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OCCURRENCE OF TRUE SPIDERS ASSOCIATED WITH CITRUS, APPLE, AND GRAPE FRUIT ORCHARDS AT ALEXANDRIA GOVERNORATE IN EGYPT

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ABSTRACT: *This study was carried out to determine the frequency of occurrence and the presence of true spiders associated with citrus, apple and grapefruit trees. This study was conducted at AL-Amriya district in Alexandria Governorate along two successive years 2013-2014. A total of 746 and 797 spiders of 25 species, 22 genera and 11 families were collected in 2013 and 2014, respectively from citrus, apple and grapefruit trees. The most dominant families with the largest number of species were: Salticidae and Theridiidae. While, the families: Agelenidae, Dictynidae, Gnaphosidae, Lycosidae, Miturgidae, Oonopidae, Philodromidae and Thomisidae including few species.*

Key words: *Araneida, fruit trees, incidence, true spiders, identification, biological control.*

INTRODUCTION

Spiders are one of the more diverse arthropod taxa, ranking seventh in global diversity, which makes them a fascinating group to study (Coddington and Levi, 1991). True spiders are worldwide distributed and occupy many ecological environments through agro-ecosystems. Taxonomists documented about 117 families, 4128 genera and 48086 species (World Spider Catalog, 2019).

True spiders are one of the most abundance predatory groups in terrestrial ecosystems. The importance of the community of the true spiders as a mortality factor, that they capture a greater number of prey species than they consume (Nyffeler *et al.,* 1992). 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). They occur with considerable densities in agro-ecosystems in the old land of the Delta and Middle Egypt (Ghabbour and Mikhail, 1993).

Ecological parameters and taxonomic importance of different species of spiders from fruit gardens, cotton fields, citrus and guava fruit gardens were investigated by many researchers (El-Hennawy, 1992; Sallam, 1996; Mohafez, 2004; Alvi, 2007; Maqsood, 2011).

This article aimed to explore the importance of the true spiders on citrus, apple and grape trees at AL-Amriya district in Alexandria Governorate.

MATERIALS AND METHODS

Individuals of the true spiders were randomly collected from citrus, apple and grape fruit trees and bushes included branches, leaves and trunks along two seasons 2013-2014 at AL-Amriya provinces in Alexandria Governorate. The samples were collected biweekly during two hours from 9-11 am during summer and 10-12 am in winter on fine silky traps. True spiders were collected from branches, leaves and trunks of different trees and bushes, by shaking five to six branches in their length between 100 to 150 cm from the four directions of a tree for each sample. The spiders were

isolated and counted in glasses and transferred in the same day to the laboratory at the Plant Protection Research Institute for counting and identification. The collected spiders were kept individually in small test tubes containing 70% ethyl alcohol. The necessary information (locality, host plant, 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. The samples were collected during two successive years (2013 and 2014) depending on the host plant (citrus from Jan. to Dec. but apple and grape from March. to Oct.).

The different spider families and species (members were counted) during all the investigation periods and classifies as mentioned before.

Identification of specimens was conducted with the aid of the descriptions of (Petrunkevitch, 1939; Kaston, 1978; Jocque and Dippenaar-Schoeman, 2007). Final identification was conducted by Mr. H. K. El-Hennawy, Characteristics of obtained families, genera and species were presented. In some cases, identification was possible only to the genus level.

Frequency of occurrence (F.O.) % =

$$\frac{\text{No of sample containing a species}}{\text{No of collected sample}} X100$$

Population fluctuation =

$$\frac{\text{No. of individual of a species}}{\text{No of sample contaning this species}}$$

RESULTS AND DISCUSSION

Distribution and occurrence of true spiders associated with some fruit orchards (citrus, apple and grape) in Al-Amiriyah location of Alexandria Governorate, was determined and presented in Tables (1, 2, 3).

