



Survey of insect pests and spiders infesting medicinal and aromatic plants Amal, E. Abo-Zaed; Hassan, M. I. and Mansour, A. M.

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Abstract:

Medicinal and aromatic plants have now become the main source for medicines, seasonings, colorings, preservatives and represent the oldest and most widespread form of medication. This study was conducted on twenty five of the most important medicinal and aromatic plants in two gardens Zoheria in Cairo and Orman in Giza Governorates. The results indicated that presence of twenty four species of insect pests belongs to fourteen families and five orders. Moreover, eighteen species of spiders belong to nine families and one order (Araneae) were recorded. All these insect pests were presented in low to medium numbers causing moderate damage. From Zoheria garden the largest number of insect pests belonging to orders, Hemiptera, Thysanoptera and Lepidoptera were recorded on sweet marjoram, mints, *Jasminum azoricum* and rosemary. The dominant spider families recorded with largest number of species. These are: Philodromidae and Theridiidae on jasmine flower, lavender and night-blooming jasmine at Zoheria garden whereas, the same families was dominant on rose, rose geranium and chamomile at Orman garden. The dominant insect orders Hemiptera, Thysanoptera, Diptera and Lepidoptera were recorded on rose, sweet basil and calendula at Orman garden.

Introduction

According to the World Health Organization, 80 percent of the population of developing countries relies on traditional plant based systems of medicine to provide them with primary health care needs (Agarwal and Upadhyaya, 2006). The large scale cultivation of these plants in countries may face the problem of sudden appearance of large populations of

variety of insect pests in a single crop. Like other plants, medicinal plants too have to bear the devastating effects of injurious insect pests, which are not only harmful for the plant but also, deteriorate the quality of the produce, thus hampering its medicinal value. The majority of the pests caused in feeding damage on reproductive or vegetative organs (those under Thysanoptera and

Heteroptera, including the Thripidae, Miridae, Pentatomidae and Pseudococcidae families), whereas others cause erosion or tunnels on heads (Noctuidae), leaves (beetles) or roots (Elateridae) (Conti, 2003). El-Gendi (2007) in Egypt, recorded eighteen insect species on marjoram and chamomile. *Nysus cymoides* Schill, *Nezara viridula* L., *Lygus gomellatus* H.S., *Nesidocoris tenuis* Reut., *Bourletiella horttensis* (Fitch), *Empoasca decipiens* Paoli, *Trupanea stellata* Fuessly, *Myzus persicae* (Sulz.) and *Aphis gossypii* Glover were the main insect pests on chamomile. Thirteen species of insect pests belong to eight families and five orders were recorded on Calendula plants. While twelve insect pests belong to nine families under six orders were recorded on chamomile plants (Solaiman, 2015).

True spiders are one of the most abundance predatory groups in terrestrial ecosystems. Spiders have proved to be beneficial in regulation of agricultural pests and their role as natural enemies has recently been more and more stressed (Ghabbour *et al.*, 1999). The presence of spiders on some ornamental plants in Egypt was studied at the first time by (Shereef *et al.*, 1996); after that (Rizk *et al.*, 2012) studied the incidence of medicinal and ornamental plants in El-Fayoum Governorate. Ghallab (2013) was collected one family of spider from lantana and croton ornamental plants from Orman garden and the most abundant families were Miturgidae, Philodromidae, Salticidae, Theridiidae and Araneidae. Zoheria and Orman gardens were the most harbored spider. The most dominant families' recorded with the largest number of species were Salticidae, Gnaphosidae, Thridiidae and Oonopidae (Hassan *et al.*, 2016).

The information regarding the occurrence of insect pests on medicinal and aromatic plants of the state is scanty. Hence the present study was undertaken

to record the insect pests and spiders associated with important medicinal and aromatic plants in countryside.

Materials and methods

This work was conducted on medicinal and aromatic plants during two successive years 2017 and 2018 in two locations, Zoheria garden in Cairo and Orman garden in Giza Governorates in Table (1). Twenty five double strokes were randomly from medicinal and aromatic plants (twigs, leaves and flowers) from January to December. Samples were collected in a polyethylene bags and transferred to laboratory. To kill insects, piece of cotton moistened with chloroform put in each sample and left for 15 minutes. The sample was emptied in Petri dish and cleaned from plant residues. Then it was examined under stereomicroscope to separate and count the major insect pests. This process was performed at weekly intervals throughout the entire period of investigation. Specimens were mounted for light microscopy according to the procedure detailed by Kosztarab and Kozár (1988).

