

## RURAL DWELLINGS AS PROTECTING REFUGES TO SPIDER BIODIVERSITY IN NILE DELTA AGRO-ECOSYSTEMS

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### ABSTRACT

The visual search and hand picking sampling method was used to collect a total of 168 individuals representing 12 families of spiders from dwellings of 3 villages in Menoufiya Governorate. The dominant families were : Salticidae 47 % of the studied collected spiders, followed by Theridiidae and Pholcidae 13 %, Agelenidae 6.6 % and Miturgidae 6 %. The identified species of these families were : *Hasarius adansoni* and *Plexippus paykulli* (Salticidae), *Theridion* spp. (Theridiidae), *Tegenaria* spp. (Agelenidae). The rare families obtained in this study were :Philodromidae, Oecobiidae, Pisauridae and Filistatidae which represented by one or two individuals. Four families of spiders were only found in dwellings habitat : Pholcidae, Pisauridae, Oecobiidae and Filistatidae. Eight families of spiders occurred in both habitats, dwellings and agroeco-systems, with considerable differences in percentages of occurrence. Hence farmer houses could be considered as protecting refuges to spiders against ecological impacts such as intensive use of pesticides.

### INTRODUCTION

The importance of spiders as biological control agents in their environments is well known for their role as predators against different pests. They occur in wide variety of habitats (Alderweireldt and Maelfait, 1989), and they are the most abundant polyphagous predators among natural enemies (Rubia and Heong, 1990). Spiders in farmer homes may play an important role against some insects e.g. house flies, mosquitoes, weevils, cockroaches and moths that attracted to the lights from nearby farms. Spiders are important also because of their ability to adapt themselves in the new habitats.

Moritz and Pfuller (1988a) reported that the spider *Achaearanea nipponica* (Theridiidae) has become a junior synonym and it is presumed to be a widely introduced synanthropic species. Hancock (1992) studied the different species of Pholcid spiders in the dwelling of Scotland. Miyashita (1987) studied density and biology of a Theridiidae spider in a house in Japan. Palacios and Jimenez (1997) recorded 2 species of spiders *Heteropoda venatoria* and *Latrodectus mactans* as natural enemies for cockroaches in dwellings of La Paz City, Mexico. Moritz and Pfuller (1988b) collected *Achaearanea tabulata* (Theridiidae) which is first record in dwellings of Berlin in 1984 as well as Europe. Jemings and McDaniel (1988) recorded that a female of *Latrodectus hesperus* (Theridiidae) was introduced to Maine (USA) from Arizona among household goods. They added that a nucleus of a breeding population was formed in the Maine dwellings. Hutchinson and Belanger (1999) collected some spiders in houses, they gave a list of spiders of homes in Canada e.g. *Cheiracanthium* spp., *Pholcus* spp., *Tegenaria domestica* and *Salticus* spp.

Tanaka (1989) studied the seasonal occurrence of *Achaearanea tepidariorum* in Japan. It was reported that it is the common species frequently associated with human dwellings.

The aim of this study is to throw light on the occurrence of spider fauna in dwellings of rural area in Menoufiya Governorate. No survey of the spiders in dwellings in Egypt has been conducted before (El-Hennawy, 2002).

## MATERIALS AND METHODS

Collecting spiders by visual search and hand picking (using a glass tube) ACCORDING TO El-Hennawy (1991) was used to collect wandering spiders or the web spinning ones from the studied houses from 3 villages : El-Moselha, Kafr El-Moselha and El-Raheb, about 2 km each, away from Shebein El-Kom, the main city of Menoufiya Governorate. The villages represent a rural area surrounded by farms cultivated by different vegetables and field crops. The houses were built of old raw mud bricks. The owners are the farmers who take care of their cattle in a special space inside the same dwellings. Sampling was carried out from all the rooms of houses, especially the stores of food stuff materials. Catching mainly concentrated from the above or top corners near the ceilings. Samples were directly preserved in 70 % ethyl alcohol collected samples as were carefully inspected using stereomicroscope and the spiders were directly investigated. Samples collected in November 1998, February, May, August, October, November 1999 and March 2000. Identification was carried out according to (El-Hennawy, 1998).

## RESULTS AND DISCUSSION

Results of Table 1 showed that the population of dwelling spiders is represented by 12 families : Lycosidae, Linyphiidae, Philodromidae, Gnaphosidae, Miturgidae, Salticidae, Theridiidae, Agelenidae, Pholcidae, Filistatidae, Pisauridae and Oecobiidae.

