



Survey and Population Density of Some Rodent Species in Sahel Silem District at Assiut Governorate

Y.M.A. Abd El Galil

Plant Protection Research Institute, ARC, Dokki, Giza, Egypt.

E.Mail: ahmed.yassermohammed@yahoo.com

ARTICLE INFO

Article History

Received:5 /2/2019

Accepted:7/4/2019

Keywords:

Survey, population density, field crops, village houses, Rodents, Myomorpha, Muridae, *Rattus rattus* (Linnaeus), *Rattus norvegicus* (Berkanhout) and *Arvicanthis niloticus* (Desmart).

ABSTRACT

Survey and population density of rodent species at Sahel Silem District, Assiut Governorate in two different habitats; field crops and village houses, were conducted during two successive years from 2015 to 2017. The obtained results recorded, three rodent species: the fruit rat, *Rattus rattus* (Linnaeus), the Nile Field rat or the Nile grass, *Arvicanthis niloticus* (Desmart) and the wild Norway rat, *Rattus norvegicus* (Berkanhout), in spring, summer, autumn and winter seasons during the experimental period. In addition, the high population density was recorded for the dominant rodent species, *Rattus rattus* in field crops while; low population density was recorded for, *Rattus norvegicus* in field crops. Moreover, *Rattus norvegicus* was dominant and the highest numbers in village houses. Furthermore, the results proved that the field crops were attacked by rodent species more than village houses during the experimental period.

INTRODUCTION

Rodents cause great economic losses to growing and stored crops, poultry and animal farms, food manufactories as well as to the structure and fabric of buildings. Besides, they gnaw through almost any object to obtain food and shelter. In addition, rodents are involved in the transmission and dissemination of many parasites and diseases to man and his domestic animals (Meehan, 1984). The FAO-WHO, (1969), was reported that the food destruction and diseases transmission are two major hazards caused by rats to human beings. Therefore, the same organization showed that the rodent species have been estimated that the foodstuffs planted every year in the world, while the completed report has been written in five years in addition that, the same organizing cleared that are never eaten by people because of damage by rats, the types of damage be caused by rats are numbers. Because they feed on crops growing in the fields and destroy fruit orchards; they consume stored grains and other foodstuffs as well as damage a wide range of man - made constructions. So food are considered as one of the most important pest groups in Egypt. Which includes several species such as: the Nile grass rat, *Arvicanthis niloticus* (Desmart), the Roof rat, *Rattus rattus* (Linnaeus), the Norway rat, *Rattus norvegicus* (Berkenhout), the house mouse, *Mus musculus* (Brants), the spiny mouse, *Acomys cahirinus* (Cretzschmar), in

addition to some desert species such as *Gerbil/us* spp., *Meriones* spp. and *Jaculus* sp., (Osborn and Helmy, 1980). Meanwhile, Kuehnert, (1988), mentioned that the two rat species, roof rat (*Rattus rattus*) and Norway rat (*R. norvegicus*), together with the house mouse (*Mus musculus*), have the distinction of being the only wild mammals to share with the man a truly cosmopolitan distribution. In most countries to which they have spread, they have tended to remain in the vicinity of human habitats (Drummond, 1977).

Each of these three species has its own ecological necessities required from the habitat for life, reproduction and distribution. They are reported in almost every rodent survey in agricultural and some authors, Hoogestral (1963) and Abd El Galil, (2005) in Assiut Governorate, carried out human habitats in Egypt. While, Mourad *et al.*, (1982), in El-Minia Governorate and Asran *et al.*, (1985) in El-Fayoum Governorate, studied the experimental period.

This study aims to know the appropriate time to control rodents and reduce their populations in the two study habitats with the least means of safe control, minimizing pollution of environmental, soil to produce relatively healthy crops, safe for humans, export them to increase the national income. So, survey rodent species at Sahel Silem District, Assiut Governorate, in two habitats: field crops and village houses. The population density of the recorded species was studied as well.

MATERIALS AND METHODS

Survey and population density of carried out in different habitats: field crops and village houses, were assessment monthly, during two successive years started from March 2015 to Feb. 2016 and from March 2016 to Feb. 2017.

