

Survey and Relative Occurrence of Rodent Species at Kafr El-Sheikh Governorate

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ABSTRACT

The present investigation was carried out for determination rodent species surveillance and their relative occurrence at three sites i.e. (animal production research station, poultry farm and farmers' houses) at Kafr El-Sheikh district, Kafr El-Sheikh Governorate during 2015 and 2016 years. Surveyed rodent species were Norway rat, *Rattus norvegicus*, white bellied rat, *Rattus rattus frugivorus* and house mouse *Mus musculus*. Average numbers of trap indices were 0.27 and 0.21 during 1st and 2nd years, respectively. The highest values of trap indices were 0.40 and 0.39 during August in 2015 and 2016, respectively. The total number of rodent species recorded through animal production research station during two successive years 2015 and 2016 were 136 and 65 individuals, respectively. The total number of rodent species in the poultry farm were 77 and 93 individuals, respectively. On the other hand, in the farmers' houses the total numbers were 109 and 95 individuals, in 2015 and 2016 respectively. Norway rat, *R. norvegicus* was the most dominant species in these location. In animal production station, the maximum numbers of rodent species are (19) individuals in August 2015 and (9) individuals in March and August 2016. The highest total number of rodents in poultry farm was recorded in May 2015 with (10) individuals and in August 2016 with (18) individuals. In farmers' houses, the lowest numbers were recorded during winter months in January and February 2015 while January was the lowest in 2016, since no rats were caught during it.

INTRODUCTION

Rodents are harmful animals in agricultural environments that cause great damage to field and orchard crops. They can contaminate stored foods and crops and spread diseases such as salmonella, hantavirus and wails disease as well as transmit bacteria and virus from their fur onto any surface that they come into contact with. In addition, they contaminate water resources. Worldwide, there are about 1700 species of rodents but only 5-10% are major pest species in agricultural environment. Rats causing considerable damage to agricultural crops specially sugarcane, wheat, maize, rice, fruit trees and vegetables, also, rats can attack small animals, specially chickens, squabs of pigeon and suckling rabbit (Abd El-Azeem, 2008). Rodent damage varies according to crop varieties, location and rodent species prevailing in the area. In Egypt, tomato and strawberry were severely infested with *Gerbillus gerbillus* in Ismailia Governorate, while damage caused by *M. musculus* reached the maximum in wheat and tomato fields at 6 October farm (El-Deeb *et al.*, 1999). Norway rat *R. norvegicus*, the house mouse rat, *M. musculus* and the white bellied rat, *R. r. frugivorus* were recorded in high numbers at El-Ibrahemia district, Sharkia Governorate (Hegab *et al.*, 2013). Every year, rats in Asia consume food crops that could feed 200 million people for an entire year (Singleton, 2003). Wire box is one of the pest methods that are used in survey as well as classification and estimate the population density of rodents. Also, can be used in the evaluation of rodenticides efficient and sometimes can be used as a method of rodent control (Desoky, 2015). Several authors studied the population density of different rodent species in some governorates (Mourad *et al.*, 1982; Asran *et al.*, 1985; El-Bahrawy, 1986; Abd El-Kariem, 1991; Asran, 1994; Hegab, 2004; Hegab *et al.*, 2006 and Hegab *et al.*, 2013).

The aim of this study was to survey and investigate related occurrence of rodent species during two successive years, 2015 and 2016 at three sites at Kafr El-Sheikh district, Kafr El-Sheikh Governorate.

MATERIALS AND METHODS

Survey and relative occurrence of rodent species at different sites:

The present study was carried out at three sites; animal production research station, poultry farm and farmers' houses at El-Nattaf village, Kafr El-Sheikh district, Kafr El-Sheikh Governorate. The first site measured about 900 m² that consists of two breeding builds and one feed storage. The second site measured 300 m², with one breeding building and one storage. The third site harboured 20 houses. Rodents were collected from the three tested sites during two successive years beginning from January 2015 till December 2016.

The wire box traps of the usual spring-door type were used to catch individuals of commensal and domestic rodents (Youssef, 1996). The traps were supplied with a suitable bait material such as tomato slices and taamia (Abd El-Karim, 1991). According to Desoky (2015), fifty wire box traps with fresh baits were used for capturing the rodents. These traps were distributed at 10-meter distance (Hussien, 1991) and in all cases, they were put very close to the walls. The traps were installed twice a month (at the beginning and mid) and left from 6 pm to 7 am on the following day. In the poultry farm, the traps were put into the building of stored food, but were put into infested places of each of animal production station and farmers houses. Traps containing rodents were transferred to the laboratory enclosed tight cloth bags. Collected animals were identified according to the key of Osborn and Helmy (1980). Trap index was estimated according to Asran *et al.*, (1985) and El-Deeb *et al.*, (1999) as follows: trap index = number of captured rats / total distributed traps. Population fluctuation of rodent species in different sites were determined the year round during the two years of study.

