

## Survey and Distribution of Commensal Rats in Three Districts of Alexandria Governorate

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### ABSTRACT

The abundance and the dynamic changes in the population densities of the common commensal rats species had been estimated in the three districts of Alexandria Governorate: Eastern, Center (Medium) and Western, throughout five consecutive years from 1995 up to 1999 using commercial anticoagulant rodenticides.

The utmost abundant rat species in the Western district of Alexandria was the Norway rat , *Rattus norvegicus* B (53.7 %), followed by roof rat, *Rattus rattus* L. (39 %) and the least abundance was recorded for the house mouse, *Mus musculus* L. (7.4 %). Also, the rate of abundance of the Norway rat in the Medium and Eastern districts was more similar to that in the Western district (54.8% and 54.3%), respectively. The same pattern was also observed for the roof rat with slight decreased value (39% and 37.2%); and the house mouse which to less extent to (9.4%) in the Medium district and (8.5%) in the Eastern district.

Also, the Western district revealed the highest mean of total counted poisoned individuals (3417.1) of the three rats species together, followed by the Eastern district (2504.8) and; the lowest mean (1900.0) in the Medium district. That, is mainly due to the location of the Western and Eastern districts nearby the shore coast and Alexandria maritime port.

In conclusion, it could be mentioned that the most abundant rodent species is the Norway rat in all districts throughout the five years of study. The lower of invasion rats to the Medium district the center of Alexandria Governorate is due to the more given attention from the clean company (Onyx), than both the other districts in the last years.

## **INTRODUCTION**

Rat and mice are extremely damaging to a wide varieties of important agriculture crops in addition to their harmful effect on public health due to their role in transmitting numerous diseases and parasites to human (Fiedler, 1994). Rodent are members of the mammalian order; Rodentia which consists of almost 1700 species worldwide. It has been estimated that one fifth of the foodstuff planted every year in the world are never eaten by people because of the damage of rodent (Howard and March, 1976). Herein, rat and mice cause heavy economic damage destroying crops growing in the field in different stages, such as sugar cane, rice, wheat, soybean and cotton.

The survey and measurement of population abundance of different species of rodent is usually estimated by using several means. A common wire spring traps, poison baits, and active burrow numbers and inspection of foods and tails traces. However, several investigations in this respect were carried out in different areas ( Gaaboub et al., 1982 ; Mourad et al., 1982 ; Desheesh et al., 1987 ; El-Feky,1990 ; Aly, 2000 and Mesbah et al., 2003 ). Generally, studying the population density of a rodent species is regarded in important point before initiating of control procedure in any region. Also, the determination of the distribution and dynamical fluctuation of a rat and / or mouse population is essential to perform the control successfully.

This research aimed to survey and study the dynamic fluctuation of the main prevailing species of commensal rodents in Alexandria districts over five consecutive years from 1995 up to 1999.

## **MATERIALS AND METHODS**

Survey of the common prevailing species of commensal rats and their distribution in Alexandria districts was carried out throughout five successive years (from 1995 up to 1999) by using commercial anticoagulant rodenticides that have been used as wheat grain baits (suitable protein rich baits) for that purpose which are shown in Table (1).

Table (1): The used anticoagulant rodenticides baits in surveying the abundant commensal rats in Alexandria Governorate.

Year	Rodenticides
1995	Tomorin <sup>®</sup> - Warfarin <sup>®</sup> - Supercaid <sup>®</sup>
1996	Tomorin <sup>®</sup> - Ratkiller <sup>®</sup>
1997	Tomorin <sup>®</sup> - Caid <sup>®</sup> - Ratak <sup>®</sup> - Redentin <sup>®</sup>
1998	Caid <sup>®</sup> - Ratak <sup>®</sup> - Racumin <sup>R</sup>
1999	Tomorin <sup>®</sup> - Ratkiller <sup>®</sup> - Redentin <sup>®</sup>

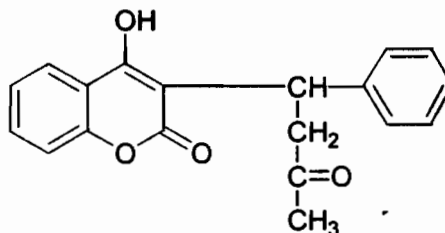
### A. Rodenticides used:

#### I. Warfarin:

Used formulation: Warfarin<sup>®</sup>

Chemical name: 4-hydroxy-3-(3-oxo-1-phenylbutyl) coumarin.

Structure formula:

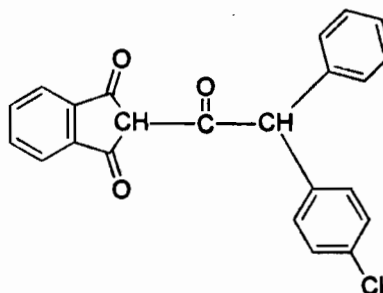


#### II. Chlorphacinone:

Used formulation: Caid<sup>®</sup> - Rodentin<sup>®</sup>

Chemical name: 2-[(2-chlorophenyl)-2-phenylacetyl] indan-1,3-dione.

