

SEX RATIO AND EMBRYOS NUMBER OF *RATTUS NORVEGICUS* AND *RATTUS RATTUS ALEXANDRINES*

ABD EL-KADER, M.R.¹, H.I. EL-DEEB², W.M. GABR² AND H. A. AHMED²

1- Fac. Agric. Al-Azhar University

2- Plant Protec. Res. Institute, ARC. Giza

(Manuscript received 16 June 2007)

Abstract

Rodent species were surveyed in three locations differed in their ecosystem (poultry farms, stores and houses) at Quesna district, Menofia 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 locations; Norway rat *Rattus norvegicus* and roof rat *Rattus rattus*. The highest number of the trapped rats was recorded for poultry farms followed by houses while the lowest number was found in case of stores. Norway rat was the most dominant species in poultry farms and rural houses but roof rat was the prevalent species in stores. 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

In agricultural environment, nature is out of balance and predators lose their favorable conditions. Rodents are considered the most important animal pests in Egypt. The rats cause monetary loss by destroying foodstuffs and materials, spread disease and abhorred by most people (Meehan, 1984). Therefore, the present work was conducted to study the distribution of rodent species in three locations differed in their ecosystem at Quesna district, Menofia Governorate, one of the important Egyptian Governorates in agriculture economy. 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

1- Study Area

Kafr El-Shiekh Ibrahim village, Quesna district at Menofia Governorate was chosen to conduct the present study. It contained about 500 feddans planted with different field crops, some vegetables and fruits. Also, there are many rural houses, buildings and some poultry farms. There are many irrigation and drainage canals.

2- Survey and distribution of rodent species

Rodent species were monthly surveyed in three different locations i.e. houses (rural houses and buildings), poultry farms and shounas (grain and wood stores). Collection was done monthly over four successive days during the period from January to December 2005. 50 life traps were distributed in five sites of each tested habitate. The traps in each habitat were baited with fresh falafel (minced horse bean fried in oil) or tomato slices according to the nature of the place. 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.

3- Females ratio and number of embryos

The trapped animals of each rodent species during the whole months of 2005 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 habitats differed in their ecosystem (poultry farms, stores and houses) at Quesna district, Menofia Governorate. Data in Table (1) indicated that two rodent species only were trapped from the three tested locations i.e. Norway rat, *Rattus norvegicus* and roof rat, *Rattus rattus*. The total number of caught animals was 436 rats. The highest number of trapped rodents was 244 rats in poultry farms followed by houses (99 animals) while the lowest number was 93 animals in case of stores. Norway rat was found abundantly in rural houses represented 72.7% from the total number of caught animals and similar level in poultry farms (71.3%) while the lowest number occurred in stores represented 48.4% of the total numbers. On the other hand, roof rat was recorded in high number in stores representing 51.6% followed by poultry farms 28.7% and houses 27.3%. In general, Norway rat was the most occurred species in poultry farms and rural houses other wise roof rat was the prevalent species in stores. Also, Norway rat was recorded with highest total number (291 animals) than roof rat (145 animals). These results may be due to the abundance of the animal foodstuffs (small chicken, eggs and fodder) in poultry farms than the other locations. These results are in agreement with those obtained by Ibrahim (1995) who recorded that Norway rat was mostly found in animals husbandry farms followed by buildings while roof rat was abundantly found in field crops followed by buildings. Also, Abd El-Kawi (2005) found that in houses

habitats of Assiut Governorate, Norway rat represented the highest number of captured rodent. However, 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. Similar results were observed by Fiedler (1994).

On the other side, the total number of caught animals differed considerably during the different months whereas it reached to the maximum in March (32 individuals) followed by 28 rats in both June and July, while the lowest number was observed in January (18 rats).

Table 1. Survey and distribution of rodent species in different locations at Quesna district, Menofia Governorate throughout 2005.

