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POPULATION DYNAMICS, SEX RATIO AND EMBRYOS NUMBER OF *Rattus norvegicus* AND Rattus rattus IN KAFE EL-SHIEKH AND DAKAHLIA GOVERNORATES.

Soliman, A.M. and M.M. Mortada
Plant Protection Res. Inst., Agric. Res. Center, Dokki, Giza, Egypt

ABSTRACT

Rodent species were surveyed in three location differed in their ecosystem (Animal husbandry, Shounas and Fruit orchards at Kafr El-Sheikh district, Kafr El-Sheikh Governorate, Aga and El-Mansoura districts Dakahlia Governorate. Also, sex ratio and the embryos number per pregnant females were studied.

Results showed that two rodent species were trapped from the three tested location; Norway rat *Rattus norvegicus* and roof rat *Rattus rattus*. The highest number of trapped rates was recorded for animal husbandry followed by fruit orchard while the lowest number was found in case of shouna.

Norway rat was the most dominant species in animal husbandry and fruit orchard but roof rat was the prevalent species in shouna.

On the other hand, the reproduction activity of both rodent species was recorded in high potential during the period from April to November as well, females ratio, pregnant females percentage and the number of embryos per female reached the maximum in these periods. Although the females ratio was more for roof rat than Norway rat, the rate of embryos number/female was higher for Norway rat than roof rat.

INTRODUCTION

To control rats one must understand the rat's habitat requirements, reproductive capabilities, food habits, life history, movements and the dynamics of its population structure. Eighteen species of rodents are pests in agriculture, horticulture, poultry farm and human dwellings in India (Parshad, 1998). Rodent damage ranging from 2% to 15% is common in agricultural crop and occasionally 25% to even 100% damage occurs during conditions of rodent outbreak (Malhi and Parshad, 1990).

In Egypt, Rodent is considered the most important animal pest. The rats cause monetary loss by destroying foodstuffs and material, spread disease and abhorred by most people (Meehan, 1984). Therefore, the present work was conducted to study the distribution of rodent species in three location differed in their ecosystem at Kafr El-Sheikh district. Also, the reproduction activity during a whole year was studied for Norway rat and roof rat, the most common and harmful rodent species in Egypt.

MATERIALS AND METHODS

Study area:

The present work was conducted at Kafr El-Sheikh and Dakahlia Governorate.

I. Animal husbandry:

A large farm of animal husbandry, located between Sakha city and Mahellet Mousa village, Kafr El-Sheikh was chosen. It occupied an area of about 35 feddans, and another farm in Meet El-Sarem village, El-Mansoura

district Dakahlia Governorate. These farms have different sections for production cattle, sheep, rabbits, chickens, eggs and milk. The animal husbandry is surrounded by cultivated area and narrow irrigation canal.

II. Shouna (grain stores):

There are two shounas. One of them about 15 feddans, belonging to seed Administration. It is adjacent to Sakha Railway Station, Kafr El-Sheikh city. The other farm was located inside Mansoura city. Main seeds stored are wheat, barley, rice, broad bean and maize.

III. Fruit orchard:

The selected fruit orchards occupied an area of about 50 feddans at Shinno village, Kafr El-Sheikh district and Boktares village, Aga district. The cultivated fruit trees of this orchard are sweet orange, mandarin, lemon, and naval orange. The orchard is surrounded by casuarina and eucalyptus trees.

1. Survey and distribution of rodent species:

Rodent species were monthly surveyed in three different location i.e. animal husbandry, shounas and fruit orchards.

Collection was done monthly over four successive days during the period from January to December 2007. 50 life traps were distributed in five sites of each tested habitat. The traps in each habitat were baited according to the nature of the place (Baits: fishes, cheese and taamia). In all cases, the traps were baited daily and left from 6.0 p.m. to 7.0 a.m. Every morning traps were checked to collect the caught rats. The trapped rodents were identified. Number of the individuals of each rodent species was recorded for each tested habitat.

