Global Science Research Journals

ISSN: 2408-5464 Vol. 6 (2), pp. 462-465, May, 2018

http://www.globalscienceresearchjournals.org/

Global Journal of Fisheries and Aquaculture

Full Length Research Paper

Mutilation caused after harvest by Nile grass rat, in wheat fields in Egypt

Mustafa Ali

El Shorouk Academy, El Shorouk, Cairo, Egypt.

Accepted 12 April, 2017

The damage caused by the Nile grass rat *Arvicanthis niloticus* in wheat field. It has been observed that the rat attack the plant during the period from fourth ears to the harvest. The maximum attack by this rat was more predominant during the period from 7- 30 April, during which the grains were in full maturity. The damage decreased gradually towards the center of the field.The highest damage at the border of the field may be due to the high number of the rats, Since *A. niloticus* is accustomed to build its burrows at the border of fields and near canals. The increase of the burrows is naturally accompanied with the increase of rodent population.

Keywords: burrows, border, damage, Nile grass rat, harvest stage.

INTRODUCTION

Rodents are considered as one of the most important pests in Egypt. They cause great economic loss to farmers (damage the growing crops, stored products, poultry and animals farm); and to food manufactures by damaging the structure and fabric of buildings Abdel-Gawad and Maher Ali (1982). Rodents are one of the most important vertebrate pests to cereal crops globally. Rodents may significantly affect crop production and livelihoods of farmers in both developed and developing countries (Stenseth *et al*., 2003).

The impact of mice is generally greatest in late autumn and early winter at a time when winter cereals crops are planted across southern Australia (wheat, barley and oats). However, wheat crops could compensate for a high level of damage from planting through to the tillering stage, and up to moderate levels at booting and ripening stages. They suggest that mouse control is required only when high levels of damage occur after the tillering stage (Mutze 1998, Brown and Singleton, 2002).

There have been only a few studies of mouse damage to wheat crops at various crop stages and these were at a subset of mouse population densities (Brown and Singleton 2002, Brown *et al*., 2003a). This work was carried out to estimate the damage caused by Nile grass rat in wheat field during the damage peak.

MATERIALS AND METHODS

Pre-harvest (last three weeks in April) to clearly state that the experiment was carried out in 2014 and in 2015, at the Experimental Station of the Faculty of Agriculture, Sohag University, El-Kawamel city, Egypt.

This work has been in two feddans of wheat crops then been limited five plots, in each plot was taken the sample by using quadrate wooded frame 100×100 cm^2 as a six distances from the outer border of the field toward in the center *i.e.*, 5, 10, 15, 20, 25, and 30 meters. The numbers of damage plants inside the frame for every single sample was counted. Before damage estimation the species of rodent prevailed in the field study was trapped and identified.

Thirty samples were taken from plots, by using five replicates for each distance. Samples were taken three times every week during the study period. Data were analyzed using analyses of variance (MSTAT-C 1988) and means were separated using the least significant differences method (LSD) at 5% probability level (Steel and Torrie, 1984), only when a significant "F" test was obtained.

RESULTS

Results show that identified the rodent species in the study area was the Nile grass rat *A. niloticus*, caused the damage in wheat fields. It is known rats consume a bout 10% of their body weight/day and contaminate a great deal of food with their droppings and urine. Beside, they gnaw through almost any object in their path to obtain food and shelter.

Data in Table (1) represented the average numbers of damaged plants in wheat fields during six different distances in the last three week, April 2014 year. Results showed that average numbers of damaged plants of wheat crop after 5 meters, are presenting 40.40, 48.80, 52.60 in week 2, week 3, week 4, respectively. The average numbers of infested plants of wheat crop decreased gradually to attain 7.80, 12.80, 23.80 respectively, after 30 meters. The grand average numbers of infested plants of wheat fields are presenting 25.40, 31.60, 38.70 in week 2, week 3, week 4 at 2014 year, respectively.

Considering that data in Table (2) represented the average numbers of infested plants in wheat fields during six different distances in the last three week in April 2015 year. Results showed that average numbers of infested plants of wheat crop after 5 meters, are presenting 48.60, 57.80, 64.60 in week 2, week 3, week 4 respectively. The average numbers of infested plants of wheat crop decreased gradually to attain 16.20, 23.20, 25.20 respectively after 30 meters. The grand average numbers of infested plants of wheat fields to attain 33.43, 41.77, 44.00 respectively, at 2015 year from treatment. The data in tables show that the damage caused by the Nile grass rat of the wheat fields during 2014 lowest than from 2015 year.

