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SURVEY OF MAIN INSECT SPECIES ASSOCIATED WITH CERTAIN MEDICINAL AND AROMATIC PLANTS AT AWLAD-SAKR DISTRICT, SHARKIA GOVERNORATE

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ABSTRACT: The present study was conducted to survey the economic insect pests infesting some medicinal and aromatic plants *i.e.,* roselle (*Hibiscus sabdariffa* L.), thyme (*Thymus vulgaris* L.) and sweet basil (*Ocimum basilicum* L.) and their common associated natural enemies as well as pollinators and visitors at Awlad–Sakr district, Sharkia Governorate, Egypt during the two summer growing seasons 2015 and 2016. The results recorded that 29 insect species belongs to 25 families and 10 orders associated with the three studied medicinal and aromatic plants. Destructive insects comprised 17 species belongs to 15 families and 8 orders. Predaceous insects composed 8 species of 6 families and 5 orders. Parasitoids were represented by only one species on sweet basil. Results also cleared that pollinators and visitors included 3 species belong to 3 families and 2 orders. *Aphis gossypii* Glover, *Bemisia tabaci* (Genn.) and *Empoasca decipiens* (Paoli) were the most dominant insect pests on roselle, thyme and sweet basil plants. *A. gossypii* was the main insect pest on roselle exhibited by general total percentage of 38.19% in the two seasons and *B. tabaci* of 51.40% on thyme and *E. decipiens* of 60.48% on sweet basil. The main predaceous insect recorded on the three aforementioned plants was *Coccinella undecimpunctata* L., representing 72.53, 56.18 and 30.38%, respectively. Yellow sticky board trap proved to be the most effective method for collecting *E. decipiens, B. tabaci, Thrips tabaci* Lind.*, Musca domestica* L.*, C. undecimpunctata, Metasyrphus corollae* (Fabr.)*, Chelonus ininatus* L. and *Culiseta longiarolata* (Macq.)*,* while the sweeping net was the pest method for collecting *Cosmolyce baeticus* L.*, Nezara virdula* L.*, Aphis mellifera* L.*, Philanthus abdelkader* Luc. and *Egyptica legyptius*. Plant sampling technique was effective for estimating *A. gossypii* and *Iceria aegyptiac* Douglas.

Key words: Survey, destructive insects, parasitoid and predaceous insects, insect pollinators and visitors, plant samples, sweeping net, yellow sticky board trap, roselle, thyme, sweet basil.

INTRODUCTION

During the last few years, medicinal and aromatic plants attracted more attention and their economic importance increased in Egypt as exported agricultural products for several pharmaceutical and therapeutic purposes. Nowadays, the Government encourages the expansion in cultivation of the medicinal and aromatic plants in Egypt, such as roselle, thyme and sweet basil. Unfortunately, many destructive insect species may feed on these plants until physiological maturation stage and this inevitably leads to eventual loss in the quantity and quality of their products (Afsah, 2005; Banjo *et al*., 2006). Also, beneficial insects such as, predators, parasitoids, pollinators and visitors can play an important role that affecting productivity of these plants (Ali *et al*., 2009). A number of investigators have surveyed the

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insects existing on different medicinal and aromatic plants in Egypt (Ramadan, 1998; Ahmad, 1990; Ali, 1998; Hammad and Mohsen, 2000; Ismail, 2001; Abd El- Megid, 2007; Abd El-Moneim *et al*., 2011; Ismail *et al*., 2016). Therefore, the current study aims to survey the insect species associated with roselle, thyme and sweet basil plants such as insect pests, natural enemies, pollinators and visitors.

MATERIALS AND METHODS

The present work was conducted at Awlad-Sakr district, Sharkia Governorate, Egypt during the two summer growing seasons 2015 and 2016 to survey the insect pests and their associated natural enemies that existed on roselle (*Hibiscus sabdariffa* L.), thyme (*Thymus vulgaris* L.) and sweet basil (*Ocimum basilicum* L.) plants. An area of about 525 m^2 was prepared and divided into three equal parts. Each part was divided into three replicates (each about 58 m^2). The seeds of roselle, thyme and sweet basil plants were sown on the 1st of April in both growing seasons. The experimental area received normal agricultural practices and was not subjected to any chemical control application during the period of investigation

Sampling Techniques

Three sampling methods were used to survey and count insects inhabiting plants, namely plant sample, insect sweeping net and yellow sticky board trap.

