Journal of Plant Protection and Pathology

Journal homepage: www.jppp.mans.edu.eg
Available online at: www.jppp.journals.ekb.eg

The Insect Pests, the Associated Predatory Insects and Prevailing Spiders in Rice Fields

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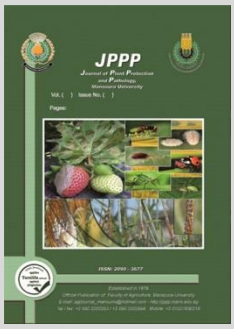

ABSTRACT

Rice, *Oryza sativa* L. is a very important food crop in Egypt as well as allover the world. Rice plants are attacked by several insect pest species. The current study was undertaken at the experimental farm of Sakha Agricultural Research Station during 2017 and 2018 rice seasons. Twenty-one insect pest species, belonging to Diptera, Hemiptera, Lepidoptera, Orthoptera and Thysanoptera were collected from rice nurseries and paddy fields using sweep net and pitfall traps. Orders: Hemiptera, Orthoptera and Diptera represented the majority of species number, with 33.33, 28.57 and 23.81%, respectively. Larvae of *Chilo agamemnon* Bles. Were rare during July, moderate during August, and high during September. *Hydrellia prosternalis* Deem. was more dominant just after transplanting, on rice that sown after mid-May. Population density of *Chironomus* spp. was moderate during May, high in July, greatly declined in September. As for insect predators, 34 species were captured, belonging to eight orders and 16 families. Order Coleoptera was represented by 15 species (44.12% out of total), followed by Hymenoptera (20.59%), and Odonata (14.71%). Sixteen spider species, belonging to nine families, were surveyed. They were f belonging to Lycosidae, Tetragnathidae and Salticidae. All spiders and insect predators appeared during the period from nurseries up to harvest. This way indicates the richness of rice fields, in Egypt, with bio control agents that should be conserved to minimize application of insecticides and regain the natural balance in rice fields.

Keywords: Predators, spiders, insect pests, rice fields.

INTRODUCTION

Rice is a very important food crop in Egypt, as well as allover the world. It occupies about 22% of the cultivated area of summer crops in Egypt, and the national average of rice is 9.2 tons/hectare (Anonymous, 2020).

Quantity and quality losses occur in rice plants as a result of several insect pests attacks. More than 100 insect pest species attack rice worldwide, but fortunately few of which cause economic losses in Egypt. Depending on the crop stages, the early rice is subject to attacks by bloodworms, *Chironomus* spp. and rice leaf miner *Hydrellia prosternalis* Deem. During tillering, the plants suffer from the rice stem borer, *Chilo Agamemnon* Bles., in addition to leafhoppers and planthoppers (Awadalla *et al* 2016, Yuan *et al.* 2019). However, the early stages of panicle information, the developing kernels are vulnerable to damage by the stink bugs (Mita *et al.* 2015).

Because the growers are worried about the damage caused by the insects, regardless of its economic importance, they tend to use insecticides. This chemical control has negative impacts on the environment and human being health. Thus, the approach of the integrated pest management should be seriously considered (Ardestania 2020).

The predatory insects are effective in regulating the pest population and accordingly, they should be conserved (Mesbah and Sherief 1999, Hendawy *et al.* 2005, El-Sheikh *et al* 2018). surveyed aquatic insect predators and terrestrials insect predators as effective bio control agents in paddy fields. In addition, spiders, as generalist predators, proved to be efficient in different agricultural ecosystems, particularly rice, because the hot and humid weather encourage these spiders to flourish (Sherif *et al.* (2001) recorded eleven spider species, belonging to six families, from rice fields. Hendawy (2004) surveyed thirteen species of orb- weaver spiders from rice fields and identified 35 insect pest species captured in webs of spiders.

The current study was undertaken throughout 2017 and 2018 rice seasons, at the experimental farm of Sakha Agricultural Research Station to investigate the major insect pests and their associated predatory insects and spiders that inhibiting rice field and their population fluctuations.

