

## EVALUATION OF DAMAGE CAUSED BY COMMON RODENTS SPECIES IN SOME FIELD CROPS AND CHICKEN FACTORY OF EGG HATCHING IN ELMANSOREIA VILLAGE AT GIZA GOVERNORATE

Hassn, M. F. \*; A. A. Farahat\* ; E. A. Ewais \*\*; A. A. R. Al-Gendy\*\*\* and M. A. Abdel-Wanees\*

\* Agric. Zoology and Nematology Dept. , Faculty of Agric., Cairo University.

\*\* Plant protection Dept. , Faculty of Agric., Cairo University.

\*\*\* Agric. Zoology and Nematology Dept. , Faculty of Agric., Al-Azhar University.

### ABSTRACT

The evaluation of the damage caused by common rats in some field crops (wheat, kidney bean and peanut) during cultivation season 2005- 2006, stored Peanut, Maize and onion during 2005 -2006 and chicken factory of hatching eggs during May 2006 to April 2007. The damage caused by *R. rattus frugivorous* and *R. rattus rattus* in wheat fields during the milky, pasty (dough) and mature stages. The rate of damage increased toward the mature stage as the damage caused to peanut percentage was 8.28%, 12.18% and 14.98% to milky, pasty and mature stages respectively. The percentage of damage was 0.14%, 0.78% and 1.17% to full size pod, full size seed and mature stages respectively. Kidney bean damage ranged between 0.15% and 0.58% (with an average of 0.35%). Peanut and Maize damage percentage in stores ranged between (0.9% and 7.07%) and (1.83% and 6.41%). Onion damage in stores was estimated, and found to be negligible as it was ranged between 0.13% and 0.2%. These stored crops could be arranged according to damage % as follow: Maize (4.22%), peanut (2.57%) and onion (0.18%). The total of the damaged eggs was 7350 eggs/year which constituted 0.182% of total eggs and the chicks killed by *R. norvegicus* (Berk.) were 2940 chicks/year, which constituted 0.096% of total chicks produced.

### INTRODUCTION

Poche *et al.* (1982) studied wheat yield reduction by the lesser bandicoot rat, *B. Bengalensis* in Bangladesh. The damage caused by this rats on mature wheat was 12.1% or 77.000 tons of grain destroyed before harvest and 17% of the damaged tillers were removed; whereas, 83% of them were cut near ground level. 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 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 approximately 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. The aim of the present work is to throw light on the damage caused by the common rodents to some field crops and chicken factory of hatching eggs at Giza Governorate .

## MATERIALS AND METHODS

Our previous studies, stated that the white bellied rat *R. rattus frugivorous* and the black bellied rat *R. rattus rattus* were the most common rodents in fields and houses while the Norway rat *R. norvegicus* (Berk.) was the most common rodent in animal farm in Elmansoreia at Giza Governorate. The first, areas cultivated with different field crops (wheat, kidney bean and peanut) during cultivation season 2005- 2006. While the second, stored Peanut, Maize and onion during 2005 -2006 and the third, factory of hatching eggs (incubators) during May 2006 to April 2007.

### a. Damage caused by rats *R. rattus frugivorous* and *R. rattus rattus* on some field crops:-

**1-Wheat:-**Three fields were selected, each was a faddan area. 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. In each sample, the numbers 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:

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

**2. Peanut:-** Three faddans were selected. Peanut damage assessment was carried out during the period from fruiting stage until harvest. The damage of rodents was distinct by the digging and the appearance of the fruit above soil surface. Ten samples per faddan 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 field width. The infested roots were counted and the damage percentage was computed using the following formula:

$$\text{Damage \%} = \frac{\text{Number of damage plant roots}}{\text{Total number of plant roots}} \times 100$$

***R. norvegicus* (Berk.), *R. rattus rattus* and *R. rattus frugivorous* in stores:-**

- 1- Peanut:-** Four stores were chosen in Elmansoreia village during 2005 – 2006 to assess the losses of stored peanut. The stored peanut were weighted before and after storage period.
  - 2- Maize:-** Three stores were selected, 100 m<sup>2</sup> each. Maize was stored with its covers in the open air. Ten samples were checked. The size of the sample was 30 cobs.
  - 3- Onion: -** stored in pyramidal stacks covered with rice hay in the open air. Three stores were selected, from each, ten samples were checked. The size of the sample was 100 onions.
- c- Damage caused by *R. norvegicus* (Berk.) in factory of eggs hatching:-** Eggs and chicks attacked by rats were monthly counted during the period from May 2006 to April 2007. the damage percentage of eggs and chicks were calculated.