1- Citrus plantations

The obtained data in Table (1) revealed that the collected spiders were 16 spider species belonging to 15 genera under 9 different families. The families as shown in Table (1) were Agelenidae, Dictynidae, Gnaphosidae, Lycosidae, Miturgidae, Oecobiidae, Philodromidae, Salticidae and Theridiidae. The highest abundant families in this study were observed for families, Salticidae and Theridiidae, as each of them harbored seven different species in them. The citrus plants harbored more abundant spiders during the second season 2014 more than the first season 2013, it record 284 and 312 individuals, respectively.

The salticid spiders on citrus trees were *Ballus piger*, *Euophrys* sp., and *Plexippus* sp., while theridiid spider species in this study associated with citrus plants were *Kochiura aulica, Enoplognatha deserta, Steatoda* sp. and *Theridion melanostictum.*

As shown in Table (1) the frequency of occurrence of the collected families, Dictynidae, Gnaphosidae, Lycosidae, Miturgidae, Oecobiidae, Philodromidae, Salticidae and Theridiidae during 2013 season on citrus plants were 58.33, 83.33, 100, 100, 100, 100, 100 and 100 % on citrus. On the other hand, the frequency of occurrence of Agelenidae, Dictynidae, Gnaphosidae, Lycosidae, Miturgidae, Philodromidae, Salticidae and Theridiidae on the same plantations were 33.33, 100, 100, 100, 100, 100, 100, 100 and 100 % during season 2014, respectively.

The highest number of spider individuals was recorded in the family Dictynidae (61 individuals) with 58.33 % of frequency , while the frequency of occurrence of spiders on Oecobiidae (20 individuals) was 100 during 2013 season; whereas during 2014 season the members of family Theridiidae was recorded the highest number (57

individuals) and the lowest number recorded of family Agelenidae was 17 individuals, with 100 and 33.33 % frequency, respectively.

Table (1). Occurrence and frequencies of spider families associated with citrus during 2013 - 2014 season at AL-Amriya in Alexandria Governorate

Families and species	2013				2014			
	T.s.	T.N.	P.D.	F.O. %	T.s.	T.N.	P.D.	F.O. %
Agelenidae (Koch)	-	-	-	-	17	4	4.25	33.3
Tgenaria sp.	-	-	-	-	17	4	4.25	33.3
Dictynidae Cambridge)	61	7	8.71	58.3	53	12	4.42	100
Dictyna sp.	61	7	8.71	58.3	53	12	4.42	100
Gnaphosidae (Pocock 1984)	23	10	2.3	83.3	35	12	2.92	100
Poecilochroa sp.	-	-	-	-	35	12	2.92	100
Zelotes sp.	23	10	2.3	83.3	-	-	-	-
Lycosidae (Sundevall)	31	12	1.55	100	29	12	4.20	100
Pardosa serena (kock)	-	-	-	-	29	12	4.20	100
Pardosa sp.	31	12	1.55	100	-	-	-	-
Miturgidae (Wager)	29	12	2.42	100	46	12	3.83	100
Cheiracanthium isiacum (Cambridge)	29	12	2.42	100	46	12	3.83	100
Oecobiidae (Blackwall)	20	12	1.67	100	-	-	-	-
Oecobius sp.	20	12	1.67	100	-	-	-	-
Philodromidae (Thorell)	23	12	1.92	100	25	12	2.68	100
Thanatus albini (Audouin)	23	12	1.92	100	25	12	2.68	100
Salticidae (Blackwall)	44	12	3.66	100	50	12	4.17	100
Ballus piger (O.P.Cambridge)	12	10	1.20	83.3	-	-	-	-
Euophrys sp.	22	12	1.83	100	50	12	4.17	100
Plexippus sp.	10	9	1.11	75	-	-	-	-
Theridiidae (Sundevall)	50	12	4.17	100	57	12	4.75	100
Kochiura aulica (kock)	10	9	1.11	75	-	-	-	-
Enoplognatha deserta Levy& Amitai	-	-	-	-	7	5	1.4	41.6
Steatoda sp. Levy& Amitai	16	10	1.6	83.3	25	12	2.08	100
Theridion melanostictum	24	12	2	100	25	10	2.5	83.3
Total number	281	89	-	-	312	88	-	-

T.s. : Total individuals of species; T. N.: Total No. of samples containing species;
P.D.: Population density; F.O. %: Frequency of occurrence.