Salticidae is the main dominant family (Fig. 1). Two species belongin to this family were identified, *Hasarius adansoni* and *Plexippus paykulli*. Salticidae represent 47 % of the whole population. Theridiidae and Pholcidae recorded similar values of 13 % of the spider population, followed by Gnaphosidae 10 %, Agelenidae 6.45 % and Miturgidae 6 % of the whole studied population. *Tegenaria* is the main genus belonging to the family Agelenidae and *Cheiracanthium* is the dominant genus of Miturgidae. *Theridion* is the main genus of Theridiidae.

The rarest families were : Pisauridae, Oecobiidae, Linyphiidae, Philodromidae and Lycosidae which occurred with a low percentage of 0.6 % for each. *Oecobius putus* is the dominant species of Oecobiidae family. *Thanatus* was the only one identified among philodromid spiders.

The four characteristic families for such habitats are: Pholcidae, Filistatidae, Pisauridae, and Oecobiidae. They never occurred in agroecosystems in the same area, according to Ghabbour *et al.* (1999) and Hussien (1999), who

studied the spider fauna associated with 18 filed and vegetable crops cultivated around these studied houses using pitfall traps. Agelenidae occurred in both habitats, but it was represented by the genus *Tegenaria* in dwellings, and with *Textrix* in agro-ecosystems.

The two species of Salticidae family: *Hasarius adansoni* and *Plexippus paykulli*, also never occurred in agro-ecosystems, while the other two species *Thanatus* spp. (Philodromidae) and *Cheiracanthium* spp. (Miturgidae) occurred in both habitats. Jimenez (1998) studied composition of arachnid fauna in 32 houses in Mexico; 42 species of Araneae were collected. Most of the collected species belonged to the families Ganaphosidae 12 %, Miturgidae 10 %, Theridiidae, Salticidae and Pholcidae 6 % for each. The species *Plexippus paykullii* represented 10 %, which is described as resident in houses.

Strickman *et al.* (1997) studied *Grossopriza lyoni* (Pholcidae) as a common inhabitant of homes in the rural village in Thailand. The results of the study suggested that *C. lyoni* could form an important component of integrated control of *Aedes aegypti* mosquito. Edwards (1993) recorded presence of *C. lyoni* as a new species of cellar spiders in Florida, USA.

Ghabbour *et al.* (1999) and Hussein (1999) recorded that Lycosidae family was the main dominant family representing 82 % of the spider populations in the agroecosystems. This study showed that this family is a rare one with only 0.6 % of the whole population. This result may be due to the difference in habitats and in nature of spider species or families.

According to Hussein (1999) the sex ratio as (females : males) was 1 : 2.6 in the agro-ecosystems nearly the same studied area (Menoufiya), while this study showed sex ratio in dwellings was 1 : 7. The percentage of juveniles in agro-ecosystems showed 26 %, a near or similar ratio as their percentage in dwellings, being 28.6 % of the whole of the population (Table 2). Hussein *et al.* (1998) studied spiders families and species in western desert of Egypt. It was reported that Lycosidae and Philodromidae were common, while Theridiidae and Thomisidae were rare families.

Comparison of spider families in dwellings with those of vegetable plantation fields in the same Governorate and those of desert ecosystems, showed that spiders of dwelling characterize for such habitat. These studies showed that the dominant spiders families in agro-ecosystems are extremely rare in dwellings, e.g., Lycosidae and Philodromidae. On the contrary, Salticidae was the rarest in vegetable plantations while it was the dominant one in dwellings (Fig. 1).

Finally four families were only found in dwelling habitats : i.e. Pholcidae, Pisauridae, Oecobiidae and Filistatidae. The family Gnaphosidae was the only one occurred almost equally in both habitats, houses and plantations. At any rate, if the two habitats harbour different species, some are common for both. This does not preclude the fact that human dwellings constitute an effective refuge for spider biodiversity within the region as a whole.

Table (1) : Incidence of spider families and species inhabiting different habitats in Menoufiya Governorate.

