1, 2) and Figure (1) may throw light on that concept, there were thirty three insect species belonging to twenty two families and ten orders on alfalfa fields, divided in to three groups, the first group of bests which include eleven insect species (*Musca domestica*, *Nexara viridul*, *Cosmlyce baeticus*, *Pieris rapae*, *Spodoptera littoralis*, *Spodoptera exigua*, *Calliphora vicina*, *Aphis gossbii*, *Sitona lividipes*, *Bruchidius trifolii* and *Agrotis epsilon*) belonging to nine families (Musciadae, Pentatomidae, Lycaenidae, Pieridae, Calliphoridae, Aphididae, Curculionidae, Bruchidae and Noctuidae) and five orders (*Diptera*, *Hemiptra*, *Lepidoptera*, *Hymenoptera* and *Coleoptera*).

The second group which includes nine of insect species (*Syrphus spp.*, *Syrphus corolla*, *Orius spp.*, *Nabis copsiformis*, *Coccinella septempunctata*, *Coccinella undecimpunctata*, *Chrysopa carnia*, *Ischenura senegalensis* and *Acherontia atropos*) belonging to seven families (Syrphidae, Anthocoridae, Nabidae, Coccinellidae, Chrysopidae, Agoniidae and Sphingidae) and six orders (*Diptera*, *Hemiptra*, *Coleoptera*, *Neuroptera*, *Odonata* and *Lepidoptera*).

The third group of pollinators, all of which belong to the rank of Hymenoptera family and it was the most important families Apida and which ones *Apis mellifera* L. and the family of Andrenidae which includes *Andrina ovatula*.

These results are in agreement with Summer, *et al.* (2007) who found that, different natural enemies (parasitoids and predators) have been found in alfalfa agroecosystem associated with their hosts. Lady beetles, *Orius* bugs, aphid lion and some hymenoptera parasitoids were the most abundant natural enemies species in alfalfa, the most abundant natural enemies are *Bathyplectes curculionis*, *Aphidius spp.*, *Trichogramma spp.*, *Coccinella septempunctata*, *Cococinella spp.*, *Orius spp.*, *Nabis spp.*, *Chrysoperla sp.* Also, Alsuhaibani, (1996) reported that the alfalfa provides a large number of arthropods, some of them are pests but many have no effect on the crop. Alfalfa supports a diverse arthropod fauna, at least 1,000 species have reported from alfalfa in the US, with perhaps 100 – 150 of these causing some degree of injury. Few of these, however, can be described as key pest species, the rest are of only local or sporadic importance, or are incidental herbivores, entomophagous (parasites and predators), or pollinators (Flanders, 2000).

Results of Tables (3, 4) and Figure (2) showed that the most common insects in Egyptian clover fields, we found that the Egyptian clover fields ranked the latest in a number of insect species after each of alfalfa and faba bean fields, it was found during survey, twenty two insect species including five species of pests (*Bruchidius trifolii*, *Phytonoms bruneipennis*, *Nezara viridula*, *Spodoptera littoralis* and *Agrotis ipsilon*), five species of natural enemies (*Sphodromantis virides*, *Sphodromantis pioculate*, *Apanteles spp.* *Trichogramma evanescens* and *Euprepocnemis plorans*) and twelve of pollinators (*Phillianthus abdelkader*, *Polistes gallica*, *Vespa orientalis*, *Eumenus maxillosa*, *Megachile uniformis*, *Megachile submucida*, *Megachile muntusemina*, *Osmia spp.*, *Chalcidoma siculum*, *Apis mellifera* L. *Andrena spp.* and *Ocnera hispida*).

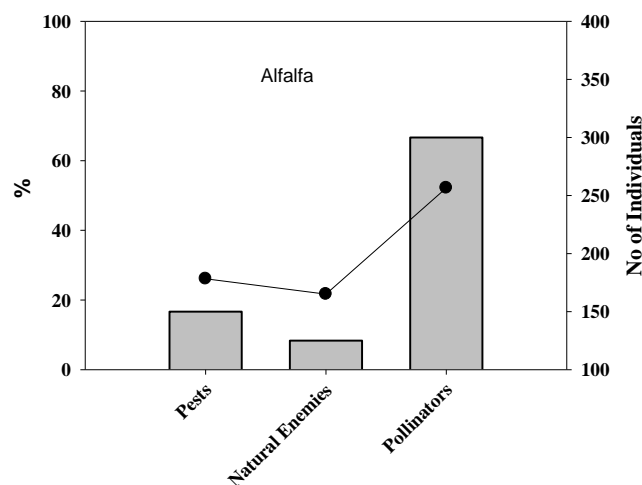


Figure (1): Percentage and Numbers of Pests, Natural enemies, and pollinators in Alfalfa fields at Dakhla Oasis, New Valley Governorate, Egypt.

