

## RODENTS SURVEY AND THEIR ESTIMATION TO SOME MAIN FIELD CROPS IN TWO DIFFERENT LOCATION At GIZA GOVERNORATE.

Waleed A.S. Soefy<sup>1</sup> ; Talat M. S. Kashta<sup>2</sup>  
and Ahmed A. R. Al-Gendy<sup>1</sup>

1- Agric. Zoology & Nematology Dept., Faculty of Agric. Al-Azhar University. Cairo.

2- Harmful Animals Dept., plant protection Instituted. Agric. Res. Center, Dokki, Giza.

**Key Words:** Rodent- damage- wheat - maize.

### ABSTRACT

This work proved the presence of three Genera viz.; *R. rattus* (Linn.) followed by *R. norvegicus* Berk., *A. niloticus* (Desm.) and *Mus musculus* Linn., belonging to two genera (*Rattus* and *Mus*) from family Muridae, were recorded in kerdasa and Osim distracts at Giza governorate. Throughtant two successive years 2015 and 2016 A.D. The damage caused by rats in wheat fields during the whole repin stages; (milky, pasty , dough and mature stages). The obtained results cleared that rate of damage increased during the pasty stage then decreased during the mature stage. The rodent damage percentage for 2015 and 2016 were (9.14%, 6.78%) and (12.81% and 6.07%) in kerdasa and Osim distracts respectively. Whereas, the rodents damage estimation in their crop fields was conducted during the full size pod, full size seed and mature stages. The calculated rodent damage percentage in maize crop fields were, (1.49% and 1.45%) and (2.59% and 0.92 % ) in kerdasa and Osim distracts respectively. Maize was exposed to high rodent infestation during the full size seed stage more than the previous or later stages. The damage of rodents to field crops may be depends upon the growth stage.

### INTRODUCTION

The seasonal changes were studied in rat's population by **Kansouth et al. (1990)** in Dahshour locality at Giza Governorate and **Hussien (1991)** at Fayoum Governorate. **Asran et al. (1991)** estimated the damage caused by the Nile grass rat *A. niloticus* (Desm.), on wheat, broad bean, chamomile and garlic in three locations at Fayoum Governorate during 1987-1988. They showed that, wheat was the most preferred crop to *A. niloticus* (Desm.), comparing with the broad bean and chamomile while caused damage on garlic was negligible. **Ejaz Ahmad et al. (1995)** estimated the annual grain losses/shop due to rats consumption, contamination, spillage, and wastage to be 740kg/shop. The annual losses would approximate about 0.3% of the estimated 1225 million mt that move through the markets yearly. **Santra et al. (2001)** estimated the damage caused by Indian house rat *Rattus rattus* (Linnaeus), brown or sewer rat *Rattus norvegicus* (Berkenhout), house

mouse *Mus musculus* Linnaeus, and Large bandicoot rat *Bandicota indica* Bechstein, in three districts of West Bengal. House rat *Rattus rattus* (Linnaeus) was the most dominant rodents which caused excessive damage on field and stored crops at West Bengal. The damages made by these rodents were approximately 5-6% paddy in the field and 7% in the stores; 6-7% (Potato and Wheat) and 1-8% other crops.

This manuscript aims to evaluate the rodent damage to some main field crops such as wheat and maize.

### MATERIALS AND METHODS

The studies are consisted of the field trials, which conducted under the field conditions in two different locations at which belong to Embaba district, Giza governorate.

#### 1. Field studies locations: -

Kerdasa and Osim villages in Embaba district at Giza governorate were selected for the field trials. They are located about 25 km far from northern of Giza pyramids, and occupied about 10000 feddans. Old cultivated lands, they are cultivated with tomato, wheat, horse bean, cabbage, kidney bean and squash in Winter, and with peanut, eggplant, maize and pepper in Summer and they are also cultivated with mandarin, palm and mango orchards.

#### 1. Rodent species survey: -

The survey studies were conducted during two agriculture years 2015 and 2016 in different locations at Giza governorate.

25 live traps with spring doors were used for three consecutive nights. Traps were supplied with tomato, lanshon and taameia and were distributed in the mentioned places in the evening, then were collected next morning. The captured individuals were identified and classified according to **Osborn and Helmy (1980)**.

#### 2. Rodent population density: -

During the period from two agriculture years 2015 and 2016 in different locations at Embaba district Giza Governorate. 25 live traps were monthly used for two consecutive nights. Traps distributed at fields were supplied with tomato, taameia and lanshon. 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 were ingathered in the next morning at 07.00 A.M.

