

## INCIDENCE AND SEASONAL FLUCTUATION OF COMMON RODENT SPECIES BY LIVE TRAP UNDER FIELD CONDITIONS AT GIZA AND BEHEIRA GOVERNORATES

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### ABSTRACT

The rodent species trapped from different habitats at Giza and Beheira Governorates were recorded. The black rat, *R. rattus* (Linn.), the Norway rat, *R. norvegicus* (Berk.) and the house mouse, *Mus musculus* Linn., were found at Giza and Beheira Governorates. The Nile grass rat [*A. niloticus* (Desm.)] was recorded in fields only found at Giza governorate. The roof rat, *Rattus rattus* (Linn.) was recorded in houses (147 & 108 individuals), fields (20 & 134 individuals) and animal buildings (55 & 34 individuals) at Giza and Beheira Governorates respectively. In addition, *R. norvegicus* (Berk.) was recorded in animal buildings 85 individuals at Giza Governorate and houses were 85 & 10 individuals recorded at Giza and Beheira Governorates respectively. *A. niloticus* (Desm.) was 14 individuals recorded in fields only at Giza Governorate and *Mus musculus* Linn., was 3 individuals recorded in fields at Giza Governorate and houses was 2 individuals recorded at Giza and Beheira Governorates. The total numbers mature and immature males individuals of *R. norvegicus* (Berk.) were 77 individuals (45.3%) and 18 individuals (10.6%) respectively, while mature and immature females individuals were 69 individuals (40.6%) and 6 individuals (3.5%) respectively. The total numbers mature and immature males individuals of *R. rattus frugivorus* were 68 individuals (51.1%) and 2 individuals (1.5%) respectively, while mature and immature females individuals were 56 individuals (42.1%) and 7 individuals (5.3%) respectively at Giza Governorate. In the same time, the total numbers mature and immature males individuals of *R. rattus frugivorus* were 65 individuals (42.8%) and 13 individuals (8.6%) respectively, while mature and immature females individuals were 63 individuals (41.4%) and 16 individuals (10.5%) respectively at Beheira Governorate. The total numbers mature and immature males individuals of *R. rattus rattus* were 35 individuals (47.3%) and 6 individuals (8.1%) respectively, while mature and immature females individuals were 30 individuals (40.5%) and 7 individuals (4.1%) respectively at Giza Governorate. In the same time, the total numbers mature males and females individuals of *R. rattus rattus* were 50 individuals (42.1%) respectively, while immature males and females individuals were 11 individuals (9.2%) and 8 individuals (6.7%) respectively at Beheira Governorate.

### INTRODUCTION

On studying rodents under field conditions, the natural history (habitat use, body size, nesting, diet, home ranges etc...) and population dynamics (survival, abundance, reproductive behaviour, and sex ratio etc...), defined by Kesiakova (1999) and Leung (1999). All over Africa, the occurrence of rodent outbreaks seems to be related to years with unusual rainfall. The seasonal changes of rats population were studied by Hussien (1991) at Fayoum Governorate and Kansouah *et al.* (1990) in Dahshour

locality at Giza Governorate. Rodent species composition differed significantly between habitats, Bekele and Leirs (1996). At Beheira Governorate *Rattus rattus* (Linn.) and addition *Rattus norvegicus* (Berk.), as well as *Mus musculus* Linn., were recorded in buildings while *Meriones shawi isis* (Thomas) and *Gerbillus gerbillus* (Olivier) were found in field crops while *Acomys cahirinus* (Desm.) were recorded in buildings and field crops by Metwally *et al.* (2009). The aim of the present work is to throw light on the incidence and seasonal fluctuation of common rodent species at Giza and Beheira Governorates .

## **MATERIALS AND METHODS**

The studies which were conducted under the field conditions into two locations, the first location, (Elmansourea and Abdel-Samad villages in Embaba district at Giza Governorate), 25 km far from Northern of Giza pyramids, and occupied about 10000 faddans. The second location, (Khaled-Ibn-El-Waleed and Zeen villages in Bader district at Beheira Governorate). The first village occupied about 2000 faddans and the second occupied about 5000 faddans and most of agricultural areas in both of them were new reclaimed land 15-30 years ago.

