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Rodent Damage and their Control for Attacking Seeds of *Rhamnus cathartica* (Buckthorn) Plants in Rural Areas, Upper Egypt

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ABSTRACT

Buckthorn (*Rhamnus cathartica*) is one of the delicious winter fruits, and was mentioned in the Qur'an as "Sidr". Buckthorn has multiple health benefits, as it is rich in fibers, vitamins and elements. This study was conducted in some rural areas in Al-Monshah district, Sohag Governorate. A mechanical survey and control of the rodent species that attacked the seeds of buckthorn trees in rural areas was studied. The results showed one type of rodent climbing on buckthorn trees which is the gray-bellied rat, *Rattus rattus alexandrinus*. The results showed a decrease in the number of rickety seeds after performing the mechanical control (destroying rodent nests from buckthorn trees). The mean year of general post-control reduction during the study period was 96.55%.

Keywords: Buckthorn, *Rhamnus cathartica*, *Rattus rattus alexandrinus* rural areas, trees.

INTRODUCTION

Rhamnus cathartica L. (common buckthorn), is a medium-sized tree indigenous to Egypt. Botanics can offer a safe harbor for many kinds of rodent, providing shelter and easily-available food supplies. They are unwanted in the orchards due to the injury they can cause to all parts of plants and containers, and also because they expose people and pets to various diseases and parasites (Knight *et al.*, 2007).

Rodent damage is the harm imposed when mice chew on or eat portions or all plant. These pests run after plants for food and to wear down their teeth preventing them from growing too long. Rodents target a several species such as ligneous plant, greensward, and herbs (perennials); the caused damage can range from fatal to insignificant but with careful planning and maintenance the issue of rodent damage can be managed. Significant damage occurs annually in both macadamia and orchards (Ramsey and Wilson, 2000 and Rizk *et al.*, 2017).

The reticent, nightly behavior of rats means that they often move unseen in a nearness until curtilage citrus and another fruit begins to ripen. They then expose their sight via a vengeance. In citrus and papaya the eating symptom appear in as spherical hole and the whole fruit hollowed out. (White *et al.*, 1997, Horskins *et al.*, 1998 and Horskins and Wilson, 1999)

MATERIALS AND METHODS

This study was conducted upon the emergence of the rodent problem of attacking seeds of household buckthorn trees in the area of Naga Al-Haj Ibrahim in Al-Monshah district, Sohag Governorate, in the period from 1/2/2021 – 1/3/2021.

The types of rodents have been identified by culling some nests and identifying the items in them from young or adult animals.

Five samples were determined (an area of 1 meter) and cleaned from the seeds falling below the house buckthorn trees, the readings were taken twice a week. The specified area was cleaned after taking each reading (the number of infected rodents seeds), this continued for two weeks starting from February first, 2021 to the middle, then all the rodent nests were destroyed (mechanical control by destroying rodent nests) in the house buckthorn trees. The infected seeds were counted from the rodents after the control process was carried out twice a week within 15 days, taking into account the cleanliness of the sample area after each reading of the infected seeds. Then, the rate of reduction in infected seeds was calculated according to (Bennett and William, 2005; Desoky *et al.*, 2014) as following/

Reduction in infected = $(\text{Number of seeds falling after treatment} / \text{Number of seeds falling before treatment} \times 100) - 100$

RESULTS AND DISCUSSION

The results showed that one type of climbing rodent, a gray-bellied rat (*Rattus rattus alexandrinus*) in was found in the study area, which is the house buckthorn trees (Table1). That is because of the gray-bellied rat is considered a climbing rodent (Abdel-Gawad, 1974; 2010). Also, the gray-bellied rat is considered to be a domestic rat and differences in the species composition of rodents depend on the location, neighborhood, type of habitat, internal specific composition and preferred food (Desoky *et al.*, 2014). Rodent species identification in the study region is more important to develop a plan in active policy

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for application of rodent control programs in recently reclaimed land in the future of Egypt (El-Sherbiny, 1987 and Desoky, 2007). Sarah *et al.* (2011) found that the presence of invasive buckthorn impacts habitat use and the presence of wildlife species maybe showed the identification of one type.