MATERIALS AND METHODS

Survey and population studies

This study was carried out at the experimental farm of Sakha Agricultural Research Station during two successive rice seasons: 2017 and 2018. The experimental rice field (about half feddan) was sown with Egyptian Hybrid 1 and Sakha 101 on two dates; May 5th and June 20th and transplanted one month later. This area was included in the Rice Research Program, Field Crops Research Institute, Agricultural Research Center. The experimental plots received normal cultural practices, but without any insecticides except herbicides.

The insects and their predators were collected, and their population fluctuations were monitored using sweep net, pitfall traps, visual records, as well as dissection of rice

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DOI: 10.21608/jppp.2021.171281

hills. The occurring arthropods in rice plots were recorded. In the nursery, sampling began seven days after broadcasting, and continued for the whole period of nursery about (one month) at 3-day intervals. In the permanent field, sampling began seven days after transplanting, and continued till harvest at 7-day intervals.

Sampling Methods

Sweep net

The Sweep net (as described by Hassan *et al*. 2016) was used for collecting the arthropods that occurring on rice plants in the nursery and permanent fields at the abovementioned intervals for identifying and counting. Each sample consisted of fifty double strokes. After each collection, the captured arthropods were introduced into a glass jar and moved to the laboratory.

Pitfall traps

Cylinder plastic containers (15 cm diameter × 20 cm height) were embedded into the dikes. Each container had water to the half of its height and provided with few drops of liquid soap as a detergent and five ml of formaldehyde for preserving the arthropods from decomposition. The experimental area was about half feddan, in which ten traps were embedded. Sampling was practiced every three days. To obtain the captured arthropods, the contents of each trap was sieved through a fine plastic net. After each collection, the captured arthropods were introduced into a glass jar and moved to the laboratory for identifying and counting.

Specimen preserving

The catches, collected by the abovementioned techniques, were cleaned from plant debris and other foreign particles. Then, the cleaned catch was emptied into another glass jar with 70% ethylene alcohol provided with few drops of glycerin to keep the arthropod tissues soft. The arthropods were identified by Systematic Research Department at Plant Protection Research Institute, Agricultural Research Center, Egypt, as well as Dr. A.S. Hendawy.

Statistical analysis:

Data were subjected to Standard Error (S.E.) and average.

RESULTS AND DISCUSSION

1. Survey of insect pests

Twenty-one insect pest species belonging to five orders: Diptera, Hemiptera, Lepidoptera, Orthoptera and Thysanoptera were surveyed from rice nurseries and permanent fields during 2017 and 2018 rice seasons (Table 1).

Table 1. Survey of insect pest species that inhibiting nursery and permanent fields, during 2017 and 2018 seasons (where, A= adult, L= larvae, P= pupae and N= nymph)

Order	Family	Common name	Insect species	Stage	Period of occurrence
Diptera (23. 81 %)	Chironomidae	Bloodworm	*Chironomus* spp.	A	May-Sep.
	Ephydridae	Rice leaf miner	*Hydrellia prosternalis* Deem.	A+L	May-Oct.
	Tabanidae	Tabanid fly	*Atylotus agrestis* Wied	A	May-Jul.
	Muscidae	Shoot-fly	*Atherigona* sp.	A	June- Sept.
	Syrphidae	Hoverflies	*Eristalis* sp.	A	Aug.-Sept.
Hemiptera (33.33 %)	Pentatomidae	Green stink bugs	*Nezara viridula* L.	A+N	May-Oct.
		White- spotted stink bugs	*Eysarcoris ventralis* (Westwood)	A+N	May-Oct.
	Cicadellidae	Leafhoppers	*Balclutha hortensis* Lindb.	A+N	May-Oct.
		Green leafhopper	*Nephotettix modulatus* (Melichar)	A+N	Jul -Oct.
	Delphacidae	Planthoppers	*Sogatella furcifera* (Horvath.)	A+N	May-Oct.
			Sogatella vibix (Haupt)	A+N	May-Oct.
	Aphidiidae	Aphid	*Rhopalosiphum* sp.	A+N	May-Oct.
Lepidoptera (9.52 %)	Crambidae	Rice stem borer	*Chilo agamemnon* Bles.	A+L	May-Oct.
	Hesperiidae	Rice Skipper	*Pelopidas thrax* Hübner	A+L+P	May-Oct.
Orthoptera (28.57 %)	Acrididae	Grasshopper	*Acrotylus insubricus* (Scop.)	A	May-Aug.
			Aiolopus strepenes (Latr.)	A	May-Sep.
			Eyprepocnemis plorans (Charp.)	A	May-Sep.
	Gryllidae	Mole crickets	*Gryllus domesticus* L.	A	May-Oct.
			Gryllus bimaculatus De Geer	A	May-Oct.
	Gryllotalpidae	Mole crickets	*Gryllotalpa gryllotalpa* L.	A+N	May-June
Thysanoptera (4.76 %)	Thripidae	Thrips	*Florithrips traeghardi* Trybom.	A+N	May-Aug.