RESULTS AND DISCUSSION

1. Survey of rodent species:

Rodent species at the three previous mentioned sites at Kafr El-Sheikh district, Kafr El-Sheikh Governorate were surveyed. Data in Table (1) indicated into the presence of three species of rats; *Rattus norvegicus*, white bellied rat, *Rattus rattus frugivorus* and house mouse

Mus musculus. *R. norvegicus* was the most dominant species followed by *R. r. frugivorus* and *M. musculus*. The dominance of *R. norvegicus* may be attributed to the availability of food and shelter as well as the places rich in organic materials. On the other hand, this may also due to the inter-specific competition between this species and other species. The higher of population due to changes of the environmental conditions in Egypt by increase and differentiation in the cover plant in the study area which have a great effect in the distribution of rodent species (El-Sherbiny, 1987; Desoky, 2007 and Abd El-Gawad, 2010). The difference in species composition of rodent depends on locality, environmental conditions, inter-specific competition and preferred food (Desoky et al., 2014).

Youssef (1996) surveyed the rodent species at Kafr El-Sheikh Governorate in two types of mills i.e. flour and rice. The black rat, *Rattus rattus*, Norway rat, *R. norvegicus* and house mouse, *M. musculus* were recorded in both two mills. It was evident that *R. rattus* outnumbered the other species in the two tested mills. Hegab et al. (2013) surveyed the rodent species at Sharkia Governorate, they trapped five species from three different habitats namely *R. norvegicus*, *R. rattus*, *frugivorus*, *M. musculus*, *Acomys cahirinus* and *R. rattus alexandrinus*. Desoky (2018) reported that *Arvicanthis niloticus* (field rat or Nile grass rat) was only rodent species prevailing in the area and responsible for maize damage at Sohag Governorate

Table 1. Survey and density of rodent species at Kafr El-Sheikh district, Kafr El-Sheikh Governorate

Rodent species	Year		Common name
	2015	2016	
<i>Rattus norvegicus</i>	+++	+++	Norway rat
<i>Rattus rattus frugivorus</i>	++	++	White bellied rat
<i>Mus musculus</i> .	+	++	The house mouse

+++ High population (more than 6 rats/trap)

++ Moderate population (3-5 rats/trap)

+ Low population (less than 3 rats/trap)

2. Relative occurrence of rodent species at Kafr El-Sheikh Governorate:

1. Trap index of rodent species at Kafr El-Sheikh Governorate:

Trap index of rodents at three different sites expressed by number of rats/total number of traps was monthly studied throughout the whole months of 2015 and 2016 years. The results obtained are given in Table (2).

Average of trap index was 0.27 and 0.21 during first and second years, respectively. The highest mean of trap index was (0.11) in animal production research station followed by farmers' houses (0.09), while poultry farm recorded (0.06) during first year. In the second year, the highest mean of trap index was (0.08) in both of poultry farm and farmers' houses; while, it recorded (0.05) in animal production research station. The highest values of trap indices were 0.40 and 0.39 during August in 2015 and 2016, respectively. While the lowest values were in January during the two successive years with (0.15 and 0.03), respectively.

It appears also that the highest trap indices in 2015 were in the animal production research station during August (0.19) and farmers' houses (0.14) during the same month followed by poultry farm (0.10) during May of the same year. The lowest numbers of trap indices during 2015

season were recorded in January for animal production research station, in April and September for poultry farm and in January and February for farmers' houses. On the other hand, data in the same table showed that highest trap indices in 2016 were (0.18) for poultry farm, (0.16) for farmers' houses and (0.11) in animal production research station during August, May and April, respectively. The rat index was zero in January of 2016 for poultry farm and farmers' houses and in November for animal production research station.

Table 2. Trap index of rodent species at three sites of Kafr El-Sheikh district, Kafr El-Sheikh Governorate during 2015 and 2016.

