FAUNA ASSOCIATED WITH THREE AQUATIC PLANTS FROM STREAMS AT KAFR EL-SHEIKH

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ABSTRACT

An experiment that lasted for two whole years was carried out at Kafr El-Sheikh city. The goal for that investigation was to survey all mites and Collembolla species adhering to three dominant plants occurring in the streams of River Nile, plus the occurring aquatic snails. Samples were taken twice per month. As for the free living snails of an ordinary conical net was used two sweeps, with 3 replicates at random to represent every sample at ever sampling date. It was also planned to gather the occurring aquatic plants at random to represent every chosen species and was replicated three times. Data was refferred to 100 gm dry weight. Extraction of organisms took place by using modified Tullegran funnels for 48 hrs. Results revealed in recording three aquatic plants were, *Azolla biliculoides*, *Lemna gibba* and *Eichhrnia crassipes*. Also, twenty four arthropod species were recorded, mites were represented by (99.50%), Collembola (0.50%), however those percentages varied from one plant to anather. On the other hand, Oribatida dominanted in the3 mentioned aquatic plants represented by (98.17%, 98.55% and 83.3% respectively) followed by *Acaridida*, represented by (0.67%, 3.21% and 6.45% respectively) and *Actinedida* represented by (1.16%, 0.33% and 1.47%) while Gamasida was the least (0.00%, 0.11% and 8.68% respectively). Gamasida flourished with *E. crassipes* and was represented (97.01%). *A. bilioculoides* held the majority of arthropods reaching (44.35%) followed by *L. gibba* that held (38.95%), while *E. crassipes* was the least and represented by (16.30%). Three dominant snails were recorded and they were *Biomphalaria alexandrina* , (70.98%) followed by *Bulinus trancutus* (26.27%) and *Eremina sp.* (2.75%) was the least.

Key words: Survey & Populations, Mites, Collembola, Snails, Aquatic plants.

INTRODUCTION

Aquatic weeds belong to various families of dicots, monocots, and Filamentons algae. From the point of view of aqua-culture and weed control, the macrophytic and algal weeds could be classified according to their habits and habitat. According to **Philipose (1968)**, they could be divided into; 1- Floating weeds, which are unattached and float with their leaves

above the water surface and roots under water i.e. waterhyacinth (*Eichhornia crassipes*), common duck weed (*Lemna gibba*) and azolla (*Azolla biliaculoides*), 2- Emergent weeds which are rooted in the bottom soil, but have all, or some of their leaves, leaf laminase or shoots above the water surface, 3- Submerged weeds which are completely submerged under water, but may be rooted in the bottom soil, 4- Marginal weeds, which fringe the shore line of the water body and are mostly rooted in water-logged soil, 5- Filamentous algae and 6-Algal blooms.

Waterhyacinth is probably the most widely known floating weed, not only infesting aquaculture forms, but also all other types of water bodies especially in Asia and many other parts of the world. The spread of the plant is truly phenomenal, as it can increase in volume by about 700 percent within 50 days **Parija (1934)** indicated that waterhyacinth causes serious harms. Infestation of Nile system by waterhyacinth caused a water loss of the amount estimated by 7.12×10^9 m^3/year which represents $^1/_{10}$ of the average yield of the river Nile **Obeid (1984)**.

It provides habitat and food for several vectors of human diseases and even microbes of serious diseases. Several species of snails are living on the roots of waterhyacinth e.g. *Bimophalaria alexandrina* and *Bulinus sp.* vector species of antrax, turaremia and anaplasmosis of cattle live among the root system. Some mosquito species (*Psorophora sp., Aedes sp., Anopheles sp.* exist also in the habitat of waterhyacinth, Anopheles mosquitoes is the main way to transmit malaria disease **Soerjani (1984)**.

The aquatic plants, causes different troubles to agriculture, depletion of water from oxygen in water which is very deleterious to plankton and fish, it's growth gives a suitable atmosphere for pests reproduction that may be injurious to human, animals and economic plants, Some of the moss mites (Oribatei) that may be associated with these plants act as intermediate host (vectors) to some tapeworms such as *Monizia expansa* (**Sheela *et al.*, 1989; Singh *et al.*, 1989; Pal-s (1990), Abou Tayesh (1997), Sengbusch (1977), Lebrun (1979), Sharshir (1986), Kaur *et al.* (1993) and Schuster (1995)**.