Order Diptera is represented by four insect species (23. 81 % out of total species) and four families; Chironomidae, Ephydridae, Tabanidae, Muscidae and Syrphidae. Chirnonmids (bloodworms) are a big threat to rice plants in saline soils, specially in nurseries and broadcast rice (Sherif *et al*. 1999). The larvae feed upon rootlets which may need rice resowing in bare batches. *Hydrellia prosternalis* (Robineau-Desvoidy) (rice leaf miner) usually causes severe damage in late-sown rice (Sherif *et al.* 1997).

Order Hemiptera is represented by seven species (33.33 % out of total species), two species are belonging to Pentatomidae. Stink bugs feed upon florets during milky stage and cause two types of damage; direct and indirect. Direct damage occurs when stink bugs (adults and nymphs) suck saps of panicles, resulting in incomplete filled grains, which reflects reduced rice yield. Indirect damage occurs when the insects insert their stylets into milky grain, and transmit fungus infection, that appears after rice milling as black or brown dots (pecky rice). The pecky rice is usually sold in the markets in lowered prices because of low quality.

Five insect species were found belonging to families: Cicadellidae, Delphacidae and Aphididae. Leafhoppers and planthoppers result in direct damage by sucking the plant saps causing hopper burns in case of dense insect populations and severe damage. The indirect damage occurs when the insects transmit virus diseases (kaushik, 2012; Berry *et al.* 2020).

Order Lepidoptera is represented by two species (9.52 % out of total); *Chilo agamemnon* has been considered for several decades until now as the most destructive pest of

rice. Many species of the genus *Chilo* have been reported from rice fields. Out of these, *C. agamemnon* is known as a pest of rice, maize and sugar-cane crops in Egypt. Others species are serious pests of rice and have been recorded attacking some Poaceae species (Mohyuddin 1990). The larvae invade rice stems and result in dead tillers, during vegetative stage, which are called dead hearts. In reproductive stage, the larvae enter the base of panicles which become completely or partially unfilled, causing the symptom of white heads (Sherif *et al.* 2008).

Order Orthoptera is represented by six insect species (28.57% out of total) belonging to three families; Acrididae, Gryllidae and Gryllotalpidae. From the economic point of view, only the mole cricket, *Gryllotalpa gryllotalpa* L. is considered an important insect pset, as the nymphs and adults feed upon rice roots, particularly in areas of drained water.

Order Thysanoptera is only represented by one Family; Thripidae that contains also one *Florithrips traegardhi* Trybom. (Sherif, and Hendawy (2004).

2. Survey of insect predators

The surveyed insect predators accounted for 34 species belonging to eight orders and 16 families (Table 2).

Table 2. Survey of insect predator species that collected from rice nursery and permanent field, during 2017 and 2018 seasons (where, A= adult, L= larvae, P= pupae and N= nymph)