These results are in agreement with those results obtained by Shawer *et al.* (1989) who reported that the main pollinators of clover, in Kafr EL-Sheikh Governorate, Egypt, were honeybees, and wild bees of family Andrenidae. While, Atallah *et al.* (1997), surveyed insect pollinators in Qena Governorate, Egypt, and presented this work in Apimondia Conference, in Belgium. A 49 insect species, belonging to 21 insect families, were surveyed. Most abundant species (30) were hyenopterous insects, followed by dipterous insects. The main pollinator of studied plants (sesame, clover, maize and broad bean) was honeybees, followed by wild bees.

On the other hand, studying the different insect species in faba bean fields, the result in Tables (5, 6) and Figure (3) showed that the presence of a large number of species of insects on this crop (pests, natural enemies and pollinators), which included twenty-four insect species belonging to fifteen families and eight orders.

These interpretations may agree with finding reported by

Hussein and Shoreit (1993), in Assiut, and New Valley governorates, they recorded survey of hymenopterous

Table (3): Percentage and Numbers of Pests, Natural enemies, and pollinators in Egyptian clover fields at Dakhla Oasis , New Valley Governorate, Egypt.

Groups	Order	%	F.	%	SP.	%	No of Individuals	%
Pestes	3	37.5	4	26.6	5	22.7	177	26.98
Natural Enemies	3	37.5	4	26.6	5	22.7	179	27.28
Pollinators	2	25	7	46.6	12	54.5	300	45.73
Total	8	100	15	99.8	22	99.9	656	100

Table (4): The most common insects in Egyptian clover (*Trifolium alexandrinum*) fields at Dakhla Oasis, New Valley Governorate, Egypt.

Groups	Order	Family	Species	
Group 1 (pests)	Coleoptera	Bruchidae	<i>Bruchidius trifolii</i>	
		Curculionidae	<i>Phytonoms bruneipennis</i>	
	Hemiptra	Pentatomidae	<i>Nezara viridula</i>	
	Lepidoptera	Noctuidae	<i>Spodoptera littoralis</i> <i>Agrotis epsilon</i>	
Group 2 (natural enemies)	Diptera	Mantidae	<i>Sphodromantis virides</i>	
			<i>Sphodromantis pioculate</i>	
	Hymenoptera	Braconidae	<i>Apanteles spp.</i>	
		Trichogrammatidae	<i>Trichogramma evanescens</i>	
Group 3 (Pollinators)	Orthoptera	Acidoidea	<i>Euprepocnemis plorans</i>	
		Hymenoptera	Sphicidae	<i>Phyllanthus abdelkader</i>
			Vespidae	<i>Polistes gallica</i>
			<i>Vespa orientalis</i>	
			<i>Eumenus maxillosa</i>	
		Megachilidae	<i>Megachile uniformis</i>	
			<i>Megachile submucida</i>	
			<i>Megachile muntusemina</i>	
			<i>Osmia spp.</i>	
			<i>Chalcidoma siculum</i>	
	Apidae	<i>Apis mellifera L.</i>		
	Andrenidae	<i>Andrena spp.</i>		
Coleoptera	Tenebrionidae	<i>Ocnerna hispida</i>		

Table (5): Percentage and Numbers of Pests, Natural enemies, and pollinators in Faba been fields at Dakhla Oasis , New Valley Governorate, Egypt

Groups	Order	%	F.	%	Spp.	%	No of Individuals	%
Pestes	5	50	5	33.3	6	25	99	15
Natural Enemies	3	30	4	26.6	7	29.2	150	22.72
Pollinators	2	20	6	40	11	45.8	411	62.27
Total	10	100	15	100	24	100	660	100

insects pollinating some plant species, honeybees and wild bees were surveyed on 22 flowering plant species, belonging to 12 plant families. Also, in Giza region, Egypt, Ibrahim (1957), noticed that, honeybees, is the main pollinator of broad bean, cotton, clover and citrus.