- 1- Species abundance: -these studies were conducted during the period from January to December 2005 at houses, fields and animal buildings in both Giza and Beheira Governorates. Fifty live traps with spring doors were used for three consecutive nights. Traps were supplied with tomato, luncheon and taameia and were distributed in the mentioned places in the evening, and recollected next morning. The captured individuals were identified and classified according to Osborn and Helmy (1980).
- 2-Population, sex and age fluctuations: - Fifty live traps were monthly used for two consecutive nights during the period from January to December 2005. Traps distributed at fields were supplied with tomato while those distributed at houses and animal buildings were supplied with taameia or luncheon (reference). Traps were cleaned before use with hot water and liquid soap, then provided with fresh food materials. They were set-up in the evening at 05.00 P.M. and recollected in the next morning at 07.00 A.M. Species, sex and age distributions were recorded. Mature females were killed by chloroform and dissected to determine if they pregnant or not.

## **RESULTS AND DISCUSSION**

### **Population density :-**

**1-Species abundance:-** The rodent species trapped from different habitats at Giza and Beheira Governorates were classified as the following: Family: Muridae, Subfamily: Murinae, Genera: *Rattus* Fischer[ *R. rattus* (Linnaeus) and *R. norvegicus* (Berkenhout)], *Arvicanthis* Lesson, *A. niloticus* (Desm.) and *Mus* Linnaeus, *M. musculus* Linnaeus. The black rat, *R. rattus* (Linn.), the Norway rat, *R. norvegicus* (Berk.) and the house mouse, *Mus musculus* Linn., were found at Giza and Beheira Governorates. The Nile grass rat [ *A. niloticus* (Desm.)] was recorded in fields only found at Giza governorate. The roof rat, *Rattus rattus* (Linn.) was recorded in houses (147 &108 individuals),

fields (20&134 individuals) and animal buildings (55&34 individuals) at Giza and Beheira Governorates respectively, Table (1).

**Table (1): Survey of rodent species at different habitat at Giza and Beheira Governorates during 2005.**

Scientific name	Habitats / Governorates									
	Fields		Animal farms		Houses		Total		(%)	
	Giza	Beheira	Giza	Beheira	Giza	Beheira	Giza	Beheira	Giza	Beheira
<i>Rattus rattus</i> (Linn.) Total 1,2&3.	55	34	20	143	147	108	222	285	54.01	95.32
1- <i>Rattus rattus rattus</i>	17	15	2	61	55	43	74	119	18	39.80
2- <i>Rattus rattus alexandrinus</i>	-	-	7	5	8	9	15	14	3.65	4.68
3- <i>Rattus rattus frugiferosus</i>	38	19	11	77	84	56	133	152	32.36	50.84
<i>Rattus norvegicus</i> (Berkenhout)	-	-	85	-	85	10	170	10	41.36	4.01
<i>A. niloticus</i> (Desm.)	14	-	-	-	-	-	14	-	3.41	0.00
<i>M. musculus</i> Linnaeus	3	-	-	-	2	2	5	2	1.22	0.67
Total	72	35	105	144	234	120	411	299	100	100

The color phases of *Rattus rattus* (Linn.); *R. rattus frugiferosus*, *R. rattus alexandrinus* and *R. rattus rattus* were found. The white bellied rat, *R. rattus frugiferosus* was recorded in fields(38 &19 individuals), houses (84&56 individuals) and animal buildings(11&77 individuals), while the black bellied rat, *R. rattus rattus* was recorded in fields (17&15 individuals), houses (55&43 individuals) and animal buildings (2&61 individuals), and also the grey bellied rat, *R. rattus alexandrinus* was found in houses (8&9 individuals) and animal buildings (7&5 individuals) and not recorded in fields at Giza and Beheira Governorates respectively. In addition, *R. norvegicus* (Berk.) was recorded in animal buildings 85 individuals at Giza Governorate and houses were 85 & 10 individuals recoded at Giza and Beheira Governorates respectively. *A. niloticus* (Desm.) was 14 individuals recorded in fields only at Giza Governorate and *Mus musculus* Linn., was 3 individuals recorded in fields at Giza Governorate and houses was 2 individuals recoded at Giza and Beheira Governorates. Similar findings consolidate these results were obtained by Kansouah *et. al* (1990) The population density of the domestic rodents in Dahshour at Giza Governorate. The maximum population of *R. norvegicus* (Berk.) was recorded in houses close to drainage canals while Harawi & Okimasa (2003) mentioned that the rodent population increased following periods when high-quality rice plants were available and vice versa.