The spider individuals were collected biweekly during two hours from (9-11) during summer and 10-12 in winter on fine silky traps, collected true spiders from branches, leaves and trunks of different trees and bushes from 25 medicinal and aromatic plants. The spiders were isolated and counted in glasses individually and transferred in the same day to the laboratory at the Plant Protection Research Institute for counting and identification. The collected spiders were kept in small test tubes containing 70% ethyl alcohol. The necessary information (locality, host plant and date) was recorded by a pencil on a slip of paper attached to each specimen inside the tube for identification. The characteristics of families, genera and species were examined using the related keys. In contrast, some specimens were identified

just on the possible genus level. Identification of specimens followed the descriptions of (Petrunkevitch, 1939;

Kaston, 1978 and Jocqué and Dippenaar-Schoeman, 2007).

Table (1) : Common and scientific names of the medicinal and aromatic plants in Zoheria and Orman gardens:

Garden name	Medicinal and aromatic plants	
	Common name	Scientific names
Zoheria garden	Aloevera	<i>Aloe vera</i> (L.)
	Calotropis procera	<i>Calotropis procera</i> (Aiton)
	Jasminum azoricum	<i>Jasminum azoricum</i> L.
	Jasmine flower	<i>Jasminum sambac</i> (L.) Aiton
	Jasmine shami	<i>Jasminum officinale</i> L.
	Lavender	<i>Lavandula angustifolia</i> Mill
	Mints	<i>Mentha</i> spp.
	Murraya	<i>Murraya paniculata</i> (L.) Jack
	Myrtus	<i>Myrtus communis</i> L.
	Night-blooming jasmine	<i>Cestrum nocturnum</i> L.
	Pencil tree	<i>Euphorbia tirucalli</i> L.
	Rosemary	<i>Rosmarinus officinalis</i> L.
	Sweet marjoram	<i>Origanum majorana</i> L.
Vinca	<i>Catharanthus roseus</i> (L.) G.Don.	
Orman Garden	Calendula	<i>Calendula officinalis</i> L.
	Carnation	<i>Dianthus caryophyllus</i> Lim
	Chamomile	<i>Chamaemelum nobile</i> (L.)
	Jasminum	<i>Jasminum grandiflorum</i> L
	Marigold	<i>Tagetes erecta</i> L.
	Mentha piperata	<i>Mentha piperata</i> L.
	Neem	<i>Azadirachta indica</i> Juss.
	Rose	<i>Rose</i> spp
	Rose geranium	<i>Pelargonium graveolens</i> L.
	Sweet basil	<i>Ocimum basilicum</i> L.
	Thyme	<i>Thymus vulgaris</i> L.

Results and discussion

A general survey was conducted on twenty five medicinal and aromatic plants at two gardens Zoheria in Cairo and Orman in Giza Governorates during two successive years 2017-2018. The results indicated that presence of twenty four species of insect pests belongs to fourteen families and five orders. Moreover, eighteen species of spiders belong to nine families and one order (Araneae), were recorded in 2017 and 2018 seasons (Tables, 2-5).

1. Survey of insect pests and spiders infesting medicinal and aromatic plants at Zoheria garden in Cairo Governorate:

The results in Tables (2 and 3) proved that fourteen true spiders belonging to seven families was recorded on fourteen medicinal and aromatic plants (aloevera, calotropis procera, *Jasminum azoricum*, jasmine flower, *Jasmine shami*, lavender, mints, murraya, myrtus, night-blooming, jasmine, pencil tree, rosemary, sweet marjoram and vinca). Members of Philodromidae and Theridiidae were the dominant spider families record 63 and 55 individuals. The highest numbers of their occurrence was collected from jasmine flower, lavender and night-blooming jasmine. The family Philodromidae was presented by two species *Thanatus albini* Audouin and *Philodromous* sp. while, the family Theridiidae presented by four species *Theridion melanosticum* O. P. Cambridge, *Kochiura aulica* (Koch), *Theridion spinitarse* O. P. Cambridge

and *Theridion* sp. Three families were representing by only a single individuals. These were Dictynidae, Eutichuridae and Uloboridae, members of the remaining families were found in few numbers. The obtained results are in harmony with that detected by Rizk *et al.*, 2012 and Hassan *et al.*, 2016.