Structure formula:

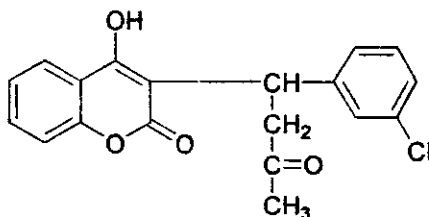


### III. Coumachlor:

Used formula: Tomorin® 1%

Chemical name: 3 - [1- (4-chlorophenyl) -3 -oxobutyl] - 4 -hydroxy coumarin.

Structure formula:

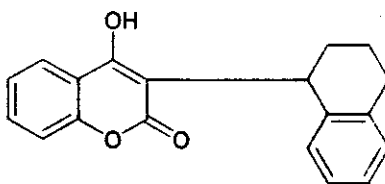


### IV. Coumatetralyl:

Used formulation: Racumin® 0.375

Chemical name: 4-hydroxy -3 -(1,2,3,4 - tetrahydro -1-naphthyl) coumarin.

Structure formula:

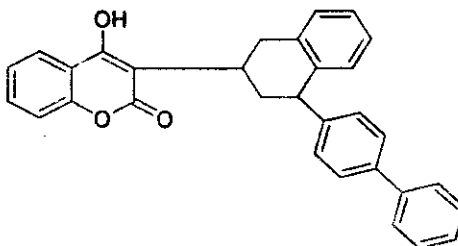


### V. Difenacoum:

Used formulation: Ratak® (50 mg / kg) - Ratkiller®

Chemical name: 3-(3 - biphenyl - = 4 -yl -1,2,3,4 -tetrahydro-1- naphthyl) - 4-hydroxycoumarin.

Structure formula:

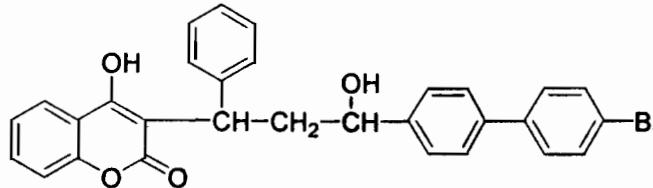


**VI. Bromadiolone:**

Used formulation: Super-caid®

Chemical name: 3-[3-(4'-bromobiphenyl-4-yl)-3-hydroxy-1-phenylpropyl]-4-hydroxycoumarin.

Structure formula:

**B. Method of survey:**

The anticoagulant rodenticides baits were distributed in different places in Alexandria Governorate. Inspection of rats and mice abundance was performed in cooperation with the Unit of Rodents Control, Ministry of Health, Alex., Egypt, by counting daily the dead commensal rats and mice species, which had been passed only on the distributed baits (as tracking powder) or fed on these used rodenticides baits in dwelling districts i.e. homes, houses, wholesaling stores, food stores and numerous factories. The died rats and mice were classified to species according to Anderson and Jones (1967). During the study, the fluctuating numbers of each species were calculated per day, per month and per year in each district [Eastern, Center (Medium) and Western]. The population density of each species was estimated for determining the ascending and /or descending abundance of each commensal rat or mice throughout the year. For studying the relationship between fluctuating and densities of the three inspected species of commensal rats and prevailing hicrothermic conditions in the districts of Alexandria Governorate, the meteorological data during the experimental years of 1995 till 1999 were also recorded and illustrated in (Fig.1), particularly for maximum and minimum temperatures and relative humidity.

**C. Statistical analysis:**

The obtained data were statistically analyzed F-test (ANOVA) at 0.05 and 0.01 levels (Steel and Torrie, 1980) using the computer program SAS (SAS Institute Inc., 1980).

## RESULTS AND DISCUSSION

Result of the estimated distribution, abundance and dynamical changes in population densities of inspected commensal rodent species throughout five successive years from 1995 up to 1999 in the three districts (Western, Eastern and Center) of Alexandria Governorate are exhibited in Tables from 2 till 7 and Figures 2 till 4.

Generally, the data given in Table (2) elucidate that three prevailing commensal rodent species were detected in the Western district of Alexandria namely, the Norway rat (*Rattus norvegicus*), the roof rat (*Rattus rattus*) and the house mouse (*Mus musculus*) also, these three previously mentioned species were found in the Center and Eastern districts through the elapsing survey period from 1995 up to 1999. In detail, the results demonstrated that in Western district, the Norway rat had the highest mean population number (424.2) followed by the roof rat (348.0) and the house mouse which had a significant decrease in the mean population number (46.8) in comparison to the Norway rat and the roof rat in year 1995. While, the calculated mean numbers of these inspected rodent species in the same Western district during 1999 decreased to 336.3 and 229.7 for Norway rat and roof rat, respectively, versus the deduced mean of the collected poisoned individuals of the house mouse which increased to 64.3 (Table 2).