Plant sample

Weekly samples of 20 leaves from each replicate of roselle and sweet basil plants were collected at random from different levels of plant height. In case of roselle plant, 20 randomized fruits were collected weekly from each replicate during fruiting and boll formation stages and continued to the harvest. While for thyme plant each sample consisted of 20 plants/ replicate (in the seedling stage) and 20 tillers/ replicate (in the vegetative growth stage). All the collected samples were kept in tightly closed paper bags and transferred to the laboratory for examination using a binocular microscope. The stages of insect species inhabited roselle, thyme and sweet basil were counted and recorded. The associated insect natural enemies in the collected samples were classified and counted.

Insect sweeping net

The insect sweeping net used was 30 cm in diameter and 70 cm in depth. Each weekly sample consisted of 20 double strokes. These samples were taken by walking diagonally across the experimental area. The caught insect species were transferred to plastic sacs containing piece of cotton saturated with ether for anesthetizing the collected insects. The plastic sacs were well tied and taken to the laboratory and samples were examined by the aid of binocular microscope and the number of each species was recorded.

Yellow sticky board trap

The yellow sticky board trap consists of wooden board (20 × 30 cm). This board was hanged on wooden rod with different heights to make the trap over plants by about 20 cm during the developmental period of plants. The sticky traps were changed weekly by new ones and the sticking insects were recognized, identified and counted.

RESULTS AND DISCUSSION

Destructive and Beneficial Insect Species Associated with Certain Medicinal and Aromatic Plants

Surveyed insect species inhabiting roselle, thyme and sweet basil plants are listed and arranged in Table 1 according to their orders and families concerning their scientific names, stage, feeding behaviour, site of occurrence and their host plant. Results revealed that 29 insect species belongs to 25 families and 10 orders were collected from the three medicinal and aromatic plants during the two seasons of the study. Destructive insects comprised 17 species belongs to 15 families and 8 orders. Predaceous insects compose 8 species of 6 families and 5 orders. Parasitoids were represented by only one species. Results also cleared that pollinators and visitors comprised 3 species belongs to 3 families and 2 orders. In general, it was observed that destructive species were more dominant than

Table 1. List of insects associated with certain medicinal and aromatic plants at Awlad-Sakr district, Sharkia Governorate during two summer growing seasons 2015 and 2016