Also, the obtained results in Table (2 and 3) indicated that sixteen insect species belonging to eight families and four orders on fourteen medicinal and aromatic plants. Members of Hemiptera, Thysanoptera and Lepidoptera were the dominant insect families recorded 88, 52 and 22 individuals, respectively. The highest numbers of their occurrence were collected from sweet marjoram, mints, *Jasminum azoricum* and rosemary recorded 30, 26, 16 and 15 individuals, respectively. Hemiptera was presented by five families: Aphididae, Aleyrodidae, Cicadellidae, Diaspididae and Monophlebidae. The most dominant insect from family Monophlebidae is *Icerya aegyptiaca* Douglas on aloevera and night-blooming jasmine; while the highest percent of members of the family Aphididae is *Aphis gossypii* Glover on mints and murraya. Thysanoptera presented by single family Noctuidae including four species *Agrotis ipsilon*, *Agrotis* spp., *Spodoptera exigua* and *Spodoptera littoralis*. Whereas the order Thysanoptera presented by a single family Thripidae which including four species *Frankliniella tritici*, *Haplothrips cottei*, *Thrips orientalis* and *Thrips palmi*.

Table (2): Survey of insect pests and spiders infesting medicinal and aromatic plants at Zoheria garden in Cairo Governorate during 2017.

Order	Family Species	Aloevera	Calotropis procera	Jasminum azoricum	Jasmine flower	Jasmine Shami	Lavender	Mints	Total
Araneae	Cheiracanthiidae <i>Cheiracanthium inclusum</i> O. P. Cambridge					+	++		10
	Philodromidae <i>Philodromous</i> sp.	+							2
	<i>Thanatus albini</i> (Audouin)		++	+	+		++	+	22
	Salticidae <i>Thyene</i> sp.					+			2
	<i>Thyene imperialis</i> (Rossi)				+				2
	<i>Euophrys</i> sp.				+				2
	Theridiidae <i>Theridion melanosticum</i> O. P. Cambridge	+							3
	<i>Kochiura aulica</i> (Koch)	++			+++				13
	<i>Theridion</i> sp.						+	++	10
	<i>Theridion spinitarse</i> O. P. Cambridge				+		++		10
	Thomisidae <i>Thomisus spinifer</i> O. P. Cambridge			+	+				4
	<i>Synema</i> sp.				++				8
	Uloboridae <i>Uloborus</i> sp.	+							2
Total		14	8	4	33	4	26	10	
Hemiptera	Aphididea <i>Aphis gossypii</i> Glover							++ +	8
	<i>Aphis nerii</i> (Boyer)		+						2
	<i>Myzus persicae</i> (Sulz.)							+	3
	Diaspididae <i>Aonidiella aurantii</i> (Maskell)					+			2
	<i>Diaspis echinocacti</i> (Bouche)	+							3
	Monophlebidae <i>Icerya aegyptiaca</i> (Douglas)	++							8
Lepidoptera	Noctuidae <i>Agrotis ipsilon</i> (Hufnagel)				+				3
	<i>Agrotis</i> spp.							+	3
	<i>Spodoptera exigua</i> (Hubner)				+			+	6
	<i>Spodoptera littoralis</i> (Boisduval)							+	3
Orthoptera	Gryllotalpidae <i>Gryllotalpa gryllotalpa</i> l.							+	3
Thysanoptera	Thripidae <i>Frankliniella tritici</i> (Fitch)			++				++	16
	<i>Haplothrips cotei</i> (Vuill.)			++					9
	<i>Thrips orientalis</i> (Bognall)					++			9
Total		11	3	16	6	11	-	26	

+ = low number (1 to 3 individuals); ++ = midum no. (3 to 9 individuals); +++ = high no. (up to 9 individuals)

Table (3): Survey of insect pests and spider infesting medicinal and aromatic plants at Zoheria garden in Cairo Governorate during 2018.

Order	Family Species	Murraya	Myrtus	Night-blooming jasmine	Pencil tree	Rosemary	Sweet marjoram	Vinca	Total
Araneae	Dictynidae <i>Dictyna</i> sp.							+	2
	Philodromidae <i>Thanatus albini</i> (Audouin)			+++		++	+		17
	<i>Phildromous</i> sp.	+							2
	Theridiidae <i>Theridion melanosticum</i> O. P. Cambridge	+	+		+				6
	<i>Kochiura aulica</i> (Koch)							+	2
	<i>Theridion</i> sp.		+			+	+		6
	<i>Theridion spinitarse</i> O. P. Cambridge	+			+		+		6
Total		6	4	15	2	10	8	10	
Hemiptera	Aleyrodidae <i>Bemisia tabaci</i> (Gen.)					+	++		12
	Aphididea <i>Aphis durantae</i> Theobald						+		3
	<i>Aphis gossypii</i> Glover	++					+		11
	<i>Myzus persicae</i> (Sulz.)					+	+		7
	Cicadellidae <i>Empoasca lybica</i> (de Bergevin and Zanon)1922						++		9
	Diaspididae <i>Chrysomphalus ficus</i> (Ashmead)	+							3
	Monophlebidae <i>Icerya aegyptiaca</i> (Douglas)			++				+	13
	<i>Icerya purchase</i> Maskell				+				3
Lepidoptera	Noctuidae <i>Agrotis ipsilon</i> (Hufnagel)						++		4
	<i>Spodoptera littoralis</i> (Boisduval)						+		3
Thysanoptera	Thripidae <i>Thrips palmi</i> Karny		+			++			18
Total		12	9	8	3	15	30	3	