The results of this work similar with Ibrahim (1972) found that *A. niloticus* was found to attack sugar cane plantations, fruit trees, cereal plantation (corn, wheat, barley and rice), granaries, barns, pigeonholes, poultry yards and sheep breeding houses. Abdel-Gawad *et al*. (1982) assessed the damage caused by rodents in some field crops (wheat, sorghum, maize and cotton) to be concentrated on the borders of the cultivated areas and decreased towards the field center. El-Deeb *et al*. (1990) estimated the damage caused by rodents in certain wheat fields in three Governorates, Kalubia, Dakhalia and Beni-Suef. They observed that the level of wheat infeststion varied between 5.43% at field edge and 1.88% at diagonal in Dakhalia, 11.01% at edge and 3.11% at diagonal in Kalubia Governorate and 10.32% at field edge and 2.84% at diagonal in Beni-Suef. Ahmed (2006) found that average numbers of infested plants of wheat crop in the outer border, an initial 11.82 and 5.23, after 30 meters from treatment during 2004 in Assuit Governorate.

(Singleton, 2000; Brown and Singleton, 2002; Brown *et al*., 2002, 2003b) required to study the relationship between abundance of mice and damage to crops over a range of population densities. This can be done through observations of a range of densities in the field, through manipulation in the field of small enclosures or by modelling the response using crop models and incorporating a mouse population model. Knowledge of this relationship would enable the development of appropriate management targets.

DISCUSSION

The results may be due to these reasons:

(1) The Nile grass rat burrows working near sources of water in the canals, so the rat population at the outer border of more fields and decreased gradually towards the center (Abdel-Gawade *et al.*, 1982 and Ahmed, 2006).

(2) Rodents are near to the outer border of the field because it’s fear of irrigation crop and sinking shelter with water and eliminate them. So be near the outer border for easy chance to escape (Abdel-Gawade *et al.*, 1982 and Ahmed, 2006).

(3) The damage in wheat crop is increasing pre-harvest directly may be due to stop irrigate wheat fields that eliminate the rat burrows, also the arrival of the grain into the process of full maturity preferred for *A. niloticus* (Abdel-Gawade *et al.*, 1982).

(4) The results show that the damage of the wheat crop during 2015 was greater than in 2014 may be due to increase population density of *A. niloticus* in this year.

Generally, the damage decreased gradually towards the center of the wheat field. The highest damage at the border of the field may be due to the high number of the rats, so *A. niloticus* is accustomed to build its burrows at the border of fields and near canals. The increases of the

Table (1) Average numbers of damaged plants / m^2 of wheat by *A.niloticus* at different sampling date and distances, at the Experimental Station of the Faculty of Agriculture, Sohag University, El-Kawamel city, during 2014.

Sampling date / Distances	Average ±SE (%) Week 2 April 2014	Week 3 April 2014	Week 4 April 2014	Grand average
5 meter	40.40±1.26 cd	48.80± 0.91ab	52.60±1.76 a	47.27±1.10 A
10 meter	32.80±104 efg	45.20±1.92 bc	45.80±1.52 bc	41.27±2.08 B
15 meter	32.60±0.63 efg	36.20±0.56 def	40.40±2.23 cd	36.40±1.57 C
20 meter	29.20±1.20 gh	32.40±0.62 fg	38.20±1.87 de	33.27±2.88 C
25 meter	9.60±2.06 ij	14.20±3.94 i	31.40±2.77 fg	18.40±1.67 D
30 meter	7.80±2.51j	12.80±3.51 ij	23.80±2.48 h	14.80±2.02 D
Grand average	25.40±2.43 C	31.60±2.71 B	38.70±1.91 A	31.90

(1) Means followed by the same small letter(s), do not significantly different at 0.05 level of probability.
(2) Means followed by the same capital letter(s), within the same column, do not significantly different at 0.05 level of probability.
(3) Means followed by the same capital letter(s), within the same row do not significantly different at 0.05 level of probability.

Table (2) Average numbers of damaged plants / m^2 of wheat by *A. niloticus* at different sampling date and distances, at the Experimental Station of the Faculty of Agriculture, Sohag University, El-Kawamel city, during 2015.

