

Studies on Some Commensal Rodent Species and Their Ectoparasites in Different Habitats at Sharkia Governorate

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ABSTRACT

Survey of some rodent species in three different localities during winter, 2003-2004 at Sharkia Governorate showed that the highest population density were 54.9, 25.4 and 19.6 % for *Rattus rattus alexandrinus*, *Rattus norvegicus* and *Mus musculus*. In houses, the percentages of rats population density were 90, 71.4 and 30.7 for *M. musculus*, *R. rattus alexandrinus* and *R. norvegicus*, respectively. The Norway rat, *R. norvegicus*, was the most dominant species in granaries (53.8 %), while the gray bellied rat, *R. rattus alexandrinus* was the least common species (7.14 %). In citrus farm, the *R. rattus alexandrinus* was the most frequent populations than other species. The survey of ectoparasites infesting rodents in three localities of the study revealed the occurrence of the three species of ectoparasites (i.e., lice, mite and fleas) on the three rodent species. The infestation rate with ectoparasites was highly on males than females in all trapped species. The infestation rates were 12.1, 9.6 and 8.2; in citrus farm, while were 7.3, 4.0 and 0.0; in granaries, but in houses were 6.3, 2.0 in granaries and 3.3 for *R. norvegicus*, *R. rattus alexandrinus* and *Mus musculus*, respectively. The application of rodenticides (i.e., Difenacoum, coumatetrayl and Diphacinone) caused highly reduction of rat population in citrus farm, houses and granaries respectively. While, coumatetrayl revealed the lowest rodenticides effective against population reduction percent than another rodenticides in granaries.

Key words: Commensal Rodent Species, Ectoparasites, Sharkia Governorate.

INTRODUCTION

Wild rats, especially the genus *Rattus*, which often live in close association with man's activities, have no doubt been the vertebrate group most costly to man in terms of economic damage and public health problems. Further, science is learning that many foci of rat-borne diseases, notably plague, are highly persistent, and not easy to control. One of the two most important species of rats is *Rattus rattus*, commonly known as the roof rat or black rat, but also as the ship rat. Another important species is *Rattus norvegicus*, commonly known as the Norway or brown rat, but also referred to as gray rat, sewer rat, water rat and wharf rat.

In Egypt, attempts were conducted with anticoagulant rodenticides against rodent species under laboratory and field conditions (Helal *et al.*, 1976). In Kuwait, Al-taqi & Al-Ziady (1982) studied mites infesting domestic and wild rodents. In Egypt, Arafá *et al.* (1975) found that *Rattus norvegicus* was highly infested with mites among other commensal rodent species.

Wild rats can attack all kinds of cereals and forage crops, vegetables, fruits, granaries, stored food and grains. On a world wide basis an annual loss of 3.55 % of stored grains is due to the damage of these wild rats (Dykstra, 1966) and rat damage occurs during all phases of food production and storage. Rats eat about 10 % of their weight each day, some 20 to 40 pounds (10 to 20 kg) per year, but they usually contaminate much more food with urine and feces. The control and management of rodent populations and their parasites associated with rodent diseases leads to reducing an infection disease.

In Egypt, anticoagulant rodenticides have long been used on a large scale to control rodents in agriculture and public health purposes Rennison *et al.*, 1975; El-Deeb *et al.*, 1985; Abdel-Moaty, 1996; Youssef, 1996; Embarak, 1997; Mourad, 1997; Hussein *et al.*, 1999 and Hussein, 2000.

However, the efficiency of the common used rodenticides against the dominant rats in relation to habitats sides is very lacking. Hence the present study was carried out to:

- 1- Survey the wild rat populations in different localities (citrus farm, granaries and houses) at Sharkia Governorate.
- 2- Survey and identification of rodent ectoparasites.
- 3- Evaluation the efficacy of three anticoagulants against wild rats in different localities.

MATERIALS AND METHODS

Field experiment:

1- Survey and population density of the dominant rodent species.

The present work was carried out at three localities in El-Halawat village Sharkia governorate during winter, 2003-2004. The first location was a farm habitat cultivated with citrus trees, wheat and lettuce. The second location is a granary near of the fields. The third location was a numerous of the houses. The first location was about two feddans, while the second and the third location were 25 house and granaries for each. Traps were set in selected sites within each location for three nights (50 traps / location); positive traps were collected and transported to the laboratory, counted and as

identified to different species. The population density of total rats and rat species were estimated as a percentage using the following equation: % population = number of rats / total No. of traps × 100.