## RESULTS AND DISCUSSION

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

- 1. Wheat: -** Data presented in Table (1) showed the damage caused by *R. rattus frugivorous* and *R. rattus rattus* in wheat fields during the milky, pasty (dough) and mature stages. It is obvious that rate of damage increased gradually during three stages as the damage percentage was 8.02%, 12.16% and 15.02 % to milky, pasty and mature stages 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*, caused significant damage to wheat crops in Australia by digging up and eating newly planted seeds, or by cutting stems and eating developing grain.
- 2. Peanut: -** peanut damage was conducted during the full size pod, full size seed and mature stages. The percentage of damage was 0.14%, 0.78% and 1.17% to full size pod, full size seed and mature stages respectively. Peanut was exposed to high rodent infestation during the full size seed stage more than the previous or later stages, Table (1). 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.

**3- Kidney bean:** - Damage was estimated in these crops during the mature stages. Kidney bean damage ranged between 0.148% and 0.578% (with an average of 0.346%), Table (1).

**Table (1): Damage caused by *A. niloticus* (Desm.) , *R. rattus rattus* and *R. rattus frugivorus* on some field crops in Elmansoreia village at Giza governorate.**

Crop test	Stage	Damage percentage			Mean ± S. D.
		Item area/ faddan			
		1	2	3	
Wheat	Milky stage	12.68	6.33	5.07	8.02 ± 4.08
	Dough stage	18.2	11.58	6.7	12.16 ± 5.77
	Mature stage	20.45	15.34	9.26	15.02 ± 5.6
Peanut	Full Size Pod	0.17	0.08	0.17	0.14 ± 1.05
	Full Size Seed	0.5	0.67	1.17	0.78 ± 0.35
	Mature	0.67	1.17	1.68	1.17 ± 0.51
Kidney bean	Mature	0.15	0.31	0.58	0.35 ± 0.22

**b. Damage caused by *R. norvegicus* (Berk.), *R. rattus rattus* and *R. rattus frugivorus* in stores:-**

Data in table (2) showed that, peanut damage percentage in stores ranged between 0.9% and 7.07%. Maize damage percentage in stores ranged between 1.83% and 6.41%. Onion damage in stores was estimated and found to be negligible as it was ranged between 0.13% and 0.2%. These stored crops could be arranged according to the rodent damage as follows: Maize (4.22%), peanut (2.57%) and onion (0.18%) in Table (2). Mwaniabe et al. (2002) evaluated crop loss due to the outbreak of *Mastomys natalensis* rat in the Lindi region, Tanzania. A total yield loss of 48% of maize, sorghum, paddy, and pulses that were in production during the 1989/90 crop season was attributed to seed depredation by this rat.

**Table (2): Damage caused by *R. rattus rattus* and *R. rattus frugivorus* on some stores crops in Elmansoreia village at Giza governorate.**

Crop items	Storage period average	Minimum %	Maximum %	Mean± S. D.
Peanut	180 days	0.90	7.07	2.57 ± 1.91
Maize	80 days	1.83	6.41	4.22 ± 2.3
Onion	68 days	0.13	0.2	0.18 ± 0.04

**c- Damage caused by *R. norvegicus* (Berk.) in factory of eggs hatching:-**

In the eggs hatching factory, eggs stay one or two nights before being used, also the produced chicks stay period of time in the factory before being delivered, meanwhile, eggs and chicks are exposed to rodent attacks.

Results in Table (3) obtained that, the total of the damaged eggs was 7350 eggs/year which constituted 0.182% of total eggs and the chicks killed by *R. norvegicus* (Berk.) were 2940 chicks/year, which constituted 0.096% of total chicks produced. Data showed that ,the percentage of infertile eggs were 23.55% recorded during one year .

**Table (3): Damage caused by *R.norvegicus* (Berk.), on hatching eggs of chicken factory.**

Months	Total eggs	Eggs infertile	Eggs damaged	Chicks produced	Chicks killed
May2006	192000	46000	500	145500	220
Jun	192000	49750	550	141700	225
Jul	192000	37350	550	154100	270
Aug	384000	79950	650	303400	300
Sep	384000	89950	650	293400	225
Oct	384000	106050	650	277300	225
Nov	384000	77000	600	306400	270
Dec	384000	95100	500	288400	250
Jan2007	384000	105000	600	278400	250
Feb	384000	110950	650	272400	240
Mar	384000	69850	750	313400	225
Apr	384000	82600	700	300700	240
<b>Total</b>	<b>4032000</b>	<b>949550</b>	<b>7350</b>	<b>3075100</b>	<b>2940</b>
%	100	23.55	0.182	76.27	0.096

