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Survey and distribution of rodent inhabiting eight districts at Gharbia governorate, Egypt

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Abstract

Rodent individuals were noticed in buildings from eight districts viz., Samannoud, El-Mahala, Tanta, Elsanta, Zifta, Bassuon, Kotor and Kafr-El-Zayat districts during two years at Gharbia Governorate, Egypt. The residents noticed 193, 146, 112, 109, 102, 82, 77 and 34 rodent individuals in Samannoud, El-Mahala, Tanta, Elsanta, Zifta, Bassuon, Kotor and Kafr-El-Zayat districts respectively during from January 2014 to December 2016 at Gharbia Governorate. There was no significant difference between number of rodent during study period (years), but there was significant difference among places and months. Rodents recorded in Elsanta and Tanta distracts were *Rattus rattus* (Linn.), *Rattus rattus frugivorous* (Rafinesque) and *Rattus rattus alexandrines* (Geoffray) and *Rattus norvegicus* Berk., and *Mus musculus* Linn., belonging to two genera (*Rattus* and *Mus*) from family Muridae. There was no significant difference between number of rodent during (cities, years and species) but there was significant difference between number of rodent during months and locations. These results could be used in the Integrated Pest Management program to control the rodents.

Keywords: Rodent, Survey, questionnaire, Body measurements, rodent.

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Introduction

In agricultural environments, nature is out of balance and predators lose their favorable conditions (Gabr, 1991). Rodent is one of the most important mammalian orders which has a great effect on the environment directly, through their destructive feeding habits and indirectly as a stable food items for many predators in the food chains (El-Sherbiny, 1987). Questionnaire was preferred over other types of surveys because of its relative accuracy and reliability both in evaluating the animal problem in different habitats and in testing the public awareness and response (Moustafa, 2005; El-Sherbiny, 1984). Survey of rodent species was carried out 15 different localities including farms and public places in Mashhad and vicinity (from 35°60' N–59°15' E to 36°35' N–60°25' E), Khorasan Razavi Province, Northeast of Iran by Gholamhossein et al. (2015). Osborn and Helmy (1980) mentioned that mean of the head and body length of adult *M. musculus* was 83.7 mm at Nile Delta and was 81, 8 mm Bahariya Oasis in the same time, mean of the tail length at the fore mentioned areas were respectively 77.2 and79 mm. They also found that, the mean of the body weight of adult *M musculus* at Nile Delta and Bohariya Oasis was 13.4 and 14.39 gm respectively. Keshta (1996) and El-Nashar (1998) found that the measurements of head and body of the house mouse were usually longer than tail for both sex under different habitats. They recorded that females weight were heavier than males either in wheat or maize crops. Bakri (2004) found that *M. musculus* was trapped from cereal crop fields heavier than that from sugar cane crop fields during two years consecutive. He recorded that the males caught from cereal crops fields were heavier than females, while the females caught from sugar cane crop fields were heavier than males, head and body of the house mouse was longer than tail for both sex in different field crops (cereal and sugar cane and field crops). The aim of this work is (1) survey and distribution of rodents in Elsanta and Tanta distracts at Gharbia Governorate and (2) Some morphological characters of rodents inhabiting the two areas.

Materials and methods

Study Locations: Survey questionnaire of some rodent species from different habitats in eight locations viz., Zifta, Kotor, Kafr-El –Zayat, El-Mahala, Bassuon, Samannoud, Elsanta and Tanta districts at Gharbia Governorate were carried out during the period from January 2014 to December 2016. Survey, distribution and population characteristic of some rodent species and sub species from different habitats in two locations from Elsanta and Tanta districts at Gharbia Governorate were carried out during the period from January 2014 to December 2016 .

Questionnaire study: The survey questionnaire was designed to answer the following questions: (1) What are the factors which encourage the presence of rodents? (2) Are there any signs, inside or outside the houses or buildings? (3) What is the interaction of residents to different buildings?