**2-Population fluctuation:-**

***R. norvegicus* (Berk.):**- Data in Table(2) showed, the seasonal fluctuation of *R. norvegicus* (Berk.) in animal farm and houses at Giza Governorate were 54 individuals (31.8%) recorded in Winter as followed Spring, Autumn and Summer,43(25.3%), 39(22.9%) and 34(20%) individuals respectively. The high numbers of *R. norvegicus* (Berk.) were 25individuals (14.7%) recorded during February while the lower numbers were 8 individuals (4.7%) recorded during March.

Table (2): Population characteristics of the Norway rat, *Rattus norvegicus*(Berk.) at Giza Governorate during 2005.

Months	Dynamic		Sex and age distributions					
	No.	%	Mature ♂	Immature ♂	Total mature♀	Pregnant ♀	Nun pregnant ♀	Immature ♀
January	21	12.4	11	0	9	2	7	1
February	25	14.7	10	7	7	2	5	1
March	8	4.7	5	0	3	1	2	0
Winter	54	31.8	26	7	19	5	14	2
April	15	8.8	5	3	7	4	3	0
May	12	7.1	6	2	3	0	3	1
June	16	9.4	7	1	7	2	5	1
Spring	43	25.3	18	6	17	6	11	2
July	9	5.3	6	0	3	0	3	0
August	10	5.9	5	0	5	3	2	0
September	15	8.8	7	1	7	3	4	0
Summer	34	20	18	1	15	6	9	0
October	14	8.2	6	2	5	0	5	1
November	14	8.2	4	2	8	2	6	0
December	11	6.5	5	0	5	0	5	1
Autumn	39	22.9	15	4	18	2	16	2
Total	170	100	77	18	69	19	50	6
%	100	-	45.3	10.6	40.6	11.2	29.4	3.5

***R. rattus frugivorus***:- The seasonal fluctuation of *R. rattus frugivorus* in fields at Giza Governorate were 43 individuals (32.3%) recorded in Spring as followed, Autumn, Summer and Winter ,35,29 and 26 individuals 26.3, 21.8 and 19.5% respectively. The high numbers of *R. rattus frugivorus* were 18 individuals (13.5%) recorded during December while the lower numbers were 4 individuals (3%) recorded during January. While the seasonal fluctuation of *R. rattus frugivorus* in fields at Beheira Governorate were 40 individuals (26.3%) recorded in Winter and Spring as followed, Autumn and Summer 39 and 33 individuals 25.7 and 21.7% respectively. The high numbers of *R. rattus frugivorus* were 16 individuals (10.5%) recorded during April while the lower numbers were 9 individuals (5.9%) recorded during September, Table (3).

***R. rattus rattus***:- The seasonal fluctuation of *R. rattus rattus* in fields at Giza Governorate were 24 individuals (32.5%) recorded in Winter as followed, Autumn, Spring and Summer 21,17 and 12 individuals 28.4, 22.9 and 16.2% respectively. The high numbers of *R. rattus rattus* were 12 individuals (16.2%) recorded during March while the lower numbers were 4 individuals (5.5%) recorded during June, July, August and September. While the seasonal fluctuation of *R. rattus rattus* in feilds at Beheira Governorate were 35 individuals (29.4%) recorded in Autumn as followed, Winter, Spring and Summer 31, 29 and 24 individuals 26.1, 24.4 and 20.2% respectively. The high numbers of *R. rattus rattus* were 13 individuals (10.9%) recorded during

December while the lower numbers were 7 individuals (5.9%) recorded during September, Table (4).

**3-Age and sex fluctuations:-**

***R. norvegicus* (Berk.):** The total numbers mature and immature males individuals of *R. norvegicus* (Berk.) were 77 individuals (45.3%) and 18 individuals (10.6%) respectively, while mature and immature females individuals were 69 individuals (40.6%) and 6 individuals (3.5%) respectively. The high numbers mature males and females were 26 and 19 individuals recorded during winter respectively, while the lower numbers were 7 and 2 individuals recorded during winter and (winter, spring and autumn) from males and females respectively, Table (2).