Table (2). Occurrence and frequencies of spider families associated with apple during 2013 -2014 season at Al-amriya in Alexandria Governorate

Families and species	2013				2014			
	T.s.	T.N.	P.D.	F.O. %	T.s.	T.N.	P.D.	F.O. %
Agelenidae (Koch)	6	2	3.0	25.0	12	7	1.71	87.5
Tgenaria sp.	6	2	3.0	25.0	12	7	1.71	87.5
Dictynidae Cambridge)	20	4	5.0	50.0	17	7	2.43	87.5
Dictyna sp.	20	4	5	50.0	17	7	2.43	87.5
Gnaphosidae (Pocock 1984)	23	8	2.88	100	17	8	2.13	100
Drossades muscorum (O.P.Cambridge)	23	8	2.88	100	7	5	1.4	62.5
Zelotes sp.	-	-	-	-	10	8	1.25	100
Lycosidae (Sundevall)	9	5	1.8	62.5	8	6	1.33	75.0
Pardosa serena (kock)	4	3	1.33	37.5	-	-	-	-
Pardosa sp.	2	2	1	25	6	5	1.2	62.5
Pirata proximus (O.P.Cambridge)	3	3	1	37.5	2	2	1	25
Miturgidae (Wager)	7	2	3.5	25	7	3	2.33	37.5
Cheiracanthium isiacum (Cambridge)	7	2	3.5	25	7	3	2.33	37.5
Oonopidae (Simon)	11	4	2.75	50.0	7	3	2.33	37.5
Dysderina scutata (O.P.Cambridge)	11	4	2.75	50.0	7	3	2.33	37.5
Philodromidae (Thorell)	13	7	1.86	87.5	19	6	3.17	75.0
Philodromus sp.	7	6	1.16	75	11	8	1.37	100
Thanatus albini (Audouin)	6	5	1.2	62.3	8	7	1.14	87.5
Salticidae (Blackwall)	20	8	2.50	100	16	5	3.2	62.5
Ballus pigr (O.P.Cambridge)	7	5	1.4	62.3	5	5	1	62.5
Euophrys sp.	-	-	-	-	3	2	1.5	25
Plexippus paykulli Audouin	6	6	1.	75	4	3	1.33	37.5
Plexippus sp.	4	3	1.33	37.5	3	2	1.5	25
Salticus sp.	3	2	1.5	25	1	1	1	12.5
Theridiidae (Sundevall)	27	8	3.38	100	21	8	2.63	100
Kochiura aulica (kock)	20	8	2.5	100	11	8	1.37	100
Enoplogna thadeserta Levy& Amitai	3	3	1	37.5	-	-	-	-
Steatoda sp	-	-	-	-	10	7	1.42	87.5
Theridion melanostictum	4	3	1.33	37.5	-	-	-	-
Thomisidae (Sundevall)	12	5	2.4	62.5	17	8	2.13	100
Misumena sp.	12	5	2.4	62.5	-	-	-	-
Thomisus spinifer O.P.Cambridge	-	-	-	-	17	8	2.13	100
Total number	137	49	-	-	134	58	-	-

T.s. : Total individuals of species; T. N.: Total No. of samples containing species;
P.D.: Population density; F.O. %: Frequency of occurrence.

Table (3). Occurrence and frequencies of spider families associated with grape during 2013 -2014 season at Al-amriya in Alexandria Governorate