Survey, distribution and Body measurements of some rodent species and sub species: Rodents were captured using wire-box traps of the usual spring –door type. Traps were distributed in the evening at houses, hospital, collage, meet

machine and poultry farms, and drainage then collected next morning. Bait materials were consisting of tomato slices, fried fish and lanshon. Positive traps provided with water using wet cotton and put in cloth bags then transferred to laboratory for the study. The collected rodents were identified using the keys given by Osborn and Helmy (1980) and Al-Gendy (2004). Sex was determined by examining the external genitalia of males and females and weight was registered then a reference number was given to each individual. The collected rodents were classified to rodent genera, species and sub-species, and then the number, age and sex were determined. The relative abundance of each rodent species was estimated as follows:

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

Trapped rodents were collected and the bait was replaced by fresh one**.** Records were made for the date, locality and number of individuals collected from each rodent species, weighted and head and body length together and tail length (mm.) were measured. Sex ratio and percentage of maturity were computed as observed by the decadence of testicles in the scrotal sac in males and perforation of the vaginal membrane in females. The mature males and females were dissected to measure the testes length in (mm.) in males and to determine the pregnant and non pregnant female. The lengths of embryos were measured in (mm.). Data were analyzed using analyses of variance (MSTAT-C, 1988) and means were separated using the least significant differences method (L.S.D) at 5% probability level, only when a significant "F" test was obtained (Steel & Torrie, 1984).

Results and Discussion

Survey questionnaire: Survey questionnaire of some rodent species were carried out in eight locations viz., Zifta, Kotor, Kafr El-Zayat, El-Mahala, Bassuon, Samannoud, Elsanta and Tanta districts at Gharbia Governorate during the period from January 2014 to December 2016 (Table 1). Rodent individuals were noticed in buildings from eight locations during two years at Gharbia Governorate. The residents noticed 193, 146, 112, 109, 102, 82, 77 and 34 vision of rodent individuals in Samannoud; El-Mahala; Tanta; Elsanta; Zifta; Bassuon; Kotor and Kafr-El-Zayat districts during two years at Gharbia Governorate, respectively (Table,1). In the 1st year the highest number of rodent was recorded during August 54 individuals while the least number (21 individuals) were recorded during April. In the 2nd year the highest numbers of rodent were recorded during July 50 individuals while the least number were recorded during February 21 individuals. There were no significant difference between number of rodent during study period (years), but there were significant difference among number of rodent in different places and there were significant difference among number of

rodent during months. Questionnaire was preferred over other types of surveys because of its relative accuracy and reliability both in evaluating the animal problem in different habitats and in testing the public awareness and response (Moustafa, 2005; El-Sherbiny, 1984). The effect of perdition on vertebrate's populations is difficult to be measured under field conditions (Azhar-Beg, 1990; Fitzgerald, 1988).

Survey and distribution: Survey and distribution of some rodent species and sub species were carried out under field conditions from some habitats, poultry farms, houses, collage, meet machine and hospital in different locations at Gharbia Governorate from January 2014 to December 2016 (Table 2). Rodent species recorded in Elsanta and Tanta distracts were *R. rattus***,** *R. r. frugivorous, R. r. alexandrines* and *R. norvegicus* and *M. musculus*. The highest number of *R. norvegicus* (6 rats) was recorded 6 individuals during summer and winter seasons in 1st year while 8 individuals were recorded during autumn in 2nd year from EL-Santa distract. The highest number of *R. norvegicus* (8 individuals) was recorded during Spring season in 1st year, while 5 individuals were recorded during Winter and Spring seasons in 2nd year from Tanta district. The highest number of *R. frogivorus* 5 individuals was recorded during spring season in1st year while 6 individuals were recorded during winter season in 2nd year from El-Santa district. The highest number of *R r. frogivorus* (4 individuals) was recorded during summer seasonin1st year, while 4 individuals were recorded during summer, autumn and winter seasons in 2nd year from Tanta district.

Table 1: Survey questionnaire and distribution of rodent individuals during 2014 and 2015 in eight districts at Gharbia Governorate.

Months	No. of rodents observed in eight districts								
	Zifta	Kotor	Kafr El Zayat	El Ma- hala	Basuon	Tanta	El- Santa	Saman-noud	Total
Jan.2014	2	1	0	8	1	3	2	14	31
Feb.	2	2	0	8	2	3	2	3	22
Mar.	3	3	1	5	2	3	3	9	29
Apr.	2	2	1	3	3	5	3	2	21
May	5	3	2	8	3	3	4	14	42
Jun.	5	4	0	12	4	4	5	13	47
Jul.	6	3	0	2	5	6	6	24	52
Aug.	8	5	3	2	6	7	7	16	54
Sep.	6	6	2	4	5	7	5	12	47
Oct.	5	3	2	6	4	5	6	5	36
Nov.	5	3	2	3	3	4	4	11	35
Dec.	4	4	0	4	3	6	5	3	29
Jan. 2015	3	1	0	8	1	3	2	13	31
Feb.	4	2	0	3	2	3	3	4	21
Mar.	3	3	1	9	3	3	2	10	34
Apr.	5	3	2	6	2	5	4	7	34
May	5	4	1	6	3	3	5	19	46
Jun.	6	3	0	6	4	4	5	0	28
Jul.	6	5	2	11	7	6	6	7	50
Aug.	7	5	4	10	6	7	6	0	45
Sep.	3	0	3	4	4	7	7	7	35
Oct.	3	3	2	8	3	5	6	0	30
Nov.	2	4	3	6	4	4	5	0	28
Dec.	2	5	3	4	2	6	6	0	28
Total	102	77	34	146	82	112	109	193	855