From Tables 2 & 3 and Figure 2, it could be revealed that the utmost abundant rat species in the Western district of Alexandria is the Norway rat (53.7%), followed by the roof rat (39%). The least abundant was detected for the house mouse (7.4%) (Table 2). Moreover, the abundance of each rat species differed from year to year according to the prevailing environmental circumstances in the district. The higher estimated rates of Norway rat or / and roof rat individuals amounted to 22.9, 26.1% and 24.5, 26.3% from the grand total counted individuals of each species during 1995 & 1996, respectively. The house mice were relatively high abundant during 1996 & 1997 (23.6, 22.5%) from the grand total counted house mice in both the years of study. While, in the other years of carried out investigation the measured rates of each inspected rat species were to a more or less extent lower and ranged from 14.9 to 19.6%, 13.1 to 18.6% and 15 to 20.3% for the Norway rat, roof rat and house mouse, respectively (Table 3). In addition, the higher abundance of Norway rat in Western district was also declared when the

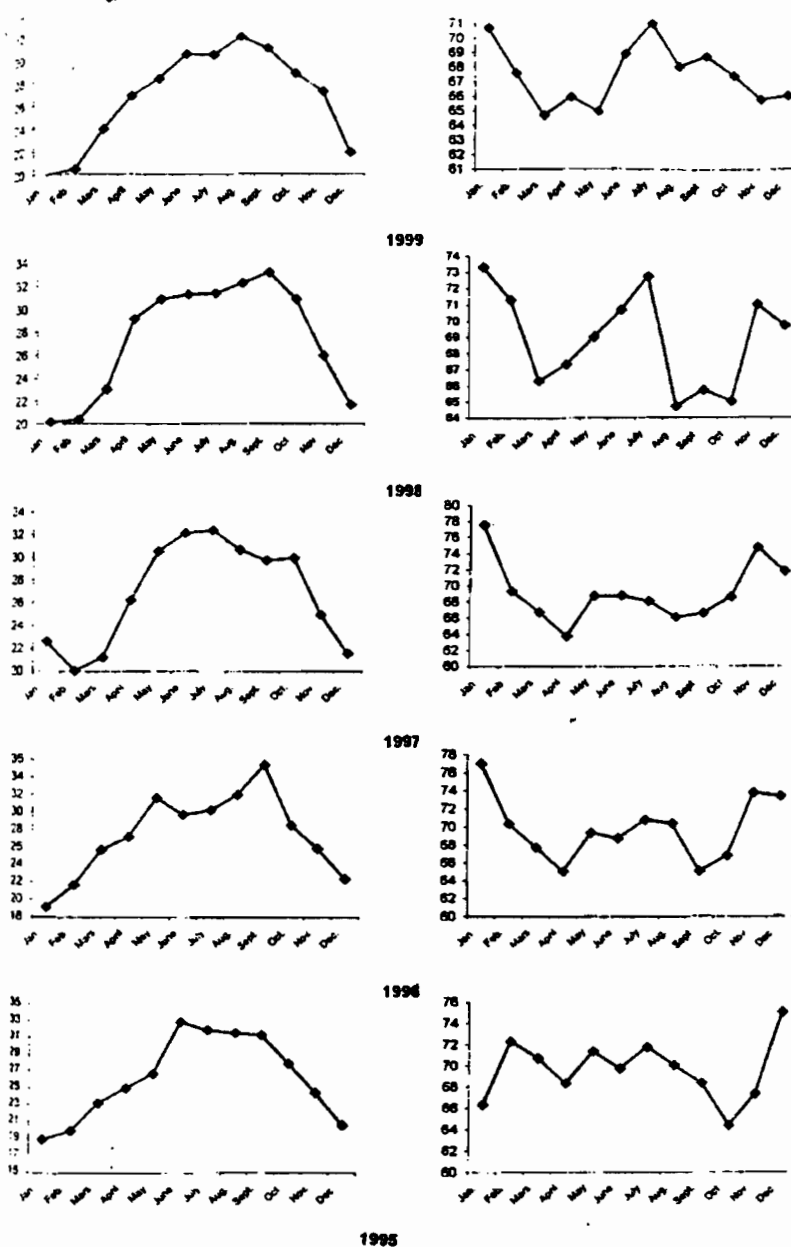


Fig. (1): The calculated monthly averages of prevailing temperature and relative humidity throughout the period of investigation (1995-1999).

relative density of this species had been calculated in proportion to the grand total counted individuals of all three species throughout the five years of study and the measured higher percentages of its prevalence ranged between 12.3% in 1995 and 9.7% in 1999, compared with 10.2% and 6.2%, 1.4% and 1.5% for the roof rat and the house mouse, in respect (Table 2 and Fig. 2).