It was stated that Waterhyacinth utilization is considered as an inter grated part of entire waterhyacinth control. In Indonesia it was successfully used for biogas production, animal feed, fertilization, mulching material, Paper, Cartoon or hard board, substrate for mushroom culture and finally as a protein

source. **Osman *et al.* (1981), Ikhtyar and Shamsuzzoman (1984), Majumodar *et al.* (1984) and Soerjani (1984).**

The objectives of the present work were :

1- Survey of mites, Collembola and snails associated with the most abundant three selected aquatic plants.
2- Estimating the population density of mites, Collembola and snails within the three aquatic plants through all time experiment.
3- Population density of predacious mites associated with the same three aquatic plants during all time experiment.

MATERIALS AND METHODS

The present investigation that lasted for two complete years that began in October 2001 through September 2003 was carried out in the Farm of the Faculty of Agriculture at Kafr El-Sheikh, three dominant aquatic plants occurring in the streams at Kafr El-Sheikh were selected for the present investigation. The selected plants were, Azolla (*Azolla biliaculoides*), the common duck weed (*Lemna gibba*) and the waterhyacinth (*Eichhornia crassipes*). To confirm the nomencluture of the selected aquatic plants the herbage samples were identified by the help of expects from Departments of Botany and Agronomy, Faculty of Agriculture, Tanta University and Department of Herbage, Agriculture Research center, Dokki, Giza. Every sample was referred to 100 gm dry weight according to different water content within the chosen aquatic plants. Samples were taken every two weeks for a period and were replicated three time during all time experiment.

Samples of aquatic snails were gathered every two weeks by using a net of plastic tissue; its diamter was 15 cm and adapted with a wooden handle of 100 cm. Ten sweeps were taken diagonally from streams, the collected specimens were put directly on the spot, in pencillin vials using forceps, and those vials were transferred to the laboratory for identification and counting. Extraction of mites and Collembola took place by using batteries of modified Tullgren funnels for 24/48 h. and organisms were received in Petri dishes containing water. Some samples were reidentified in USDA laboratory, Washington D.C, for confirmation obtained data were statistically analyzed according to **Duncan's (1955).**

RESULTS

1- Survey of fauna associated with three aquatic plants :

As shown in Table (1), 16 mite species belonging to 14 families were recorded. These were sorted under the following

four groups; (a) Oribatida, represented by 5 species from 4 families. (b) Acaridida represented by two species belonging to one family. (c) Actinedida represented by 7 species of 7 families and (d) Gamasida represented by two species within two families. The recorded eight Collembola species were found to belong to 8 families. As for the snails, it was found out that only three snails were recorded in table (3).

2. Population density of fauna associated with three aquatic plants.

2.1. Azolla (*Azolla biliculoides*) :

2.1.1. Mean number and percentages of sub-order Acarina associated with the weed :

Results in tables (1 & 2) and Fig. (1) indicated that mites were represented (41.56 ind. = 99.66%) of the whole extracted fauna and included three suborders, they were, Oribatida that was considered to be the dominant group (40.80 ind. = 98.17%) followed by Actinedida that was represented by (0.48 ind. = 1.16%), while Acaridida was the least group (0.28 ind. = 0.67%), however Gamasida was totally absent.

2.1.2. Mean number and percentage of mite species:

From tables (1 & 2), it was clear that suborder Oribatida, was represented by three species, *Oribatula tadrosi* (Popp.) that was considered to be the most dominant species (39.73 ind. = 97.35%) followed *Hypochthinus sp.* (0.64 ind. = 1.57%), while *Galumna tarsipennata* (0.44 ind. = 1.085) was the least. The suborder Acaridida, *Tyrophagus sp.* was the most dominant species (0.16 ind. = 57.14%) followed by *Rhizoglyphus sp.* (0.12 ind. = 42.86%); while the suborder Actinedida was represented by 2 species, *Tydeus sp.* the most dominant species (0.38 ind. = 79.17%) followed by *Conaxa setirostris* (0.1 ind. = 20.83%).