L.S.D (0.05): Month: 0.4873; Year: 0.1989 and Locations: 0.3978.

Table 2: Survey, distribution and seasonally population rodent species during 2014 and 2015 at Gharbia Governorate.

Year	Season	*R. norvegicus*		*R. r. alexanderi-nous*		*R. r. frogivorus*		Total survey live trap		Survey question-aire	
		EL-Santa	Tanta	EL-Santa	Tanta	EL-Santa	Tanta	El-santa	Tanta	El -Santa	Tanta
2014	Winter	6	5	2	0	4	2	12	7	7	9
	Spring	2	8	5	3	5	1	12	12	14	12
	Summer	6	0	1	4	2	4	9	8	18	20
	Autumn	5	2	2	3	1	0	8	5	15	15
	Total	19	15	10	10	12	7	41	32	54	56
2015	Winter	5	5	3	4	6	4	14	13	7	9
	Spring	2	5	6	3	5	1	13	9	12	12
	Summer	5	2	1	4	4	4	10	10	19	20
	Autumn	8	3	4	4	2	4	14	11	17	15
	Total	20	15	14	15	17	13	51	43	55	56

L.S.D (0.05): Cities; Years and Sexes: 0.0196- Month: 0.0479- Species and Location: 0.024.

The highest number of *R. r. alexandrines* was recorded 5 individuals during spring season in1st year while 6 individuals were recorded during spring in 2ndyear from El-Santa district. The highest number of *R. r. alexandrines* (4 individuals), was recorded during summer season in 1st year, while 4 individuals were recorded during summer, autumn and winter seasons in 2nd year from Tanta district. There were no significant difference between number of rodent in (cities, years and species) but significant difference between number of rodent in months and locations were recorded. The present results agree with the findings of Harmston and Wright (1960), who indicated that *R. norvegicus* have followed water steams and become firmly entrenched at garbage dumps at food processing places, and at farms where adequate food, water and harborage were available. While Abdel-wanis (2008) found that, *R. norvegicus* was the most dominant species followed by *R. r. frugivorous* and *R. r. rattus* respectively, whereas *R. r. alexandrines* and *A.s niloticus* showed low percentage while *M. musculus* was the lowest in El-Mansoureia and Abd El-Samad villages at Embaba distract.

Body measurements of some rodent species and sub species

***R. norvegicus*:** Body weight: there were no significant difference between two districts (El Santa-Tanta) and (two year), but there were significant difference between sex. Ear: there were no significant difference between two distracts (El Santa-Tanta), and two year and sex. Ear length Hind foot length.(there were no significant difference between two districts (El Santa-Tanta) and (sex) but there were significant difference between two year. Head and body length: there were no significant difference between two districts (El Santa-Tanta) and two year, but there were significant difference between sex. Hind foot length: there were no significant difference between two districts (El Santa-Tanta) and sex, but there were significant difference between two year. Tail length: there were no significant difference between two districts (El Santa-Tanta) and two year, but there were significant difference between sex. Tail length Head and body length; there were no significant difference between sex and two year, but there were significant difference between two districts (El Santa-Tanta).

Table 3: Measurements of some morphological characteristic for rodent species recorded in EL-Santa district during 2014 and 2015 at Gharbia Governorate.