2. Females ratio and number of embryo:

The trapped animals of each rodent species during the whole moth of 2007 were counted, sexed and weight. The mature females were autopsied to detect the pregnancy and the number of embryos per female was recorded.

RESULTS AND DISCUSSION

1. Survey and distribution of rodent species:

Rodent species were surveyed in three habitat differed in the ecosystem (animal husbandry, shouna and fruit orchard) at Kafr El-Sheikh and Aga districts.

Data in Table (1) indicated that two rodent species only were trapped from the three tested location in two districts during 2007. i.e. Norway rat, *Rattus norvegicus* and roof rat, *Rattus rattus*. The total number of caught rodents were 411 and 417 individuals in Kafr El-Sheikh and Aga districts respectively. The highest number of trapped rodents were 233 and 207 rats in animal husbandry followed by fruit orchards 91 animals in Kafr El-Sheikh district while 112 individuals were recorded in shouna of Mansoura district. The lowest number was 87 animals in shouna of Kafr El-Sheikh district. While 98 individuals were trapped in fruit orchards of Aga district. Norway rat was found abundantly in animal husbandry represented 72.1 and 71.5 % followed by fruit orchards 68.1 and 64.3 % while the lowest number occurred in

shouna of Kafr El-Sheikh, represented 48.3% and 42.9 in shouna of Mansura district from the total number of caught animals.

On the other hand, roof rat was recorded in high number in shouna representing 51.7 and 57.1 % in two districts followed by fruit orchard 31.9 and 35.7 % while in animal husbandry was 27.9 and 28.5 %. In general, Norway rat was the most occurred species in animal husbandry and fruit orchards other wise roof rat was the prevalent species in shouna in two districts. Also, Norway rat was recorded with the highest total number (272 and 259 animals) than roof rat (139 and 160 animals). These results may be due to the abundance of the animal foodstuffs (small chicken, eggs and fodder in animal husbandry than the other locations. These results are in agreement with those obtained by Ibrahim (1995) who recorded that Norway rat was mostly found in animal husbandry farms while roof rat was abundantly found in field crops followed by buildings. Gabr (1997) mentioned that roof rat was the most caught species in houses, fields and poultry farms followed by Norway rat and other rodent species in three different Governorates. Also, Abd El-Kawi (2005) found that in houses habitats of Assiut Governorate, Norway rat represented the highest number of captured rodent.

Table (1): Survey and distribution of rodent species in different location at Kafr El-Sheikh, and Dakahlia during the year of 2007.

Location		Total No. of caught rodent	Norway rat		Roof rat	
			No.	%	No.	%
Kafr El-Shiekh	Animal husbandry	233	168	72.1	65	27.9
	Shouna	87	42	48.3	45	51.7
	Fruit orchard	91	62	68.1	29	31.9
Dakahlia	Animal husbandry	207	148	71.5	59	28.8
	Shouna	112	48	42.9	64	57.1
	Fruit orchard	98	63	64.3	35	35.7
	Total	411	272	66.2	139	33.8
		417	259	62.1	158	37.9

2. Sex ratio and embryos number:

The sex ratio and number of embryos per pregnant females of both Norway rat and roof rat were studied during the whole months of the years. Regarding the Norway rat, Table (2) revealed that the total number of trapped animals of this species during the year were 272 and 259 rats, while the total number of females were 96 and 98 individuals represented 35.3 and 37.8 %. The pregnant females through this period were 30 and 35 individuals representing 31.25 and 35.7 % from the total number of females.