The main crops cultivated in this areas were Wheat, Broad bean, Maize, Sorghum, Egyptian clover, Onion, garlic; some vegetable crops such as Tomato, Pepper, Eggplant, and certain fruit orchards; Pomegranate, Citrus, Mango and date Palm.

In field crops: rodent species survey and population density in the varied crops and village houses were carried out for 3 successive nights monthly as follows:

In field crops: five Feddans were chosen in each village as replicate one Feddan. There 30 traps were placed in each replicate for three night monthly during two successive years, i.e. (30 traps / Feddan x Five Feddans = 150 traps x 3 nights = 450 traps).

Meanwhile, in houses village: five replicates were chosen in the villages mentioned above, each replicate included three houses the traps were placed by ten traps for each house during three nights for two successive years, i.e. (3 houses / one site x 5 sites = 15 houses x 10 traps / house = 150 traps / 3 nights = 450 traps). These traps were baited with fresh Falafel or tomato and were distributed at 6 pm and checked at 7 am. The recorded data were calculated according to the next formula to estimate the rodent species population density. Also, the collected rodents were classified into species according to the key of rodent which described by Osborn and Helmy, (1980).

$$\% \text{ Population density} = \frac{\text{Number of caught rodents}}{\text{Total traps / 3 nights}} \times 100$$

RESULTS AND DISCUSSION

The tabulated data in Tables (1 and 2), showed the obtained results of trials of the survey and population density of rodent and its species which found in two different habitats; field crops and village houses during two successive years. This work started from March 2015 to Feb. 2016 and March 2016 to Feb. 2017 at Sahel Silem District, Assiut Governorate.

Rodent species while were trapped in these habitats cleared that, five species prevalence in all habitats were, the first rat the Fruit rat, *Rattus rattus* (Linnaeus), the second rat the wild Norway rat, *Rattus norvegicus* (Berkanhout) and the third rat, the field Nile rat or the Nile grass rat, *Arvicanthis niloticus* (Desmarts). All recorded species belonged to sub- order: Myomorpha, family: Muridae, rodent identified and classified to Osborn and Helmy, (1980).

1. Survey and Population Density in Field Crops Habitat:-

For field crops the average of the caught number of different species of field rodents in spring, summer, autumn and winter seasons in villages which belong to Sahel Silem District at Assiut Governorate during two successive years which started from March 2015 to Feb. 2016 and March 2016 to Feb. 2017 were (32.33, 38.66, 46.00 and 25.00 individuals) respectively. (Table 1). These data proved that autumn season was the most prevalence in fields followed by spring, summer, autumn and winter. On the other hands, the obtained results (table. 2) illustrated that the dominant rodent species at the different seasons were as follows:

- (1) For spring season;
Rattus rattus (62.89%) > *Arvicanthis niloticus* (21.65%) > *Rattus norvegicus* (15.46%).
- (2) For summer season;
Rattus rattus (63.80%) > *Arvicanthis niloticus* (20.70%) > *Rattus norvegicus* (15.50%).
- (3) For autumn season;
Rattus rattus (64.51%) > *Arvicanthis niloticus* (18.14%) > *Rattus norvegicus* (17.35%).
- (4) For winter season;
Rattus rattus (65.58%) > *Arvicanthis niloticus* (18.58%) > *Rattus norvegicus* (15.84%).

Therefore, the former data proved that *Rattus rattus* was the dominant species followed by *Arvicanthis niloticus*. Meanwhile, *Rattus norvegicus* was the fewer species found in during the whole seasons of the two successive years the experimental period.

The previous results agreed with many other studies those obtained by Asran *et al.*; (1985), In El-Fayoum Governorate, studied the population density of *A. niloticus* in different habitats and showed that the rodent population density differed from location to locations, from district to another and from month to month, forming a cycle with two peaks per year one in May and the second in November. The highest population occurred in cattle farms followed by fields and orchards. The cattle farm close environment, with food available all the year round, was the most favorable habitat for rat populations.