2.1.3. Mean number and percentage of Collembola :

Data in table (2) showed that the collembolan species were represented (0.14 ind. = 0.34%) of the whole extracted fauna and it was clear from table (1) that the most prevalent extracted individuals were from the family Hypogastruridae (0.04 ind. = 28.58%) followed by all the other families.

2.1.4. Mean number and percentage of aquatic snails :

From the table (3) it was clear that the most prevalent extracted individuals were *Biomphalaria alexandrina* (1.66 ind. = 68.03%) followed by *Bulinus truncatus* (0.68 ind. = 27.87%) while *Eremina sp.* (0.1 ind. = 4.10%) was the least.

2.2. Common duck weed (*Lemna gibba*):

2.2.1. Mean number and percentage of sub-order Acarina associated with the weed :

Results in tables (1 & 2) and Fig. (1) indicated that mites were represented by (36.18 ind. = 89.67%) of the whole extracted fauna and included four suborders, that were: Oribatida, that was considered to be the most dominant group (43.86ind. = 96.33%) followed by Acaridida represented by (1.16 ind. = 3.21%); Actinedida represented (0.12 ind. = 0.33%) while, Gamasida was the least (0.04 ind. = 0.11%).

2.2.2. Mean number and percentage of mite species:

From the same table (1) it was clear that *Oribatula tadrosi* (Popp) was the most dominant species (34.42 ind. = 98.74%) followed *Hypochthinus* sp. (0.24 ind. = 0.69%) , while *Galumna tarsipennata* was the least (0.2 ind. = 0.57%) in suborder Oribatida. On the other hand in suborder Acaridida in the same table it was clear that *Typhophagus sp.* (0.62 ind. = 53.45%) followed by *Rhizoglyphus sp.* were (0.54 ind. = 46.55%) and suborder Actinedida it was clear found that one species only *Speleorchestes sp.* (0.12 ind = 100%), in the same trend Gamasid found that *Amblyseius sp.* (0.04 ind = 100%).

2.2.3. Mean number and percentage of Collembola :

This order, tables (1 & 2) represented (0.12 ind. = 0.33%) of the whole extracted fauna. On the other hand, data in table (1) showed that the most prevalent extracted individuals were *Proistoma sp.* (0.08 ind = 66.66%) while, *Hypogastrura sp.* and *Isotomurius sp.* represented (0.02 ind. = 16.67%) for each.

2.2.4. Mean number and percentage of aquatic snails :

From the table (3) it was clear that the most prevalent extracted individuals were *Biomphalaria alexandrina* (1.76 ind. = 77.88%) followed by *Bulinus truncatus* (0.46 ind. = 20.35%) while *Eremina sp.* (0.04 ind. = 1.77%) was the least.

Table (1): Mean numbers and percentages of mites and Collembola associated with three aquatic plants collected from the River Nile streams at Kafr El-Sheikh.