Order	Family	Common Name	Species	Stage	Period of occurrence
Coleoptera (44.12 %)	Staphylinidae	Rove beetles	*Paederus alfierii* Koch	A	May-Oct.
			Philonthus spp.	A	May-Aug.
	Coccinellidae	Lady beetles	*Scymnus interruptus* Goeze.	A	May-Aug.
			Coccinella undcimpunctata L.	A	Jul.-Aug
			Stethorus sp.	A	Jul.-Aug
	Carabidae	Ground beetles	*Rhyzobius litura* F.	A	Jun.-Aug
			Bembidion spp.	A	Jun.-Aug
			Harpalus sp.	A	Jul.-Aug
			Pterostichus spp.	A	Jun.-Aug
			Tachys sp.	A	Jun.-Aug
			Cybister sp.	A	Jul.-Aug
	Dytiscidae	Aquatic Beetles	*Bidessus major* Sharp	A	Jul.-Aug
			Hydrovatus sordidus Sharp	A	Jul.-Aug
			Bidessus confuses Klug	A	Jul.-Aug
	Anthicidae	Flower beetles	*Anthicus* spp.	A	Aug.-Sept.
Hymenoptera (20.59%)	Vespidae	Yellow wasps	*Polistes gallicus* L.	A	Jul.-Aug
	Crabronidae*	Spider wasps	*Trypoxylon* sp.*		May-Sept.
	Formicidae	Ants	*Camponotus* sp.*	A	May- Sept.
			Messor sp.*		
			Monomorium sp.		
			Phiedole sp. *		
			Solenopsis sp.		
Hemiptera (2.94 %)	Veliidae	Ripple Bug	*Microvelia* spp.	A+N	May-Aug.
Odonata (14.71%)	Coenagrionidae	Common bluetail damselfly	*Ischnura senegalensis* (Rambur)	A	May- Sept.
	Aeschnidae	Vagrant emperor dragonfly	*Anax ephippiger* (Burmeister)	A	May- Sept.
		Lesser emperor dragonfly	*Anax parthenope* Selys*	A	May- Sept.
	Libellulidae	Scarlet dragonfly	*Crocothemis erythraea* (Brulle)	A	May-Sept.
		Northern banded groundling dragonfly	*Brachythemis impartita* (Karsch)*	A	May- Sept.
Neuroptera (2.94%)	Chrysopidae	Lacewing	*Chrysoperla carnea* Steph.	A	Jul.-Sept.
Diptera (11.76%)	Syrphidae	Hoverflies	*Eupeodes corollae* (F.)	A	Jun.- Sept.
			Sphaerophoria scripta (L.)		
			Scaeva albmaculata(Macquart)*		
	Chloropidae	Chloropid flies	*Anatrichus pygmaeus* Lamb	A	May- Sept.
Orthoptera (2.94%)	Tettigoniidae	Long-horned grasshopper	*Conocephalus conocephalus* L.	A+N	Jun.- Sept.

*** One family and eight species are recorded for the first time in rice fields in Egypt.**

Order Coleoptera had the highest number of predatory species (15 species representing 44.12 % out of total). Family Staphylinidae was represented by two species; while Coccinellidae was represented by three species, Predators of both families appeared in rice nurseries and permanent fields throughout the seasons; from May up to October. However, *Cybister* beetles were detected during July and August. Hymenoptera was represented by seven species; two wasp species and five ant species, they all constituted 20.59 % out of surveyed species. Both families; Vespidae, Crabronidae and Formicidae occurred in the experimental fields from May up to September, and thus covered the whole experimental period. Three formicid species and crabronid species, *Trypoxylon* sp. are recorded for the first time in rice fields in Egypt; *Camponotus* sp., *Messor* sp. and *Phiedole* sp.

Each of Hemiptera, Neuroptera and Orthoptera was represented by one species (2.94 % out of total for each) and one family. The species were captured in different traps from May up to August or October.

Order Odonata had five species (14.71 % out of total) belonging to three families. All insect predatory species were trapped from May up to September. Two odonatous species are recorded for the first time in rice fields in Egypt; *Anax parthenope* Selys and *Brachythemis impartita* (Karsch).

Order Diptera was represented by two families and four species. Order Orthoptera had only one species, *Conocephalus* spp. (Fam.: Tittigoniidae)

El-Sherif *et al.* (1979), in Egypt, indicated that *Ischnura sengalensis* (Rambur) and *Hemianax ephippiger* are the most dominant species of Odonata at nursery and paddy field. William *et al*. (1996) concluded that the high populations of generalist predators in rice fields occurred by mid-season. Hendawy *et al.* (2005) observed that both damsel flies and dragon flies are feeding mainly on dipterous, stem and leaf borer larvae and leaf and plant hoppers. *Ischnura senegalensis* was the most dominant, while *Crucothemis erythraea* was the least one. Ghahari *et al*. (2009) surveyed a total of 35 staphylinid species belonging to 23 genera and 10 subfamilies from rice fields. Girish *et al*. (2015) found that the population dynamics of insect predators were highest under different rice ecosystems.

