

## The Most Common Insect Species in Alfalfa Field in Egypt

<sup>1,2</sup>Mohamed A. Shebl, <sup>1</sup>Soliman M. Kamel, <sup>1</sup>Talaat A. Abu Hashesh and <sup>1</sup>Mohamed A. Osman

<sup>1</sup>Department of Plant Protection, Faculty of Agriculture, Suez Canal University, Ismailia, Egypt

<sup>2</sup>Graduate School of Bioresource and Bioenvironmental Science, Entomological Laboratory,  
Faculty of Agriculture, Kyushu University, Fukuoka, 812-8581, Japan

---

**Abstract:** Alfalfa is a superb forage, but it can be shelter by a complex of insect pests, natural enemies and pollinators. Alfalfa insect populations can vary greatly from field to field. Therefore, it is essential to check each alfalfa field frequently for the presence of insects. The survey of the insect fauna of alfalfa *Medicago sativa* L. was carried out in different areas of Egypt like Ismailia, Suez, Swia Oasis and The New Valley. A high number of insects were collected from alfalfa fields. Different samples were collected during the season 2003, the insect faunal composition could be categorized to the following groups; pests, natural enemies and pollinators.

**Key words:** Alfalfa • Pests • Natural enemies • IPM • Pollinators • Ecosystem

---

### INTRODUCTION

Alfalfa 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 as well as beef cattle and horses. Alfalfa, *Medicago sativa* L., is among the most prized of forage and is grown worldwide [1]. Alfalfa, *Medicago sativa* L. is a high quality forage and green manure crop; varieties are available and are being bred that are well-adapted to reclaimed agricultural lands in Egypt. Currently there are 200-300,000 acres of alfalfa planted in Egypt and acreage is rising each year [2].

Alfalfa provide a large number of arthropods; some of them are pests but many have no effect on the crop [3]. 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 [4].

Alfalfa fields, as a short-term perennial agroecosystem, support a wide range of arthropods, most of which have neither positive nor negative effects on the

crop. In fact, alfalfa fields are important contributors to the biodiversity of agricultural systems [5]. The contribution of alfalfa to biological diversity and for the nurturing of beneficial insects for other species often goes unrecognized. This should be considered an important environmental benefit of incorporating alfalfa into a cropping system. While it is true that alfalfa production fields often represents a significant change from the naturally occurring flora and fauna of a region, it is not true that wildlife are automatically losers in this tradeoff. Agricultural activities interact significantly with wildlife on several different levels and many forms of wildlife adapt, adjust, or even thrive within and alongside agriculture [6]. In extensive surveys conducted in the Sacramento Valley, California and in subsequent analysis by wildlife biologists, many species of wildlife were found to be present in alfalfa fields. Of the 643 regularly-occurring resident and migratory terrestrial wildlife (amphibians birds, mammals and reptiles), 162 species or 25% were considered regular users of a alfalfa fields to varying degrees [7]. Correct identification and efficient sampling methods for beneficial and pest insects are two critical steps toward implementation of integrated pest management (IPM) programs. IPM includes the use of all feasible control tactics (e.g., crop rotation, resistant hybrids and chemical control) to manage pests within a profitable, yet environmentally sound production system. Current integrated pest management (IPM) programmes sue

cultural, biological and chemical tactics for managing alfalfa pests; however instances, IPM is not practiced by alfalfa growers because of the cost and time involved in implementing these tactics [8]. Efficient sampling methods are necessary for making accurate and timely evaluations of insect population (infestation) levels. These estimates can then be used for comparison with economic thresholds and consideration of appropriate management tactics. For production of high yielding, high quality alfalfa, the crop should be checked weekly. In cooler weather, sampling can be done less frequently. In hot weather, however, sampling frequency should be increased (insects develop, feed and reproduce faster under warmer conditions). Shorter sampling intervals are also necessary as insect populations and/or damage approach economically damaging levels. Therefore, it was very important to check the insect fauna of alfalfa agroecosystem in Egypt for improving IPM programmes and for improving alfalfa cultivation in Egypt.

### MATERIALS AND METHODS

The survey of the insect fauna of alfalfa *Medicago sativa*, L. was carried out in different areas of

Egypt in western and eastern desert; Ismailia, Suez, Swia Oasis and The New Valley. In Suez, Swia Oasis and The New Valley samples have been collected from different fields during summer season. Samples have been collected from the university farm, Ismailia during the whole season of 2003 (Fig. 1). An area of one feddan was cultivated with alfalfa in early October. This area received usual agriculture practices but no chemical control application was practiced. During the season 2003, the sampling technique was based on using sweep net; 50 full length double net-strokes were practiced, the samples were taken by cross distribution of the filed every two weeks. Catch was killed in an ordinary cyanide jar, then spread on a sheet of white paper for identification. Sweep Net Sampling-This is currently the most convenient method of estimating many of the pest and beneficial insect populations in alfalfa. Although it provides only a relative estimate of insect density, it is sufficient and cost effective for most above ground insect pests of alfalfa. Sweep net sampling is not recommended for determining absolute estimates of alfalfa weevil, cutworm, armyworm, grasshopper, or aphid populations. However, the sweep net is often useful for detecting initial low-density populations of alfalfa weevil larvae and pea aphids.