Concerning the average number of embryos per female, they were 7.4 and 7.5 %. The average percentage of females was in maximum through June (55.6 and 56.1%) while males outnumbered females during the rest year months. Also, the lowest number of females were observed in December and January as they were (3 and 1 females) represented 16.7 and 8.3 % in Kafr El-Sheikh and Dakahlia, respectively. On the other hand,

the pregnant females were recorded only during the period of April to November while they were completely absent in winter months from December to March. The highest number of pregnant females were (7 and 8 females) in June represented (46.7 and 57.1 %) from the total number of trapped females, respectively. The lowest number of pregnant females occurred in September, October and November as they were (2,1 and 2 & 3,2 and 2 pregnant females) representing (18.2, 12.5 and 25 & 30, 22.2 and 28.6 %) of the total number of females in Kafr El-Sheikh and Dakahlia, respectively. On the other side, the average number of embryos / pregnant female were in the maximum (8.5 embryos) The minimum number of embryos / pregnant female were 6.0 embryos in average in both districts. On the other side, the total number of caught animal differed considerably during the different months whereas it reached to the maximum in March (30 individuals) followed by 27 rats in both June and July, while the lowest number was observed in January (16 rats).

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Table (2): Female ratio and average number of embryos/pregnant female of Norway rat *Rattus norvegicus* trapped from Kafr El-Sheikh and Dakahlia during the year of 2007.

Month	No. of trapped animals		Females				Pregnant				Average No. of embryos per female	
			No.		%		No.		%			
	K	D	K	D	K	D	K	D	K	D	K	D
January	16	12	0	1	0.0	8.3	0	0	0.0	0.0	0.0	0.0
February	21	27	6	7	28.6	25.9	0	0	0.0	0.0	0.0	0.0
March	30	28	9	9	30.0	32.1	0	0	0.0	0.0	0.0	0.0
April	19	17	8	9	42.1	52.9	6	5	75.0	75.0	7.0	8.0
May	24	24	9	8	37.5	33.3	5	5	55.6	55.0	8.0	8.5
June	27	25	15	14	55.6	56.0	7	8	46.7	46.7	7.0	7.0
July	27	28	10	12	37.0	42.8	3	5	30.0	30.0	8.5	7.5
August	22	21	9	9	40.9	42.8	4	5	44.4	44.4	7.5	7.5
September	25	24	11	10	44.0	41.6	2	3	18.2	18.2	8.5	8.0
October	20	21	8	9	40.0	42.8	1	2	12.5	12.5	7.0	7.5
November	23	18	8	7	34.8	38.8	2	2	25.0	25.0	6.0	6.0
December	18	16	3	3	16.7	18.7	0	0	0.0	0.0	0.0	0.0
Total	272	259	96	98	-	-	30	35	-	-	-	-
Average	-	-	-	-	35.3	37.8	-	-	31.25	35.7	7.4	7.5

Concerning roof rat, data in Table (3) showed that the number of caught animals were fluctuated from month to another as the highest number occurred in November (17 and 18 animals) followed by January (15 and 17 individuals) and December (14 and16 individuals) while the lowest number (7 and 9 rats) were observed in Kafr El-Sheikh and Dakahlia, respectively. The total number of trapped rats were (139 and 158 individuals) during the all year months. Females represented (39.5 and 41.7 %) of the total number of females were recorded. The lowest number of females were 2 and individuals) representing (28.6 and 30 %) in March from the total number of captured roof rats. Females outnumbered males during October Only

representing (61.5 and 64.3 %) from the total number while the numbers of males were more than females in the rest months of the year. Regarding the pregnant females, no pregnant female were trapped during winter months, December, January and February. The highest number of caught pregnant females were in November (5 and 4 females) represents (62.5 and 50 % followed by May (4 and 4 females) represents 100 and 80 % while they were present in fixed number (2 and 3 pregnant females) during three months i.e. June, July, August (summer months) represents (40, 50, and 40 & 60, 60 and 75%), respectively. from the total number of females. In general, the total numbers of pregnant females were (22 and 31 females) represents (40.0 and 46.9 %) to the total number.

The average number of embryos per female were noticed in the maximum rate (7.5 embryos / female) in June and May while the minimum rate were (2 and 3 embryos / female) in March. The total number of embryos / females were 5.8 in average.

Table (3): Females ratio and average number of embryos/pregnant female of roof rat *Rattus rattus* trapped from Kafr El-Sheikh and Dakahlia during the year of 2007.

