

## EVALUATION THE EFFICACY OF SAMPLING METHODS FOR SURVEY SPIDERS AT KAFR EL-SHEIKH GOVERNORATE RICE NURSERIES.

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### ABSTRACT

An experiment was carried out at the farm of Sakha Agricultural Research Station, Kafr El-Sheikh governorate in 2014 and 2015 seasons. The objective was to study population fluctuations of the spiders and evaluation the efficacy of sampling methods for survey spiders at rice nursery. Specimens were collected from rice nursery by pitfall trap, water pan trap and sweep net were taken to the laboratory after labeling. All samples were taken during April and the first week of May. A total of 346 individuals belonging to 12 species and 8 families were recorded during the study period. The population density of family Tetragnathidae was found highest (28 individuals) followed by linyphiidae (20 individuals) in the first season. While in the second season the population density of family Linyphiidae was found highest (247 individuals) followed by Lycosidae (29 individuals). Indicated that the water pan trap the highest efficacy trap and trapped 51.47% followed by pitfall trap 27.94% , meanwhile sweep net trap ranked the last category and represented by 20.58% during the first season. While the pitfall trap the highest efficacy trap and trapped 45.87% followed by water pan trap 40.26%, while sweep net trap came in the last category with 13.86% in the second season.

**Keywords:** Tetragnathidae, linyphiidae, rice nursery.

### INTRODUCTION

Spiders are one of the most abundant predatory groups in the terrestrial ecosystems. They feed on insects and some other arthropods. Therefore, they can play important roles in pests control. About 35,000 species of spiders have been identified in the world. (Ghavami et al. 2007)

In Egypt, Sherif *et al.* (2001). surveyed eleven spiders species belonging to six families, i. e. Araneidae, Salticidae, Clubionidae, Theridiidae, Tetragnathidae and Philodromidae and all identified species are recorded for the first time in rice fields. In Egypt, Hendawy (2004). surveyed thirteen species of orb-weaver spiders from rice fields. three of which are recorded three of spiders for the first time, *Argiope near gibberosa*, *Tetragnatha Javana* and *T. jaculator*. The population fluctuations of the common four genera (*Tetragnatha*, *Araneus*, *Argiope* and *Singa*) were monitored. In India, the highest numbers of species were recorded for Salticidae and Araneidae followed by Lycosidae and Tetragnathidae. Clubionidae, Eresidae, Thomisidae and Pisauridae were represented by one species each. Among the spiders, lycosids and tetragnathids were dominant in all locations. Spider populations were higher in paddy fields than in rice nurseries. *Pardosa* sp. and *Tetragnatha* sp. belonging to Lycosidae and Tetragnathidae were the most dominant spider species.

(Sudhikumar *et al.* 2004; Vijay and Patil 2004)

In Pakistan, The relative abundance of *Lycosa pseudoannulata* was found highest followed by *Arctosa himalayensis* in rice fields followed by *Araneus inutus* and *Tetragnatha mandibulata*. Recorded Three new species of family Lycosidae; *Lycosa terrestris*, *Lycosa nigricans* and *Lycosa maculate*. (Khan, 2006; Butt *et al.*, 2006). The Population dynamics of spiders in rice fields. Observed the population density spider of *Lycosa* sp. was higher during seasons of study in Japan. The Spider predator population (Tetragnathidae, Araneidae, Oxyopidae, Salticidae, Lycosidae, Metidae

and Tomisidae) were significantly more in bed transplanting than in other crop establishment methods. Families (Lycosidae, Tetragnathidae, Araneidae, Oxyopidae, Salticidae and Thomisidae) representing 10 genera. Amongst these, four species were identified as *Lycosa pseudoannulata*, *Tetragnatha maxillos*, *Tetragnatha javensis* and *Oxyopes javannus*. The relative abundance of *Lycosa pseudoannulata* was found highest followed by *Tetragnatha maxillosa*, *Tetragnatha javensis* and *Araneus* sp. (Butt and Tahir, 2010; Ankit *et al.*, 2013; Sarao and Mahal, 2014)

The aim of this work was to study population fluctuations of spiders and to evaluate the efficacy of sampling methods for surveying spiders at rice nursery.