Family	Species	Mean numbers and Percentages of mites and collombola in						Total mean
		Azolla biliaculoides		*Lemna gibba*		*Eichhornia crassipes*		
		Mean	%	Mean	%	Mean	%	
Galumnidae	*Galumna tarsipennata*	0.44e	1.08	0.2 f	0.57	0.08 h	0.64	0.72
	%	61.11		27.78		11.11		
Oribatulidae	*Oribatula tadrosi*	39.72a	97.35	48.42 a	98.74	11.16 a	89.43	85.30
	%	64.56		40.35		13.08		
	Scheloribates sp.	0.00	0.00	0.00	0.00	0.02 i	0.16	0.02
	%	0.00		0.00		100.00		
Hypochoniidae	Hypochthinus sp.	0.64d	1.57	0.24 e	0.69	0.2 f	1.60	1.08
	%	59.26		22.22		18.52		
Haplozetidae	*Haplozetes sp.*	0.00	0.00	0.00	0.00	1.02 d	8.17	1.02
	%	0.00		0.00		100.00		
Total Oribatida		40.80		34.86		12.48		88.14
Acaridae	*Tyrophagus sp.*	0.16f	57.14	0.62 d	53.45	0.74 d	75.51	1.52
	%	10.53		40.79		48.68		
	Rhizoglyphus sp.	0.12f	42.86	0.54 d	64.55	0.24 e	24.49	0.90
	%	13.33		60.00		26.67		
Total Acaridida		0.28		1.16		0.98		2.42
Nanorchestidae	*Speleorchestes sp.*	0.00	0.00	0.12 f	100.00	0.00	0.00	0.12
	%	0.00		100.00		0.00		
Cheyletidae	*Cheyletus malaccensis*	0.00	0.00	0.00	0.00	0.04 h	18.18	0.04
	%	0.00		0.00		100.00		
Eupodidae	*Eupodes sp.*	0.00	0.00	0.00	0.00	0.06 h	27.28	0.06
	%	0.00		0.00		100.00		
Tarsonemidae	*Stenotarsonemus sp.*	0.00	0.00	0.00	0.00	0.02 i	9.09	0.02
	%	0.00		0.00		100.00		
Conaxidae	*Conaxa setirostris*	0.10 f	20.83	0.00	0.00	0.00	0.00	0.10
	%	100.00		0.00		0.00		
Bdellidae	*Bdellus sp.*	0.00	0.00	0.00	0.00	0.08 h	36.36	0.08
	%	0.00		0.00		100.00		
Tydeidae	*Tydeus sp.*	0.38 e	79.17	0.00	0.00	0.02 h	9.09	0.40
	%	95.00		0.00		5.00		
Total Actinedida		0.48		0.12		0.22		0.82
Phytoseiidae	*Amblyseius sp.*	0.00	0.00	0.04 h	100.00	0.68 d	52.31	0.72
	%	0.00		5.55		94.45		
Pachylaelapidae	*Pachylaelaps sp.*	0.00	0.00	0.00	0.00	0.62 d	74.69	0.62
	%	0.00		0.00		100.00		
Total Gamasida		0.00		0.04		1.30		1.34
Total Mites		41.65		36.18		14.98		92.70
Cyphoderidae	*Cyphoderus sp.*	0.02 i	14.28	0.00	0.00	0.00	0.00	0.02
	%	100.00		0.00		0.00		
Hyposgastruridae	*Hyposgastrura sp.*	0.04 i	28.58	0.02 i	16.67	0.04 h	20.00	0.10
	%	40.0		20.00		40.00		
Tulbergidae	*Tulbergi sp.*	0.02 i	14.28	0.00	0.00	0.00	0.00	0.02
	%	100.00		0.00		0.00		
Odontellidae	*Odontella sp.*	0.02 i	14.28	0.00	0.00	0.00	0.00	0.02
	%	100.00		0.00		0.00		
Onychiuridae	*Onychrurus sp.*	0.02 i	14.28	0.00	0.00	0.16 f	80.00	0.18
	%	11.11		0.00		88.89		
Isotomuridae	*Isotomurus sp.*	0.00	0.00	0.02 i	1.67	0.00	0.00	0.02
	%	0.00		100.00		0.00		
Poduridae	*Proustoma sp.*	0.00	0.0	0.8 h	66.66	0.00	0.00	0.08
	%	0.00		100.00		0.00		
Sphaeridae	*Sphaerida sp.*	0.02 i	14.2	0.00	0.00	0.00	0.00	0.02
	%	100.00		0.00		0.00		
Total Collembola		0.14		0.12		0.20		0.46
Total fauna		41.79		36.30		15.18		93.16

Mean of mites and Collombola with different letters are significantly different (P = 0.05) Duncar's (1955) multiple range test.