Table 1. Survey of rodent species in nests on buckthorn trees

Rodent species	Common name
<i>Rattus rattus alexandrinus</i> (Geoffroy,1803)	The gray bellied rat or alexandrinus rat

Data in Table (2) and figure (1) show the percentage of reduction in numbers of rotting seeds after 15 days of performing mechanical control (destroying rodent’s nests from buckthorn trees) in 5 samples under

study as follows: 97.02%, 96.43%, 95.60%, 96.98 and 96.72%. The average year for the reduction after the control was 96.55%. Rodents occur all over the world and have adapted to most types of ecosystems. Rodents cause damage to harvest and stored products besides pollution, forestland and orchards, ornamental plants, property damage, cable and irrigation pipe, and disease transmission (Desoky, 2016).The destructions of rodents and the efforts to stop them will never decrease, despite the fact that man hopes to improve his standard of life and wellness. In the face of the rapidly rising human population in Egypt, the problem has become more acute. The behavior of rodent populations is altered when man changes deserts, woodless and rangeland into food or fiber production. This is a common feature of the Mideast region, including Egypt.

Table 2. Number of infested buckthorn seeds with samples before and after the mechanical control process (destroying of rat nests) and the calculated percentage of reduction during the period of study.

Number of times samples	Study period	Samples/1m					Grand total
		1	2	3	4	5	
Before treatment							
Week1	1	221	205	188	264	197	1075
	2	207	160	179	254	156	956
Week2	3	183	213	192	199	187	974
	4	194	178	146	211	191	920
Grand Total		805	756	705	928	731	3925
After treatment							
Week3	1	2	3	1	4	3	13
	2	5	4	7	6	7	29
Week4	3	7	8	9	7	5	36
	4	10	12	14	11	9	56
Grand Total		24	27	31	28	24	134
Reduction %		97.02	96.43	95.60	96.98	96.72	96.55

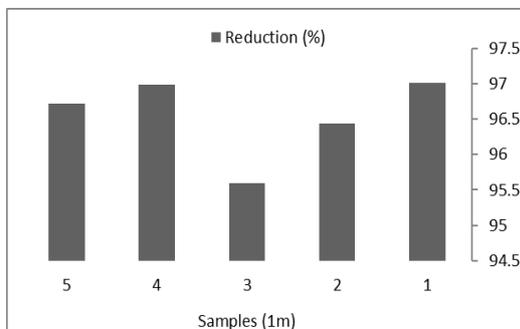


Figure 1. The percentage of buckthorn seed reduction after performing mechanical control (destroying rodent nests from trees).

In some cases, such activities are carried out without prior knowledge of the actual fauna of the area, and the natural predators of rodents are driven away, or killed for food, or for their leather. Consequentially,

Photo index



Photo 1. House buckthorn trees

rodents rise in number and diverse rodent species may emerge. The reasons of changes in species spreading are generally due to changes in environmental conditions and the superior survival strategy of the replacing species (Maher, 1978).

Rodents are implicated in many types of damage, including crop and tree damage, structural property and cable damage, disease transmission (Witmer *et al.*, 1998). Climbing rats and some rodents prefer palm and fruit trees when its available in the appropriate environment for survival and breeding (White *et al.*, 1997 , Horskins *et al.*1998 and Horskins& Wilson 1999).

In conclusion, these results suggest that mechanical control (destroying rodent’s nests from buckthorn trees) could be incorporated in Integrated Pest Management (IPM) programmes of the gray bellied rat, *R. r. alexandrinus* on *Rhamnus cathartica* trees.



Photo 2. Rodent nests with buckthorn trees



Photo 3. Infested buckthorn seeds



Photo 4. Samples after the control process

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أضرار القوارض ومكافحتها لمهاجمة بذور نباتات *Rhamnus cathartica* (النبق) في المناطق الريفية ، صعيد مصر

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النبق (*Rhamnus cathartica*) هو أحد فواكه الشتاء اللذيذة ، وقد ورد ذكره في القرآن باسم "السدر". يتمتع النبق بفوائد صحية متعددة ، فهو غني بالألياف والفيتامينات والعناصر . أجريت هذه الدراسة في بعض المناطق الريفية بمركز المنشاه بمحافظة سوهاج في صعيد مصر. تمت دراسة المسح الميكانيكي والتحكم في أنواع القوارض التي هاجمت بذور أشجار النبق في المناطق الريفية. أظهرت النتائج نوعًا واحدًا من القوارض التي تتسلق على أشجار النبق وهو الجرذ الرمادي البطني (الجرذ السكندري) *Rattus rattus alexandrinus*. كما أظهرت النتائج انخفاضًا في عدد البذور المتهاكلة بعد إجراء مكافحة الميكانيكية (تدمير أعشاش القوارض في أشجار النبق). وكان المتوسط العام للخفض خلال فترة الدراسة ٩٦,٥٥٪.