Location	Total No. of caught animals	Norway rat		Roof rat	
		No.	%	No.	%
Poultry farms	244	174	71.3	70	28.7
Stores	93	45	48.4	48	51.6
Houses	99	72	72.7	27	27.3
Total	436	291	66.7	145	33.3

Table 2. Females ratio and average number of embryos/pregnant female of Norway rat *Rattus norvegicus* trapped from Quesna district, Menofia Governorate throughout 2005.

Month	No. of trapped animals	Females		Pregnant		Average No. of embryos per female
		No.	%	No.	%	
January	18	0	0.0	0	0.0	0.0
February	25	6	24.0	0	0.0	0.0
March	32	9	28.1	0	0.0	0.0
April	20	9	45.0	7	77.8	7.0
May	25	10	40.0	5	50.0	8.0
June	28	16	57.1	8	50.0	6.5
July	28	12	42.9	4	33.3	9.0
August	23	9	39.1	5	55.6	8.0
September	27	11	40.7	2	18.2	7.0
October	20	8	40.0	1	12.5	9.0
November	24	8	33.3	2	25.0	8.0
December	21	4	19.0	0	0.0	0.0
Total	291	102	35.1	34	33.3	7.8

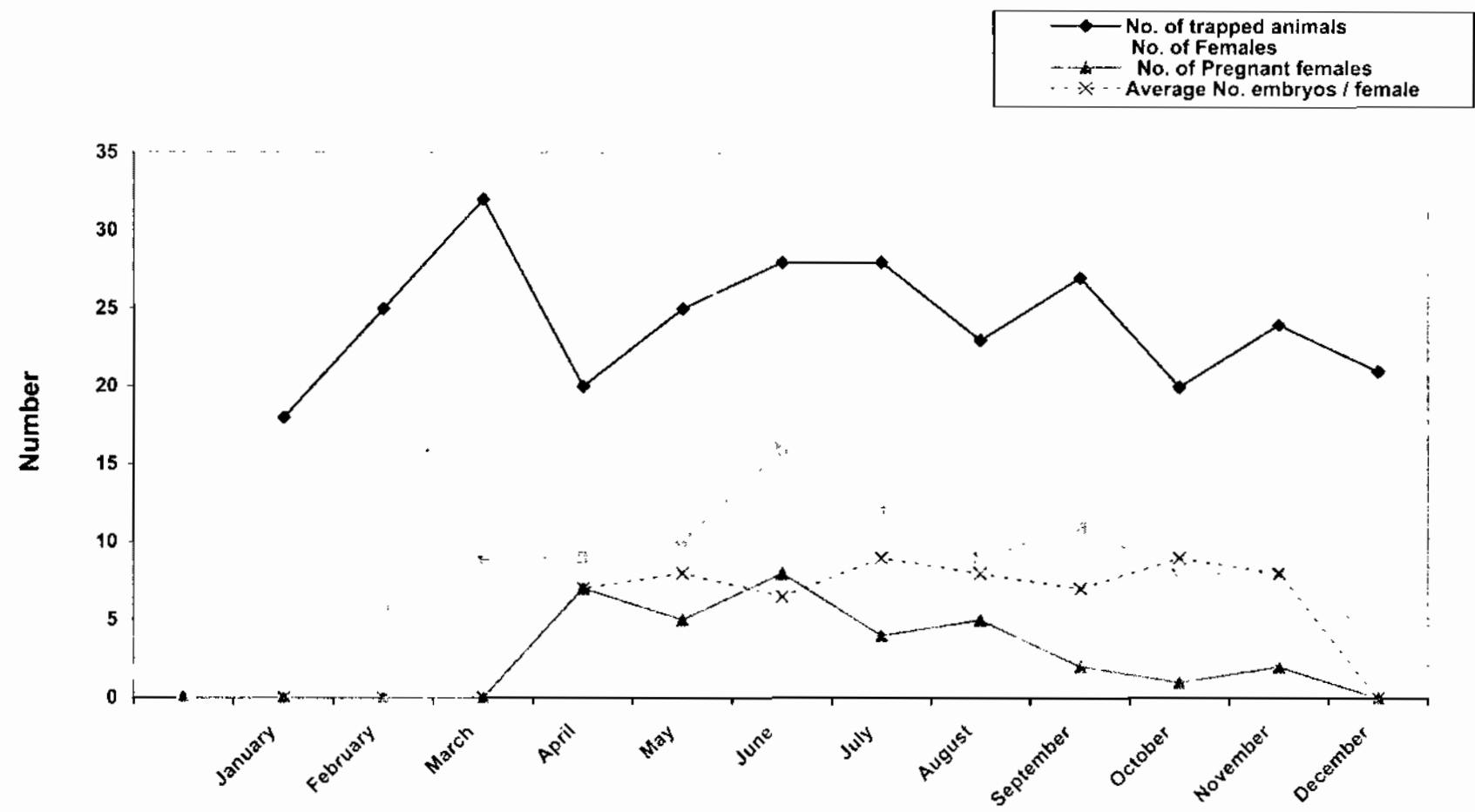


Fig 1. Females ratio and average number of embryos/pregnant female of Norway rat *Rattus norvegicus* trapped from Quesna district Menofia Governorate throughout 2005.