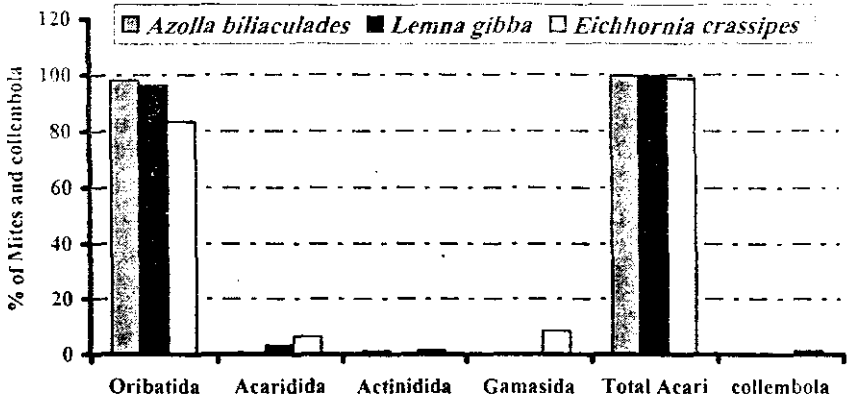

Fig. (1): Percentages of mites and Collembola in three aquatic plants from streams at Kafr El-Sheikh.

Table (2): Total means and percentages of mites and Collembola adhearing with three aquatic plants in streams at Kafr El-Sheikh

Groups	Total mean number of mites occurring in						Total Acari	
	Azolla biliaculoides		*Lemna gibbia*		*Eichhornia crassipes*			
	Mean	%	Mean	%	Mean	%	Mean	%
Oribatida %	40.80 a 46.29	98.17	34.86 a 39.55	96.35	12.48 a 14.16	83.31	88.14	95.06
Acaridida %	0.28 d 11.57	0.67	1.16 b 47.93	3.21	0.98 c 40.49	6.45	2.42	2.61
Actinedida %	0.48 c 58.54	1.16	0.12 d 14.63	0.33	0.22 d 26.83	1.47	0.82	0.88
Gamasida %	0.00		0.04 e 2.99	0.11	1.30 b 97.01	8.68	1.34	1.45
Total mites %	41.56 a 44.81	99.66	36.18 a 39.03	99.67	14.98 a 16.16	98.68	92.72	99.50
Total Collembola %	0.14 d 30.43	0.34	0.12 d 26.09	0.33	0.20 d 43.48	1.32	0.46	0.50
Total fauna %	41.70 44.75		36.30 38.95		15.18 16.30		93.18	

Mean of mites and Collombola with different letters are significantly different (P = 0.05) Duncan's (1955) multiple range test.

2.3. Waterhyacinth (*Eichhornia crassipes*) :

2.3.1. Mean number and percentage of sub-order Acarina associated with the weed :

From tables (1 & 2) and Fig. (1) data showed that mites represented (14.98 ind. = 98.68%) of the whole extracted fauna and included four suborders were Oribatida was found to be the dominant group (12. 48 ind. = 83.31%) followed by Gamasida represented by (1.3 ind. = 8.68%) and Acaridida represented by

(0.98 ind. = 6.45%). Actinedida was the least one (0.22 ind = 1.47%).

2.3.2. Mean number and Percentage of mite species :

Data in table (1) it was clear that *Oribatula tadrosi* (Popp) the most dominant species (11.16 ind. = 89.43%) followed by Haplozetes sp. (1.02 ind. = 8.17%), while *Hypochthinus sp.*, *Galumna tarsipennata* and *Scheloribates sp.* were (0. 2 ind. = 1.6%), (0.08 ind. = 0.64%) and (0.02 ind. = 0.16%) respectively in suborder Oribatida.

In the same table suborder Acaridida it was clear that *Tyrophagus sp.* the most dominant species (0.74 ind. = 75.51%) followed by *Rhizoglyphus* sp. (0.24 ind. = 24.49%), while in the sub-order Actinedida, it was clear that *Bdella* sp. (0.08 ind. = 36.36%) followed by *Eupodeus sp.* (0.06 ind. = 27.28%), while *Cheyletus malaccensis, Stenotarsonemus sp.* and *Tydeus sp.* were (0.04 ind. = 18.18%), (0.02 ind. = 0.09%) and (0.02 ind. = 9.09%) respectively. On the other hand, in the sub-order Gamasida it was clear that *Amblyseius sp.* the most dominant species (0.68 ind. = 52.31%) and *Pachylaelaps sp.* Came in second order (0.62 ind. = 47.69%).