2- Survey and identification of rodent ectoparasite.

Rodents were collected alive from various location sites, and classified different species. The sex of the rodents species was also determined. The distribution frequency of each species (%) was estimated. For the collection of ectoparasites, rodents were individually anaesthetized in a jar containing a cotton pad moistened with chloroform, then brushed in a deep white plate using a relatively hard brush. After collection of ectoparasites, they were preserved in glass bottles containing 70 % ethyl alcohol and labeled with necessary Informations. The ectoparasites were classified to fleas, lice and mites. From the animal in the sample, mites were isolated in small vials using a camel's hair brush to avoid destruction of collected mites and then counted using stereoscopic binocular microscope. Clearing of collected specimens was done using lactic acid. Mites were mounted and left to dry using a hot plate and prepared for microscopic examination (Embarak, 1997). Identification of mites was done using different keys constructed by Karg (1971), Krantz (1975), Zaher (1986 a & b) and (Embarak, 1997).

3- Evaluation the efficacy of three anticoagulants against wild rats in different localities.

Anticoagulant rodenticides used:

- I- Difenacoum 0.005% (Canasafenacoum) single dose and was supplied by Ministry of Agricultural.
- II- Diphacinone 0.005% (El-Mared or T.R.C.) multi dose and was supplied by Ministry of Health and populations.
- III- Coumatetrayl 0.0375 (Shery rat) multi dose and was supplied by Ministry of Health and populations.

The tests were conducted during the winter of 2003-2004 in three localities (citrus farm, granaries and houses) at Sharkia Governorate against the Norway rat (*Rattus norvegicus*), the roof rat (*Rattus rattus*) and house mouse (*Mus musculus*). The roof rat comprised more than 60 % of the total number of rats in the localities.

All rodenticides were prepared and made bait on crushed maize.

This study was carried out in three localities (citrus farm, granaries and houses); thirty plastic bait stations were prepared with crushed maize without chemicals, then distributed in three locations for 3 days. The food consumption was estimated for each locality, after that distributed of three anticoagulant rodenticides in three localities for 3 days, which are thirty plastic bait stations for chemical. Each chemical ten plastic bait stations (Each station about

on 100 gm of rodenticide). The rodenticide consumption was estimated and recorded. Then, after that distributed the broken corn without rodenticides at the same localities, the food consumption was estimated and recorded. The percent reduction in the activity of rodents and related percent control was expressed by the equation of Kaukeinen (1979).

Reduction of rat population % = 100 - [(post-treatment / pretreatment) × 100].

RESULTS AND DISCUSSION

1- Survey and distribution of wild rats:

Survey of rodents in three different localities habitat at Sharkia Governorate (i.e., citrus farm, granaries and houses) revealed the occurrence of three rodent species in citrus farm and houses (viz., *R. rattus alexandrinus*, *R. norvegicus* and *Mus musculus*). In granaries, *Mus masscults* was not recorded, while, *R. rattus alexandrinus* and *R. norvegicus* were recorded.

Data in table (1) show that the percentages of rat population density at different localities were 71.4, 21.4 and 7.14 % in houses, citrus farm and granaries for *R. rattus alexandrinus* respectively. While, *R. norvegicus* was recorded 53.8, 30.7 and 15.3 % in the granaries, houses and citrus farm respectively. *Mus musculus* not found in granaries, while was revealed 90 and 10 % in houses and citrus farm respectively. The gray bellied rat, *R. rattus alexandrinus*, was most dominant species constituting 54.9 % of the total rodents trapped, followed by the Norway rat *R. norvegicus* 25.4 %, while the house mouse or sisi, *Mus musculus* was the least common species recording 19.6 %. These results agree with those obtained by Arafa (1968); Salit (1972); Abazaid (1990); Embarak (1997) and Hussein (2000) who observed that the survey of wild rat species during autumn, 1997 at different habitat sites in Qalubia Governorate the highest population density at open store (63 %), then pea field (50 %) and citrus farm (45 %). The Norway rat, *Rattus norvegicus*, was the most dominant species in each habitat site, whereas the gray bellied, *R. rattus alexandrinus* was least common species.