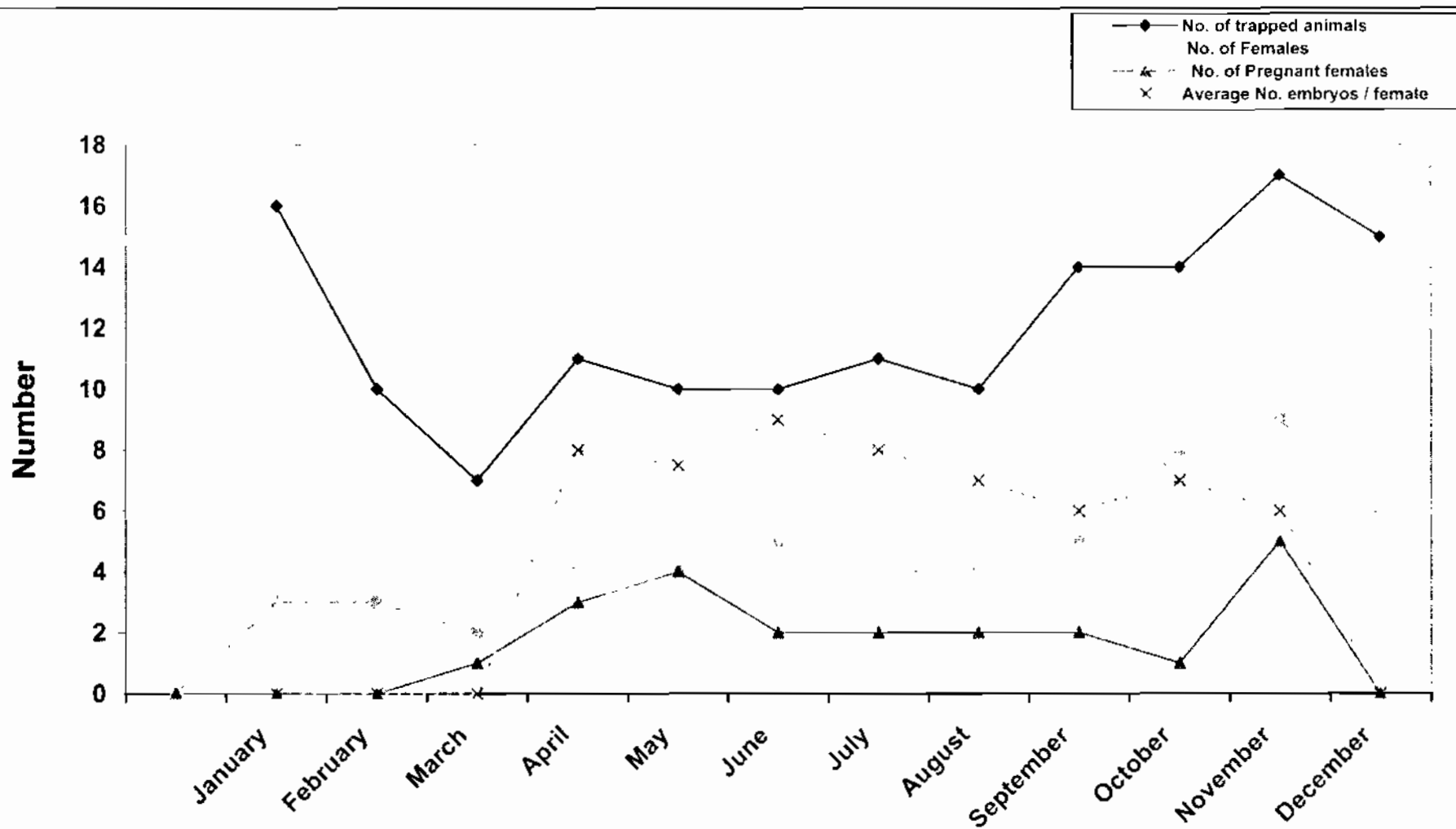


Fig 2. Females ratio and average number of embryos/pregnant female of roof rat *Rattus rattus* trapped from Qesma district Menofia Governorate throughout 2005.

Table 3. Females ratio and average number of embryos/pregnant Female of roof rat *Rattus rattus* trapped From Quesna district, Menofia Governorate throughout 2005.

Month	No. of trapped animals	Females		Pregnant		Average No. of embryos per female
		No.	%	No.	%	
January	16	3	18.8	0	0.0	0.0
February	10	3	30.0	0	0.0	0.0
March	7	2	28.6	1	50.0	1.0
April	11	4	36.4	3	75.0	8.0
May	10	4	40.0	4	100.0	7.5
June	10	5	50.0	2	40.0	9.
July	11	4	36.4	2	50.0	8.0
August	10	4	40.0	2	50.0	7.0
September	14	5	35.7	2	40.0	6.5
October	14	8	57.1	1	12.5	7.0
November	17	9	52.9	5	55.6	6.0
December	15	6	40.0	0	0.0	0.0
Total	145	57	39.3	22	38.6	6.7

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) and Fig (1) revealed that the total number of trapped animals of this species during the year was 291 rats, while the total number of females was 102 represented 35.1%. The pregnant females through this period were 34 individuals representing 33.3% from the total number of females. Concerning the average number of embryos per female, it was 7.8. The average percentage of females was in maximum through June (57.1%) while males outnumbered females during the rest year months. Also, the lowest number of females was observed in December as it was 4 females represented 19%. On the other hand, females were completely absent during January. Concerning the pregnant females, they were recorded only during the period of April to November while they were completely absent in winter months from December to February in addition to March. The highest number of pregnant females was 7 and 8 females in April and June represented 77.8 and 50% from the total number of trapped females, respectively. The lowest number of pregnant females occurred in September, October and November as it was 2, 1 and 2 pregnant females representing 18.2, 12.5 and 25% of the total number of females, consecutively. On