2.3.3. Mean number and percentage of Collembola :

Data in tables (1 & 2) showed that this order represented (0.20 ind. = 1.32%) of the whole extracted fauna and included two genera: *Onychiurus sp.* represented by (0.16 ind. = 80.0%) and *Hypogastrura sp.* (0.04 ind. = 80.0%).

2.3.4. Mean number and percentage of aquatic snails :

Data in table (3) showed that two aquatic snails *Biomphalaria alexandrina* were represented by (0.2 ind. = 50%) while *Bulinus truncatus* represented by (0.2 ind. = 50%).

The statistical analysis table (1) showed significant relation in between *Oribatula tadrosi* (Popp.) populations and all other species of acarina and Collembola.

Results in table (2) showed significant relation ship between total mean numbers sub-order Oribatida and all other mite suborders in the three aquatic investigated plants. A clear significant relationship between the total recorded mites and total Collembola within the three aquatic plants.

3. Population density of predacious mites associated with three aquatic plants :

The role of the predacious mites in suppressing the population of main plant pests was recorded by **Sheela, *et al.***

(1989). The present results table (4) indicated that (*Azolla biliculoides*) held one species from Actenidida was extracted, it was *Cunaxa setirostris* and was represented by (0.10 ind. = 100%). On the other hand, by the same trend in (*Lemna gibba*) was found to hold *Amblyseius sp.* a gamasid mite and represented (0.04 ind. = 100%). Two species from Gamasida were extracted from waterhyacinth (*E. crassipes*) and they were *Amblysieus sp.* and *Pachylaelaps sp.* represented (0.68 ind. = 43.04% and 0.62 ind. = 39.24% respectively). The other extracted species of mites that followed *Cunaxa setirostris*, *Bdella sp.*, *Eupodeus sp.* and *Cheyletus malaccensis* represented (0.10 ind. = 6.34%, 0.08 ind. = 5.07%, 0.6 ind. = 3.80% and 0.04 ind. = 2.51% respectively).

Table (3): Mean numbers and percentages of aquatic snails associated with three aquatic plants collected from the River Nile streams at Kafr El-Sheikh.

Species	Total mean number and percentages of aquatic snails in						Total	
	Azolla biliaculoides		*Lemna gibbia*		*Eichhornia crassipes*			
	Mean	%	Mean	%	Mean	%	Mean	%
Eremina sp.	0.1	4.10	0.04	1.77	0.00	0.00	0.14	2.75
%	71.43		28.57		0.00			
Biomphalaria alexandrina	1.66	68.03	1.76	77.88	0.20	50.00	3.62	70.98
%	45.86		48.62		5.52			
Bullinus truncatus	0.68	27.87	0.46	20.35	0.20	50.00	1.34	26.27
%	50.75		34.33		14.92			
Total snails	2.44		2.26		0.40		5.1	
%	47.84		44.31		7.85			

Table (4): Mean numbers and percentages of predacious mites associated with three aquatic plants grown in streams at Kafr El-Sheikh.

Species	*Azolla biliculoides*		*Lemna gibba*		*Eichhornia crassipes*	
	Mean	%	Mean	%	Mean	%
1- *Amblyseius sp.*	0.00	0.00	0.04	100.00	0.68	43.04
2- *Pachaelaps sp.*	0.00	0.00	0.00	0.00	0.62	39.24
3- *Cunaxa setirostris*	0.10	100.00	0.00	0.00	0.10	6.34
4- *Bolella sp.*	0.00	0.00	0.00	0.00	0.08	5.07
5- *Eupodeus sp.*	0.00	0.00	0.00	0.00	0.06	3.80
6- *Cheyletus malaccensis*	0.00	0.00	0.00	0.00	0.04	2.51
Total predacious mites	0.10		0.04		1.58	
%	5.81		2.33		91.86	