## REFERENCES

- Abdel-Karim, S. H. (1991): Studies on rodents in Sharkia Governorate. Ph. D. Thesis, Fac Agric., Zagazig Univ.pp.294.
- Ahmad, E.; Hussain, I. and Brooks, J. E. (1995): Losses of stored foods due to rats at grain markets in Pakistan. *International Biodeterioration and Biodegradation*, 36(1-2):125-133
- Asran, A. A.; El-Deeb, H. I. and El-Halfawy, M. A. (1991): Rat damage to certain crops and population density of *Arvicanthis niloticus*, in Fayoum Governorate. *Journal of Agricultural Research Center*, 69 (1):273–279.
- Brown, P. R. (2005): The effect of simulated house mouse damage to wheat in Australia. *Crop Protection*; 24(2): 101-109
- Mwanjabe, P.S.; Sirima, F.B. and Lusingu, J. (2002): Crop losses due to outbreaks of *Mastomys natalensis* (Smith, 1834) Muridae, Rodentia, in the Lindi Region of Tanzania *International Biodeterioration and Biodegradation*, 49(2-3):133-137.
- Poche, R. M; Main. M. Y; Sterner, R; Haque, M. E. and Sultand, P. (1982):Rodent movements in wheat fields. *Mammalia*,50:165–172.
- Santra, K. B; Khalua, M. and Manna, C. K. (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, J. ; Wilson, J. and Horskins, K. (1997): The role of adjacent habitats in rodent damage levels in Australian macadamia orchard systems. Crop Protection, 16(8):727-732.

**تقدير الخسائر التي تسببها القوارض الشائعة في بعض محاصيل الحقل ومعامل  
تفريخ بيض الدواجن في قرية المنصورية بمحافظة الجيزة**  
مراد فهمي حسن\*، أحمد عبد السلام فرحات\* ، عصام عبد الرؤوف عويس\*\* ، أحمد  
عاطف رياض الجندي\*\*\*و محمد على عبدالونيس\*  
\* قسم الحيوان والنيماتولوجيا الزراعية- كلية الزراعة - جامعة القاهرة.  
\*\* قسم وقاية النباتات-كلية الزراعة - جامعة القاهرة.  
\*\*\*قسم الحيوان الزراعي والنيماتودا- كلية الزراعة - جامعة الأزهر.

الهدف من البحث تقدير الخسائر الناتجة عن الإصابة بالجرذان الشائعة في الحقول مثل  
الجرذ الأسود( الجرذ ذوالبطن السوداء) وجرذ النخيل ( الجرذ ذو البطن الرمادي) في الموسم  
الزراعي ٢٠٠٥/٢٠٠٦، وفي معاميل تفريخ بيض الدواجن والمصابة بالجرذ النرويجي في الفترة من  
مايو ٢٠٠٦ حتى أبريل ٢٠٠٧.  
أظهرت النتائج مايلي:-

متوسط الخسائر التي يسببها الجرذان المتسلقه مثل جرذ النخيل والجرذ الأسود في حقول  
القمح أثناء مرحلة الطور البنى والطور العجيني وطور النضج كانت ٨,٠٢، ١٦,١٦ و ١٥,٠٢%  
على التوالي. وفي حقول الفول السوداني كان متوسط الخسائر التي سببتها الجرذان أثناء تكوين  
القرون وإكتمال البذور وطور النضج ١٤,٠٧، ١٧,١٧ و ١٠,٣٥% على التوالي. بينما في حقول الفاصوليا  
كان متوسط الخسائر في طور النضج ٠,٣٥%.  
كما أظهرت النتائج مايلي:-

الخسائر التي سببتها الجرذان المتسلقة للفول السوداني والذرة الشامية والبصل تتراوح  
قيمتها من (٠,٩ إلى ٧,٠٧%)، (١,٨٣ إلى ٦,٤١%) و(٠,١٣ إلى ٠,٢%) على التوالي.  
وأوضحت النتائج مايلي:-

الخسائر الناتجة عن الإصابة بالجرذ النرويجي في معاميل تفريخ الدواجن في البيض كانت  
٧٣٥٠ بيضة/سنة والكتاكيت الناتجة كانت ٢٩٤٠ كتكوت/سنة.  
يتضح مما سبق أن الجرذان المتسلقة التي تعيش في أسقف المنازل وعلى أشجار الفاكهة  
والنخيل تهاجم محاصيل الحبوب المنزرعة والمخزونة وأيضا الجرذ النرويجي يفضل المواد الغذائية  
الغنية بالبروتين والدهون حيث يعيش في معاميل تفريخ بيض الدواجن.