Plantations*	Dwellings
Lycosidae <i>Lycorma ferox</i>	Lycosidae
Linyphiidae <i>Erigone dentipalpis</i> <i>Prinerigone vagans</i> <i>Erigone</i> spp.	Linyphiidae
Philodromidae : <i>Thanatus albini</i>	Philodromidae : <i>Thanatus albini</i>
Gnaphosidae <i>Zelotes</i> complex <i>Trachyzelotes</i> sp. <i>Setaphis subtilis</i> <i>Micaria</i> sp.	Gnaphosidae
Miturgidae <i>Cheiracanthium</i> sp.	Miturgidae
Dictynidae	
Salticidae	Salticidae : <i>Hasarius adansoni</i> <i>Plexippus paykulli</i>
Theridiidae	Theridiidae : <i>Theridion</i> sp.
Dysderidae <i>Dysdera</i> sp.	
Agelenidae <i>Textrix</i> sp.	Agelenidae <i>Tegenaria</i> sp.
Titanoecidae <i>Titanoeca</i> sp.	
	Pholcidae
	Filistatidae
	Pisauridae
	Oecobiidae : <i>Oecobius putus</i>

\* According to Ghabbour et al. (1999) and Hussein (1999).

Table (2) : Total numbers of spider families and species obtained from dwellings of studied rural houses.

Date	Total No.	Spider family	M	SM	F	SF	J	Species
Nov. 1998	2	Salticidae		1		1		<i>Hasarius sp.</i> <i>Plexippus sp.</i>
Feb. 1999	14	Agelenidae		1			2	<i>Tegenaria sp.</i>
		Gnaphosidae		1				
		Pholcidae					2	
		Salticidae	1		1		1	<i>Hasarius adansoni</i> <i>Plexippus paykulli</i>
		Theridiidae	2		2	1		<i>Theridion sp.</i>
May 1999	25	Agelenidae			3			<i>Tegenaria sp.</i>
		Filistatidae			1			
		Pholcidae	3		3		3	
		Salticidae	2		1	1		<i>Hasarius adansoni</i> <i>Plexippus paykulli</i>
		Theridiidae	2				3	
		Theridiidae	1		2			
Aug. 1999	22	Agelenidae					2	<i>Tegenaria sp.</i>
		Filistatidae					1	
		Pholcidae		1				
		Pisauridae		1				
		Salticidae	1			1	1	<i>Hasarius adansoni</i> <i>Plexippus paykulli</i>
		Theridiidae	3	1	9	1	1	<i>Theridion sp.</i>
		Theridiidae	1	1	1			
Oct. 1999	16	Agelenidae			1		1	<i>Tegenaria sp.</i>
		Miturgidae					1	<i>Cheiracanthium sp.</i>
		Oecobiidae			1			<i>Oecobius putus</i>
		Pholcidae	2		1		5	
		Salticidae			1			<i>Hasarius adansoni</i> <i>Plexippus paykulli</i>
		Salticidae			2			
Nov. 1999	39	Gnaphosidae	6		1		3	
		Pholcidae			1		1	
		Salticidae	5	1	2	1	3	<i>Hasarius adansoni</i>
		Theridiidae	3	1	2	1	2	<i>Plexippus paykulli</i>
		Theridiidae	1		4	1		
Mar. 2000	50	Miturgidae	3		3		9	<i>Cheiracanthium sp.</i>
		Gnaphosidae			1			
		Linyphiidae	1					
		Lycosidae					1	<i>Thanatus sp.</i>
		Philodromidae	7		3		1	<i>Hasarius adansoni</i>
		Salticidae	2		5		5	<i>Plexippus paykulli</i>
		Theridiidae			9			