+ = low number (1 to 3 individuals); ++ = medium no. (3 to 9 individuals); +++ = high no. (up to 9 individuals)

2. Survey of insect pests and spiders infesting medicinal and aromatic plants at Orman garden in Giza Governorate:

This survey is considered an essential work in studying the survey of spiders and insects that attacked eleven medicinal and aromatic plants at Orman garden in Giza Governorate (*Calendula*, carnation, chamomile, *Jasminum grandiflorum*, marigold, *Mentha piperata*, neem, rose, *Rose geranium*, sweet basil and thyme). These plants received eight spider families consists of sixteen species. In Tables (4 and 5) the number of collected spiders associated members of Theridiidae, Philodromidae and Thomisidae were the dominant spider families recorded 94, 45 and 42 individuals, respectively. While other remaining families Salticidae, Eutichuridae, Dictynidae, Lycosidae and Filistatidae composed of 21, 16, 10, 6 and 2 individuals, respectively. The highest numbers of spider occurrence were collected from rose, *Rose geranium*, chamomile, sweet basil, neem and *Mentha piperata* composed of 52, 39, 35, 28, 20 and 20 individuals, respectively. While marigold and carnation received the lowest number of spider of 10 and 8 individuals, respectively.

As similar results in Zoheria garden the family Philodromidae was presented by two species while, Theridiidae by three species *T. melanosticum*, *K. aulica* and *Theridion* sp. whereas, Thomisidae by four species *Misumena atrocincta*, *Synema candicans*, *Thomisus spinifer* and *Thomisus* sp. Four families were representing by only a single individual. These were Dictynidae, Eutichuridae, Filistatidae and Lycosidae members.

Tables (4 and 5) indicated that twenty two insect species belonging to

thirteen families and five orders on eleven medicinal and aromatic plants. Members of Hemiptera, Thysanoptera, Diptera and Lepidoptera were the dominant insect families composed of 80, 61, 45 and 38 individuals, respectively. The highest numbers of their occurrence were collected from rose, sweet basil, calendula, mentha, carnation and marigold recorded 45, 38, 35, 29, 23 and 22 individuals, respectively. Hemiptera was presented by six families: Aphididae, Aleyrodidae, Diaspididae, Miridae, Monophlebidae and Pentatomidae. The most dominant insect from family Aphididae is *A. gossypii* on rose, sweet basil, calendula and mentha. Thysanoptera presented by two families Noctuidae including four species and Pieridae including one species. Whereas the order Thysanoptera presented by a single family Thripidae which including five species the most dominant insect *Frankliniella occidentalis* on marigold, rose and carnation.

Similar results were obtained by (Abd El-Raheem and Abd EL-Wareth, 2015) who reported that chamomile crop infesting *Myzus persicae* (Sulzer) was the numerous pest as compared with the other insect pests (54.17% and 71.70%). The highest level of abundance was recorded during March and April. Also, the results indicated that 15 insects included seven sap-suckers, seven predators and one parasitoid on German chamomile, where the common insect pests were *M. persicae*, *N. cymoides*, *L. gomellatus* and *N. tenuis*. Chamomile plants are known to harbor many species of insects and mites including *M. persicae*, *A. gossypii*, *E. decipiens* and *N. cymoides* (Etman *et al.*, 1990 and Rahil, 2005).

Table (4): Survey of insect pests and spiders on medicinal and aromatic plants at Orman Garden in Giza Governorate during 2017.