Similarly, the same pattern of commensal rats distribution and abundance had been merely observed in the Eastern and Medium districts of Alexandria (Tables 4 till 7; Figs 3,4).

From Tables 4& 5 and Figure 3, it is also clear that the highest common rat species in the Eastern district of Alexandria is the Norway rat (54.3%), followed by the roof rat (37.2%); while the house mouse was the least abundant one (8.5%)(Table 4). The calculated densities of each rat species differed from year to year according to the prevailing environmental circumstances in the district. The higher estimated densities of Norway rat or / and roof rat comprised 31.6, 20.8 and 19.6, 30.6% from the grand total of counted individuals of each species in years 1996, 1997 for the first and 1995, 1996 for the second species, respectively. The measured population density of the house mouse was relatively high during 1996, 1997 – 25.5, 20.3% from the grand total of counted house mice in the years of study (Table 5). In the other years of the performed inspections the measured densities of each inspected rat species were to a more or less extent lower and ranged between 13.1, 20.8, 12.9, 18.9 and 17.4, 19% for the Norway rat, roof rat and house mouse, respectively (Table 5). Noticeably, the higher abundance of the Norway rat was also detected when the relative density of this species was calculated in proportion to the grand total of all counted individuals of the three species throughout the five years of study. The calculated higher percentage of its occurrence ranged between 9.5% in 1995 and 9.2% in 1999, compared to 7.3and 6.7% for the roof rat and 1.5%, 1.6% for the house mouse, in respect (Table 4 & Fig. 3).

The mean values of the collected poisoned individuals of the three rat species in the Eastern district were comparatively lower and amounted to 232.8, 179.0 and 36.8 for Norway rat, roof rat and house mouse, respectively in 1995, more or less increased or / and decreased throughout the years 1996 to 1998, whereas in 1999 the decreased mean numbers of the Norway rat and roof rat comprised 226.6, 146.8, respectively, but for the house mouse slightly increased to 39.4 (Table 4). The calculated mean numbers of the collected poisoned individuals in the Medium district were more or less fluctuated and amounted to



159.5, 126.7 and 22.8 for the three rat species: Norway rat, roof rat and house mouse, respectively in year 1995 (Table 6), while, showed a noticeable increase up to 226.2, 158.2 and 44.2 during 1999 for Norway rat, roof rat and house mouse, respectively, inverse with Western and Eastern districts of Alexandria Governorate.

These above mentioned results of the extracted means densities of the three rodent populations were ascertained by the deduced values of calculated relative densities of inspected commensal rats species in proportion to the grand total of counted individuals of each species or / and of all species in each district of Alexandria Governorate during the period of study (1995 -1999).

Also, from Tables 6 & 7 and Figure 4, it could be revealed that the higher incidence of the Norway rat in the Medium district of Alexandria reached (35.8%) and the least abundant house mouse (9.4%) (Table 6). Moreover, the annual differences in the abundance of each rat species, to great extent, were affected by the prevailing circumstances in the district. The higher calculated rates of Norway rat or / and roof rat population densities comprised 27.5, 20.2% in 1996, 1997 and 20.2, 27.7% in 1995, 1996 in proportion to the grand total of counted individuals of each species, respectively. Also, the calculated densities of house mouse were relatively high during 1996, 1997 –24.7, 22.6% from the grand total of its counted individuals in the years of study. But in the other years of investigation the calculated rates of each inspected rat species were to a more or less extent lowered and ranged between 11.4, 25.3% & 12.2, 23% and 12.6, 24.5%, for the Norway rat, roof rat and house mouse, respectively (Table 7). The higher abundance of Norway rat in this district was also revealed when the relative density of this species was calculated in proportion to the grand total of counted individual of all inspected three species throughout the five years of study. The estimated higher percentages of its occurrence amounted to 8.3% in 1995 and 13.9% in 1999, compared to 7.2 and 8.3% for the roof rat and 1.2, 2.3% for the house mouse, respectively (Table 6 and Fig. 4).

In addition, the same trend of above cited results was attained when the relative density of all counted individuals of each inspected commensal rat species in the three district was calculated in mean numbers and proportioned to the grand total of counted individuals of all three species in the Governorate throughout the five years of study.