Families and species	2013				2014			
	T.s.	T.N.	P.D.	F.O. %	T.s.	T.N.	P.D.	F.O. %
Agelenidae (Koch)	43	8	5.37	100	64	8	8.0	100
Tgenaria sp.	43	8	5.37	100	64	8	8.0	100
Dictynidae Cambridge)	31	7	4.43	87.5	22	8	2.75	100
Dictyna sp.	31	7	4.43	87.5	22	8	2.57	100
Gnaphosidae (Pocock 1984)	60	8	7.50	100	70	8	8.75	100
Poecilochroa sp.	32	8	4	100	28	8	3.5	100
Zelotes sp.	28	8	3.5	100	42	8	5.25	100
Lycosidae (Sundevall)	35	7	5.0	87.5	20	6	3.33	75.0
Pardosa sp.	35	7	5.0	87.5	20	6	3.33	75.0
Miturgidae (Wager)	20	8	2.50	100	23	8	2.88	100
Cheiracanthium isiacum(Cambridge)	20	8	2.50	100	23	8	2.88	100
Oecobiidae (Blackwall)	16	6	2.67	75.0	17	5	3.40	62.5
Oecobius putus (O.P.Cambridge)	16	6	2.67	75.0	17	5	3.40	62.5
Oonopidae (Simon)	18	8	2.25	100	16	6	2.66	75.0
Dysderina scutata (O.P.Cambridge)	18	8	2.25	100	16	6	2.66	75.0
Philodromidae (Thorell)	22	6	3.66	75.0	37	8	7.40	62.5
Thanatus albini (Audouin)	22	6	3.66	75.0	37	8	7.40	62.5
Salticidae (Blackwall)	28	5	5.60	62.5	27	8	3.38	100
Plexippus paykulli Audouin	28	5	5.60	62.5	20	8	2.5	100
Plexippus sp.	-	-	-	-	7	5	1.4	62.5
Theridiidae (Sundevall)	55	8	6.88	100	33	8	4.13	100
Kochiura aulica (Kock)	22	8	2.75	100	15	8	1.87	100
Steatoda sp.	17	8	2.12	100	-	-	-	-
Theridion melanostictum	16	8	2	100	18	8	2.25	100
Thomisidae (Sundevall)	-	-	-	-	22	5	4.4	62.5
Misumena sp.	-	-	-	-	22	5	4.4	62.5
Total number	328	71	-	-	351	78	-	-

T.s. : Total individuals of species; T. N. : Total No. of samples containing species;
P.D. : Population density; F.O. % : Frequency of occurrence.

2-Apple plantations

The obtained results in Table (2) proved that the collected spiders were 22 spider species belonging to 20 genera under 10 families. The families were Agelenidae, Dictynidae, Gnaphosidae, Lycosidae, Miturgidae, Oonopidae, Philodromidae, Salticidae, Theridiidae and Thomisidae.

The number of collected spiders associated with apple orchard was 137 and 134 individuals during the first and second season, respectively. The dominant spider families and the frequency of occurrence at Al-Ameria region was determined for the members of the spider families Gnaphosidae, Salticidae and Theridiidae and recorded 100 %, but the lowest frequency was determined for the families Agelenidae and Miturgidae (25 %).

The highest abundance of the true spiders was recorded for the members of family Theridiidae as it represented by 27 and 21 spider individuals during the first and second season, respectively. Whereas , the lowest population for the family Agelenidae was 6 individuals during 2013 season and for the family Miturgidae was 7 individuals in the second year 2014.

3- Grape plantations

The obtained results in Table (3) indicated that the collected spiders were 15 spider species belonging to 14 genera under 11 families. The families were Agelenidae, Dictynidae, Gnaphosidae, Lycosidae, Miturgidae, Oecobiidae, Oonopidae, Philodromidae, Salticidae, Theridiidae and Thomisidae. The numbers of spider individuals associated with grape trees were 328 and 351 individuals during the first and second season, respectively.

As for the values of population and frequencies of occurrence of different true spiders during season 2013 of grape plantations, it can be noticed that the highest frequencies were recorded for the members of families Gnaphosidae followed by Theridiidae and Agelenidae represented by 60, 55 and 43 spider individuals, respectively, but individuals of family Oecobiidae was recorded the lowest frequencies represented by 18 spider individuals. While, in season 2014 the highest abundance of the collected spider was for the members of family Gnaphosidae (70 individuals), the highest frequency was determined for the members of families: Agelenidae, Dictynidae, Gnaphosidae, Miturgidae, Salticidae and Theridiidae (100 %).