Number of rodents caught a month

$$\text{Population density \%} = \frac{\text{Number of rodents caught a month}}{\text{Traps' number} \times \text{nights' number}} \times 100$$

Captured animals were transferred in tight cloth bag and inserted into a jar provided with a piece of cotton wool wetted with chloroform to anesthetizing rodents. Rodents were counted then classified according to **Osborn and Helmy (1980)**. Species, subspecies, sex, maturity status of males and females were recorded. Mature females were also dissected to determine if they pregnant or not. Rodents' population structure in fields, animal buildings and houses were studied. Monthly population density was estimated all the year round as last equation.

### 3. Damage caused by rodents in fields:-

Field damage assessment was done in kerdasa and Osim villages at Embaba district, Giza governorate, during 2014 to 2017 seasons. Damage caused by rats was achieved in areas cultivated with different field crops .

#### a-Wheat

Three fields were selected, one feddan each. In each field, 15 samples were selected diagonally and were determined by using wooden frame (100 x 100 cm). Samples were taken during milky, doughy and mature stages of wheat. In each sample, the number of damaged and undamaged tillers inside the frame were counted, and the percentage of damage was calculated according to **Poch et al., (1982)** as follows:

$$\text{Damage \%} = \frac{\text{Number of damaged tillers}}{\text{Total number of tillers counted}} \times 100$$

#### b. Maize

In this study, three feddans were selected to estimate the damage in 10 samples were checked, the sample size was 30 consecutive plants which are selected randomly from one row, the distance in between rows was 1/10 the filed width. Ten samples were checked. The size of the sample was 30 cobs. Cobs were divided to healthy, 25% damaged, 50% damaged, 75% damaged and 100% damaged. The damage percentage was calculated as follows:

$$\text{Damage \%} = \frac{A \times 0 + B \times 0.25 + C \times 50 + D \times 0.75 + E \times 1}{\text{Total number of sampled plants}} \times 100$$

Where:

A: healthy plants

B: Plants with 25% damage

C: Plants with 50% damage

D: Plants with 75% damage

E: Plants with 100% damage

## RESULTS AND DISCUSSION

### 1-Survey and distribution: -

Survey and distribution of some rodent species and subspecies were carried out under field conditions from some habitats, at two different locations at Embaba district Giza governorate during two agriculture Season of 2014 – 2015 and 2015 – 2016 A.D.

This work proved the presence of three Genera viz.; *R. rattus* (Linn.) followed by *R. norvegicus* Berk., *A. niloticus* (Desm.) and *Mus musculus* Linn., belonging to two genera (*Rattus* and *Mus*) from family Muridae, were recorded in Kerdasa and Osim districts at Giza governorate (Table,1) according to the full description of rodent species of Egypt adopted by Osborn and Helmy (1980) as the following:-

Kingdom: Animalia  
 Subkingdom: Metazoa  
 Phylum: Chordata  
 Subphylum: Vertebrata  
 Class: Mammalia  
 Subclass: Theria  
 Infraclass: Eutheria  
 Order: Rodentia  
 Suborder: Myomorpha  
 Family: Muridae  
 Subfamily: Murinae  
 Genera:

*i-Rattus* Fischer, 1803

**a-R. rattus** (Linnaeus,1758)

**b- R. norvegicus** Berkenhout, 1767

ii-*Mus* Linn. *M. musculus* Linnaeus, 1758.

iii- *Arvicanthis* *A. niloticus* (Desm.)

The recorded data in table (1) revealed that Osim district have a higher density more than Kerdasa district. Also proved that *R. Rattus* was the most dominant one followed by *R. norvegicus*, *Mus musculus* and *A. niloticus* for each of field crops and vegetable crops during the whole experimental period which comprised two successive years 2015 and 2016 A.D.

**Table (1): Survey of rodents in different locations at Giza governorate during two agriculture years 2014 to 2016.**

Genera	Common name	Scientific name	Locations	Field crops			Vegetable crops			Total rodent numbers		Average
				1 <sup>st</sup> year	2 <sup>nd</sup> year	Av.	1 <sup>st</sup> year	2 <sup>nd</sup> year	Av.	1 <sup>st</sup> year	2 <sup>nd</sup> year	
1- <i>Rattus</i>	Black-bellied rat	<i>R. rattus</i>	kerdasa	4	7	5.5	0	5	2.5	4	12	8.0
			Osim	29	2	15.5	13	4	8.5	42	6	24.0
	Norway rat	<i>R. norvegicus</i>	kerdasa	6	9	7.5	7	18	12.5	13	27	20.0
			Osim	0	1	0.5	0	2	1.0	0	3	1.5
2- <i>Arvicanthis</i>	Nile rat	<i>A. niloticus</i>	kerdasa	1	1	1.0	1	1	1.0	2	2	2.0
			Osim	9	5	7.0	4	1	2.5	13	6	9.5
3- <i>Muss</i>	House mouse	<i>M. musculus</i>	kerdasa	1	9	5.0	15	1	8.0	16	10	13.0
			Osim	0	0	0.0	0	3	1.5	0	3	1.5
Total No. of entrapped rodents/25 trips/ 3 nights			kerdasa	12	25	18.5	23	25	24.0	35	50	42.5
			Osim	38	8	23.0	17	10	13.5	55	18	36.5