***R. rattus frugivorus*:-** The total numbers mature and immature males individuals of *R. rattus frugivorus* were 68 individuals (51.1%) and 2 individuals (1.5%) respectively, while mature and immature females individuals were 56 individuals (42.1%) and 7 individuals (5.3%) respectively at Giza Governorate. In the same time, the total numbers mature and immature males individuals of *R. rattus frugivorus* were 65 individuals (42.8%) and 13 individuals (8.6%) respectively, while mature and immature females individuals were 63 individuals (41.4%) and 16 individuals (10.5%) respectively at Beheira Governorate. The high seasonally numbers mature males and females were 20 and 18 individuals recorded during Spring respectively, while the lower numbers were 15 and 11 individuals recorded during (winter and summer) and winter from males and females respectively. The high seasonally numbers immature males and females were 4 and 5 individuals recorded during Autumn and Spring respectively, while the lower numbers were 1 individuals recorded during summer and Autumn from females at Giza Governorate. The seasonal fluctuation mature males and females were 18 and 16 individuals recorded during Winter and Autumn followed by Summer and Spring (17 and 12) and 14 individuals respectively at Beheira Governorate. The high numbers mature males and females were 11 and 9 individuals recorded during March and June respectively, while the lower numbers were 2 individuals recorded during (January and February) and January from males and females respectively. The immature males were 2 individuals only during December. The high numbers immature females were 4 individuals recorded during April respectively, while the lower numbers were 1 individuals recorded during June, September and October at Giza Governorate. The high numbers mature males and females were 7 and 9 individuals recorded during March and April respectively, while the lower numbers were 5 and 4 individuals recorded during (February, June, July and December) and January from males and females respectively. The high numbers immature males and females were 3 individuals recorded during April and May respectively. While the lower numbers were 1 individuals recorded during (February, June, July and December) and (January, February, march, July and November) respectively at Beheira Governorate, Table (3).

***R. rattus rattus*:-** The total numbers mature and immature males individuals of *R. rattus rattus* were 35 individuals (47.3%) and 6 individuals (8.1%) respectively, while mature and immature females individuals were 30

individuals (40.5%) and 7 individuals (4.1%) respectively at Giza Governorate. In the same time, the total numbers mature males and females individuals of *R. rattus rattus* were 50 individuals (42.1%) respectively, while immature males and females individuals were 11 individuals (9.2%) and 8 individuals (6.7%) respectively at Beheira Governorate. The high seasonally numbers mature males and females were 12 and 10 individuals recorded during Winter respectively, while the lower numbers were 5 and 4 individuals recorded during summer and winter from males and females respectively at Giza Governorate. The seasonal fluctuation mature males and females were 16 and 14 individuals recorded during Autumn and (Winter and Autumn) followed by (Winter, Summer and Spring 14,12 and 8 individuals) and (Spring and Summer 12 and 10 individuals) respectively at Beheira Governorate. The high numbers mature males and females were 5 and 6 individuals recorded during March respectively, while the lower numbers were 1 individuals recorded during September and (June, July and August) from males and females respectively at Giza Governorate. The high numbers mature males and females were 7 and 6 individuals recorded during December and (January and November) respectively, while the lower numbers were 2 and 3 individuals recorded during April and (June, August and September) from males and females respectively at Beheira Governorate, Table (4). The numbers of rodents are expected to be increased in the appropriate climatic conditions with food availability. Shanker & Sukumar (1999) stated that, breeding of small mammal populations of mountain forest patches in Southern India was probably influenced by climate and food availability which are seasonal.

#### **4- Pregnancy:-**

The percentage of pregnant females to non-pregnant females' of rodent species trapped at Giza Governorate could be arranged descending according to the number of pregnant females in the following order: *Rattus rattus rattus* (8.1&32.4%) and *Rattus rattus frugivorous* (7.5&34.6%) and *Rattus norvegicus* (11.2 &29.4%), The pregnancy percentage of rodents captured at Beheira Governorate could be arranged descending according to the number of pregnant females in the following order: *Rattus rattus rattus* (10&31.9%) and *Rattus rattus frugivorous* (10.5&30.9%).