From the demonstrated results in Table 8, it could be seen that the measured population density of Norway rat was always the higher throughout the elapsing years from 1995 up to 1999 and ranged from 7.3% in 1998 to 15% in 1995. The highest value of its measured total

numbers amounted to (50581) individuals resembling 54.2% of the grand total of counted individuals of all the three inspected species (93398) during the five years of investigation. No significant changes in the mean numbers of Norway rat were detected throughout the elapsing years of study except, in 1998 there was a significant decrease in the estimated number of Norway rat resembled ( $191.4 \pm 115.4$ ). Nextly, for the roof rat species, its estimated numerical densities were lower and ranged from 4.8% in 1998 to 10.5% in 1996, with a comparative lower value of its estimated total numbers comprised (35159) individuals equal to 37.6% of the grand total of inspected individuals of all three species during the five years of study. Also, in 1998 the mean numbers of the roof rat significantly decreased to ( $124.9 \pm 110.2$ ) than those revealed in the other years of study (Table 8). For the house mouse, these deduced means values were to a great extent the lowest and ranged from 1.3% in 1998 to 2% only in 1996 with a lowest value of its counted total individuals (7658) resembling 8.5% of the grand total of detected individuals of the three rat species during the years of conducted study. Similar to both the other rat species, the mean numbers of the house mouse in 1998 significantly reduced up to ( $33.9 \pm 12.7$ ) than those deduced in the other years of study (Table 8).

In addition, numerical calculations of the mean numbers of the three rats populations in the three districts of Alexandria Governorate was done to compare the occurring densities of rats in each of the three districts. In particular, that is very important in control procedure.

From the results recorded in Table 9, it could be mentioned that the Western district oftenly exhibited the highest significant increase in the mean numbers of all the inspected three rat species throughout the five years of study followed by the Eastern district, whereas, the Medium district showed the least estimated mean numbers of the three rats of populations. It could be also noticed that, the calculated mean numbers of the studied species in the three districts of the Governorate, to a more or less extent, fluctuated from a year to the other. Despite, the detected differences between the three districts did not indicate clear significance due to the prevailing environmental circumstances in these districts and occurring changes in hygrothermic conditions throughout the subsequent years of study.

From the previous obtained results it seems clearly that both the Western and Eastern districts were more invaded by commensal rodent species than the Medium district; ascertainly due to their location nearby the shore coast and Alexandria maritime port. In this respect, the most abundant rodent species is the Norway rat in all districts. Moreover, the

lower rates invasion to the medium district of the Governorate is due to the given more-attention from the clean company (Onyx), than both the other districts in the last years.

Generally, in recent time Alexandria Governorate has more authority attention and developmental aspects in all locations of its districts consequently that will be reflected on the densities of prevailing populations of commensal rat species which, will be gradually decrease in future.

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Table (2): The mean numbers and the relative densities of inspected commensal rats species in Western district in proportion to the grand total of counted individuals of three species during each consequent year from 1995 up to 1999.

Years	Mean and total numbers of counted rats species / year									LSD 0.05	Grand total
	**N.R.			R.R.			M.M.				
	*Mean no.	Total no.	% from grand total	Mean no.	Total no.	% from grand total	Mean no.	Total no.	% from grand total		
1995	424.2 a ±167.2	5038	12.3	348.0 a ±138.5	4177	10.2	46.8 b ±19.7	561	1.4	109.5	9776
1996	449.0 a ±151.9	5388	13.2	351.3 b ±104.6	4207	10.3	59.0 c ±18.9	708	1.7	93.2	10303
1997	338.9 a ±67.5	4307	10.5	252.4 b ±73.2	2969	7.2	37.5 c ±29.5	674	1.6	52.1	7950
1998	271.8 a ±118.5	3261	8.0	166.8 b ± 69.3	2093	5.1	64.3 c ±10.9	450	1.1	65.1	5804
1999	336.3 a ±126.4	3981	9.7	229.7 b ±79.5	2541	6.2	64.3 c ±13.5	610	1.5	85.0	7132
Grand total		21975	53.7		15987	39.0		3003	3003		40962

\*Data of mean numbers expressed as mean ± SD.

Data of total numbers = The sum of rats species in 12 months.

\*\*N.R. = Norway rat

(*Rattus norvegicus*)

R.R. = roof rat

(*Rattus rattus*)

M.M. = House mouse

(*Mus musculus*)

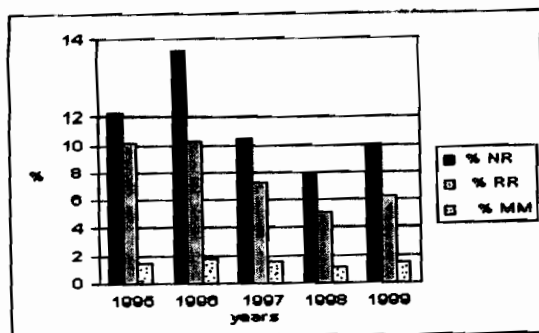


Fig.(2): The abundance of commensal rat species in Western district, Alexandria Governorate, in proportion to the grand total of poisoned individuals of the three rodent species, during the subsequent years from 1995 till 1999.