Generally, as shown in table (4) it could be stated that predacious mites were most prevalent on *E. crassipes* represented by (91.86%) followed by *A. biliculoides* (5.81%)

while *L. gibba* was least (2.33%) in this category. **Somaa (2000)** recorded that list of insect pests on *Eichhornia crasipes* from its their whitefly, Aphis, Thrips and other insects. **El-Badry (1968)** found that the predatory mite, *Amblyseius gossipi* may be used as predator for all stages of the whitefly. On the other hand, the same auther recorded a significant negative correlation between the predatory mite *Ambleysieius gossipi* and both the whitefly immature stages, *Aphis spp.* and *Tetranychus cucurbitacearum.* **Sharshir (1992)** found that, *Amblyseius barkeri* could be used for the biological control of *Thrips tabaci* and *Tetranychus urticae* on cucumber.

DISCUSSION

The present investigation results revealed recording three fauna groups associated with three selected aquatic plants grown in streams located at Kafr El-Sheikh. [1] The recorded mites, were as follows, *A. biliculoides* (44.81%), *L. gibba* (39.03%) and *E. crassipes* (16.16%), [2] The collembolan recorded species were: *A. biliculoides* (30.43%), *L. gibba* (26.09%) and *E. crassipes* (43.48%), [3] The total arthropods mites & Collembola were : *A. biliculoides* (44.75%), *L. gibba* (38.95%) and *E. crassipes* (16.30%).

On the other hand, the aquatic recorded snails were: *A. biliculoides* (47.84%), *L. gibba* (44.31%) and *E. crassipes* (7.85%).

The distribution of fauna on the three aquatic plants was one of the main points examined in the present work. Results indicated that fauna flourished well on *A. biliculoides* followed by *L. gibba* while *E. crassipes*, Came third in that category. Those results confirms the prior studies done by **Gamieh (1991), Al-Assuity *et al.* (1993), Keplin (1993), Tadros *et al.* (1995), El-Shafei (2003) and Sharshir (2003)**. It is suggested that the dispersion of organisms may be correlated with the degree of growth of plants, sufficient good grown roots and leaves, water content, Organic matter, fertilizers and other factors responsible for the convenient factors needed for the growth and reproduction of organisms. It would be stated that Acarina was the dominant group in aquatic plants reaching (94.34%) followed by Collembola (0.47%). Those results comes with the same trend of prior investigators and confirming those of **Tadros (1994) and Sharshir (1986 & 2003)**. That phenomenon may be due to the fact that the large fraction of fauna are mites and they are degradators nourish on either organic matter or specific fungi, bacteria and actinomycetes, Sharshir (1986 & 2003), **Tadros *et al.* (1995) and Steinberger**

(1995). Colembola, on the other hand, can adapt its mode of living from damp soils and to nearly dry soils and even it could live with aquatic plants and/or near streams and drains... etc. **Tadros (1994), Sharshir (1986 & 2003), Steiner (1995) and Abou Tayesh (1997).**

The same authers stated that according to the close inter-relationship between organisms and the habitat. It is suggested that the increase of the fauna population on one plant and not the other may be due to plant moisture and to other living organisms, and to the importance of moisture to nearly all microflora, one of the main diet for mite microorganisms, and to most biological and physiological processes happening to fauna. These results comes confirming to most prior investigations. **Hammer (1994) and Sharshir (1986 & 2003).**

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الفونا المرتبطة بثلاث نباتات مائية فى ترع نهر النيل بكفرالشيخ