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التواجد والتغيرات الموسمية للقوارض الشائعة بواسطة المصائد الحية تحت الظروف الحقلية في محافظتي الجيزة والبحيرة.  
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الهدف من البحث حصر و دراسة خواص أعداد القوارض الشائعة بواسطة المصائد الحية تحت الظروف الحقلية في بيئات مختلفة بمحافظة الجيزة والبحيرة عام ٢٠٠٥م.  
أوضحت النتائج مايلي :-

تم تسجيل الجرذ المتسلق والجرذ النرويجي وفأر المنزل في محافظتي الجيزة والبحيرة بينما جرد الحشائش النيلي سجل في محافظة الجيزة فقط.  
الجرذ المتسلق سجل في المنازل والحقول ومباني الحيوانات (١٤٧ و ١٠٨ فردا) و (٢٠ و ١٣٤ فردا) و (٥٥ و ٣٤ فردا) في محافظتي الجيزة والبحيرة على التوالي.  
أشكال الجرذ المتسلق وهي جرد النخيل (الجرذ المتسلق ذو البطن البيضاء) سجل في المنازل والحقول ومباني الحيوانات (٣٨ و ١٩ فردا) و (٨٤ و ٥٦ فردا) و (١١ و ٧٧ فردا) والجرذ الأسود (الجرذ المتسلق ذو البطن السوداء) سجل في الحقول والمنازل (١٧ و ١٥ فردا) و (٥٥ و ٤٣ فردا) والجرذ السكندري (الجرذ ذو البطن الرمادي) سجل في المنازل ومباني الحيوانات (٨ و ٩ أفراد) و (٧ و ٥ أفراد) في محافظتي الجيزة والبحيرة على التوالي ولم يسجل الجرذ السكندري في الحقول في محافظتي الجيزة والبحيرة.  
كما أن الجرذ النرويجي سجل ٨٥ فردا في مباني الحيوانات في محافظة الجيزة بينما سجل في المنازل ٨٥ فردا و ١٠ أفراد في محافظتي الجيزة والبحيرة على التوالي.  
وبالنسبة إلى جرد الحشائش النيلي سجل ١٤ فردا فقط في الحقول بمحافظة الجيزة.  
وسجل فأر المنزل في الحقول ٣ أفراد بمحافظة الجيزة وفردان في المنازل بمحافظة البحيرة.  
إجمالى أعداد الذكور البالغة وغير البالغة للجرذ النرويجي كانت ٧٧ فردا و ١٨ فردا على التوالي بينما كان اجمالى أعداد الإناث البالغة وغير البالغة كانت ٦٩ فردا و ٦ أفراد على التوالي في محافظة الجيزة.  
إجمالى أعداد الذكور البالغة وغير البالغة لجرذ النخيل كانت ٦٨ فردا وفردان على التوالي بينما كان اجمالى أعداد الإناث البالغة وغير البالغة كانت ٥٦ فردا و ٧ أفراد على التوالي في محافظة الجيزة.  
إجمالى أعداد الذكور البالغة وغير البالغة لجرذ النخيل كانت ٥٦ فردا و ٧ أفراد على التوالي بينما كان اجمالى أعداد الإناث البالغة وغير البالغة كانت ٦٣ فردا و ١٦ أفراد على التوالي في محافظة البحيرة.  
إجمالى أعداد الذكور البالغة وغير البالغة للجرذ الأسود كانت ٣٥ فردا و ٦ أفراد على التوالي بينما كان اجمالى أعداد الإناث البالغة وغير البالغة كانت ٣٠ فردا و ٧ أفراد على التوالي في محافظة الجيزة.  
إجمالى أعداد الذكور والإناث البالغة كانت ٥٠ فردا بينما كان اجمالى أعداد الذكور والإناث غير البالغة كانت ٧ أفراد و ١٦ فردا على التوالي في محافظة البحيرة.





Table(3): Population characteristics of *Rattus rattus rattus* at Giza and Beheira Governorates during 2005.