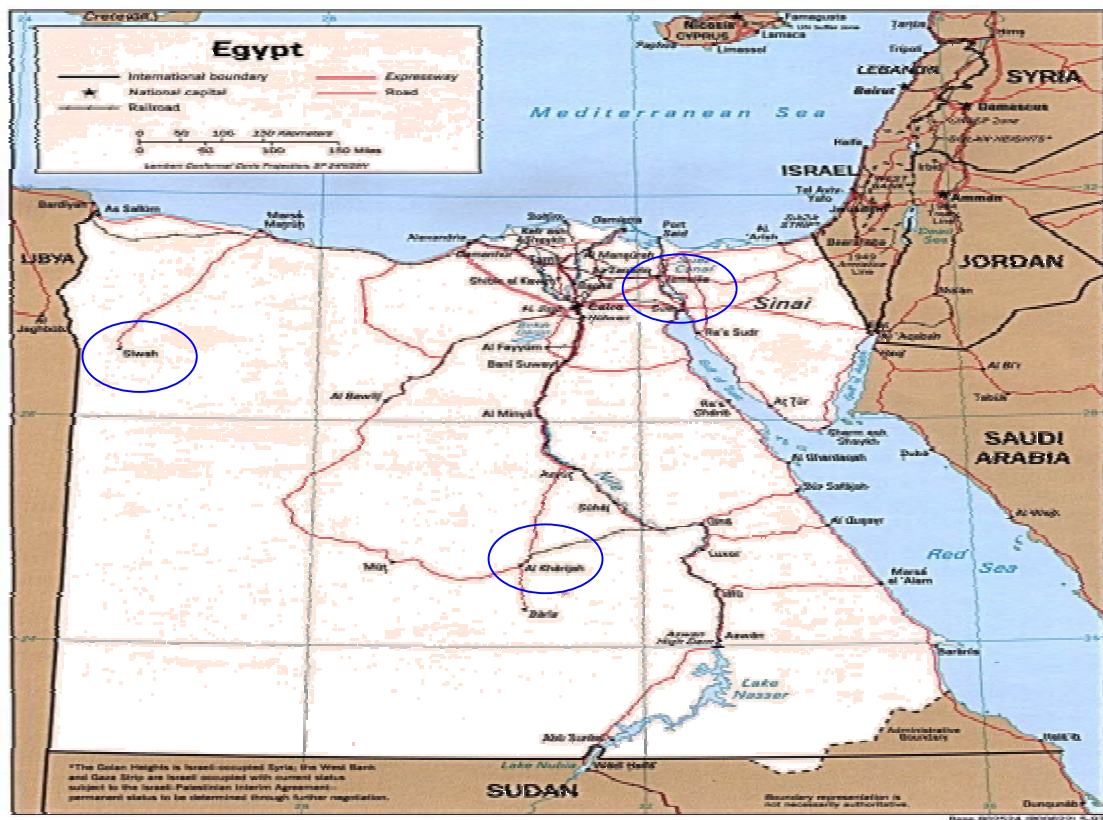


Fig. 1: Egypt map with collecting areas

**RESULTS AND DISCUSSION**

A high number of insects were collected from alfalfa fields. About 10 different orders were found Coleoptera, Diptera, Hemiptera, Homoptera, Orthoptera, Lepidoptera, Dictyoptera, Neuroptera, Odonata and Hymenoptera. Different species could be categorized depending on economic value into the following group:

- Pests, Table 1
- Natural Enemies, Table 2
- Pollinators, Table 3

The most abundant pest species in alfalfa field were *Cosmlyce baeticus* and *Hypera brunneipennis* and Aphids. Alfalfa weevil (*Hypera postica* Gyllenhal) and Egyptian alfalfa weevil (*H. brunneipennis* Boheman) are the most important insect pests of alfalfa. Pea aphid (*Acyrtosiphon pisum* Harris), blue alfalfa aphid (*Acyrtosiphon kondoi* Shinji), spotted alfalfa aphid (*Therioaphis maculate* Buckton) and cowpea aphid (*Aphis craccivora* Koch) are the principal aphids associated with alfalfa [9].