Month	No. of trapped animals		Females				Pregnant				Average No. of embryos per female	
			No.		%		No.		%			
	K	D	K	D	K	D	K	D	K	D	K	D
January	15	17	3	4	20.0	23.5	0	0	0.0	0.0	0.0	0.0
February	9	11	3	4	33.3	36.3	0	0	0.0	0.0	0.0	0.0
March	7	10	2	3	28.6	30.0	1	3	50.0	75.0	2.0	3.0
April	10	13	4	7	33.3	53.8	3	4	75.0	66.6	7.0	7.0
May	9	9	4	5	44.4	55.5	4	4	100.0	80.0	6.5	7.5
June	9	12	5	5	45.4	41.6	2	3	40.0	60.0	7.5	6.0
July	10	11	4	5	40.0	45.4	2	3	50.0	60.0	7.0	65
August	9	12	4	6	44.4	50.0	2	3	50.0	75.0	6.0	6.0
September	13	15	5	6	38.5	40.0	2	4	40.0	80.0	5.5	6.0
October	13	14	8	9	61.5	64.3	1	3	12.5	33.3	6.0	5.0
November	17	18	8	8	47.1	44.4	5	4	62.5	50.0	5.0	5.5
December	14	16	5	4	35.7	31.2	0	0	0.0	0.0	0.0	0.0
Total	135	158	55	66	-	-	22	31	-	-	-	-
Average	-	-	-	-	39.5	41.7	-	-	40.0	46.9	5.8	5.8

Reviewing the aforementioned data in Table (2) and (3) it is obvious that the reproduction activity of both Norway and roof rats was recorded with high potential during April to November where females ratio, pregnant females percentage and number of embryos per females reached the maximum in these periods. These results may help the decision maker for rodent control to start the control program in this period in which the rate of embryos number per females was in the maximum. On the other hand, the total number of trapped Norway rats was higher than roof rat. Although the females ratio was more for roof rat than Norway rat, the rate of embryos number/female was higher for Norway rat than roof rat.

The size and number of litters depend on rat species and vary with nearness to limit of their climatic range availability of nutritious food, density of the local rat population and age of the rat (Walter and Rexe, 1974). The obtained results are in harmony with those obtained by Youssef (1996) and Abd El-Karim (1991). Also, similar observations were recorded by Butler and Whelan (1994) and Fiedler (1994).

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التذبذبات العددية والنسبة الجنسية وعدد الاجنة فى كل من الفأر النرويجى والفأر المتسلق فى محافظتى الدقهلية وكفر الشيخ

احمد محمود سليمان ، محمد محمد مرتضى

معهد بحوث وقاية النباتات ، مركز البحوث الزراعية ـ الدقى

تم دراسة التذبذبات العددية لنوعين من القوارض تم اصطيادهما من ثلاثة اماكن مختلفة فى نظامها البيئى (مزارع انتاج حيوانى ، مخازن ، مزارع فاكهة) وذلك بمركز كفرالشيخ بمحافظة كفرالشيخ ومركزى المنصورة وأجا محافظة الدقهلية. كما تم دراسة النسبة الجنسية وعدد الاجنة للاناث الحوامل خلال عام ٢٠٠٧ م.

أظهرت النتائج أن النوعين الأكثر شيوعا هما الفأر النرويجى والفأر المتسلق. وكان الفأر النرويجى هو النوع الاكثر شيوعا فى مزارع الانتاج الحيوانى ومزارع الفاكهة ، بينما كان الفأر المتسلق هو الشائع فى المخازن.

ومن ناحية اخرى تم تسجيل اعلى معدل للنشاط الجنسى لكلا النوعين خلال الفترة من ابريل حتى شهر نوفمبر حيث بلغت نسبة الاناث والنسبة المئوية للاناث الحوامل وكذلك عدد الاجنة لكل أنثى حامل اعلى معدل خلال هذه الفترة. ورغم ان نسبة الاناث كانت أعلى فى حالة الفأر المتسلق عنه فى حالة الفأر النرويجى الا ان معدل عدد الاجنة للاناث كان الاعلى فى حالة الفأر النرويجى عنه فى حالة الفأر المتسلق