Abazaid (1990) recorded that in the cultivated area in El-Mattana, Qena Governorate five species of rodents (*R. r. frugivorus*, *A. niloticus*, *R. r. alexandrinus*, *M. musculus* and *R. norvegicus*) were by In El-Salhiya Research Station, Alexandria, three rodent species were observed. These species were *A. niloticus*, *R. r. Frugivorous* and *M. musculus*; associated with different plantations (tomatoes, pear and citrus "orange"). Orange and rear areas were infested with the highest numbers of these species, and the lowest record was found in the tomatoes. Numbers and percentages of rodents for the period of study were 42.92%, 39.48% and 17.60% in case of

oranges, pear and tomatoes area ,respectively. *A. niloticus* comprised 48.9% of all specimens trapped followed by *R. r. frugivorus* (32.6%) and *M. musculus* (18.5%) that meant that the area of study was infested with the highest number of *A. niloticus* followed by *R. r. frugivorus* and finally *M. musculus*. El-Nashar (1998), recorded the different species of rodents *Mus musculus*, *Arvicanthis niloticus* and *Rattus rattus* in wheat and maize crops in Malawi district at Minia governorate, through 1995 and 1996. He found that, *Mus musculus*, was the dominant one, in wheat fields (67.71) and maize fields (49%) followed by *Arvicanthis niloticus* 28.13% in a wheat field and 51 % in a maize field. In addition, *Rattus rattus* recorded 4.17% in a wheat field and 0% maize field. Abd El Galil (2005), studied that Survey and distribution of rodent species in the two different locations in Assiut University Farm at Assiut Governorate, In field crops, the Roof rat, *Rattus rattus*, occurred abundantly (65.3%) followed by the Norway rat, *Rattus norvegicus* (18.1%), the Nile grass rat, *Arvicanthus niloticus* (12.5%) and the Demsey rat, *Gerbillus pyramideum* (4.2%) respectively. Rizk *et al.*, (2017), provide that in some villages at Sohag Governorate, one of the upper Egyptian governorates, rodent species survey and calculate density in three different habitats, five species at family Muridae recorded in Akhmim district (Sohag Governorate) through 2014-2016 in the tested habitats, *Rattus rattus*, *R. norvegicus*, *Arvicanthis niloticus*, *Acomys cahirinus* and *Mus musculus*, in field crops, each habitat are discrimination of one species, *Arvicanthis niloticus* in field crops, *Rattus rattus* and *R. norvegicus* spread in the three habitats, *R. norvegicus* the predominant species in field crops only and *Rattus rattus* in other two habitats. The highest density of all recorded species was during spring then summer, whereas autumn and winter respectively.

2. Survey and Population Density in Village Houses Habitat:-

For village houses the average of total caught number of different species in villages, Sahel Silem District at Assiut Governorate during two successive years the experimental period were, (32.67, 31.67, 23.00 and 35.33 individuals/ 150 traps /3 nights) for spring, summer, autumn and winter, respectively (Table3 and 4). These data proved that winter season and summer season were had the most prevalence for rodent species in houses of the villages. Meanwhile, the descending arrangement order of rodent species at deferent seasons for village houses habitats according to their population density where is following:

(1)For spring season;

Rattus norvegicus (42.86%)>*Rattus rattus* (39.79%)>*Arvicanthis niloticus* (17.35%).

(2)For summer season;

Rattus rattus (44.76%)>*Rattus norvegicus* (31.43%)> *Arvicanthis niloticus* (23.81%).

(3)For autumn season;

Rattus rattus (52.17%)> *Rattus norvegicus* (42.01%)> *Arvicanthis niloticus* (5.82%).

(4)For winter season;

Rattus rattus (49.05%)> *Rattus norvegicus* (40.56%)>*Arvicanthis niloticus* (10.39%).

Therefore, the recorded data proved that *Rattus norvegicus* was the dominant species followed by *Rattus rattus* > *Arvicanthis niloticus* in village houses during the spring season, in autumn, winter and summer

seasons recorded data provide that *Rattus rattus* was the dominant species followed by *Rattus norvegicus* > *Arvicanthis niloticus* in village houses. The previous figures proved that the prevalence of the rodent species in field crops was more than in village houses. Also, the results cleared that, *Rattus rattus* was the dominant one in field crops. Meanwhile, *Rattus norvegicus* was the dominant spring season one in village houses. Therefore, the mentioned results; provide that the highest population of rodent species was in field crops in two years of the study. Also, the studied habitat could be arranged ascending by as follows; field crops > houses.