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*

Table 1: The most common pests in alfalfa fields

Order	Family	Species
Coleoptera	Fam: Curculionidae	<i>Hypera brunneipennis</i> <i>Sitona lividipes</i>
	Fam: Scarabidae	<i>Tropinota squalida</i> <i>Scarabus sacer</i>
	Fam: Agromyzidae	<i>Leriomyza trifolii</i>
Diptera	Fam: Musciade	<i>Musac domestica</i>
	Fam: Calliphoridae	<i>Lucilia spp.</i>
Hemiptera	Fam: Pentatomidae	<i>Nexara viridula</i>
	Fam: Lygaeidae	
Homoptera	Fam: Jassidae	<i>Empoasca decipiens</i>
	Fam: Aphididae	<i>Acyrtosiphon pisum</i> <i>Therioaphis pisum</i>
Orthoptera	Fam: Acrididae	<i>Eupropocnemis plorans</i>
	Fam: Tettigonidae	<i>Homorochryphus nitidulus</i>
Lepidoptera	Fam: Elachistidae	<i>Colias eurytheme</i>
	Fam: Lycaenidae	<i>Cosmlyce baeticus</i>
	Fam: Pieridae	<i>Pieris rapae</i>
	Fam: Noctuidae	<i>Spodoptera littoralis</i> <i>Spodoptear exigua</i>

Table 2: The most common natural enemies associated with pests in alfalfa fields

Order	Family	Species
Coleoptera	Fam: Coccinellidae	<i>Coccinella septempunctata</i> <i>Coccinella undecimpunctata</i> <i>Scymnus spp.</i>
	Fam: Staphylinidae	<i>Paederus alfieri</i>
	Fam: Syrphidae	<i>Syrphus spp.</i>
Hemiptera	Fam: Anthocoridae	<i>Orius spp.</i>
	Fam: Nabidae	<i>Nabis capsiformis</i>
Dictyoptera	Fam: Mantidae	<i>Sphodromatis bioculata</i> <i>Mantis savigyni</i> <i>Mantis religiosa</i>
	Fam: Chrysopidae	<i>Chrysopa carnea</i>
	Fam: Myrmeleontidae	<i>Cueta variegata</i>
Odonata	Fam: Agrionidae	<i>Ischenura senegalensis</i>
	Fam: Libellulida	<i>Crocothemis erythraea</i>
Hymenoptera	Fam: Aphidiidae	<i>Syrphus spp.</i>

Table 3: the most common pollinators in alfalfa fields

Order	Family	Species
Hymenoptera	Fam: Andriidae	<i>Andrina ovatula</i>
	Fam: Anthophoridae	<i>Anthophora spp.</i>
	Fam: Xylocopidae	<i>Xylocopa spp.</i> <i>Ceratina spp.</i>
	Fam: Halictidae	<i>Halictus spp.</i>
	Fam: Apidae	<i>Apis mellifera</i>
	Fam: Megachilidae	<i>Chalcidoma siculum</i> <i>Osmia spp.</i> <i>Megachile submucida</i> <i>Megachile uniformis</i> <i>Megachile mintusemina</i>

*curculionis*, *Aphidius* spp., *Trichogramma* spp., *Coccinella septempunctata*, *Coccinella* spp., *Orius* spp., *Nabis* spp., *Chrysoperla* sp. [9].

Different bee species have been collected from alfalfa ecosystem belonging to 6 different families. The most common and abundant bee species was leafcutting bees. the most abundant bees visiting alfalfa flowers were Megachilid bees followed by Halictids, Anthophorids and colletids, respectively. It was clear that the most abundant species visiting alfalfa flowers was the leaf-cutting bees *Megachile patellimana* Spin [10]. Total of 545 Hymenoptera, belonging to 13 genera, were obtained at the 20 alfalfa sites. *Megachile*, a genus of solitary bees, was the most frequently collected, representing almost half of all collected bees. The social *Bombus* was second infrequency and represented 20 % of the collections [11].

Insect fauna of alfalfa in Saudi Arabia have studied using standard 15" sweeping net. The identification of insects revealed the prevalence of 103 insect species

belonging to 94 genera, 49 families and 10 orders of class insecta. Of these insects, 18 species were recorded for the first time in Saudi Arabia. The insect fauna of alfalfa was divided, according to their importance to alfalfa grower, to the following categories of insects expressed in percentages; 48% phytophagous insects, 25.6% entomophagous insects, 21.6% pollinating insects and 4.8% for other insects (saprophagous, scavengers --- etc.). Studying entomofauna of alfalfa is important for developing integrated pest management programs for alfalfa and neighboring [3]. A fieldside view of an alfalfa field may show little apparent activity - simply a mass of green. However, each successive regrowth of alfalfa creates an environment which teems with insect life. The numbers and kind of insects that inhabit alfalfa have been described as "incredible" [12]. A count of 591 species was recorded in a field near Ithaca, NY [13]. Insects are so abundant in alfalfa fields that university entomology classes can often be found sweeping in alfalfa fields to study the diversity of insects to be found there. Some of these insects, of course feed on alfalfa as a primary source of food, but there are many beneficial insects as well. These 'beneficials' prey on herbivorous or sucking insect pests of alfalfa. Dozens of predacious and parasitic insects occur in alfalfa and several "work horses" of biological control are especially abundant [14]. The role of beneficial insect pests in helping to reduce crop damage in an alfalfa integrated pest management (IPM) program has been understood for some time. However, several of the species present in alfalfa also effect a number of other neighboring crops where they may greatly reduce the threat of pest damage. Due to its reservoir of insects, planting alfalfa in strips with other crops has been proposed to help distribute and nurture beneficial insects [13].