2- Survey and identification of rodent ectoparasites.

The parasitic species of mites (Acari), lice and fleas (Insecta: Anoplura and Siphonaptera) were found on all species of rodents encountered during the course of the present work in winter season 2003-2004. The ectoparasites were collected from the three rodent species, (*R. rattus alexandrinus*, *R. norvegicus* and *Mus musculus*) in the three different localities (citrus farm, granaries and houses) during the course of the present work. The survey of ectoparasites infesting rodents in the three localities of the study were revealed the occurrence of three species of ectoparasites (Lice, mite and fleas) on the three rodent species trapped. This is in agreement with Salman and Maher Ali (1979); Salman *et al.* (1986);

Morsy *et al.*, (1986 and 1988); Sourly *et al.* (1987) and Embarak (1997).

Data in (Table 2, 3 and 4) represent the index and the infestation rate of Lice, mite, fleas and total ectoparasites on both sexes of the three rodent species trapped from the three localities in Sharkia Governorate during winter season 2003-2004.

In the citrus farm (Table 2) show that *R. norvegicus* was the highly infested rodent species with ectoparasites (infestation rate 12.1) followed by *R. rattus alexandrinus* (9.6), while *Mus musculus* was least species infested with ectoparasites (8.2) during winter 2003-2004. On the other side, the infestation with ectoparasites was higher on males than on females in all species. In case of the infestation rate of rodents with Lice, *Mus musculus*, *R. norvegicus* and *R. rattus alexandrinus* were infested species with lice (indices were 3.7, 3.3 and 3.1 respectively). The Lice index was higher on males than females in all rodent species during the period of study. The infestation rate of rodent species with mites and fleas were highly on males than on females during the period study.

In the granaries (Table 3) show that *R. norvegicus* was the highly infested rodent species with ectoparasites (infestation rate 7.3) followed by *R. rattus alexandrinus* (4.0), while, *Mus musculus* was absent in granaries during the winter season 2003-2004. The Lice, mites and fleas Indexes were higher on males than on females for *R. norvegicus* and *R. rattus alexandrinus*.

In houses, data in table (4) revealed that the total number of ectoparasites and infestation rate were 243 and 2.01; 180 and 3.33; 115 and 6.3 for *R. rattus alexandrinus*, *Mus musculus* and *R. norvegicus* respectively. Generally the lice index was higher on males than on females in all rodent species during the period study. Also the mites index was highly on

males than on females (1.7 and 1.5) for *R. norvegicus*, exclusive *Mus musculus* and *R. rattus alexandrinus* the mites index were highest on females than on males (1.25 ; 0.1) and (0.72 ; 0.37) respectively. The fleas index was highly in all rodent species during the period study, higher flea index (2.83) was on *R. norvegicus* followed by *Mus musculus* (1.94) while, in case of *R. rattus alexandrinus* was least than two rodent species. The fleas index was higher on females than on males for *Mus musculus* (2.4) and *R. rattus alexandrinus* (1.2) while, fleas index was higher on males than on females (2.9 males, 2.6 females) in case of *R. norvegicus*. Data in table (5) show that, the population reduction percent varied considerably according to the tested rodenticide and habitat site. In citrus farm, Difenacoum proved to be the most effective anticoagulant on population reduction percent followed by Coumatetrayl and Diphacenone showing 94.29, 91.43 and 85.71 %, respectively. In the houses, Difenacoum, Coumatetrayl and Diphacinone were observed the highly population reduction percent with all rodenticides showing 82.63, 78.92 and 61.75 %, respectively. While, Coumatetrayl revealed the lowest rodenticides effective on population reduction percent (50 %) than another two rodenticides in granaries.

In general, it was observed from the results obtained concerning index of lice, mites and fleas on both sexes of the three rodent species were trapped from three localities at Sharkia Governorate that *R. rattus alexandrinus* ranked the first in the infestation with ectoparasites in two localities (i.e., citrus farm and houses) followed by *Mus musculus* (in houses) and *R. norvegicus* (in citrus farm), while, *R. norvegicus* was higher in the infestation with ectoparasites in granaries.

Table (1): Percentages of rats population density and sex ratio at different localities in Sharkia Governorate.