3. Insect- predator association

Nine predatory species were collected as associated with *C. agamemnon*, *H. prosternalis*, leafhoppers and *Chironomus* spp. (Table 3); six of these predators were insects, while three of which were spiders. The rove beetle, *Paederus alfierii* (Fabricius) preyed upon eggs of each of *C. agamemnon* and *H. prosternalis.*

Table 3. Common predators and their associated prey in rice fields at 2017 and 2018 seasons

Predator		Prey			
Scientific name	**Common name**	**RSB**	**RLM**	**L&P-H**	**BLW**
Paederus alfierii Koch	Rove beetle	√(E)	√(E)	X	X
Ischenura senegalensis (Rambur)	common bluetail damselfly	√(A)	√(A)	√(N+A)	√(A)
Crocothemis erythreae (Brulle)	Scarlet dragonfly	√(A)	√(A)	√(A)	√(A)
Conocephalus conocephalusI (L.)	African meadow katydid	√(E)	X	X	X
Anatrichus pygmaeus Lamb	Grassland chloroped fly	√(L)	X	X	X
Microvella sp.	Ripple bug	X	X	√(N+A)	X
Pardosa spp.	Wolf spiders	√(A)	X	X	X
Argiope trifasciata (Forsskål)	Banded garden spider	√(A)	√(A)	√(N+A)	√(A)
Tetragnatha spp.	Long-jawed spiders	√(A)	√(A)	√(N+A)	√(A)

RSB: *Chilo Agamemnon*, RLM: *Hydrellia prosternalis*, L&P-H: leafhoppers and planthoppers, BLW: Blood worms *Chironomus* spp.
E: Eggs, L: Larvae, N: Nymphs, A: Adults, X: Not found

The damselfly, *Ischnura senegalensis* fed upon adults of each of *C. agamemnon*, *H. prosternalis* and *Chironomus* spp., and nymphs and adults of leafhoppers and planthopper. The dragonfly, *Crocothemis erythreae* fed upon adults of *C. agamemnon* , H. prosternalis , nymphs and adults of leafhoppers and planthopper ,as well as adults of *Chironomus* spp. However, *Conocephalus* only attacked the eggs of rice stem borer, *C. agamemnon*. The dipterous, *Anatrichus pygmaeus* fed upon larvae of *C. agamemnon*. *Microvelia* sp. attacked and fed upon nymphs and adults of leafhoppers and planthoppers. The spiders, *Argiope* spp and *Tetragnatha* spp. preyed upon adults of each of *C. agamemnon*, *H. prosternalis*, *Chironomus* spp. as well as nymphs and adults of leafhoppers and planthopper .The spider, *Pardosa* spp. fed only upon *C. agamemnon* adults .

4. Population fluctuation of insect predators in rice fields

Population fluctuation of some predatory insects associated with major rice insects prevailing in rice fields are presented in Table (4).

Table 4. Population fluctuations of *Paederus alfierii, Conocephalus conocephalus* and *Ischnura senegalensis* in the Egyptian rice fields at Kafr El-Sheikh region

Species	*Paederus alfierii*			*Conocephalus conocephalus*			*Ischnura senegalensis*		
Date of Inspection	**2017**	**2018**	**Av.**	**2017**	**2018**	**Av.**	**2017**	**2018**	**Av.**
May 21	2	3	2.50	3	1	2.00	2	1	1.50
27	6	4	5.00	5	5	5.00	8	0	4.00
Jun 3	6	5	5.50	10	8	9.00	22	8	15.00
10	8	9	8.50	3	11	7.00	18	12	15.00
18	6	2	3.00	4	2	3.00	13	18	15.50
26	17	1	9.00	1	3	2.00	7	24	15.50
Jul 2	17	20	18.50	0	9	4.50	3	31	17.00
8	18	24	21.00	13	12	12.50	26	27	26.50
16	5	12	8.50	17	3	10.00	1	17	8.50
30	21	38	29.50	4	8	6.00	4	18	11.00
Aug 6	10	24	17.00	5	2	3.50	11	15	13.00
14	3	24	13,50	3	12	7.50	19	10	14.50
20	12	51	31.50	11	15	13.00	10	30	20.00
27	34	23	28.50	10	19	14.50	11	3	7.00
Sept 3	22	14	18.00	6	11	8.50	26	21	28.50
10	29	35	32.00	8	2	5.00	16	3	9.50
18	16	19	17.00	14	3	8.50	5	18	11.50
25	25	12	18.00	5	9	7.00	12	7	9.50
Total	257	320		122	135		214	263	
Annual Avarege±S.E.	19.28±2.21	17.78±3.24		6.78±1.12	7.50±1.22		11.89±1.86	14.61±2.31	