Months	Sex and age distributions															
	Dynamic		Giza Governorate						Dynamic		Beheira Governorate					
	No.	%	Mature ♂	Immature ♂	Total Mature ♀	Pregnant	Non pregnant	Immature ♀	No.	%	Mature ♂	Immature ♂	Total Mature ♀	Pregnant	Non pregnant	Immature ♀
January	6	8	4	0	2	0	2	0	12	10.1	6	0	6	1	5	0
February	6	8	3	1	2	0	2	0	10	8.4	3	2	4	1	3	1
March	12	16.2	5	0	6	2	4	1	9	7.5	5	0	4	0	4	0
Winter	24	32.5	12	1	10	2	8	1	31	26.1	14	2	14	2	12	1
April	5	6.7	2	1	2	0	2	0	11	9.3	2	2	4	2	2	3
May	8	10.8	4	0	4	0	4	0	9	7.5	3	0	5	2	3	1
June	4	5.5	3	0	1	0	1	0	9	7.5	3	1	3	0	3	2
Spring	17	22.9	9	1	7	0	7	0	29	24.4	8	3	12	4	8	6
July	4	5.5	2	1	1	0	1	0	8	6.8	3	1	4	0	4	0
August	4	5.5	2	0	1	0	1	1	9	7.5	5	1	3	0	3	0
September	4	5.5	1	1	2	1	1	0	7	5.9	4	0	3	2	1	0
Summer	12	16.2	5	2	4	1	3	1	24	20.2	12	2	10	2	8	0
October	5	6.7	3	0	2	0	2	0	11	9.3	5	2	4	2	2	0
November	8	10.8	3	1	4	2	2	0	11	9.3	4	1	6	2	4	0
December	8	10.8	3	1	3	1	2	1	13	10.9	7	1	4	0	4	1
Autumn	21	28.4	9	2	9	3	6	1	35	29.4	16	4	14	4	10	1
Total	74	100	35	6	30	6	24	3	119	100	50	11	50	12	38	8
%	100	-	47.3	8.1	40.5	8.1	32.4	4.1	100	-	42.1	9.2	42	10.1	31.9	6.7

**Table (4): Population Characteristics of *Rattus rattus frugivorous* at Giza and Beheira Governorates during 2005.**

Months	Sex and age distributions															
	Dynamic		Giza Governorate						Dynamic		Beheira Governorate					
	No.	%	Mature ♂	Immature ♂	Total Mature ♀	Pregnant	Non pregnant	Immature ♀	No.	%	Mature ♂	Immature ♂	Total Mature ♀	Pregnant	Non pregnant	Immature ♀
January	4	3	2	0	2	0	2	0	14	9.2	6	2	5	2	3	1
February	5	3.8	2	0	3	1	2	0	13	8.6	5	1	6	1	5	1
March	17	12.7	11	0	6	1	5	0	13	8.6	7	0	5	1	4	1
Winter	26	19.5	15	0	11	2	9	0	40	26.3	18	3	16	4	12	3
April	13	9.8	7	0	2	0	2	4	16	10.5	4	3	9	2	7	0
May	13	9.8	6	0	7	2	5	0	13	8.6	4	2	4	1	3	3
June	17	12.7	7	0	9	2	7	1	11	7.1	4	1	4	1	3	2
Spring	43	32.3	20	0	18	4	14	5	40	26.3	12	6	14	4	10	5
July	9	6.8	5	0	4	0	4	0	14	9.2	6	1	6	1	5	1
August	9	6.8	4	0	5	0	5	0	10	6.6	6	0	4	0	4	0
September	11	8.3	6	0	4	0	4	1	9	5.9	5	0	4	2	2	0
Summer	29	21.8	15	0	13	0	13	1	33	21.7	17	1	14	3	11	1
October	10	7.5	5	0	4	2	2	1	15	9.9	6	2	6	2	4	1
November	7	5.3	3	0	4	1	3	0	12	7.9	6	0	6	2	4	0
December	18	13.5	10	2	6	1	5	0	12	7.9	6	1	4	1	3	1
Autumn	35	26.3	18	2	14	4	10	1	39	25.7	18	3	16	5	11	2
Total	133	100	68	2	56	10	46	7	152	100	65	13	63	16	47	11
%	100	-	51.1	1.5	42.1	7.5	34.6	5.3	100	-	42.8	8.6	41.4	10.5	30.9	7.2