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تحتل النباتات المائية النامية فى نهر النيل وفروعه وروافده والمصارف درجة عالية من الأهمية حيث أنها مرتع خصب للفونا الحيوانية والحشرية سواء النافعة منها أو الضارة وقد استخدمت تلك النباتات فى صناعات عديدة مثل إنتاج الأخشاب والبيوجاز ... الخ. كما أن البعض تستخدم كغذاء للحيوان والطيور وتسميد بعض المحاصيل بالإضافة لما سبق من أهمية فهناك أهمية عظمى وهى كمية الفاقد من مياه النيل عن طريق تلك النباتات وقد سجلت الأبحاث أن ورد النيل يستهلك حوالى ٧,١٢ × ١٠^{٩} م٣ سنوياً من مياه النيل وهذه الكمية تعادل ١٠٪ من كمية مياه نهر النيل وبالإضافة الى ذلك فيمكن لهذه النباتات أن تعيق الملاحه فى نهر النيل وروافده وتعتبر تلك النباتات مصدراً للأفات التى تغير على بعض المحاصيل الزراعية المجاورة كما أن تلك النباتات تعتبر مخزن للقواقع المائية والتى تعتبر عائل وسيط لأخطر الأمراض التى تفتك بالإنسان والحيوان مثل البلهارسيا وقد قام بعض العلماء بإجراء بعض البحوث على الفونا الحيوانية والحشرية المرتبطة بتلك النباتات المائية سواءً فى مصر أو فى العالم ومن هنا قمنا باختيار ثلاث نباتات مائية سائدة فى ترع نهر النيل وهى الأزولا *Azolla biliculoides* وعدس الماء *Lemna gibba* وورد النيل *Eichrnia crassipes*. وذلك لبحث النقاط الأتيه عليها.

حصر لأنواع الفونا الحيوانية والقواقع المرتبطة بتلك النباتات ودراسة توزيع تلك الفونا على تلك النباتات وكذلك دراسة المفترسات الأكاروسية المرتبطة بها.

وقد استغرقت التجربه عامين كاملين إبتداءاً من أكتوبر ٢٠٠١م الى سبتمبر ٢٠٠٣م وأجرى البحث بالترع التى تمر بمزرعة كلية الزراعة بكفرالشيخ – جامعة طنطا وكانت تؤخذ العينة بواسطة شبكه قطرها ١٥سم مركب عليها نسيج من البلاستيك ذو فتحات دقيقة ولها يد خشبيه طولها ١م وكانت تؤخذ العينه بميل على حافة الترعه وكانت تكرر ثلاث مرات ثم تفصل منها القواقع وتوضع فى برطمانات خاصة

وتنقل للمعمل للتعريف والعد ثم تحمل العينة على اقماع برليزى لفصل ما بها من أكاروسات وكولمبولا ثم تعد وتصنف وتنسب الى ١٠٠جم مادة جافة.

وقد سجلت النتائج ما يلى :

كانت نسبة الأكاروسات المرتبطة بتلك النباتات هى السائدة وتمثل ٩٩,٥% بينما نسبة الكولمبولا تمثل ½% وعند دراسة تحت رتب الأكاروسات فكانت نسبة تحت رتبه الحلم الخنفسى Oribatida هى السائدة فى الثلاث نباتات المختارة كما يلى : (٩٨,١٧%، ٩٨,٥٥%، ٨٣,٣٠%) على التوالى. بينما نسبة باقى تحت الرتب الأكاروسية وهى: *Acaridida, Actinedida, Gamasida* قليله جداً فى الثلاث نباتات وخاصة تحت رتبه Gamasida فيما عدا نسبة تواجد تلك تحت الرتبه Gamasida على ورد النيل فكانت تشتمل على نوعين من المفترسات الأكاروسية هما: *Amblyseius sp.*, *Pachelealaps sp.* دون غيره من النباتات وكان النوع *Oribatula tadrosi* هو السائد فى تحت رتبه الحلم الخنفسى Oribatida فى الثلاث نباتات المختارة.

وقد وجد أن نسبة مجموع الفونا الحيوانية فى الأزولا سائدة بنسبة ٤٤,٧٥% ثم تلاها عدس الماء بنسبة ٣٨,٩٥% ونسبة وجودها فى ورد النيل كانت ١٦,٣٠%.

وقد سجلت الدراسة ثلاث أنواع من القواقع المائية مرتبطة بالثلاث نباتات المائية المختارة وكان أكثرها سيادة هو النوع *Biomphalaria alexandrina* بنسبة ٧٠,٩٨% ثم تلاه النوع *Bulinus trancutus* بنسبة ٢٦,٢٧% وكان النوع *Eremina sp.* أقلها بنسبه ٢,٧٥% فى الثلاث نباتات المختارة.