the other side, the average number of embryos/pregnant female was in the maximum (9 embryos) in both July and October and it was fixed (8 embryos) in May, August and November. The minimum number of embryos/pregnant female occurred in June as it was 6.5 embryos in average.

Concerning roof rat, data in Table (3) and Fig (2) showed that the numbers of caught animals were fluctuated from month to another as the highest number occurred in November (17 animals) followed by January (16) and December (15) while the lowest number (7 animals) was observed in March. This number ranged between 10 to 14 rats in the rest months. The total number of trapped rats was 145 during the all year months. Females represented 39.3% of the total number of caught animals with 57 females. The highest number of females was recorded in November and October (9 and 8 females) representing 52.9 and 57.1%, respectively, but the lowest number of females was 2 (28.6%) in March and 3 females in both January and February represented 18.8 and 30% from the total number of captured roof rats. Females outnumbered males during October and November only representing 57.1 and 52.9% from the total number while the numbers of males were more than females in the rest months of the year. The sex ratio was equal in case of June (50% for both males and females). Regarding the pregnant females, no pregnant female was trapped during winter months December, January and February. The highest number of caught pregnant females was in November (5 individuals) represents 55.6% followed by May (4 individuals) represents 100% and April (3 individuals) 75% while they were present in fixed number (2 pregnant females) during four months i.e. June, July, August and September (summer months) represents 40, 50, 50 and 40% from the total number of females, consecutively. In general, the total number of pregnant females was 22 represents 38.6% of the total number. Concerning the average number of embryos per female, it was noticed that the maximum rate was 9 embryos/ female in June followed by 8 during April and July while the minimum rate was 1.0 only in March and it ranged between 7.5 to 6.0 embryos/female through the rest months. The total number of embryos/female was 6.5 in average.