The average numbers of *P. alfierii* had five peaks annually of the predatory adults. These peaks averaged 8.50, 21.00, 29.00, 31.50 and 32.00 predatory adults/fifty double strokes +10 pitfall traps. These peaks occurred on June 10th,

July 8th, July30th, August 20th and September 10th, respectively.

The average numbers *C. conocephalus* nymphs and adults had three peaks were detected on June 3rd, July 8th and August 27th. The averages of these peaks were 9.00, 12.50 and 14.5 nymphs and adults/50 double strokes +10 pitfall traps, respectively.

Also, three peaks were found for *I. senegalensis* adults; 2.50 occurred on July 8th, 20.00 on August 10th, and appeared 28.50 adults on September 3rd.

Data in Table (5) show the population fluctuations of three insect predators associated with some rice insect pests. Average of 2017 and 2018 seasons, show that *Crocothemis erythraea* density had three peaks on June 10th ,July 8th and August 14th, with 9.50, 9.50 and 8.50 individuals/50 double strokes +10 pitfall traps.

Table 5. Population fluctuations of *Crocothemis erythraea, Anatrichus pygmaeus* and *Microveila* sp. in the Egyptian rice fields at Kafr El-Sheikh region

Species	*Crocothemis erythraea*			*Anatrichus pygmaeus*			*Microveila* sp.		
Date of Inspection	**2017**	**2018**	**Av.**	**2017**	**2018**	**Av.**	**2017**	**2018**	**Av.**
May 21	1	2	1.50	1	1	1.00	0	1	0.50
27	2	5	3.50	3	5	4.00	1	3	2.00
Jun. 3	5	11	8.00	1	2	1.50	3	3	3.00
10	7	12	9.50	4	8	6.00	2	4	3.00
18	8	3	5.50	5	6	5.50	1	4	2.50
26	12	0	6.00	3	8	5.50	1	3	2.00
Jul. 2	1	0	0.50	11	15	13.00	6	5	5.50
8	12	7	9.50	10	17	13.50	9	10	9.50
16	4	1	2.50	8	12	10.00	1	3	2.00
30	5	5	5.00	3	4	3.50	3	4	3.50
Aug. 6	6	8	7.00	9	18	13.50	8	1	4.50
14	6	11	8.50	4	12	8.00	2	0	1.00
20	5	2	3.50	6	10	8.00	12	13	12.50
27	4	3	3.50	8	14	11.00	15	17	16.00
Sept. 3	3	9	6.00	14	22	18.00	19	25	22.00
10	3	12	7.50	5	11	8.00	24	32	28.00
18	10	5	7.50	9	24	16.50	11	21	16.00
25	5	2	3.50	5	19	12.00	7	15	11.00
Total	99	98		109	208		125	164	
Annual Avarege±S.E.	5.50±0.78	5.44±0.98		6.06±0.85	11.56±1.59		6.94±1.64	9.11±2.21	

The peaks of *Anatrichus pygmaeus* occurred on July 8th, August 6th, and September 3rd with average s of both years with13.50, 133.50 and 16.50 predatory insect, respectively. The peaks of *Micovelia* sp. activity were only two, small one was detected on July 8th with 9.50 individuals, while the big one was detected on September 10th with 28.00 individuals/50 double strokes +10 pitfall traps.