Table(3): The calculated relative densities of prevailing commensal rats in proportion to the grand total of counted individuals of each species in Western district, Alexandria Governorate during the elapsing period from 1995 till 1999.

Commensal rat species	Year of inspection	Total counted rats	% from grand total
N.R	1995	5038	22.9
	1996	5388	24.5
	1997	4307	19.6
	1998	3261	14.9
	1999	3981	18.1
Grand total / species ( No. , %)		21975 <b>(53.7%)</b>	100
R.R.	1995	4177	26.1
	1996	4207	26.3
	1997	2969	18.6
	1998	2093	13.1
	1999	2541	15.9
Grand total / species (No , %)		15987 <b>(39%)</b>	100
M.M.	1995	561	18.6
	1996	708	23.6
	1997	674	22.5
	1998	450	15.0
	1999	610	20.3
Grand total / species ( No. , %)		3003	100
Grand total / all species (No. , %)		<b>(7.4%)</b> 40962 <b>(100%)</b>	

Table (4): The mean numbers and the relative densities of inspected commensal rats species in Eastern district in proportion to the grand total of counted individuals of three species during each consequent year from 1995 up to 1999.

Years	Mean and total numbers of counted rats species / year									LSD <sub>0.05</sub>	Grand total
	**N.R.			R.R.			M.M.				
	*Mean no.	*Total no.	% from grand total	Mean no.	Total no.	% from grand total	Mean no.	Total no.	% from grand total		
1995	232.8 a ± 83.1	2794	9.5	179.0 a ± 85.4	2148	7.3	36.8 b ± 9.4	442	1.5	190.7	5384
1996	421.4 a ± 104.9	5057	17.2	279.0 b ± 88.2	3349	11.4	52.6 c ± 19.2	633	2.2	167.0	9039
1997	276.9 a ± 58.5	3323	11.3	172.5 b ± 26.2	2070	7.0	42.2 c ± 20.2	506	1.7	32.0	5899
1998	173.8 a ± 92.8	2103	7.1	119.8 b ± 50.5	1408	4.8	36.1 c ± 12.7	433	1.5	131.3	3944
1999	226.6 a ± 126.2	2719	9.2	146.8 a ± 95.7	1978	6.7	39.4 b ± 9.2	473	1.6	184.4	5170
Grand total		15996	54.3		10953	37.2		2487	8.5		29436

\*Data of the mean numbers expressed as mean ±SD

Data of total numbers = The sum rats species in 12 months.

\*\*N.R. - Norway rat

R.R. = roof rat

M.M. = House mouse

(*Rattus norvegicus*)

(*Rattus rattus*)

(*Mus musculus*)

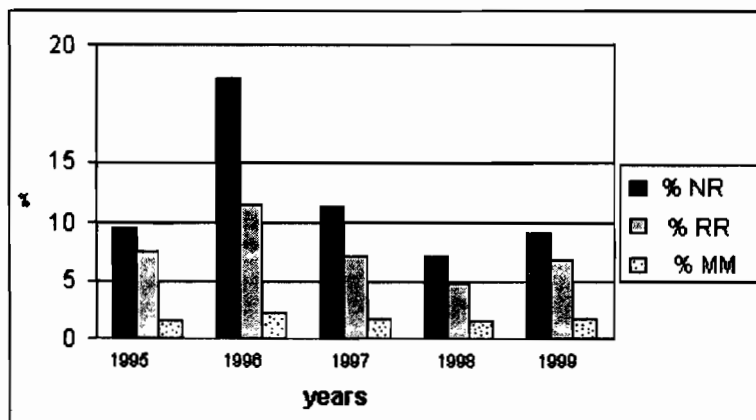


Fig.(3): The abundance of commensal rat species in Eastern district, Alexandria Governorate, in proportion to the grand total of poisoned individuals of the three rodent species, during the subsequent years from 1995 till 1999.

Table(5): The calculated relative densities of prevailing commensal rats in proportion to the grand total of counted individuals of each species in Eastern district, Alexandria Governorate during the elapsing period from 1995 till 1999.

Commensal rat species	Year of inspection	Total counted rats	% from grand total
N.R	1995	2794	17.5
	1996	5057	31.6
	1997	3323	20.8
	1998	2103	13.1
	1999	2719	17.0
Grand total / species (No , %)		15996 (54.3%)	100
R.R.	1995	2148	19.6
	1996	3349	30.6
	1997	2070	18.9
	1998	1408	12.9
	1999	1978	18.0
Grand total / species (No , %)		10953 (37.2%)	100
M.M.	1995	442	17.8
	1996	633	25.5
	1997	506	20.2
	1998	433	17.4
	1999	473	19.0
Grand total / species (No , %)		2487	100
Grand total / all species (No , %)		29436 (100%)	



Table (6): The mean numbers and the relative densities of inspected commensal rats species in Medium district in proportion to the grand total of counted individuals of three species during each consequent year from 1995 up to 1999.