The obtained results are in harmony with that conducted by Ghabbour *et al.* (1999) who surveyed spiders in 18 different crops in Menoufiya governorate, using pitfall traps, and recorded 10 spider families on winter crops, where Lycosidae was the dominant family constituting about 80% followed by Linyphiidae, Philodromidae, Gnaphosidae and Tetragnathidae.

In addition, similar results were obtained by (El-Hennawy, 1992; Sallam, 1996; Mohafez, 2004; Alvi, 2007; Maqsood, 2011).

REFERENCES

Alvi, Z. H. (2007). Taxonomical and ecological studies of spiders from some fruit gardens of district Jhang, M. Phil. Thesis (Unpublished), Dept. Zoology, Govt. College Univ., Faisalabad.

Coddington, J. A. and H. Levi (1991). Systematics and evolution of spiders (Araneae). Annual Review of Ecology, Evolution, and Systematics, 22: 565-592.

El-Hennawy, H.K. (1992). Distribution of Spider Genera in Egypt (Arachnida: Araneida). Serket 3(1): 1-32.

Ghabbour, S. I. and W. Z. A. Mikhail (1993). Habitat classification using soil fauna populations. Publications of the National Biodiversity Unit No.1, 203-236.

Ghabbour, S. I., A. M. Hussein and H. K. El-Hennawy (1999). Spider populations associated with different crops in Menoufiya Governorate, Nile

Delta, Egypt. Egypt. J. Agric. Res., 77 (3), 1163-1179.

Jocqué, R. and A. S. Dippenaar-Schoeman (2007). Spiders families of the world. Belgium, Peteers nv, Royal Museum for Central Africa, 336pp.

Kaston, B.J. (1978). How to know the spider. W.C. Brown Co., Dubuque, Iowa, U.S.A., 272pp.

Maqsood, I. (2011). Taxonomical and ecological studies of spiders from the citrus and guava fruit gardens of district Faisalabad, Pakistan, M. Phil. Thesis Unpublished, Dept. of Zoology, Govt., College Univ. Faisalabad, Pakistan.

Mohafez, M. A. M. (2004). Ecological and biological studies on spiders in Egypt. Ph.D. Thesis, Fac. Agric. Al-Azhar Univ., 178 pp.

Nyffeler, M., D. A. Dean and W. L. Sterling (1992). Diets, feeding specialization and predatory role of two lynx spiders, *Oxyopes salticus* and *Peucetia viridans* (Araneae: Oxyopidae), in a Texas cotton agro ecosystems. Environ. Entomology, (21): 1457-1465.

Petrunkevitch, A. (1939). Catalogue of American spiders. Part one. Transactions of the Connecticut Academy of Arts and Sciences, 33: 133-338.

Sallam, G.M.E. (1996). Studies on true spiders in Giza Governorate. M.Sc. Thesis, Fac. Agric. Cairo Univ., 139pp.

World Spider Catalog. (2019). Natural History Museum Bern, online at http://wsc.nmbe.ch, version 20.0, accessed on [Accessed Feb. 2018].

تواجد العناكب الحقيقية المرتبطة ببساتين الموالح والتفاح والعنب بمحافظة الإسكندرية بمصر

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الملخص العربى

تم دراسة تتابع التواجد للعناكب الحقيقية المرتبطة على أشجار الموالح والتفاح والعنب فى منطقة العامرية بمحافظة الإسكندرية على مدار موسمين متتاليين ٢٠١٣، ٢٠١٤. و تم جمع ٧٤٦، ٧٩٧ عنكبوت تابعة ل ٢٥ نوع و ٢٢ جنس و ١١ عائلة في عامي ٢٠١٣، ٢٠١٤ على التوالي على كل من الموالح والتفاح والعنب. وكانت أكثر العائلات تواجداً عائلة Salticidae، Theridiidae. بينما كانت العائلات الأقل تواجداً هى Agelenidae، Dictynidae، Gnaphosidae، Lycosidae، Miturgidae، Oonopidae، Philodromidae، Thomisidae.

السادة المحكمين

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