### MATERIALS AND METHODS

#### Experimental design:

An experiment was carried out at the farm of Sakha Agricultural Research Station, Kafr El-Sheikh governorate, in 2014 and 2015 seasons.

The area was about one and half Feddan, cultivated with Giza 178, hybrid 1 and Egyptian Yasmien rice variety on 9<sup>th</sup> of May during the two seasons. The normal agricultural practices were adopted throughout the growing season as recommended including application of herbicides, but without application any pesticides and fungicides. The seedlings were transplanted in permanent field one month after sowing.

While the area about at the second location was an area of about one and half Feddan, laid out in a randomized complete block design with four replicates. cultivated with Sakha 104 rice variety on 12<sup>th</sup> April in both seasons. The normal agricultural practices were adopted throughout the growing season as recommended.

#### Spider Collection

Spiders were collected from rice nurseries using various sampling methods i.e., sweep net, pitfall and water pan trap throughout the rice nursery period.

starting from 17<sup>th</sup> of April till the first week of May. Sampling began 4 days after rice sowing, and the catches were collected four days after rice sowing, and continued every three days in the nursery.

**Sweep net:**

A standard sweep net of 32 cm diameter was used for this purpose. The sweep net was used as 10 double strokes in each of rice nursery. Sampling began 5 days after rice sowing, and continued every three days till transplanting.

**Pitfall trap:**

The pitfall traps were used wide mouth plastic jars (11 cm deep and 7.5 cm in diameter) were introduced into other plastic jars which were permanently buried in the rice nursery bunds . Five traps were installed at each site at 10 M. interval in an alternating pattern along the length of rice nursery bunds in the selected field. The traps were fixed (2-3 cm) at the bottom with few drops of formalin to kill and few drops of detergent preserve the insects.

**Water pan trap:**

The water pan trap consisted of a plastic pan (15 cm deep and 7.5 cm in diameter). The pan contained water to about 5cm height, and provided with 5ml detergent substance, to minimize the water surface tension, and keep the trapped arthropods in the pan. In addition, the water was provided with few drops of formalin to avoid the arthropods decomposition.

Ten water traps were used fixed in the nursery, and the catches were collected four days after rice sowing, and continued every three days.

**Insect preservation and identification**

The collected spiders were kept in glass vials with 75% ethyl alcohol and few drops of glycerin to keep their tissues soft, and labeled for date, site and

method of collection. Specimens were identified by specialists Rice Research and Training Center, Sakha, Kafr El- Sheikh, Egypt.

**RESULTS AND DISCUSSION**

Data in Table (1) show the population density of spider species collected by different traps from rice nursery field during 2014 season. The most of spider densities were low in the first samples. All samples were taken during April and the first week of May. Collected 58 species belonging to seven families .family Tetragnathidae contained three species; *Tetragnatha* sp., *Tetragnatha javana* and Tetragnathidae (spider ling) . While family Lycosidae contained two species; *Lycosa* sp. and *Pardosa* sp. . Families Araneidae, Linyphiidae, Philodromidae, Salticidae and Theridiidae were represented by one spider for each; *Larinia* sp., linyphiidae (spider ling), *Thanatus* sp., *Ballus* sp. and Theridiidae (spider ling) respectively. The population density of family Tetragnathidae was found highest (28 individuals) followed by family linyphiidae (20 individuals).

This results agreement with (Hendawy, 2004), In Egypt, surveyed thirteen species of orb- weaver spiders from rice fields. Recorded three of spiders for the first time, *Argiope* near *gibberosa*, *Tetragnatha Javana* and *T. jaculator*. The population fluctuations of the common four genera (*Tetragnatha*, *Araneus*, *Agiopie* and *Singa*) were monitored. (Ghavami, 2010; Goswami et al., 2015). In Iran, families. Tetragnathidae and Araneidae were dominant families and *Tetragnatha extensa* (Linnaeus,) (Family Tetragnathidae) and *Neoscona adianta* (Walckenaer) (Family Araneidae) were the most abundant species. Orb weavers were dominant.