Order	Family	Species	Stage	Feeding behaviour	Site of occurrence	Host plants
Homoptera	Aphididae	*Aphis gossypii* Glover	Nymphs+ adults	Destructive	Leaves	Roselle, sweet basil and thyme
	Aleyrodidae	*Bemisia tabaci* (Genn.)	Eggs+ adults	Destructive	Leaves+ fruits	Roselle, sweet basil and thyme
	Cicadellidae	*Empoasca decipiens* (Paoli)	Nymphs+ adults	Destructive	Leaves	Roselle, sweet basil and thyme
Hemiptera	Margarodidae	*Icerya aegyptiaca* (Douglas)	Nymphs+ adults	Destructive	Leaves+ fruits	Roselle
	Lygaeidae	*Oxycarinus hyalinipennis* (Costa)	Nymphs+ adults	Destructive	Fruits	Roselle
	Pentatomidae	*Nezara viridula* L.	Nymphs+ adults	Destructive	Leaves	Roselle, sweet basil and thyme
Lepidoptera	Noctuidae	*Spodoptera exigua* (Hb.)	Larvae+ adults	Destructive	Leaves	Roselle
		Sesamia cretica Led.	Adults	Destructive	Leaves	Roselle
	Lycaenidae	*Cosmolyce baeticus* L.	Larvae+adults	Destructive	Leaves	Roselle, sweet basil and thyme
	Gelechiidae	*Sitotroga cerealella* (Oliv.)	Larvae+ adults	Destructive	Leaves	Roselle, sweet basil and thyme
	Pyraustidae	*Ostrinia nubilalis* Hbn.	Adults	Destructive	Leaves	Roselle and sweet basil
Diptera	Culicidae	*Culiseta longiareolata* (Macq.)	Adults	Pollinator& visitor	Leaves	Roselle, sweet basil and thyme
	Muscidae	*Musca domestica* L.	Adults	Pollinator& visitor	Leaves	Roselle, sweet basil and thyme
	Syrphidae	*Metasyrphus corollae* (Fabr.)	Adults	Predator	Leaves	Roselle, sweet basil and thyme
		Egyptica legyptius	Adults	Predator	Leaves	Roselle, sweet basil and thyme
	Agromyzidae	*Liriomyza trifolii* (Burg.)	Adults	Destructive	Leaves	Sweet basil
Hymenoptera	Sphegidae	*Philanthus abdelkader* Luc.	Adults	Predator	Leaves	Roselle, sweet basil and thyme
	Apidae	*Apis mellifera* L.	Adults	Pollinator& visitor	Leaves	Roselle, sweet basil and thyme
	Formicidae	*Monomorium pharaonis* L.	Adults	Destructive	Leaves + fruits	Roselle and sweet basil
	Vespidae	*Polistes gallica* L.	Adults	Predator	Leaves	Roselle
	Braconidae	*Chelonus ininatus* L.	Adults	Parasitoid	Leaves	Sweet basil
Thysanoptera	Thripidae	*Thrips tabaci* Lind.	Nymphs+ adults	Destructive	Leaves	Roselle , sweet basil and thyme
Coleoptera	Curculionidae	*Sitona lividipes* Fab.	Adults	Destructive	Leaves	Roselle, sweet basil and thyme
	Coccinellidae	*Coccinella undecimpunctata* L.	Adults	Predator	Leaves	Roselle, sweet basil and thyme
		Scymnus punctillum Weise	Adults	Predator	Leaves	Sweet basil
Odonata	Agrionidae	*Ischnura senegalensis* Ramb.	Adults	Predator	Leaves	Roselle and sweet basil
Orthoptera	Acrididae	*Aiolopus strepens* (Latr.)	Adults	Destructive	Leaves	Sweet basil
		Eyprepocnemis plorans (Charp.)	Adults	Destructive	Leaves	Roselle, sweet basil and thyme
Neuroptera	Chrysopidae	*Chrysoperla carnea* Steph.	Adults	Predator	Leaves	Sweet basil

beneficial species including predators, parasitoids, pollinators and visitors on the tested plants during the two growing seasons of the study.

Similar trends were found by Abd El-Moneim and Abd El-Wahab (2006) who recorded fourteen phytophagous insect species and six insect predators on roselle plants. These results agree partially with those of Ali *et al.* (2009), who found that the destructive insects were more dominant than beneficial insects on cumin plants, while diverse trend was recorded on anise and caraway plants at Abanoub district, Assiut Governorate, Egypt during 2007 and 2008 growing seasons.

Survey and Relative Densities of Insect Pests

On roselle plants

Obtained results in Table 2 revealed that thirteen insect species belongs to thirteen families and seven orders were surveyed on roselle plants. The most dominant species were arranged descendingly according to their relative densities as follows: *Aphis gossypii* Glover, *Empoasca decipiens* (Paoli), *Bemisia tabaci* (Genn.), *Icerya aegyptiaca* (Douglas) and *Spodoptera exigua* (Hb.). *A. gossypii* was the major insect pest species constituting 16.05 and 64.38% of the total number of pests during 2015 and 2016 growing seasons, respectively by general total percentage of 38.19%, *E. decipiens* ranked second, representing 47.22 and 14.52% in the first and second seasons, alternatively by general total of 32.24%, followed by *B. tabaci* which recorded 34.89 and 7.57% during the two successive growing seasons, consecutively. The general relative densities of *I. aegyptiaca* and *S. exigua* were 0.03 and 0% during the first season and 6.18 and 6.18% during the second one by general total percentage of 2.85 and 2.83%, successively. Moreover, yellow sticky board trap proved to be the most effective method for collecting *E. decipiens* and *B. tabaci*, while plant sample was effective for estimating *A. gossypii* and *I. aegyptiaca*. The sweeping net was the pest method for collecting *Cosmolyce baeticus* and *Nezara viridula* L. Although *Oxycarinus hyalinipennis* (Costa) which was very injurious pest of the bolls showed relative densities of 0.36% in the first season and 0.60% in the second one.