Sampling date / Distances	Average ±SE (%) Week 2 April 2015	Week 3 April 2015	Week 4 April 2015	Grand average
5 meter	48.60±0.95 bc	57.80±0.86 ab	64.60±1.48 a	57.00±1.63 A
10 meter	38.40±1.91 de	50.60±0.63 bc	50.60±0.81 bc	55.27±3.22 A
15 meter	37.60±2.15 ef	41.80±2.46 cde	47.40±1.47 cd	42.27±1.93 BC
20 meter	33.80±255 efg	39.0±2.76 de	47.20±1.42 cde	40.00±3.63 C
25 meter	26.0±2.68 gh	38.20±2.13 e	29.0±2.71 fgh	31.07±2.11 D
30 meter	16.20±3.33 i	23.20±2.83 hi	25.20±2.46 ghi	21.53±2.37 E
Grand average	33.43±2.33 B	41.77±2.54A	44.00±2.57 A	31.90

(1) Means followed by the same small letter(s), do not significantly different at 0.05 level of probability.
(2) Means followed by the same capital letter(s), within the same column, do not significantly different at 0.05 level of probability.
(3) Means followed by the same capital letter(s), within the same row do not significantly different at 0.05 level of probability.

burrows are naturally accompanied with the increase of rodent population. More research effort is required to measure damage to crops over a range of rodent densities to determine the impact on yield. Researches in the future will require providing a better understanding of rodent population and access to new or improved methods of rodent damage reduction by eliminating Integrated Pest Management Approach for the regulation of the rodent population density (Desoky, 2015). Table 1 & 2

REFERENCES

Abdel-Gawad KH, Maher Ali A (1982). The active burrows as a parameter for the detection of population density of rodents during control campaign. Assiut J. Agric. Sci., 13: 115-120.

Abdel-Gawad KH, Maher Ali A, Salit AM (1982). Assessment of damage caused by rodents in some field crops. Assiut Jour.Agri.Sci., 13 (1): 73-78.

Ahmed, H SK (2006). Studies on damage caused by rodents on some field crops and its control in Upper Egypt (Assiut area).M.Sc. Thesis Agric., Al-Azhar Univ.

Brown PR, Singleton GR (2002). Impacts of house mice on crops in Australia—costs and damage. In: Clark, L., Hone, J., Shivik, J.A., Watkins, R.A., Ver Cauteren, K.C., Yoder, J.K. (Eds.), Human Conflicts with Wildlife: Economic Considerations. National Wildlife Research Center, Fort Collins CO, pp. 48–58.

Brown PR, Chambers LK, Singleton GR (2002). Pre-sowing control of house mice (*Mus domesticus*) using zinc phosphide: efficacy and potential non-target effects. Wildl.Res.29:27 -37.

Brown PR, Singleton GR, Tann CR, Mock I (2003a). Increasing sowing depth to reduce mouse damage to winter crops. Crop Prot 22, 653–660.

Brown PR, Davies MJ, Croft JD, Singleton GR (2003b). Impact of farm management practices on house mouse populations and crops in an irrigated farming system. In: Singleton GR, Hinds LA, Krebs CJ, Spratt DM (Eds.) Rats, Mice and People: Rodent Biology and Management, ACIAR Monograph, Vol. 96. Australian Centre for International Agricultural Research, Canberra, pp. 338–342.

Desoky, A.S.S (2015) Some Examples of the Damage Caused by Birds and Rodent in field Crops and their Control**,** Academic Research Journal of Agricultural Science and Research, Vol. 3(1), pp. 1-3, January 2015.

El-Deeb HI, Asran AA and El-Halafawy AM (1990). Pre-harvest damage and active burrows of rats in wheat fields.Agri.Res.Review,68: 229-233.

Ibrahim MM (1972). Damage and control of Nile grass rat, *A. niloticus* 1st.Sci.Symp.on rodent and their control in Egypt,27.

MSTAT-C (1988). MSTAT-C, a microcomputer program for the design, arrangement, and analysis of agronomic research experiments. Michigan State University, East Lansing, USA.

Mutze GJ (1998). The 1993 strychnine baiting program for mouse control in South Australian grain crops. I. Efficacy. Wildl. Res. 25,533–546.

Singleton GR (2000). Ecologically based rodent management— integrating new developments in biotechnology. In: Salmon TP, Crabb AC (Eds.), Proceedings of the 19th Vertebrate Pest Conference. Mission Valley Hilton Hotel, San Diego, CA. University of California Davis, CA, pp. 221–227.

Steel RGD and Torrie JH (1984).Principles and procedures of statistics. McGraw Hill Book Co., Tokyo, Japan.

Stenseth NC, Herwig L, Skonhoft A, Davis SA, Pech RP, Andreassen HP, Singleton GR, Lima M, Machangu RM, Makundi RH, Zhang Z, Brown PR, Shi D, Wan X (2003). Mice, rats, and people: the bio-economics of agricultural rodent pests. Front. Ecol. Environ. 1, 367–375.