5. Survey and population fluctuations of spiders in rice fields

Sixteen spider species, belonging to nine families, were surveyed from the experimental rice fields during 2017 and 2018 seasons (Table 6). Three wolf spider species (Family: Lycosidae) were collected, as well as two long-jawed spiders (Family: Tetragnathidae). However, each of Thomisidae, Philodromidae, Araneidae, Pisauridae and Salticidae families was represented by only one spider species.

Table 6. Survey of spider species collected by sweep net and pitfall traps from rice nursery and permanent field, during 2017 and 2018 seasons.

Family	Common Name	Spider species	Stage	Period of occurrence
Thomicidae	Crab spider	*Thomisus* sp.	A+S*	Sept.
Lycosidae	Wolf spider	*Lycosa* sp	A	May-Oct.
		Pardosa spp	A	May- Oct.
		Wadicosa fidelis (O. P.-Cambridge)	A	May- Oct.
		Hogna ferox (Lucas)	A	May- Oct.
Tetragnothridae	Long –jawed spider	*Tetragnatha javana* (Thorell)	A+S	Jun- Oct.
		Tetragnatha nitens (Audouin)	A+S	Jun- Oct.
Philodromidae	Running crab spiders	*Thanatus Albini* (Audouin)	A+S	May-Oct.
	Crab spiders	*Philodromus* sp.	A	Sept.
Araneidae	Typical-orb weavers	*Argiope trifasciata* (Forsskål)	A+S	May-Oct.
	Orb weavers	*Hypsosinga albovittata* (Westring)	A+S	Jun- Oct.
Pisauridae	Nursery web spiders	*Dolomedes* sp	A+S	May-Oct.
Salticidae	Jamping spiders	*Ballus* sp.	A	Sept.
		Thyene imperialis (Rossi)	A	Sept.
Eutichuridae.	Sac spider	*Cheiracanthium* sp.	A	Sept.
Linyphiidae	sheetweb spider	*Erigone dentipalpis* (Wider)	A	May-Oct.

A: Adult, S: Spiderlings

Sherif *et al.* (2001) recorded eleven spider species, belonging to six families, from rice fields. Hendawy (2004) identified 35 insect pest species captured in webs of spiders. The pests were found belonging to eight orders (Coleoptera, Diptera, Ephemeroptera, Homoptera, Hemiptera, Lepidoptera, Orthoptera and Hymenoptera) and 31 families.

Fortunately, the most occurring insect pests in spider webs were adults of rice leaf miner, *Hydrellia prostenalis*, bloodworms, *Chironomus* spp, and leafhoppers, planthoppers, and rice stem borer, *Chilo agamemnon*. In Inda Venkateshalu *et al.* (2009) indicated that lycosids comprised 36.45 % of surveyed spiders from rice fields. Ghavami (2010) recorded 27 spider species belonging to 14 families, from rice fields. *Tetragnathidae* and *Araneidae* were the most dominant families; *Tetragnatha extensa* and *Neoscona adianta* were the most dominant species. Muddasir *et al.* (2016) indicated that Lycosid, *Pardosa pseudoanulata* was the predominant spider in rice fields, and were found predating on all types of pests in rice fields.

Three spider species were recorde, from rice nursery and permanent field, during 2017 and 2018 seasons. These species were *Pardosa* spp., *Tetragnatha* spp. and *Argiope trifasciata*. Peaks of spider activity, as predators of rice insect pests are presented in Table (7)

Table 7. Population fluctuations of the most dominant spiders in the Egyptian rice fields at Kafr El-Sheikh region