The present results agree with the findings of Hammad and Mohsen (2000), Ismail (2001), Afsah (2005) and Ismail *et al*. (2010) who mentioned that *A. gossypii, T. tabaci, O. hyalinipennis, E. decipiens and E. insulana* were the most harmful insect pests on roselle plants.

On thyme plants

Nine insect species belongs to nine families and six orders were recorded on thyme plants as indicated in Table 3. The main caught insect species were *B. tabaci, E. decipiens, A. gossypii* and *T. tabaci*. *B. tabaci* was the most dominant species and comprised 52.10% of the total number of insect pests, followed by *E. decipiens, A. gossypii and T. tabaci* with values of 42, 2.85 and 2.65% in the first season of the study, respectively. Similar trends were found in the second season where the relative densities of *B. tabaci* was 48.86%, followed by *E. decipiens, A. gossypii* and *T. tabaci* which recorded 42.70, 2.56 and 0%, consecutively. Obtained results indicated that yellow sticky board traps were the most favourable technique for collecting *B. tabaci, E. decipiens* and *T. tabaci*, while plant samples were more effective for estimating aphids.

Similar results were obtained by Raich (1977), Legutowaska *et al*. (2005) and Mazhar *et al*. (2011) who recorded that thyme aphid, *A. serpylli* and *B. tabaci* were the main insect pest on thyme plants.

On sweet basil plants

As shown in Table 4, thirteen insect pest species belongs to twelve families and eight orders were recorded on sweet basil plants. The major insect species were *E. decipiens, B. tabaci, C. baeticus, Aiolopus strepens* (Latr.) and *A. gossypii* with densities of 60.79, 29.09, 3.12, 2.83 and 1.38% during the first season, while in the second season the relative densities of these

Table 2. Total number of insect pests recorded on roselle plants, using plant sample, sweeping net and yellow sticky board trap at Awlad-Sakr district, Sharkia Governorate during the two summer growing seasons 2015 and 2016

Insect species	2015					2016					General total	
	PS	SN	YSBT	Total number	RO (%)	PS	SN	YSBT	Total number	RO (%)	Number	RO (%)
Aphis gossypii **Glover (Homoptera: Aphididae)**	3987	0	0	3987	16.05	13514	0	0	13514	64.38	17501	38.19
Empoasca decipiens **(Paoli) (Homoptera: Cicadeliidae)**	114	1	11613	11728	47.22	136	0	2911	3047	14.52	14775	32.24
Bemisia tabaci **(Genn.) (Homoptera: Aleyrodidae)**	606	0	8059	8665	34.89	1314	0	274	1588	7.57	10253	22.37
Icerya aegyptiaca **(Douglas) (Hemiptera: Margarodidae)**	7	0	0	7	0.03	1298	0	0	1298	6.18	1305	2.85
Spodoptera exigua **(Hb.) (Lepidoptera: Noctuidae)**	0	0	0	0	0	0	0	1298	1298	6.18	1298	2.83
Thrips tabaci **Lind. (Thysanoptera: Thripidae)**	3	0	273	276	1.11	0	0	0	0	0	276	0.60
Oxycarinus hyalinipennis **(Costa) (Hemiptera: Lygaeidae)**	90	0	0	90	0.36	125	0	0	125	0.60	215	0.47
Cosmolyce baeticus **L. (Lepidoptera: Lycaenidae)**	4	22	5	31	0.12	0	37	9	46	0.22	77	0.17
Nezera viridula **L. (Hemiptera: Pentatomidae)**	5	12	6	23	0.09	1	14	6	21	0.10	44	0.10
Sitona lividipes **Fab. (Coleoptera: Curculionidae)**	0	2	4	6	0.02	6	2	24	32	0.15	38	0.08
Eyprepocnemis plorans (**Charp.) (Orthoptera: Acrididae)**	1	15	1	17	0.07	0	1	6	7	0.03	24	0.05
Sesamia cretica **Led. (Lepidoptera: Noctuidae)**	0	0	0	0	0	0	1	13	14	0.07	14	0.03
Monomorium pharaonis **L. (Hymenoptera: Formicidae)**	7	0	0	7	0.03	0	0	0	0	0	7	0.02
General total	4824	52	19961	24837	100	16394	55	4541	20990	100	45827	100

PS= Plant sample. SN = Sweeping net. YSBT= Yellow sticky board trap. RO (%) = Relative occuraence percentage.