Months	animal production research station		poultry farm		farmers' houses		Total	
	2015	2016	2015	2016	2015	2016	2015	2016
	Jan.	0.05	0.03	0.05	0.00	0.05	0.00	0.15
Feb.	0.08	0.04	0.07	0.04	0.05	0.05	0.20	0.13
Mar.	0.09	0.09	0.05	0.06	0.13	0.08	0.27	0.23
Apr.	0.16	0.11	0.03	0.06	0.12	0.09	0.31	0.26
May	0.14	0.08	0.10	0.10	0.06	0.16	0.30	0.34
Jun.	0.12	0.05	0.09	0.13	0.09	0.13	0.25	0.31
Jul.	0.13	0.06	0.07	0.11	0.12	0.09	0.32	0.26
Aug.	0.19	0.09	0.07	0.18	0.14	0.12	0.40	0.39
Sep.	0.14	0.04	0.03	0.09	0.07	0.08	0.24	0.21
Oct.	0.11	0.06	0.07	0.06	0.08	0.04	0.26	0.16
Nov.	0.09	0.00	0.09	0.04	0.11	0.08	0.29	0.12
Dec.	0.06	0.00	0.08	0.04	0.07	0.03	0.21	0.07
Total	1.36	0.65	0.75	0.91	1.09	0.95	3.20	2.51
Mean	0.11	0.05	0.06	0.08	0.09	0.08	0.27	0.21

2. Population fluctuation of rodent species at three sites at Kafr El-Sheikh district, Kafr El-Sheikh Governorate during 2015 and 2016 years:

1. In animal production station:

Data in Table (3) show that the total number of rodent species in animal production research station during the two successive years 2015 and 2016 were 136 and 65 individuals, respectively.

Table 3. Population fluctuation of rodent species in animal production station at Kafr El-Sheikh Governorate during 2015 and 2016 .

Months	Number of rodent species							
	<i>Rattus norvegicus</i>		<i>Rattus rattus frugivorus</i>		<i>Mus musculus</i>		Total	
	2015	2016	2015	2016	2015	2016	2015	2016
Jan.	3	3	2	0	0	0	5	3
Feb.	4	3	2	1	2	0	8	4
Mar.	4	4	3	3	2	2	9	9
Apr.	9	8	4	2	3	1	16	11
May	7	6	4	1	3	1	14	8
Jun.	8	3	3	2	1	0	12	5
Jul.	7	3	4	2	2	1	13	6
Aug.	13	6	4	2	2	1	19	9
Sep.	9	2	3	1	2	1	14	4
Oct.	6	5	4	1	1	0	11	6
Nov.	6	0	3	0	0	0	9	0
Dec.	4	0	2	0	0	0	6	0
Total	80	43	38	15	18	7	136	65

Norway rat, *R. norvegicus* was the most dominant species in the site during first and second seasons, it recorded 80 and 43 individuals followed by white bellied rat, *R. r. frugivorus* which recorded 38 and 15

individuals and the house mouse, *M. musculus* which recorded 18 and 7 individuals during first and second years, respectively. The maximum number of rodent species were (19) in August 2015 and (9) in both March and August 2016.

2. In poultry farm.

The total number of rodents in poultry farm during 2015 and 2016 were 75 and 91 individuals, respectively, Table (4). *R. norvegicus* achieved higher population than *R. r. frugivorus* and *M. musculus*, since it recorded 48 and 53 individuals during 2015 and 2016, respectively *R. r. frugivorus* was the second, it recorted 19 and 26 individuals followed by *M. muschlus* which recorded 8 and 12 individuals during first and second years, respectively.

On the other hand, the highest total number of rodents in 2015 was recorded in May (10) individuals while the lowest (3) individuals was in both of April and September. In 2016, the maximum number of rodent species was 18 individuals in August, while the minimum number was zero in January, since no rodents were captured during this month.

Table 4. Population fluctuation of rodent species in poultry farm at Kafr El-Sheikh Governorate during 2015 and 2016.

Months	Number of rodent species							
	<i>Rattus norvegicus</i>		<i>Rattus rattus frugivorus</i>		<i>Mus musculus</i>		Total	
	2015	2016	2015	2016	2015	2016	2015	2016
Jan.	3	0	2	0	0	0	5	0
Feb.	4	2	2	2	1	0	7	4
Mar.	4	4	1	1	0	1	5	6
Apr.	3	3	0	2	0	1	3	6
May	6	5	2	3	2	2	10	10
Jun.	3	8	1	4	0	1	4	13
Jul.	5	6	1	3	1	2	7	11
Aug.	4	8	2	6	1	4	7	18
Sep.	3	6	0	2	0	1	3	9
Oct.	4	6	3	0	0	0	7	6
Nov.	4	3	3	1	2	0	9	4
Dec.	5	2	2	2	1	0	8	4
Total	48	53	19	26	8	12	75	91

3. In farmers' houses.

The population fluctuation of the three rodent species found in farmers' houses was studied and tabulated in Table (5).