## 2. Rodent range for some main filed crops:-

The percentage in Tables 2 and 3 and Figures 1 and 2 should that percentage of damage which ceased by field rodents to each of wheat crop and maize crops during two successive years 2015 and 2016 in kerdasa and Osim districts throughtat their life in field at the whole different of growth stages. The rodent damage percentage in wheat were (9.14% and 6.78%) for Kerdasa and (12.81% and 6.07%) for Osim district for 2015 and 2016, respectively. Meanwhile the field rodents caused during in maize which was planted in kerdasa and osim less than which had happened in wheat crops in some locations.

**Table (2) Damage caused by common rodents on wheat crop in kerdasa and Osim areas during 2015 – 2016 seasons.**

Area	Season	No. of the investigated plants			Damage%
		Intact one	Infested one	Total	
kerdasa	2015	3545	357	3902	9.14
	2016	2997	218	3215	6.78
Osim	2015	3653	537	4190	12.81
	2016	2796	181	2977	6.07

**Table (3) Damage caused by common rodents on Maize crop in kerdasa and Osim areas during 2015 – 2016 seasons.**

Area	Year	No. of the investigated plants			Damage %
		Intact one	Infested one	Total	
kerdasa	2015	2822	42	2864	1.49
	2016	2896	42	2938	1.45
Osim	2015	2973	77	3050	2.59
	2016	2721	25	2746	0.92



**Fig.(1):Damage caused by common rodents in wheat crops**



**Fig (2) Rodent damage for maize crop**

The previous results nearly confirmed with the next researchers; **Asran et al. (1991)**, **Ejaz Ahmed et al. (1995)** and **Sentra et al. (2001)** who indicated that *R. norvegicus* Berk., 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. Also, **Kansouth et al., (1990)** stated that, the domestic rodent species in Dahshour locality *Rattus rattus alexandrinus*, *Rattus rattus frugivorus* and *Rattus norvegicus* Berk., while **Abdel-Wanis (2008)** found that, *Rattus norvegicus* was the most dominant species followed by *Rattus rattus frugivorous* and *Rattus rattus rattus* respectively, whereas *Rattus rattus alexandrines* and *Arvicanthis niloticus* showed low percentage, respectively while *Mus musculus* was the lowest El- Mansourea and Abd El-Samad villages in Embaba distract and **Abd El-Halim et al., (2009)** recorded that, *Rattus norvegicus*, *Rattus rattus alexandrinus*, *Rattus rattus frugivourus*, *Acomys cahirinus* and *Mus musculus*.

**Damage caused by rats *R. rattus* on some field crops:-**

**a. Wheat:** - Data presented in Table (3) showed the damage caused by rats in wheat fields during the milky, pasty (dough) and mature stages. It is obvious that rate of damage increased during the pasty stage then decreased during the mature stage as the damage percentage were (9.14%, 6.78%) and (12.81% and 6.07%) in kerdasa and Osim distracts respectively. The damage of rats to field crops may be depends upon the

growth stage. These results are supported by **Abdel-Karim (1991)**, who stated that most cereal crops are subjected to low infestation with rats during milky stage, increased drastically during dough stage and then decreased during mature stage. **Brown (2005)** mentioned that house mice, *Mus domesticus*, cause significant damage to wheat crops in Australia by digging up and eating newly planted seeds, or by cutting stems and eating developing grain.

**b-Maize:-** The damage caused by rats was conducted during the full size pod, full size seed and mature stages in maize fields. The percentage of **were** recorded damage (1.49% and 1.45%) and (2.59% and 0.92 % ) in kerdasa and Osim distracts respectively. Maize was exposed to high rodent infestation during the full size seed stage more than the previous or later stages. **White et al. (1997)** determined the damage caused by *Rattus rattus* (Linn.) to macadamia nut crops were from several Australian macadamia orchards during the 1995/1996 growing season. Both the extent and pattern of crop damage were associated with the type of adjacent non-crop habitat. Orchards adjacent to large, temporally stable, structurally complex habitats experienced high levels of rodent damage (mean 9.9%). Front row trees adjacent to these stable habitats showed significantly higher damage than trees further into the orchard, suggesting an interaction between the crop and non-crop habitats. Orchards adjacent to highly modified grasslands and other orchard blocks exhibited the lowest levels of damage (mean 0.8%), with the damage in these areas being uniformly distributed. *Rattus rattus* (Linn.) was the main rodent species responsible for the damage.