Finally, the results of a study on the most common insects species on each alfalfa, Egyptian clover and faba been fields at Dakhla Oasis, revealed that, this crops fields gathered a large number of insects in general and insect pollinators particular also shows that these crops have the ability to attract a large number of pollinators private honey bees and wild bees

Although a large proportion of their natural enemies, but it is also home to a large number of pests, which require

careful of them and develop appropriate programs when control.

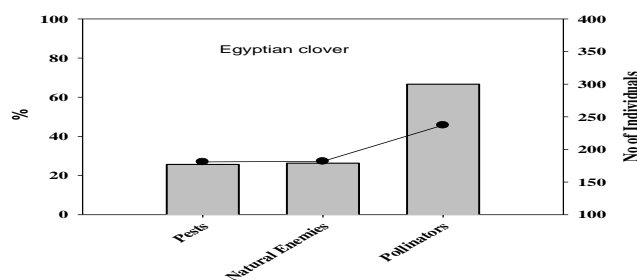


Figure (2): Percentage and Numbers of Pests, Natural enemies, and pollinators in Egyptian clover fields at Dakhla Oasis, New Valley Governorate, Egypt.

Table (6): The most common insects in faba been (*Vicia faba*) fields at Dakhla Oasis, New Valley Governorate, Egypt.

Groups	Order	Family	Species	
Group 1 (pests)	Orthoptera Lepidoptera	Gryllotalpidae	<i>Gryllotalpa gryllotalpa</i>	
		Noctuidae	<i>Agrotis epsilon</i> <i>Spodoptera littoralis</i>	
	Hemiptera Homoptera Lepidoptera	Pentanomidae	<i>Nezara viridula</i>	
		Aphididae	<i>Aphis craciora</i>	
		Pyralidae	<i>Etiella zinkenella</i>	
Group 2 (natural enemies)	Diptera Coleoptera	Mantidae	<i>Sphodromantis virides</i>	
		Coccinellidae	<i>Sphodromantis pioculate</i> <i>Coccinella septempunctata</i>	
	Odonat	Chrysopidae	<i>Coccinella undecim punctata</i>	
		Agoniidae	<i>Ischenura senegalensis</i> <i>Akis reflexa</i> <i>Akis elevate</i>	
	Group 3 (Pollinators)	Hymenoptera	Megachilidae	<i>Megachile uniformis</i> <i>Megachile submucida</i> <i>Megachile muntusemina</i> <i>Osmia spp.</i> <i>Chalcidoma siculum</i>
Apidae Sphicadae				<i>Apis mellifera L.</i> <i>Phillanthus abdelkader</i>
				Vespidae Andrenidae Nymphalidae

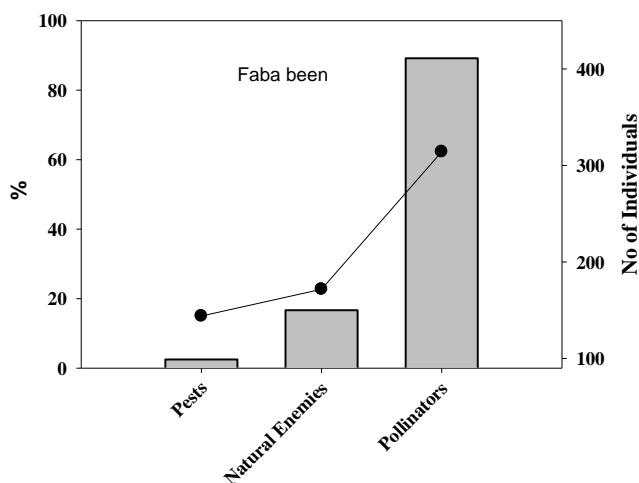


Figure (3): Percentage and Numbers of Pests, Natural enemies, and pollinators in Faba been fields at Dakhla Oasis, New Valley Governorate, Egypt.

References

[1] Aalbu, R. L.; Triplehorn C. A.; Campbell, J. M.; Brown, K. W.; Somerby, R. A. and Thomas, D. B.(2002): Family 106. Tenebrionidae Latreille 1802, p. 463-509. In: American Beetles. Volume 2.Polyphaga: Scarabaeoidea through Curculionoidea (R. H. Arnett, Jr., M. C. Thomas, P. E. Skelley, and J. H. Frank, eds.). CRC Press, Boca Raton, FL.