Order	Family Species	Calendula	Carnation	Chamomile	Jasminum grandiflorum	Marigold	Mentha piperata	Total
Araneae	Dictynidae <i>Dictyna</i> sp.			++				8
	Lycosidae <i>lycosa cingara</i> C.L. (Kock)			+				2
	Philodromidae <i>Thanatus albini</i> Audouin	++	+			+	++	20
	<i>Phildromous</i> sp.		+					2
	Salticidae <i>Thyene</i> sp.			+++				15
	<i>Thyene imperialis</i> (Rossi)	+						2
	<i>Euophrys</i> sp.				+		+	4
	Theridiidae <i>Kochiura aulica</i> (Koch)			++	++	++	++	16
	<i>Theridion</i> sp.	+			+			4
	<i>Theridion spinitarse</i> O. P. Cambridge			+	+	+		12
	Thomisidae <i>Thomisus</i> sp.		+		+		+	6
<i>Synema candicans</i> O. P. Cambridge		+		+			4	
Total		12	8	35	10	10	20	
Diptera	Agromyzidae <i>Liriomyza trifolii</i> (Burgess)	++						9
	<i>Melanagromyza sojae</i> (Zehntner)	++				++		20
	Tephritidae <i>Trupanea stellata</i> (F.)			+		+		7
Hemiptera	Aphididea <i>Aphis gossypii</i> Clover	+					+	8
	<i>Myzus persicae</i> (Sulz.)		++				+	13
	Miridae <i>Nesidocoris tenuis</i> Reut.	+						4
	Pentatomidae <i>Nezara viridula</i> L.			++				9
Lepidoptera	Noctuidae <i>Agrotis segetum</i> (Denis and Schiffermiller)	+						4
	<i>Agrotis</i> spp.						+	3
	<i>Spodoptera exigua</i> (Huebner)						+	4
	<i>Spodoptera littoralis</i> (Boisduval)	+					+	8
	Pieridae <i>Pieris brassicae</i> L.	+						3
Orthoptera	Acrididae <i>Aiolopus stripins</i> Latreille	+						4
	Gryllotalpidae <i>Gryllotalpa gryllotalpa</i> L.						+	4
Thysanoptera	Thripidae <i>Frankliniella occidentalis</i> (Pergand)		++				++	18
	<i>Haplothrips cottei</i> (Vuill.)		+		++			12
	<i>Neohydatothrips samayunkur</i> (Kudô)					++		9
Total		35	23	13	9	22	29	

+ = low number (1 to 3 individuals); ++ = midum no. (3 to 9 individuals); +++ = high no. (up to 9 individuals)

Table (5): Survey of insect pests and spiders on medicinal and aromatic plants at Orman Garden in Giza Governorate.

Order	Family Species	Neem	Rose	Rose geranium	Sweet basil	Thyme	Total
Araneae	Cheiracanthiidae <i>Cheiracanthium inclusum</i> O. P. Cambridge		++			+	10
	Filistatidae <i>Filista</i> sp.	+					2
	Lycosidae <i>Lycosa</i> sp.		+	+			4
	Philodromidae <i>Thanatus albini</i> Audouin		+++		+	++	25
	Salticidae <i>Thyene imperialis</i> (Rossi)				++	+	10
	Theridiidae <i>Theridion melanosticum</i> O. P. Cambridge	++	+++	+			25
	<i>Kochiura aulica</i> (Koch)	++	+	+++	+	++	27
	<i>Theridion</i> sp.		++		+		10
	Thomisidae <i>Thomisus spinifer</i> O. P. Cambridge	+		+	++		12
	<i>Synema candicans</i> O. P. Cambridge	+			+		4
	<i>Synema</i> sp.		+	++	+	+	14
<i>Misumena atrocincta</i> Costa				+		2	
Total		20	52	39	28	14	
Diptera	Agromyzidae <i>Liriomyza trifolii</i> (Burgess)				++		9
Hemiptera	Aleyrodidae <i>Bemisia tabaci</i> (Gen.)	+		++	+		15
	Aphididea <i>Aphis craccivora</i> Koch		++				8
	<i>Aphis gossypii</i> Glover		++		++		19
	<i>Myzus persicae</i> (Sulz.)		+				4
	Diaspididae <i>Aonidiella aurantii</i> (Maskell)		+				3
	Monophlebidae <i>Icerya aegyptiaca</i> (Douglas)	+	++	+			4
	Pentatomidae <i>Nezara viridula</i> L.				+		3
Lepidoptera	Noctuidae <i>Spodoptera exigua</i> (Huebner)	+			+		7
	<i>Spodoptera littoralis</i> (Boisduval)				++		9
Thysanoptera	Thripidae <i>Frankliniella occidentalis</i> (Pergande) (Pergand)		++				8
	<i>Thrips palmi</i> Karny		+			+	7
	<i>Thrips tabaci</i> Lind.		++				9
Total		10	45	9	38	4	

+ = low number (1 to 3 individuals); ++ = midum no. (3 to 9 individuals); +++ = high no. (up to 9 individuals)

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