Body measurements		BW (gm)		HB (mm)		T (mm)		HF (mm)		E (mm)		% T/HB		% E/HF	
Sex	Year	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
R. norvegicus	2014	165.3	222.0	177.5	190.0	155.0	177.5	33.75	33.75	18.75	18.75	88.18	93.53	56.05	58.03
	2015	163.4	225.5	170.0	191.25	158.75	177.5	37.5	37.5	20.0	15.5	93.2	92.78	55.33	53.55
	Total	328.6	447.5	347.5	381.25	313.75	355.0	71.25	71.25	38.75	38.75	181.38	186.3	111.38	111.58
R. r. alexandrines	2014	139.8	190.8	148.8	170.0	181.25	188.75	31.25	32.5	21.25	21.25	122.65	111.03	68.44	65.48
	2015	149.8	175.0	160.0	161.25	200.0	186.25	32.5	37.5	22.5	20.0	124.5	116.1	70.2	54.18
	Total	289.5	365.8	308.8	331.25	381.25	375.0	63.75	70.0	43.75	41.25	247.15	227.13	138.64	119.65
R. r. frugivorous	2014	161.0	156.0	195.0	172.5	220.0	190.0	27.5	30.0	25.0	25.0	112.9	109.85	91.65	83.3
	2015	171.5	185.5	160.0	175.0	192.5	210.0	32.5	35.0	22.5	20.0	120.45	119.9	69.05	58.35
	Total	332.5	341.5	355.0	347.5	412.5	400.0	65.0	65.0	47.5	45.0	233.35	229.75	160.7	141.65

BW: body weight, HB: head and body length, T: tail length, HF: Hind foot length, E: Ear length.

Table 3: Measurements of some morphological characteristic for rodent species recorded in EL-Santa district during 2014 and 2015 at Gharbia Governorate.

Body measurements		BW (gm)		HB (mm)		T (mm)		HF (mm)		E (mm)		% T/HB		% E/HF	
Sex	Year	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
R. norvegicus	2014	179.75	204.75	180	196.25	162.5	175	36.25	37.5	21.25	20	90.27	89.225	59.07	53.55
	2015	156.75	196.75	190	183.75	171.25	165	35	36.25	20	20	90.22	87.02	57.1	55.32
	Total	336.5	401.5	370	380	333.75	340	71.25	73.75	41.25	40	180.49	176.245	116.17	108.87
R. r. alexandrines	2014	141.25	133.165	173.75	170	187.5	188.75	30	31.25	20	22.5	107.84	109.2	66.66	74.99
	2015	148.5	115.25	156.25	157.5	170	190	38.75	33.75	20	22.5	108.96	120.15	51.77	66.64
	Total	289.75	248.415	330	327.5	357.5	378.75	68.75	65	40	50	216.8	229.35	118.43	141.63
R. r. frugivorous	2014	135.66	170	165	175	213.33	220	30	35	23.33	25	129.23	125.7	77.76	71.4
	2015	180.66	117.33	166.66	156.66	190	186.66	36.66	36.66	21.66	20	113.95	118.98	59.5	54.73
	Total	316.32	287.33	331.66	331.66	403.33	406.66	66.66	71.66	44.99	45	243.18	244.68	137.25	126.13

BW: body weight, HB: head and body length, T: tail length, HF: Hind foot length, E: Ear length.

***R. r. frugivorous*:** Body weight: there were no significant difference between two districts (El Santa-Tanta), two year and sex. Ear: there were significant difference between two distracts (El Santa-Tanta) and two year but there were no significant difference between sex. Ear length Hind foot length: there were significant difference between two districts (El Santa-Tanta), two year and sex. Head and body length: there were no significant difference between two districts (El Santa-Tanta), two year and sex. Hind foot length: there were no significant difference between two districts (El Santa-Tanta) and sex but there were significant difference between two year. Tail length: there were no significant difference between two districts (El Santa-Tanta) and sex, but there were significant difference between two year. Tail length Head and body length: there were no significant difference between sex and two year, two districts (El Santa-Tanta).

***R. r. alexandrines*:** Body weight**:** there were no significant difference between two districts (El Santa-Tanta), two year and sex. Ear: there were no significant difference between two districts (El Santa-Tanta), year and sex. Ear length Hind two foot length**:** there were no significant difference between two

districts (El Santa-Tanta),two year and sex. Head and body length: there were no significant difference between two districts (El Santa-Tanta), two year and sex. Hind foot length: there were no significant difference between two districts (El Santa-Tanta) and sex but there were significant difference between two year. Tail length: (there were no significant difference between two districts (El Santa-Tanta), two year and sex). Tail length Head and body length: there were no significant difference between two districts (El Santa-Tanta), but there were significant difference between two year and sex.

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