Years	Mean and total numbers of counted rats species / year									LSD <sub>0.05</sub>	Grand total			
	**N.R.			R.R.			M.M.							
	*Mean no.	*Total no.	% from grand total	Mean no.	Total no.	% from grand total	Mean no.	Total no.	% from grand total					
1995	159.5 ±89.7	a	1915	8.2	126.7 ±60.4	a	1659	7.2	22.8 ±10.6	b	273	1.2	54.4	3847
1996	293.2 ±107.6	a	3519	15.3	189.7 ±60.3	b	2276	9.9	44.7 ±15.3	c	536	2.3	61.7	6331
1997	212.2 ±62.3	a	2546	11.1	115.6 ±45.5	b	1387	6.0	40.8 ±22.1	c	490	2.1	40.2	4423
1998	119.7 ±74.0	a	1436	6.2	83.3 ±51.1	a	999	4.4	28.3 ±12.5	b	339	1.5	45.4	2774
1999	266.2 ±133.6	a	3194	13.9	158.2 ±69.8	b	1898	8.3	44.2 ±12.3	c	530	2.3	76.1	5622
Grand total			12610	54.8			8219	35.8			2168	9.4		22997

\*Data of mean numbers expressed as mean ±SD.

Data of total numbers = The sum rats species in 12 months.

\*\*N.R - Norway rat  
(*Rattus norvegicus*)

R.R. = roof rat  
(*Rattus rattus*)

M.M. = House mouse  
(*Mus musculus*)

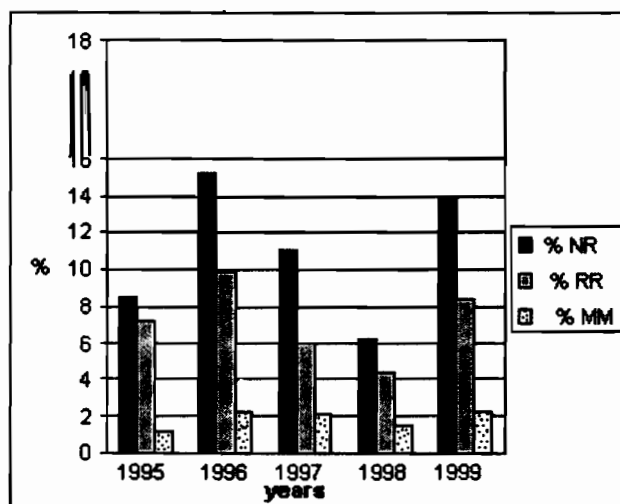


Fig.(4): The abundance of commensal rat species in Medium district, Alexandria Governorate, in proportion to the grand total of poisoned individuals of the three rodent species, during the subsequent years from 1995 till 1999.

Table(7): The calculated relative densities of prevailing commensal rats in proportion to the grand total of counted individuals of each species in Medium district, Alexandria Governorate during the elapsing period from 1995 till 1999.

Commensal rat species	Year of inspection	Total counted rats	% from grand total
N.R	1995	1915	15.2
	1996	3519	27.9
	1997	2546	20.2
	1998	1436	11.4
	1999	3194	25.3
Grand total / species (No , %)		12610 (54.8%)	100
R.R.	1995	1659	20.2
	1996	2276	27.7
	1997	1387	16.9
	1998	999	12.2
	1999	1898	23.0
Grand total / species (No , %)		8219 (35.8%)	100
M.M.	1995	274	12.6
	1996	536	24.7
	1997	490	22.6
	1998	339	15.6
	1999	530	24.5
Grand total / species (No, %)		2168	100
Grand total / all species (No , %)		(9.4%) 22997 (100%)	

Table (8): The estimated annual mean numbers and the relative densities of abundant commensal rats species in Alexandria Governorate in proportion to the grand total of counted individuals of all species during the elapsing period from 1995 till 1999.

Years	Mean and total numbers of counted rates species / year									Grand total			
	**N.R.			R.R.			M.M.						
	*Mean no.	*Total no.	% from grand total	Mean no.	Total no.	% from grand total	Mean no.	Total no.	% from grand total				
1995	272.2 ±164.4	a	9747	10.4	210.6 ±139.7	b	7984	8.5	35.4 ±17.1	b	1276	1.4	19007
1996	286.6 ±105.7	a	13964	15.0	268.2 ±108.6	a	9832	10.5	52.1 ±18.9	a	1877	2.0	25673
1997	281.4 ± 87.0	a	10176	10.9	178.0 ± 68.6	b	6426	6.9	46.4 ±25.9	a	1670	1.8	18272
1998	191.4 ±115.4	b	6800	7.3	124.9 ±110.2	c	4500	4.8	33.9 ±12.7	b	1222	1.3	12522
1999	274.8 ±137.7	a	9794	10.6	273.0 ± 85.2	a	6417	6.9	44.8 ±13.1	a	1613	1.7	17924
Total			50581	54.2			35158	37.6			7658	8.2	93398
LSD 0.05	61.6				48.8				8.5				

\*Data of the mean numbers expressed as mean ±SD

Data of total numbers = The sum rats species in 12 months.