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).

REFERENCES

1. Abdel-Karim, S.M. 1991. Studies on rodents in Sharkia Governorate. Ph. D. Thesis, Fac. Agric. Zagazig Univ., Egypt.
2. Adel-Kawi, Y.M. 2005. Comparative studies on rodenticides against some rodents. Ph. D. Thesis, Fac. Agric. Al-Azhar Univ., Egypt.
3. Butler, F.T. and J., Whelan. 1994. Population structure and reproduction in brown rats *Rattus norvegicus* from pig farms. Co. Kildare, Ireland. J. Zool., London, 233, 277-291.
4. Fiedler, L.A. 1994. Rodent pest management in eastern Africa. FAO Plant Production and Protection Technical. No. 123. Rome.
5. Gabr, W.M. 1997. Factors affecting the efficacy of Warfarin to roof rat *Rattus rattus* in Egypt. Ph. D. Thesis. Fac. Agric. Cairo. Univ.
6. Ibrahim, K.I. 1995. Studies on the toxicity effect of some substances on rodents in Egypt. M. Sc. Thesis, Fac. Agric. Al-Azhar Univ. Egypt.
7. Meehan, A.P. 1984. Rats and mice their biology and control, the rentokil library, London.
8. Walter, B.L. and M. Rexe. 1974. Rat control manual. Reprinted from control. Vol. 42, No. 8 D.U., August.
9. Youssef, A.E. 1996. Ecological, biological and toxicological studies on rats in stored and shounes. Ph. D. Thesis, Fac. Agric. Menofia Univ. Egypt.

دراسة النسبة الجنسية وعدد الأجنة في كل من الفأر النرويجي والفأر المتسلق

محمد رجائي عبد القادر^١، حسن إبراهيم الديب^٢، وحيد محمد جبر^٢ ،

هاني عبد العاطي أحمد^٢

١ - كلية الزراعة - جامعة الأزهر - القاهرة.

٢ - معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الجيزة.

تم حصر انواع القوارض في ثلاث أماكن مختلفة في نظامها البيئي (مزارع دواجن ، مخازن ومنازل) بمركز قوبسنا بمحافظة المنوفية. كما تم دراسة النسبة الجنسية وعدد الأجنة للإناث الحوامل. أظهرت النتائج أن نوعين اثنين فقط من القوارض تم اصطيادهما من الأماكن الثلاثة تحت دراسته هما الفأر النرويجي والفأر المتسلق. وكان أعلى عدد للفئران المصادة قد سجل في مزارع الدواجن ثم المنازل بينما كان أقل عدد تم اصطياده من المخازن. وكان الفأر النرويجي هو النوع الأكثر شيوعا في مزارع الدواجن والمنازل الريفية بينما كان الفأر المتسلق هو الشائع في المخازن. ومن ناحية اخرى تم تسجيل أعلى معدل للنشاط الجنسي لكلا النوعين خلال الفترة من أبريل حتي سهر نوفمبر حيث بلغت نسبة الإناث و النسبة المئوية للإناث الحوامل وكذلك عدد الأجنة لكل أنثى حامل وصلت الي أعلى معدل خلال هذه الفترة. ورغم أن نسبة الإناث كان أعلى في حالة الفأر المتسلق عن في حالة الفأر النرويجي إلا أن معدل عدد الأجنة / للإناث كان الأعلى في حالة الفأر النرويجي عن في حالة الفأر المتسلق.