Table 3. Total number of insect pests recorded on thyme plants, using plant sample, sweeping net and yellow sticky board trap at Awlad-Sakr district, Sharkia Governorate during the two summer growing seasons 2015 and 2016

Insect species	2015					2016					General total	
	PS	SN	YSBT	Total number	RO (%)	PS	SN	YSBT	Total number	RO (%)	Number	RO (%)
***Bemisia tabaci* (Genn.) (Homoptera: Aleyrodidae)**	95	12	3372	3479	52.10	26	0	871	897	48.86	4376	51.40
***Empoasca decipiens* (Paoli) (Homoptera: Cicadeliidae)**	6	22	2777	2805	42.00	12	3	769	784	42.70	3589	42.15
***Aphis gossypii* Glover (Homoptera: Aphididae)**	190	0	0	190	2.85	47	0	0	47	2.56	237	2.78
***Thrips tabaci* Lind. (Thysanoptera: Thripidae)**	0	0	177	177	2.65	0	0	0	0	0	177	2.08
***Cosmolyce baeticus* L. (Lepidoptera: Lycaenidae)**	2	0	3	5	0.07	0	26	38	64	3.49	69	0.81
***Sitona lividipes* Fab. (Coleoptera:Curculionidae)**	3	1	11	15	0.22	4	2	13	19	1.03	34	0.40
***Nezera viridula* L. (Hemiptera: Pentatomidae)**	0	0	2	2	0.03	0	17	8	25	1.36	27	0.32
***Sitotroga cerealella* (Oliv.) (Lepidoptera: Gelechiidae)**	0	0	4	4	0.06	0	0	0	0	0	4	0.05
***Eyprepocnemis plorans* (Charp.) (Orthoptera: Acrididae)**	1	0	0	1	0.01	0	0	0	0	0	1	0.01
General total	297	35	6346	6678	100	89	48	1699	1836	100	8514	100

Table 4. Total numbers of insect pests recorded on sweet basil plants, using plant sample, sweeping net and yellow sticky board trap at Awlad-Sakr district, Sharkia Governorate during the two summer growing seasons 2015 and 2016

Insect species	2015					2016					General total	
	PS	SN	YSBT	Total number	RO (%)	PS	SN	YSBT	Total number	RO (%)	Number	RO (%)
Empoasca decipiens **(Paoli) (Homoptera: Cicadeliidae)**	43	29	7569	7641	60.79	17	0	2224	2241	59.47	9882	60.48
Bemisia tabaci **(Genn.) (Homoptera: Aleyrodidae)**	167	0	3490	3657	29.09	49	0	1075	1124	29.83	4781	29.26
Cosmolyce baeticus **L. (Lepidoptera: Lycaenidae)**	4	374	14	392	3.12	0	312	7	319	8.47	711	4.35
Aiolopus strepens **(Latr.) (Orthoptera: Acrididae)**	0	135	221	356	2.83	0	0	0	0	0	356	2.18
Aphis gossypii **Glover (Homoptera: Aphididae)**	173	0	0	173	1.38	55	0	0	55	1.46	228	1.40
Thrips tabaci **Lind. (Thysanoptera: Thripidae)**	0	0	189	189	1.50	0	0	0	0	0	189	1.16
Nezera viridula **L. (Hemiptera: Pentatomidae)**	37	36	10	83	0.66	0	7	3	10	0.27	93	0.57
Sitona lividipes **Fab. (Coleoptera: Curculionidae)**	0	4	15	19	0.15	3	2	14	19	0.50	38	0.23
Eyprepocnemis plorans **(Charp.) (Orthoptera: Acrididae)**	2	16	6	24	0.19	0	0	0	0	0	24	0.15
Ostrinia nubilalis **Hbn. (Lepidoptera: Pyraustidae)**	0	10	5	15	0.12	0	0	0	0	0	15	0.09
Liriomyza trifolii (**Burg.) (Diptera: Agromyzidae)**	13	0	0	13	0.10	0	0	0	0	0	13	0.08
Sitotroga cerealella **(Oliv.) (Lepidoptera: Gelechiidae)**	0	3	1	4	0.03	0	0	0	0	0	4	0.02
Monomorium pharaonis **L. (Hymenoptera: Formicidae)**	4	0	0	4	0.03	0	0	0	0	0	4	0.02
General total	443	607	11520	12570	100	124	321	3323	3768	100	16338	100