[2] Alford, D. V. (1999): A Textbook Of Agricultural

Entomology. Blackwell, Oxford, UK. 337pp.

[3] Alsuhaibani, A.M.(1996). Entomofauna of alfalfa in Riyadh, Saudi Arabia, Journal of King Saud Univ., Vol. 8, Agric. Sci., 2:269 – 277.

[4] Arnett, R. H.; Thomas , M. C.; Skelley, P. E. and Frank , J. H. (2002): American Beetles, Volume 2: Polyphaga: Scarabaeoidea through Curculionoidea. CRC Press, Boca Raton, London, New York, Washington, D.C., 861p.

[5] Atallah, M.A. ; E.H. Kamel ; H.M. Eshba and N.S.M. Ahmed (1997). Insect pollinators of some field crops and their abundance in Quena region, Upper Egypt. Proc. 35th Apimondia Congr., Belgium, 276-277.

[6] Chinery, M. (2007): Insects Of Britain And Western Europe. A & C Black Publishers Ltd. Soho Square, London, 324pp.

[7] Choate, P. M. (1999): Introduction to the Identification of Beetles (Coleoptera). Dichotomous Keys to Some Families of Florida Coleoptera.23-33.

[8] Dindal, D. L. (1990): Soil Biology Guide. A wiley, Interscience publication, New-York, 1349pp.

[9] Erwin, T. L.; Kavanaugh, D. H. and Moore, W. (2004): Key To Tribes And Genera Of Costa Rican, Carabidae. Prepared for INBio, 26 pp.

[10] Flander . K.L. and E.B. Radcliffe, (2000). IPM world textbook, Alfalfa IPM, University of Minnesota.

[11] Hangay, G. and Zborowski, P. (2010): A Guide To The Beetles Of Australia. National Library of Australia Cataloguing-in-Publication entry Hangay, George. 249pp.

[12] Hussein, M.H. and M.N. Shoreit (1993). Survey of

- hymenopterous insects pollinating some plant species in Assiut and New Valley Governorates, Egypt. Menofiya J. Agric. Res., Vol. 18 (1993) No. 1 (1):359 - 372
- [13] Ibrahim, S.H. (1957). Pollination, and factors affecting their activity with special reference to the honey bee and pollen grain plants in Egypt. M.Sc. Thesis, Cairo Univ., 124pp.
- [14] Kaufman, E. and Eaton, E (2007): Kaufman Field Guide To Insects Of North America. Houghton Mifflin Harcourt.392 pp.
- [15] LaPolla, J. H.; Brady , S. G. and Shattuck, S. O. (2010): Phylogeny and taxonomy of the *Prenolepis* genus-group of ants (Hymenoptera: Formicidae). Systematic Entomology, 35: 118–131.
- [16] Picker, M.; Griffith, C. and Weaving, A. (2004): Field Guide To The Insects Of South Africa..Struik Publishers.440 pp.
- [17] Quagliotto, L., G. Azziz, N. Bajsa, P. Vaz, C. Pérez, F. Ducamp, M. Cadenazzi, N. Altier and A. Arias,(2009). Three native *Pseudomonas fluorescence* strains tested under growth chamber and field conditions as biocontrol agents against damping-off in alfalfa. Biological Control, 51: 42-50.
- [18] Shower, M.M. Salem and R.S. Saleh, (1989). Survy of insect pollinators of Egyption clover, *Trifolium alexandrinum* L. at Kafr El- Sheikh , Egypt. Proc. 4 int. Conf. Apic. Trop. Climates, 134 – 137.
- [19] Slater, J. A. and Baranowski, R. M. (1990): The Lygaeidae Of Florida (Hemiptera: Lygaeidae). Arthropods of Florida and Neighboring Land Areas.Vol. 14.Florida Dept. of Agriculture and Consumer Services, Division of Plant Industry, Gainesville.211 pp.
- [20] Steel, W. O. (1970); Coleoptera: Staphylinidae of South Georgia. Pacific Insects Monograph, 23: 240-242.
- [21] Summers, C.G., L.D. Godfrey and T.E. Natwick, (2007). Managing Insects in alfalfa. University of California, Division of Agriculture and Natural Resources, publication 8295, 12/2007.USA.
-