The previous results agreed with many other studies those obtained by EL-Sherbiny *et al.*; (1993). Rats were life - trapped monthly from four agricultural activity habitats located in a village that represents the Nile Delta agro ecosystem. The roof rat (*Rattus rattus*) and the Norway rat (*R. norvegicus*) were the only rat species found in these areas; however, the latter was the dominant one. The effects of different environmental factors (i.e. seasonal and temperature changes, availability of food and nesting sites, as well as a degree of habitat sophistication and man-made construction) on rat numbers, rat species and the ratio between both sexes were briefly discussed. This type of information could lead to a more efficient and long lasting rat control operation suitable for each habitat type. Mourad *et al.* (1982), in El-Minia Governorate, studied rodent population density in some urban areas and showed that population density in the city was less than town adjacent to rural areas. The grey-bellied rat, *R. r. alexandrinus* was the dominant species followed by *R. norvegicus*, *R. r. frugivorous*, *A. niloticus* and *Acomys cahirinus*. Within each year, the highest densities of all species were noticed during spring followed by autumn and the lowest densities were during winter and summer seasons. Abd El Galil (2005), studied that Survey and distribution of rodent species in the two different locations in Assiut University Farm at Assiut Governorate, In houses habitat, the highest index was recorded with the Norway rat, *R. norvegicus* (72.6%), while the Nile grass rat, *A. niloticus* and the demsey rat, *G. pyrameidum* were completely absent. Rizk *et al.*; (2017), provide that in some villages at Sohag Governorate, one of the upper Egyptian governorates, rodent species survey and calculate density in three different habitats, five species at family Muridae recorded in Akhmim district (Sohag Governorate) through 2014-2016 in the tested habitats, *Rattus rattus*, *R. norvegicus*, *Arvicanthis niloticus*, *Acomys cahirinus* and *Mus musculus*, in field crops, each habitat is discrimination of one species, *Arvicanthis niloticus* in field crops, *Rattus rattus* and *R. norvegicus* spread in the three habitats, *R. norvegicus* the predominant species in field crops only and *Rattus rattus* in other two habitats. The highest density of all recorded species was during spring then summer, whereas autumn and winter respectively.

Table (1): Survey and population density of rodent species in villages, Sahel Silem District at Assiut Governorate throughout two successive years March 2015 to February 2017.

Habitat	Season	Entrapped rodents / 150 traps / 3 nights		Rodent species					
				<i>Rattus rattus</i>		<i>Rattus norvegicus</i>		<i>Arvicanthis Niloticus</i>	
		Average	% population	Average	%	Average	%	Average	%
Field crops	Spring	32.33	7.19	20.33	62.89	5.00	15.46	7.00	21.65
	Summer	38.66	8.59	24.66	63.80	6.00	15.50	8.00	20.70
	Autumn	46.00	10.22	29.67	64.51	8.00	17.35	8.33	18.14
	Winter	25.00	5.56	16.33	65.58	4.00	15.84	4.67	18.58
	Gross average	35.50	7.89	22.75	64.1	5.75	16.19	7.00	19.71

Table (2): Survey and population density of rodent species in villages, Sahel Silem District at Assiut Governorate throughout two successive years March 2015 to February 2017.

Habitat	Season	Entrapped rodents / 150 traps / 3 nights		Rodent species					
				<i>Rattus rattus</i>		<i>Rattus norvegicus</i>		<i>Arvicanthis Niloticus</i>	
		Average	% population	Average	%	Average	%	Average	%
Houses farmers	Spring	32.67	7.26	13.00	39.79	14.00	42.86	5.67	17.35
	Summer	31.67	7.78	15.66	44.76	11.00	31.43	8.33	23.81
	Autumn	23.00	5.11	12.00	52.17	9.67	42.01	1.33	5.82
	Winter	35.33	7.85	17.33	49.05	14.33	40.56	3.67	10.39
	Gross average	30.66	7.00	14.49	46.44	12.25	39.22	4.75	14.34