insect pests were 59.47, 29.83, 8.47, 0 and 1.46%, alternatively.

Such findings are in agreement with those of Banjo *et al*. (2006) and Lubiarz *et al*. (2013) who reported that the insects found on sweet basil plant were belonged to Homoptera, Diptera, Coleoptera, Orthoptera and Lepidoptera. Amaar (2010) carried out ecological studies on certain pests infesting sweet basil at North Sinai and Giza Governorates. The author recorded that the main piercing sucking insect species on sweet basil were *A. gossypii, E. decipiens, T. tabaci, Tetranychus urticae* Koch and *Orius albidipennis.*

Survey and Relative Densities of Natural Enemies

As shown in Table 5, five predaceous species belonging to five families and four orders were recorded on roselle plants. These species were arranged descendingly according to their relative densities as follows: *Coccinella undecimpunctata* L., *Metasyrphus corollae* (Fabr.), *Ischnura senegalensis* Ramb., *Philanthus abdelkader* Luc. and *Polistes gallica* L., they represented by 66.23, 28.48, 3.97, 1.32 and 0% in the first season and by 78.03, 15.61, 0.58, 4.62 and 1.16% in the second season, alternatively. It is worthy to mention that the arrangement of the three last predaceous insects in the second season somewhat varied as compared with the first one. On thyme plants three predaceous species belonging to three families and three orders were recorded. *C. undecimpunctata* was the most dominant insect predator with densities of 45.76 and 76.67% and it followed by *M. corollae* with relative densities of 54.24 and 20.00% during the two successive seasons, respectively. On sweet basil seven predaceous insect species belonging to five families and five orders and only one parasitoid species were recorded. The main caught natural enemies were *C. undecimpunctata, Chelonus ininatus* L., *Egyptica legyptius* and *M. corollae* with values of 26.19, 25.60, 33.93 and 7.14% in the first season of the study, while the values were 38.04, 32.61, 0 and 22.83% in the second one, successively.

Several predaceous species were recorded by many other researchers on medicinal and aromatic plants, *e.g.,* Ali (1998) who found that *C. undcimpunctata, S. syriacus, C. vulgaris* and *Sarcophaga* sp. were associated with insect pests on mint and marjoram plants. Hammad and Mohsen (2000) recorded *C. undcimpunctata, S. interruptus, O. albidipennis, O. laevigatus, P. alfierii* and *M. corollae* as predatory insects on roselle plants. Ismail (2001) reported that *C. carnea, C. undecimpunctata, S. interrptus, P. alfierii* and *P. gallica* were the most important insect predaceous species on certain medicinal and aromatic plants. Afsah (2005) found that *C. carnea* was the main insect predator on roselle plants.

Survey and Relative Densities of Pollinators and Visitors

In Table 6 one pollinator species belong to 1 family and 1 order and two visitors belong to 2 families and 1 order were recorded on the three studied plants (roselle, thyme and sweet basil). According to their relative densities they represented on roselle plants as follows: *Culiseta longiareolata* (Macq), *Musca domestica* L. and *Apis mellifera* L. by 81.19, 14.26 and 4.55% in the first season as well as 95.05, 2.58 and 2.37%, in the second one, respectively. On thyme plants the densities of *C. longiareolate* and *M. domestica* recorded 94.93 and 4.38% in the first seasons, while in the second one they were 81.63, 12.11% followed by *A. mellifera* with low densities of 0.69 and 6.26%, respectively. On sweet basil *C. longireolate*, *A. mellifera* and *M. domestica* were presented by 76.63, 12.30 and 11.06% in the first season as well as 75.61, 16.29 and 8.11% in the second season, respectively.