Rodent species	Sex	Citrus farm	Granaries	Houses	No. of males and females	Grand total of rodents	%
		%	%	%			
<i>R. rattus alexandrinus</i>	M	18.75	12.5	68.75	96	168	54.9
	F	25	0	75	72		
	Total	21.4	7.14	71.4	168		
<i>R. norvegicus</i>	M	33.3	33.3	33.3	36	78	25.4
	F	0	71.4	28.5	42		
	Total	15.3	53.8	30.7	78		
<i>Mus musculus</i>	M	16.6	0	83.3	36	60	19.6
	F	0	0	100	24		
	Total	10	0	90	60		

Table (2): Number of ectoparasites and their infestation rate on rodent species in citrus farm during winter 2003-2004.

Rodent species	Sex	No. of rodents examined	Total no. of ectoparasites	Infestation rate	No. of ectoparasites and infestation rate					
					Lice		Mite		Flea	
					No.	Lice index	No.	Mite index	No.	Flea index
<i>R. rattus alexandrinus</i>	M	18	286	15.8	87	4.8	55	3.1	144	8.0
	F	18	70	3.8	28	1.5	12	0.6	21	1.2
	Total	36	356	9.6	115	3.1	67	1.8	165	4.5
<i>R. norvegicus</i>	M	12	146	12.1	39	3.3	15	1.3	92	7.6
	F	0	0	0	0	0	0	0	0	0
	Total	12	146	12.1	39	3.3	15	1.3	92	7.6
<i>Mus musculus</i>	M	6	49	8.2	22	3.7	3	0.5	24	4
	F	0	0	0	0	0	0	0	0	0
	Total	6	49	8.2	22	3.7	3	0.5	24	4

Table (3): Number of ectoparasites and their infestation rate on rodent species in granaries during winter 2003-2004.

Rodent species	Sex	No. of rodents examined	Total no. of ectoparasites	Infestation rate	No. of ectoparasites and infestation rate					
					Lice		Mite		Flea	
					No.	Lice index	No.	Mite index	No.	Flea index
<i>R. rattus alexandrinus</i>	M	12	48	4.0	12	1.0	9	0.75	27	2.25
	F	0	0	0	0	0	0	0	0	0
	Total	12	48	4.0	12	1.0	9	0.75	27	2.25
<i>R. norvegicus</i>	M	12	121	10.1	35	2.9	31	2.6	55	4.6
	F	30	186	6.2	27	0.9	33	1.1	126	4.2
	Total	42	307	7.3	62	1.4	64	1.5	181	4.3
<i>Mus musculus</i>	M	0	0	0	0	0	0	0	0	0
	F	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0

Table (4): Number of ectoparasites and their infestation rate on rodent species in houses during winter 2003-2004.

Rodent species	Sex	No. of rodents examined	Total no. of ectoparasites	Infestation rate	No. of ectoparasites and infestation rate					
					Lice		Mite		Flea	
					No.	Lice index	No.	Mite index	No.	Flea index
<i>R. rattus alexandrinus</i>	M	66	115	1.74	33	0.5	25	0.37	57	0.86
	F	54	128	2.37	24	0.4	39	0.72	65	1.20
	Total	120	243	2.01	57	0.47	64	0.53	122	1.01
<i>R. norvegicus</i>	M	12	76	6.	21	1.75	20	1.7	35	2.9
	F	6	20	6.5	4	0.6	19	1.5	16	2.6
	Total	18	115	6.3	25	1.3	39	2.1	51	2.83
<i>Mus musculus</i>	M	30	75	2.5	24	0.8	4	0.1	47	1.56
	F	24	105	4.4	17	0.70	30	1.25	58	2.41
	Total	54	180	3.33	41	0.75	34	0.62	105	1.94

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دراسات على بعض أنواع القوارض المتعايشة وطفيلياتها الخارجية في مواطن مختلفة بمحافظة الشرقية