#### REFERENCES

- Abd El-Halim, A.S.; K.A. Allam ; A.M. Metwally and A.M. El Boraey (2009):** Seasonal variation of infestation rate with lice, tick and mite among rodents in certain Egyptian Regions. J. Egypt Soc., Parasitol.,39 (2):617-624.
- Abdel –Karim, S.M. (1991):** Studies on rodents in Sharkia Governorate. Ph.D. Thesis, Fac. Agric., Zagazig University. pp. 294.
- Abdel-Wanis, M.A. (2008):** Studies on some rodent in Egypt. M.Sc. Thesis, Fac., Agric., Cairo Univ., pp.111.
- Asran, A.A.; H.I. El-Deeb and M.A. EL-Halafawy (1991):** Rat damage to certain crops and population density of *Arvicanthis niloticus* in Fayuom Governorate. Egypt. J. Agric., Res., 69(1):273-279.
- Brown, P. (2005):** The effect of simulated house damage to wheat in Australia. Crop Protection., 24(2): 101-109.



- Ejaz Ahmed ; Iftikhar Hussain and Joe E. Brooks (1995).** Losses of stored foods due to rats at grain markets in Pakistan. *International Biodeterioration and Biodegradation*, 36(1-2):125-133
- Hussien, S.S.M. (1991):** Ecological studies and control of certain rodents in Beni-Suef Governorate. M.Sc. Thesis, Fac., Agric., Cairo Univ. pp. 103.
- Kansouth, A.S.; M.S. El-Zemaity and M.W. Mikhail (1990):** Population density of domestic rodents and associates fleas at Dahshour, Giza Governorate, *Annual Agricultural Science*, Faculty of Agriculture, Ain Shams University, Cairo, Egypt, 35 (1): 543 – 550.
- Osborn, D.J. and I. Helmy (1980):** The contemporary land mammals of Egypt (including Sinai). Published by Field Museum of National History, London.
- Poche, R.M. ; M.Y. Main,; R. Sterner; M.E. Haque, and P. Sultand, (1982):** Rodent movements in wheat fields. *Mammalia*, 50: 165-172.
- Santra, K. B. ; M. Khalua, and C.K. Manna (2001):** Rodent population : Nature and extent of damages of agricultural crops depending upon different ecological conditions of the Gangetic plane of West Bengal. *Proceedings of the Zoological Society Calcutta*, 54 (1):68-72.
- White K.P. ; P.Hurban ; T. Watanabe and D.S. Hogness (1997):** Coordination of Drosophila metamorphosis by two ecdysone-induced nuclear receptors. *Science.*, 276: 114-117

### حصر وتقدير خسائر القوارض لبعض محاصيل الحقل في منطقتين

#### مختلفتين في محافظة الجيزة.

وليد عبد السميع سليمان سويفى<sup>1</sup> – طلعت محمد سليمان قشظة<sup>2</sup> –

احمد عاطف رياض الجندي<sup>1</sup>

1- قسم الحيوان الزراعى والنيماطودا – كلية الزراعة – جامعة الازهر – القاهرة

2- قسم بحوث الحيوانات الضارة – معهد بحوث وقاية النباتات – مركز البحوث الزراعية – الدقى – الجيزة.

تم اجراء البحث في مركزى كرداسة وأوسيم التابعين لمحافظة الجيزة . والمحاصيل التي

تم فيها اجراء البحث هي: القمح والذرة والخضروات .

الدراسات الخاصة بالحصر كانت في جميع المحاصيل المذكورة اما تقدير الخسائر فاقترصر على محصولي القمح والذرة فقط خلال عامي 2015 ، 2016 الميلادى. اثبتت الدراسة على وجود ثلاثة أجناس هي *Arvicunthus Mus & Rattus* من عائلة العضلان *Muridea* والانواع التي تتبعها وجدت في امكان الدراسة المذكورة سابقاً هي *A. niloticus & R. rattus* بالإضافة للانواع *Mus musculus*. كما أوضحت النتائج المتحصل عليها بالنسبة لتقدير الخسائر التي سببتها القوارض الحقلية لمحصولي القمح والذرة ان معدلات الإصابة كانت تزداد في التطور العجيني ثم تبدأ في التناقص حتى يصل المحصول لطور النضج الكامل . وكانت النسبة المئوية للخسارة لمحصول القمح خلال عامي 2015 & 2016 ( 9.14 % & 6.78 %) و ( 12.81 % & 6.07 %) في كلا من مركزى كرداسة واوسيم على التوالي بينما بلغت الخسارة في محصول الذرة في نفس السنوات والمراكز على التوالي ( 1.49 % & 1.45 %) و ( 2.59 % & 0.92 %). وتوصلت الدراسة أيضاً الى أن الخسائر الناتجة من القوارض للمحاصيل الحقلية ربما تتوقف على طور النمو للمحصول.