Table 5. Survey and relative densities of some insect natural enemies on roselle, thyme and sweet basil plants, using plant sample, sweeping net and yellow sticky board trap at Awlad-Sakr district, Sharkia Governorate during 2015 and 2016 summer growing seasons

Host plant	Parasitoid and predaceous insect species	2015					2016					General total	
		PS	SN	YSBT	Total number	RO (%)	PS	SN	YSBT	Total number	RO (%)	Number	RO (%)
Roselle	*Coccinella undecimpunctata* L. (Coleoptera: Coccinellidae)	34	36	30	100	66.23	27	21	87	135	78.03	235	72.53
	Metasyrphus corollae (Fabr.) (Diptera: Syrphidae)	1	23	19	43	28.48	5	8	14	27	15.61	70	21.60
	Philanthus abdelkader Luc. (Hymenoptera: Sphegidae)	0	2	0	2	1.32	0	5	3	8	4.62	10	3.09
	Ischnura senegalensis Ramb. (Odonata: Agrionidae)	0	6	0	6	3.97	0	1	0	1	0.58	7	2.16
	Polistes gallica L. (Hymenoptera: Vespidae)	0	0	0	0	0	0	0	2	2	1.16	2	0.62
	General total	35	67	49	151	100	32	35	106	173	100	324	100
Thyme	*Coccinella undecimpunctata* L. (Coleoptera: Coccinellidae)	5	3	19	27	45.76	0	6	17	23	76.67	50	56.18
	Metasyrphus corollae (Fabr.) (Diptera: Syrphidae)	4	4	24	32	54.24	1	3	2	6	20.00	38	42.70
	Philanthus abdelkader Luc. (Hymenoptera: Sphegidae)	0	0	0	0	0	0	0	1	1	3.33	1	1.12
	General total	9	7	43	59	100	1	9	20	30	100	89	100
Sweet basil	*Coccinella undecimpunctata* L. (Coleoptera: Coccinellidae)	10	12	22	44	26.19	3	7	25	35	38.04	79	30.38
	Chelonus ininatus L. (Hymenoptera: Braconidae)	0	0	43	43	25.60	1	2	27	30	32.61	73	28.08
	Egyptica legyptius (Diptera: Syrphidae)	0	49	8	57	33.93	0	0	0	0	0	57	21.92
	Metasyrphus corollae (Fabr.) (Diptera: Syrphidae)	3	4	5	12	7.14	3	8	10	21	22.83	33	12.69
	Chrysoperla carnea Steph. (Neuroptera: Chrysopidae)	0	0	0	0	0	1	5	0	6	6.52	6	2.31
	Philanthus abdelkader Luc. (Hymenoptera: Sphegidae)	0	4	1	5	2.98	0	0	0	0	0	5	1.92
	Ischnura senegalensis Ramb. (Odonata: Agrionidae)	0	3	1	4	2.38	0	0	0	0	0	4	1.54
	Scymnus punctillum Weise (Coleoptera: Coccinellidae)	0	2	1	3	1.79	0	0	0	0	0	3	1.15
	General total	13	74	81	168	100	8	22	62	92	100	260	100

Table 6. Survey and relative densities of pollinators and visitors on roselle, thyme and sweet basil plants, using plant sample, sweeping net and yellow sticky board trap at Awlad-Sakr district, Sharkia Governorate during 2015 and 2016 growing seasons