**Table (1): Survey of spider species collected by sweep net (5 double strokes), 10 water pan traps and 5pitfall traps from rice nursery during 2014 season.**

Period of occurrence	Family	Spider Species	Number individuals
April- May	Araneidae	<i>Larinia</i> sp.	3
	Linyphiidae	Spider ling	20
	Philodromidae	<i>Thanatus</i> sp.	1
	Salticidae	<i>Ballus</i> sp.	3
	Lycosidae	<i>Lycosa</i> sp.	1
		<i>Pardosa</i> sp.	1
	Tetragnathidae	<i>Tetragnatha</i> sp	7
		<i>Tetragnatha javana</i>	3
		Spider ling	18
	Theridiidae	Spider ling	1

Data in Table (2) showed that the population density of spider species collected by different traps from rice nursery field during 2015 season. Collected 289 species belonging to six families .family Linyphiidae contained three species; *Bathypantes* sp., *Erigone* sp. and Linyphiidae (spider ling). While the family Araneidae contained one species; *Larinia* sp. . So that family Lycosidae contained two species; *Lycosa* sp., *Wdicosa* sp. and *Pardosa* sp. families Philodromidae, Dycytinidae and Salticidae were represented by one specie for each; *Thanatus* sp., *Dyctina* sp. and *Ballus* sp. respectively. The population

density of family Linyphiidae was found highest (248 individuals) followed by family Lycosidae (29 individuals). These results are in line with those of (Sherif et al. 2001) who surveyed of eleven spiders species belonging to six families, I. e. Araneidae, Salticidae, Clubionidae, Theridiidae, Tetragnathidae and Philodromidae. All identified species are recorded for the first time in Egypt. (Motobayashi, et al., 2006). In Japan, the family Lycosidae was the most abundant, followed by Linyphiidae and Salticidae. Spider abundance and biomass were greater in untilled than in tilled paddies during each cropping season.

**Table (2): Survey of spider species collected by sweep net (5 double strokes), 10 water pan traps and 5 pitfall traps from rice nursery during 2015 season.**

Period of occurrence	Family	Spider Species	Number individuals
April- May	Araneidae	<i>Larinia</i> sp.	2
		<i>Bathyphantes</i> sp.	86
	Linyphiidae	<i>Erigone</i> sp.	49
		Spider ling	113
	Philodromidae	<i>Thanatus</i> sp.	2
	Dyctinidae	<i>Dyctina</i> sp.	3
	Salticidae	<i>Ballus</i> sp.	4
		<i>Lycosa</i> sp.	13
	Lycosidae	<i>Pardosa</i> sP.	13
		<i>Wdicosa</i> sp.	3

Data illustrated in Table (3) revealed that, by using water pan trap during 2014 season. There is no individuals from family Dictynidae. On the other hand family Linyphiidae ranked the first category and represented by (16 individuals) followed by family Tetragnathidae (12 individuals) and family Araneidae (3 individuals) and family Salticidae represented by (2 individuals). While family Lycosidae and Philodromidae ranked the last category and represented by (1 individuals).

Pitfall trap, there is no individuals from families Araneidae, Lycosidae and Dictynidae. Family Tetragnathidae came in the first category and represented by 11 individuals followed by family Linyphiidae (6 individuals). While families Salticidae and Philodromidae comes in the last category represented by one individuals.

Sweep net, there is family Linyphiidae ranked the first category with (5 individuals) followed by families Salticidae, Lycosidae and Tetragnathidae represented by (2 individuals) for each one. While family Araneidae, Dictynidae and Philodromidae comes in the last category and represented by one individuals.