M : Male. SM : Sub adult male. F : Female. SF : sub adult female. J. Juvenile

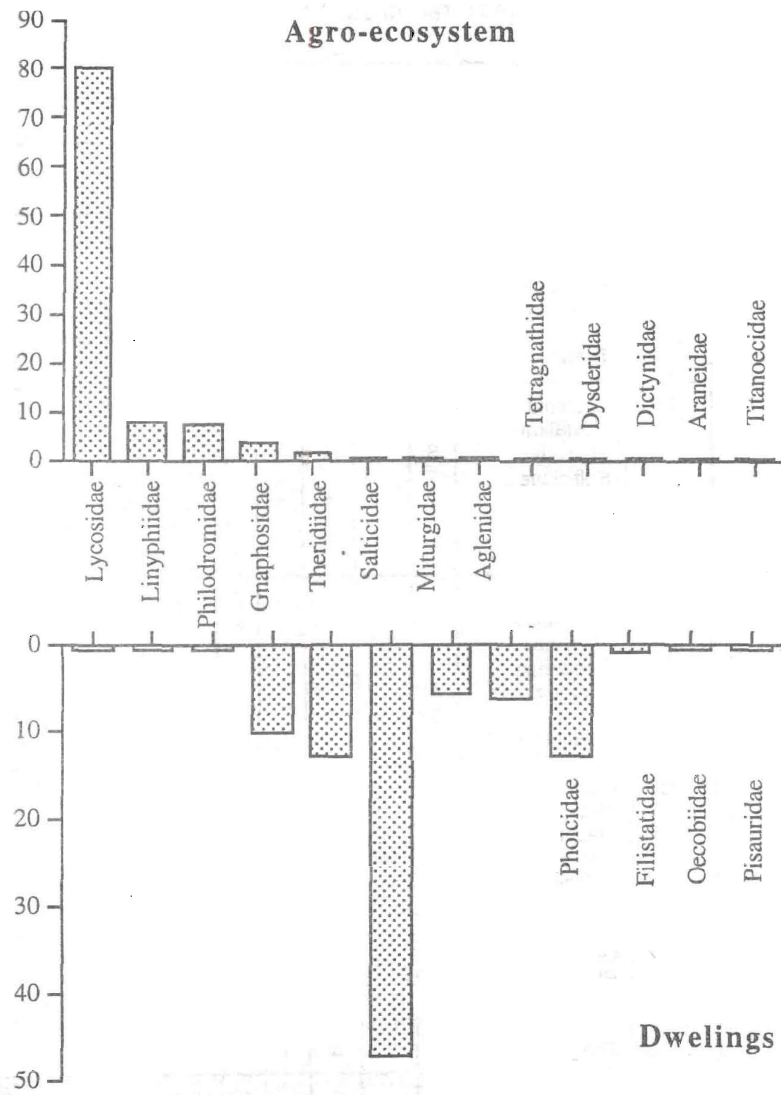


Fig. (1) : Percentages of spider families among the whole population in both agro-ecosystem and dwellings in the study area.

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المنازل الريفية كملاجيء تحمي تنوع العناكب فى النظم الزراعية بدلتا النيل - مصر  
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معهد بحوث وقاية النباتات - مركز البحوث الزراعية - القاهرة

تم بطريقة البحث والالتقاط اليدوى أخذ عينات من عناكب المنازل الريفية من ٣ قرى بالمنوفية بمصر وأظهر البحث أن التنوع الأحيائى لهذه العناكب يشمل ١٢ عائلة هي :  
*Lycosidae, Linyphiidae, Philodromidae, Miturgidae, Clubionidae, Salticidae, Theridiidae, Agelenidae, Pholcidae, Filistatidae, Pisauridae* and *Oecobiidae*.

وأن العائلة السائدة والأكثر تواجد هي " *Salticidae* " وتشمل ٤٧ % من مجتمع العناكب تحت الدراسة يليها عائلتي *Theridiidae* و *Pholcidae* بنسبة ١٣ % ثم *Gnaphosidae* بنسبة ١٠ % من المجتمع الكلى لعناكب المنازل .  
وإبتداءً إلى دراسات متزامنة (للمؤلفين) ١٩٩٩ لمسح العناكب فى زراعات الخضار والمحاصيل الحقلية الملاصقة والمحيطه بهذه المنازل الريفية إتضح أن :  
١. هناك أربع عائلات فقط لم نجدها الا فى المنازل الريفية وهى :

*Pholcidae, Filistatidae, Pisauridae* and *Oecobiidae*

٢. تشترك ٨ عائلات (من جملة ١٢ عائلة) فى تواجدها فى كلتا البيئتين (المنازل الريفية و (المزارع المحيطة ) ولكن بنسب مختلفة ، فعائلة *Lycosidae* توجد بنسبة سائدة فى المزارع تصل إلى ٨٢ % (حسين ١٩٩٩) لكنها تتواجد تتواجد فى المنازل بنسبة ضئيلة (٠,٦ % ) كما أظهرت هذه الدراسة .

٣. العائلة *Gnaphosidae* تتواجد بنسبة محسوسة ومتوازنة فى كلتا البيئتين ١٠,١ % و ٣,٥ % فى المنازل والمزارع على الترتيب .

٤. وهكذا فإن المنازل الريفية يمكن إبتبارها مأوى يحمى العناكب ضد الضغوط البيئية مثل الاستخدام المفرط للمبيدات الذى قد يضر بهذه المفترسات الهامة لمعظم حشرات وأفات المزارع المحيطة .