Host plant	Pollinator and visitor insect species	2015					2016					General total	
		PS	SN	YSBT	Total number	RO (%)	PS	SN	YSBT	Total number	RO (%)	Number	RO (%)
Roselle	*Culiseta longiareolata* (Macq.) (Diptera: Culicidae)	74	42	2987	3103	81.19	77	20	4507	4604	95.05	7707	88.93
	Musca domestica L. (Diptera: Muscidae)	30	104	411	545	14.26	4	49	72	125	2.58	670	7.73
	Apis mellifera L. (Hymenoptera: Apidae)	1	148	25	174	4.55	0	83	32	115	2.37	289	3.33
	General total	105	294	3423	3822	100	81	152	4611	4844	100	8666	100
Thyme	*Culiseta longiareolata* (Macq.) (Diptera: Culicidae)	20	14	3131	3165	94.93	1	27	363	391	81.63	3556	93.26
	Musca domestica L. (Diptera: Muscidae)	4	15	127	146	4.38	0	10	48	58	12.11	204	5.35
	Apis mellifera L. (Hymenoptera: Apidae)	0	13	10	23	0.69	0	7	23	30	6.26	53	1.39
	General total	24	42	3268	3334	100	1	44	434	479	100	3813	100
Sweet basil	*Culiseta longiareolata* (Macq.) (Diptera: Culicidae)	36	21	2478	2535	76.63	5	58	1028	1091	75.61	3626	76.32
	Apis mellifera L. (Hymenoptera: Apidae)	22	348	37	407	12.30	0	212	23	235	16.29	642	13.51
	Musca domestica L. (Diptera: Muscidae)	13	51	302	366	11.06	7	36	74	117	8.11	483	10.17
	General total	71	420	2817	3308	100	12	306	1125	1443	100	4751	100

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حصـــر الآفـــات الحشـــرية الرئيســـية المـــرتبطـــة ببعـــض النبـــاتـــات الطبيـــة والعطـــريـــة بمنطقة أولاد صقر- محافظة الشرقية

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أُجريت هذه الدراسة بهدف حصر الآفات الحشرية الرئيسية التي تصيب نباتات الكركديه، الزعتر والريحان وكذلك أهم الأعداء الحيوية المصاحبة لها والملقحات الحشرية والحشرات الزائرة خلال الزراعة الصيفية في منطقة أولاد صقر بمحافظة الشرقية خلال موسمي ٢٠١٥ و ٢٠١٦، وقد أشارت النتائج إلى تسجيل ٢٩ نوع حشري تتبع ٢٥ عائلة و١٠ رتب حشرية علي الثلاث نباتات الطبية والعطرية محل الدراسة، تم تسجيل ١٧ نوع حشري تتبع ١٥ عائلة و٨ رتب كآفات حشرية، وتم أيضا تسجيل ٨ أنواع مفترسة تتبع ٦ عائلات و٥ رتب، وتم حصر طفيل حشري واحد على نباتات الريحان فقط خلال هذه الدراسة، أوضحت النتائج أيضاً وجود ثلاثة أنواع من الملقحات الحشرية الزائرة تتبع ٣ عائلات و٢ رتبة، وكان كلا من حشرة منّ القطن، الذبابة البيضاء ونطاط أوراق البطاطس هي أكثر الآفات الحشرية سيادة على كلا من نباتات الكركديه، الزعتر والريحان، تبين أن حشرة منَّ القطن كانت الآفة الرئيسية حيث تواجدت بنسبة ٣٨,١٩% من التعداد الكلى فى السنتين على نباتات الكركديه والذبابة البيضاء بنسبة ٥١,٤٠% علي نباتات الزعتر ونطاط أوراق البطاطس بنسبة ٦٠,٤٨% علي نباتات الريحان ، سُجل أبو العيد ذو الإحدى عشر نقطة كمفترس حشري رئيسي على الثلاث نباتات المشار إليها سابقاً مُسجلاً ٧٢,٥٣، ٥٦,١٨ و ٣٠,٣٨% من إجمالي المفترسات الحشرية المتواجدة على النباتات محل الدراسة على الترتيب، تعتبر المصائد اللاصقة الصفراء أفضل طريقة لجمع حشرات نطاط أوراق البطاطس، الذبابة البيضاء، تربس القطن، الذبابة المنزلية، أبوالعيد ١١ نقطة، ذبابة السرفس، طفيل البراكون وكذلك البعوض بينما شبكة جمع الحشرات تعتبر أفضل طريقة لجمع حشرات أبو دقيق البقوليات، البقة الخضراء، نحل العسل، ذئب النحل وكذلك المفترس الحشري *Egyptica legyptius*، وتعتبر العينات الخضرية أفضل طريقة لجمع حسرات من القطن والبق الدقيقي المصري.

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