\*\*N.R. = Norway rat  
(*Rattus norvegicus*)

R.R. = roof rat  
(*Rattus rattus*)

M.M. = House mouse  
(*Mus musculus*)

Table(9): The estimated means of counted individuals of the three inspected commensal rats in the investigated districts of Alexandria Governorate during the elapsing period from 1995 up to 1999.

Years	Western		Medium		Eastern		LSD 0.05
	Mean of *(Nr + RR + MM)		Mean of (Nr + RR + MM)		Mean of (Nr + RR + MM)		
1995	819.0 ±309.0	a	301.83 ±147.9	b	448.67 ±165.9	b	190.67
1996	860.08 ±219.0	a	528.17 ±158.7	b	750.65 ±194.7	a	166.95
1997	662.5 ±303.0	a	368.58 ±368.58	c	491.92 ±148.0	b	81.95
1998	483.67 ±17.5	a	231.71 ±76.4	b	328.67 ±145.9	b	131.32
1999	519.83 ±205.5	a	467.8 ±129.7	a	430.8 ±226.5	a	184.35
Total	3417.08		1900.04		2504.76		

The data expressed as mean ±SD.

\* Nr = Norway rat (*Rattus norvegicus*).

RR = roof rat (*Rattus rattus*).

MM = house mouse (*Mus musculus*).

الملخص العربي

دراسة حصر وتوزيع القوارض المنتشرة في الثلاثة مناطق

الرئيسية لمحافظة الإسكندرية

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تم حصر ودراسة توزيع القوارض المنتشرة في المناطق الثلاثة لمحافظة الإسكندرية منطقة شرق ومنطقة وسط ومنطقة غرب خلال خمسة أعوام متتالية من عام 1995 حتى عام 1999 وقد أستخدم في الحصر الطعوم السامة من المبيدات للمجهزة تجاريا وذلك تحت الظروف الجوية السائدة في تلك الفترة.

أظهرت النتائج لمتحصل عليها وجود ثلاثة أنواع من الفئران في المناطق الثلاثة التي تم فيها للحصر وهي الفأر النرويجي Norway rat ( *Rattus norvegicus* ) والفأر المتسلق roof rat

( *Rattus rattus* ) والفأر المنزلي house mouse ( *Mus musculus* ) .

في منطقة غرب الإسكندرية كان الفأر النرويجي هو الأكثر انتشارا حيث بلغ معدل انتشاره بالنسبة للأنواع الأخرى (53,7%) يليه في الانتشار الفأر المتسلق (39%) ثم الفأر المنزلي الذي كان أقل الأنواع

الثلاثة انتشارا (7,4%). أما في منطقة وسط وشرق الإسكندرية فقد كان معدل انتشار الفأر النرويجي مشابها لمنطقة غرب الإسكندرية حيث بلغ (54,8% و 54,3%) علي الترتيب ونفس التشابه لوحظ أيضا في الفأر المتسلق حيث بلغ معدل انتشاره (39%) في منطقة وسط ، (37,5%) في منطقة شرق الإسكندرية. أما الفأر المنزلي فقد زاد معدل انتشاره قليلا في كلا المنطقتين عن منطقة غرب الإسكندرية حيث بلغ

معدل انتشاره (9,4% ، 8,5% ) في منطقة وسط وشرق الإسكندرية عتي الترتيب.

أظهرت منطقة غرب الإسكندرية أعلى متوسط في الأعداد الكلية للفئران الثلاثة معا حيث بلغت أعداد للفئران المسممة التي تم جمعها (3417,1) فأر يليها منطقة شرق الإسكندرية (2504,8) فأر

و كانت أقل المناطق الثلاثة في متوسط أعداد الفئران الثلاثة معا (1900) فأر منطقة وسط الإسكندرية. ربما يعود ذلك

إلى موقع منطقة غرب الإسكندرية لقربها من المنطقة الساحلية وميناء الإسكندرية البحري.

يمكن القول بصفة عامة أن الفأر النرويجي هو النوع الأكثر انتشارا في المناطق الثلاثة خلال الخمس سنوات التي أجريت فيها الدراسة أما انخفاض أعداد للفئران في منطقة وسط التي تعتبر مركز محافظة الإسكندرية ربما يعود إلى الاهتمام الملحوظ من شركة النظافة ( أونكس) بهذه المنطقة عن بقية مناطق محافظة الإسكندرية في السنوات الأخير