Nearly 1000 species of arthropods are associated with alfalfa agro-ecosystem and play an integral role in various arthropod plant community complexes associated with the intensified agriculture [15]. More study should be carried out in the future to study the fauna and flora structure of alfalfa and other crops, plants, trees as well. However, we should wondering about the effect of climate change and global warming on the fauna and flora structure of different plants, crops, tress.....etc. Global warming and climate change is the most conflict for agriculture production in the world right now so we need more answers to be ready for any change in the agriculture ecosystem.

## REFERENCES

1. Summers, C.G., 1998. Integrated pest management in forage alfalfa. *Integ. Pest Manag. Rev.*, 3: 127-154.
2. Shebl, M.A., S.M. Kamel, T.A. Abu Hashesh and M.A. Osman, 2008. The impact of leafcutting bees (*Megachile minutissima*, Megachilidae, Hymenoptera) (Radoszkowski, 1876) artificial nest sites on seed production of alfalfa, Ismailia, Egypt. *Agric. J.*, 5: 33-35.
3. Alsuhaibani, A.M., 1996. Entomofauna of Alfalfa in Riyadh, Saudi Arabia, *Journal of King Saud University. Agricultural Sciences. J. King Saud Univ.*, Vol. 8, *Agric. Sci.*, 2: 269-277.
4. Flanders, K.L. and E.B. Radcliffe, 2000. IPM world textbook, *Alfalfa IPM*, University of Minnesota
5. Putnam, D.H., M. Russelle, S. Orloff, J. Kuhn, L. Fitzhugh, L. Godfrey, A. Kiess and R.F. Long, 2001. *Alfalfa, Wildlife and the Environment. The importance and benefits of alfalfa in the 21st century. A friendly and informative guide to alfalfa, the queen of forages. California Alfalfa and Forage Association.* pp: 24.
6. Putnam, D.H., 1998. Contributions of alfalfa to wildlife and the environment *Proceedings of the 28th National Alfalfa Symposium, Bowling Green, KY, February*, pp: 26-27.
7. Kuhn, J., T. Ellis and L. Fitzhugh, 1996. Alfalfa helps wildlife on your farm. In *Proceedings, 27<sup>th</sup> National Alfalfa Symposium and 26<sup>th</sup> California Alfalfa Symposium, 9-10 December, 1996, San Diego, CA. Certified Alfalfa Seed Council, Davis, CA and Univ. of California, Davis.*
8. Degooyer, T.A., L.P. Pedigo and M.E. Rice, 1999. Effect of alfalfa grass intercrops on insect population, *Envrion. Entomo.*, 28(4): 703-710.
9. 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.
10. El-Badawy, A., 1975. Studies on family Megachilidae in the New valley with special reference to active pollinator. Ph.D. Thesis, Fac. Agric., Cairo University.
11. Brookes, B., E. Small, L.P. Lefkovitch, H. Dammon and D.T. Fairey, 1994. Attractiveness of alfalfa (*Medicago sativa* L.) to wild pollinators in relation to wild flowers. *Can. J. Plant. Sci.*, 74: 779-783.

12. Pimental, D. and A.G. Jr. Wheeler, 1973. Species and diversity of arthropods in the alfalfa community. *Environ. Entomol.*, 2: 659-668.
12. Manglitz, G.R. and R.H. Ratcliffe, 1988. Insects and Mites. pp. 671-695. In A.A. Hanson, D.K. Barnes and R.R. Hill, Jr., (eds) *Alfalfa and Alfalfa Improvement*. Monograph No. 29. American Society of Agronomy, Madison, WI.
14. Leigh, T.F., 1991. Alfalfa as an Insectary for Beneficial Insects. In *Proceedings, 21st Alfalfa Symposium*, 9-10 December, 1991, Sacramento, CA. Department of Agronomy and Range Science, University of California, Davis, CA.
15. Summers, C.G., 1976. Population fluctuations of selected arthropods in alfalfa: influence of two harvesting practice. *Environ. Entomol.*, 5(1): 103-110.