Results obtained exhibited that the total numbers of rodent species during 2015 and 2016 were 109 and 95 individuals, respectively. Rodent species could be arranged according to their relative abundance in the following descending order: *R. norvegicus*, *M. musculus*, and *R. r. frugivorus*, since *R. norvegicus* recorded 62 and 41 individuals during 2015 and 2016, respectively. *M. musculus* recorded 22 and 30 individuals, while *R. r. frugivorus* was the third with 23 and 24 individuals in 2015 and 2016, respectively. The maximum number of caught rats was obtained during August and May of the two years with total number of 14 and 16 animals, respectively.

The lowest numbers were recorded during January and February 2015 with the same number of 5 individuals, while January was the lowest in 2016, since no rats were caught during it.

Reviewing the obvious mentioned results, it is clear that the population density of each rodent species varied from month to another. The numbers started to increase through the months of spring and summer, but lowest numbers were in winter. It is clear that *R. norvegicus* outnumbered the other species in the three tested sites. Also, trap index clearly differed from one place to another.

Table 5. Population fluctuation of rodent species in farmers' houses at Kafr El-Sheikh Governorate during 2015 and 2016.

Months	Number of rodent species							
	<i>Rattus norvegicus</i>		<i>Rattus rattus frugivorus</i>		<i>Mus musculus</i>		Total	
	2015	2016	2015	2016	2015	2016	2015	2016
Jan.	3	0	2	0	0	0	5	0
Feb.	4	3	1	1	0	1	5	5
Mar.	7	3	4	2	2	3	13	8
Apr.	5	4	4	2	3	3	12	9
May	4	7	2	4	0	5	6	16
Jun.	6	6	2	3	1	4	9	13
Jul.	7	5	2	2	3	2	12	9
Aug.	8	5	2	4	4	3	14	12
Sep.	4	3	0	2	3	3	7	3
Oct.	4	1	2	2	2	11	8	4
Nov.	6	3	3	2	2	3	11	8
Dec.	4	1	1	0	2	2	7	3
Total	62	41	23	24	22	30	109	95

Hegab *et al.* (2006) surveyed rodent species in three differed sites at Sharkia Governorate i.e. (houses, citrus farm and granaries) and revealed that, the houses stated the highest numbers of rodents (192) animals followed by citrus farm (51) animals and the granaries (42) animals. These results agree also with Desoky *et al.* (2014) who revealed that the presence of three species of rats included the lesser garibe *Garbillus sp.* (1.03%), the Nile grass rat, *A. niloticus* (4.44%) and the white bellied rat *R. r. frugivorus* (94.97%). He also reported that, the highest population of rodent species were recorded during spring (34.41%) and summer (29.03%), followed by autumn (20.79%) and winter (15.77%), respectively.

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دراسة الحصر والتذبذب العددي للقوارض في محافظة كفر الشيخ
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أجريت هذه الدراسة بقرية النطاف التابعة لمركز كفر الشيخ بمحافظة كفر الشيخ بهدف حصر أنواع الفئران الموجودة في هذه المنطقة ودراسة التذبذب العددي لها خلال عامي ٢٠١٥ و ٢٠١٦. وتم إختيار ثلاث أماكن مختلفة بتلك المنطقة وهي (محطة بحوث الإنتاج الحيواني ومزرعة الدواجن وبيوت الفلاحين). وأظهرت النتائج تواجد ثلاث أنواع من الفئران وهي الفأر النرويجي وفأر المنزل والفأر ذو البطن البيضاء وكان الفأر النرويجي هو الأكثر شيوعا في الثلاثة أماكن محل الدراسة. وكانت أعلى قيم دليل التعداد $trap\ index$ ٠.٤٠ ، ٠.٣٩ ، خلال شهر أغسطس خلال عامي الدراسة. وكان العدد الكلي لأنواع الفئران الموجودة بمحطة الإنتاج الحيواني هو ١٣٦ و ٦٥ فأر خلال ٢٠١٥ و ٢٠١٦ على التوالي بينما كان ٧٩ ، ٩٣ فأرا في مزرعة الدواجن و ١٠٩ و ١٢٥ فأرا في منازل الفلاحين خلال عامي الدراسة. وبشكل عام فإن أعلى تعداد للفئران في المناطق الثلاثة قد تم تسجيله في أشهر الربيع والصيف. بينما سجلت أقل الأعداد خلال شهور الشتاء والخريف.