Species	*Pardosa* spp			*Tetragnatha* spp.			*Argiope trifasciata*		
Date of Inspection	2017	2018	Av.	2017	2018	Av.	2017	2018	Av.
May 21	3	2	2.50	2	3	2.50	0	0	0.00
27	4	16	10.00	1	5	3.00	0	1	0.50
Jun. 3	5	6	5.50	3	11	7.00	2	2	2.00
10	9	8	8.50	4	6	5.00	2	3	2.50
18	2	6	4.00	2	3	2.50	1	4	2.50
26	1	7	4.00	5	16	10.50	3	5	4.00
Jul. 2	10	17	13.50	11	14	12.50	6	8	7.00
8	4	18	11.00	20	27	23.50	4	9	6.50
16	2	5	3.50	13	39	26.00	1	7	4.00
30	18	11	14.50	21	46	33.50	3	3	3.00
Aug. 6	14	20	17.00	14	35	24.50	8	8	8.00
14	24	23	23.50	22	44	33.00	2	12	7.00
20	27	41	34.00	39	51	24.50	10	16	13.00
27	23	14	18.50	46	62	33.00	15	25	20.00
Sept. 3	14	22	18.00	35	43	54.00	19	23	26.00
10	15	39	27.00	44	34	39.00	14	19	16.50
18	19	26	22.50	51	62	56.50	11	18	14.50
25	22	35	28.50	62	73	67.50	17	21	19.00
Total	216	316		395	574		118	184	
Annual Average±S.E.	12.00±2.05	17.56±2.78		21.94±4.59	31.89±5.27		6.56±1.48	10.22±1.91	

The wolf spiders, *Pardosa* spp. exhibited five peaks of activity, recorded on May 27th ,June 10th , July 2nd , August 20th and September 10th . The population densities of this spider at the abovementioned dates were 10.00, 8.50, 13.50, 34.00 and 27.00 spiders /50 double strokes +10 pitfall traps, respectively.

The long-jawed spider *Tetragnatha* spp. appeared in four peaks of activity, during the first week of June (7.00 individuals), last week of July (33.50 individuals), late August (54 individuals) and late September (67.00 spiders /50 double strokes +10 pitfall traps).

The banded-garden spider, *Argiope trifasciata* was detected with only two peaks; on July 2nd , and on September 3rd , with population densities of 7.oo and 26.00 spiders /50 double strokes +10 pitfall traps, respectively.

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الأفات الحشرية والمفترسات الحشرية والعناكب السائدة المرتبطة بها في حقول الأرز

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يعتبر الأرز من المحاصيل الغذائية الهامة للغاية في مصر وكذلك في جميع أنحاء العالم. تتعرض نباتات الأرز للإصابة بأنواع عديدة من الآفات الحشرية ، أجريت الدراسة الحالية في المزرعة التجريبية بمحطة البحوث الزراعية بسخا خلال موسمي 2017 و 2018 لمحصول الأرز. تم حصر 21 نوعًا من الآفات الحشرية ، والتي تنتمي إلى رتب Diptera و Hemiptera و Lepedoptera و Orthoptera و Thysanoptera وذلك في مشاتل وحقول الأرز باستخدام شبكة جمع الحشرات والمصائد الأرضية. اشتملت رتب Hemiptera و Orthoptera و Diptera على غالبية أنواع الآفات الحشرية ،بنسب 33.33 و 28.57 و 23.81 ٪ على التوالي ، كانت يرقات ثاقبة الأرز *Chilo agamemnon*. نادرة خلال يوليو ، ومتوسطة خلال أغسطس ، وأعلى خلال سبتمبر. صانعة أنفاق أوراق الأرز *Hydrellia prosternalis* كانت أكثر شيوعًا بعد الزراعة مباشرة على الأرز المنزرع بعد منتصف مايو. الكثافة العددية للديدان الدموية *Chironomus* spp. كانت معتدلة خلال شهر مايو ، وأعلى في يوليو ، وانخفضت بشكل كبير في سبتمبر. أما المفترسات الحشرية التي تم حصرها كانت 34 نوعا تنتمي لثمانية رتب و 16 عائلة. تم تمثيل رتبة غمدية الأجنحة بـ 15 نوعًا (44.12٪ من الإجمالي) ، تليها غشائية الأجنحة (20.59٪) ، ثم الرعاشات (14.71٪)). تم حصر ستة عشر نوعًا من العناكب تنتمي إلى تسع عائلات. وغالبية ما تم العثور عليها تنتمي إلى عائلات Lycosidae، Tetragnathidae و Salticidae. تواجدت جميع العناكب والحشرات المفترسة في الفترة من المشاتل و حتى الحصاد. و يشير هذا إلى ثراء حقول الأرز في مصر بالأعداء الحيوية و التي يجب الحفاظ عليها بتقليل استخدام المبيدات الحشرية ، واستعادة التوازن الطبيعي في حقول الأرز.