During 2015 season, by using water pan trap, family Linyphiidae com in the first category and represented by (111 individuals) followed by family Lycosidae (7 individuals) and family Dictynidae (2 individuals), families Salticidae and Philodromidae

came in last category with (1 individuals).while absent families Araneidae and Tetragnathidae .

Pitfall trap, family Linyphiidae ranked the first category with (122 individuals) followed by family Lycosidae (9 individuals), family Dictynidae (4 individuals) and family Salticidae (2 individuals). while family Tetragnathidae and Philodromidae comes in the last category and represented by one individuals.

Sweep net, family Linyphiidae ranked the first category and represented by (25 individuals) followed by family Lycosidae (11 individuals) and family Tetragnathidae (3 individuals).While families Salticidae, Dictynidae and Philodromidae comes in the last category and represented by one individuals. While family Araneidae was absent with all sampling methods during 2015 season.

These results are in agreement with those of (Barrion *et al.*, 2012; Goswami *et al.*, 2015)) In China, collected spiders by sweep net and pitfall trap from rice fields.

As a conclusion, the obtained data in Table(3) indicated that water pan trap the highest efficacy trap and trapped 51.47% followed by pitfall trap 27.94% meanwhile sweep net trap ranked the last category and represented by 20.58% during 2014 season.

During 2015 season, the pitfall trap was the highest efficacy trap and trapped 45.87% followed by water pan trap 40.26%, while sweep net trap came in the last category with 13.86%.

**Table (3): Evaluation the efficacy of different traps for survey spider species from rice nursery field during 2014 and 2015 seasons.**

Spider family species	2014 season				2015 season			
	Water pan 10traps	Different traps			Total	Water pan10 traps	Different traps	
Pitfall 5 traps		Sweep net 10double strokes	Total	Pitfall 5 traps			Sweep net 10double strokes	Total
Linyphiidae	16	6	5	27	111	122	25	258
Araneidae	3	0	1	4	0	0	0	0
Salticidae	2	1	2	5	1	2	1	4
Lycosidae	1	0	2	3	7	9	11	27
Tetragnathidae	12	11	2	25	0	1	3	4
Dictynidae	0	0	1	1	2	4	1	7
Philodromidae	1	1	1	3	1	1	1	3
Total	35	19	14	68	122	139	42	303
%	51.47	27.94	20.58	100	40.26	45.87	13.86	100

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### تقييم كفاءة طرق جمع العينات لحصر العناكب في مشاتل الأرز في محافظة كفرالشيخ

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أجريت هذه الدراسة في المزرعة البحثية بسخا بمحافظة كفرالشيخ خلال الموسمين ٢٠١٤ و ٢٠١٥ بهدف حصر العناكب في مشاتل الأرز وتقييم فاعلية طرق تجميع العينات في حقول الأرز. أوضحت النتائج تجميع ٣٤٧ فرداً من العناكب قسمت إلى ١٢ نوعاً و ٨ عائلات. في الموسم الأول كانت الكثافة العددية لعائلة Tetragnathidae مرتفعة (٢٨ فرداً) يتبعها عائلة Linyphiidae (٢٠ فرداً) بينما في الموسم الثاني وجدت الكثافة العددية لعائلة Linyphiidae هي الأعلى (٢٤٧ فرداً) يتبعها عائلة Lycosidae (٢٩ فرداً). كما أوضحت النتائج أن المصيدة المائية كانت أكثر كفاءة حيث جمعت ٥١,٤٧% يليها المصيدة الأرضية بنسبة ٢٧,٩٤% بينما جأت شبكة الجمع في المرتبة الأخيرة بنسبة ٢٠,٥٨% خلال الموسم الأول. وفي الموسم الثاني كانت المصيدة الأرضية أكثر كفاءة بنسبة ٤٥,٨٧% يليها المصيدة المائية بنسبة ٤٠,٢٦% بينما جاءت أيضاً شبكة الجمع في المرتبة الأخيرة بنسبة ١٣,٨٦%.