معهد بحوث وقاية النباتات - الدقى - الجيزة - مصر

- هدف البحث إلى إجراء حصر لأنواع القوارض المختلفة للقوارض في ثلاث أماكن مختلفة بمحافظة الشرقية خلال فصل الشتاء ٢٠٠٣ - ٢٠٠٤ وقد أظهر هذا الحصر أن تعداد القوارض كان عاليا في هذه الفترة حيث كان ٥٤,٩ ، ٢٥,٤ ، ١٩,٦ % لكل من الجرذ الاسكندراني الجرذ النرويجي وفؤيرة المنزل على التوالي.
- ١- كانت نسبة تعداد الفئران في المنازل ٩٠ ، ٧١,٤ ، ٣٠,٤ % لكل من فؤيرة المنزل، الجرذ المتسلق و الجرذ النرويجي على التوالي.
- ٢- الجرذ النرويجي كان أكثر الفئران تعددا في المخازن حيث بلغت النسبة ٥٣,٨ % بينما كان الجرذ الاسكندراني أقلها تعدادا حيث بلغت النسبة ٧,١٤ %.
- ٣- في مزرعة الموالح كان الجرذ الاسكندراني الأكثر تعدادا عن كل الأنواع الأخرى.
- أظهرت الدراسة أيضاً أن هناك ثلاثة أنواع من الطفيليات الخارجية مصاحبة لهذه الفئران وهي القمل والحلم والبراغيث. وكان معدل الإصابة بهذه الطفيليات مرتفعاً في الذكور عن الإناث حيث كان ١٢,١ ، ٩,٦ ، ٨,٢ % للقمل و ٧,٣ ، ٤,٠ ، ٤,٠ % للحلم و ٦,٣ ، ٢,٠ ، ٣,٣ % للبراغيث لكل من الجرذ النرويجي و الجرذ الاسكندراني وفؤيرة المنازل في مزرعة الموالح و المخازن، المنازل على التوالي.
- كما أظهرت الدراسة أنه باستخدام مبيدات القوارض داي فيناكوم، كوماترريل وداي فائينون في المكافحة انخفض تعداد الفئران بنسبة عالية في مزرعة الموالح والبيوت و المخازن على التوالي. بينما أظهر الكوماترريل أقل تأثير في خفض نسبة التعداد بالمقارنة بالمركبين الأخرين في المخازن.

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دراسات على بعض أنواع القوارض المتعايشة وطفيلياتها الخارجية في مواطن مختلفة بمحافظة الشرقية

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معهد بحوث وقاية النباتات - الدقى - الجيزة - مصر

- هدف البحث إلى إجراء حصر للأصناف المختلفة للقوارض في ثلاث أماكن مختلفة بمحافظة الشرقية خلال فصل الشتاء ٢٠٠٣ - ٢٠٠٤ وقد أظهر هذا الحصر أن تعداد القوارض كان عاليا في هذه الفترة حيث كان ٥٤,٩ ، ٢٥,٤ ، ١٩,٦ % لكل من الجرذ الاسكندراني الجرذ النرويجي وفؤيرة المنزل على التوالي.
- ١- كانت نسبة تعداد الفئران في المنازل ٩٠ ، ٧١,٤ ، ٣٠,٤ لكل من فؤيرة المنزل، الجرذ المتسلق و الجرذ النرويجي على التوالي.
- ٢- الجرذ النرويجي كان أكثر الفئران تعداد في المخازن حيب بلغت النسبة ٥٣,٨ % بينما كان الجرذ الاسكندراني أقلها تعدادا حيث بلغت النسبة ٧,١٤ %.
- ٣- في مزرعة الموالح كان الجرذ الاسكندراني الأكثر تعدادا عن كل الأنواع الاخرى.
- أظهرت الدراسة أيضاً أن هناك ثلاثة أنواع من الطفيليات الخارجية مصاحبة لهذه الفئران وهي القمل والحلم والبراغيث. وكان معدل الإصابة بهذه الطفيليات مرتفعاً في الذكور عن الإناث حيث كان ١٢,١ ، ٩,٦ ، ٨,٢ % للقمل و ٧,٣ ، ٤,٠ ، صفر % للحلم و ٦,٣ ، ٢,٠ ، ٣,٣ % للبراغيث لكل من الجرذ النرويجي و الجرذ الاسكندراني وفؤيرة المنازل في مزرعة الموالح و المخازن، المنازل على التوالي.
- كما أظهرت الدراسة أنه باستخدام مبيدات القوارض داي فيناكوم، كوماتر ايل وداي فاثيون في المكافحة انخفض تعداد الفئران بنسبة عالية في مزرعة الموالح والبيوت و المخازن على التوالي. بينما أظهر الكوماتر ايل أقل تأثير في خفض نسبة التعداد بالمقارنة بالمركبين الأخرين في المخازن.