REFERENCES

- Abazaid, A.A. (1990). Efficiency of some common used rodenticides and some new alternatives against rodents in Qena Governorate. M. Sc. Thesis Faculty of Agriculture, Assiut Univ; Egypt, PP. 93.1990.
- Abd El-Galil, Y.M.A. (2005). Comparative studies on rodenticides against some rodents. Ph.D. Thesis Fac. Agric., Al Azhar Univ; Egypt. PP. 163...2005.
- Asran, A.A.; El Deeb, H.I.; Kuehnert, G. and El-Halfawy, M.A. (1985). Population density of rodents in different locations in Fayoum Governorate. J. Agric. Sci., Mansoura Univ. Egypt. 10, (4): 1527-1528.1985.
- Drummond, D.C. (1977). Rats in urban Britain. The 139 th annual meeting of the British Association for the Advancement of Science, Aug 31-Sep 7, 1977. 8 pages. 1977.
- El-Sherbiny, A.H. (1987). Rat, man and culture. Egypt J. wild l. and Nat. Resource..(9), PP.17.1987.
- El-Nashar, M.A. (1998). Ecological and toxicological studies on some Egyptian rodents in certain traditional cultivated areas in some governorates in Egypt. M. Sc. Thesis Fac. Of Agric., Al-Azhar Univ., PP. 62.1998.
- EL-Sherbiny, A.H.; A.M. Omar and Z.M. Awad (1993). Fluctuations in Rat Populations at Four Agricultural Activities in the Delta Region, Egypt. Al-Azhar J. Agric. Res., (18), (December):(353-364).1993.

- FAO-WHO joint project. (1969). Bibliography on rodent pest biology and control, 1960 - 1969. WHO Vector Biology and Control Unit. WHO. 1211 Geneva 27, Switzerland, 222 Pages.1969.
- Hoogestral, H. (1963). A brief review of the contemporary land mammals of Egypt (including Sinai). J. Egypt. Publ. Hlth. Assoc. (38): 1-35. 1963.
- Kuehnert, G.1988. Field rats and Control in Egypt: analysis of a national rodent control strategy. Final report (Sept. 1982 - Aug. 1988). Egyptian - German Field Rat Control Project. 118 pages.1988.
- Meehan, A.P. (1984). Rats and mice their biology and control. Published By Rentokil Limited East Grain Stead. W. Sussex RH. 192 J.Y. London U.K. PP. 383.1984.
- Mourad, M. G.; K. H. Abd El-Gawad and M. A. Ali (1982). Population Density of rodent species in some urban area Minia Governorate. Assiut Journal of Agric. Sci., 13. (2):19-23.,1982.
- Osborn, D.J. and I. Helmy (1980) Contemporary land mammals of Egypt (including Sinai). Published by field Museum of National History London Fieldiana zoology, New Series, No.5: pp 569. 1980.
- Rizk, A. M.; Eisa, Y. A. E. and M. I. Abd El Azeem (2017). Survey of Rodent Species at Three Habitats and Control it by Use Change Base Carrier of Zinc Phosphide Bait Technique in Sohag Governorate. Egypt. Acad. J. Biology Sci.; 9, (1): 33- 42., 2017.

ARABIC SUMMARY

حصر وكثافة عددية لأنواع القوارض في مركز ساحل سليم محافظة اسيوط

ياسر محمد عبد القوي عبد الجليل

معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقي - جيزة

تهدف هذه الدراسة لتحديد التوقيت المناسب لمكافحة القوارض وخفض اعدادها بأنسب وسائل مكافحة الامنة وتقليل تلوث البيئة لانتاج محاصيل صحية وأمنة للإنسان نسيباً، وزيادة قابليتها للتصدير وبالتالي زيادة الدخل القومي. لذا تم الحصر والكثافة العددية لبعض انواع القوارض المتواجدة بقرى مركز ساحل سليم محافظة اسيوط عامي 2015 / 2017.

اوضحت النتائج وجود جرذ النخيل المتسلق، *Rattus rattus* (Linnaeus) , يليه جرذ الحقل النيلي، *Arvicanthis niloticus* (Desmart) يليه الجرذ النرويجي، *Rattus norvegicus* (Berkanhout) , في مواسم الربيع والصيف والخريف والشتاء لعامي الدراسة.

كما اوضحت النتائج ان جرذ النخيل المتسلق، *Rattus rattus* (Linnaeus) كان شائعاً في الحقول الزراعية بينما الجرذ النرويجي، *Rattus norvegicus* (Berkanhout) كان اقل في الحقول الزراعية وشائعاً و سائداً في المنازل الريفية وكانت انواع القوارض اكبر في الحقول الزراعية عن المنازل الريفية في هذه الدراسة.