Using some rodent control methods in pomegranate orchards (*Punica granatum*) at Sohag Governorate - Egypt

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ABSTRACT

Rodents are occasional pests of orchard crops throughout the world. The application of rodenticides is an effective and practical method for controlling rodent pests and reducing damage. However, a paucity of information exists on the efficacy of rodenticides in orchards (Pomegranate trees) for these pest species. To address this gap in knowledge, we first identify rodent species. We then used this index to test the efficacy of three rodenticides baits are Racumin 0.0375%, Difenacom 0.005% "anticoagulant", and Zinc phosphide 2% "Acute Toxicity" to determine their utility for controlling rats in agricultural orchards, compared with one methods of Mechanical control by "destroying burrows and nests". The results showed that the methods tested, Zinc phosphide 2% grain bait was the most effective option for controlling rodent (**Inhibition**% = 87.95**), respectively).The use of elevated bait stations proved effective at providing bait to target species and should substantially limit non-target access to rodenticides.

Keywords: Rodents, Control, Pomegranate Orchards, Sohag

INTRODUCTION

Pomegranate (*Punica granatum* L.) is one of the oldest known cultivated plants (Lye, 2008), known to be native to central Asia (Morton, 1987; Holland *et al*., 2009). Pomegranate fruit has been traditionally known to beneficial to human health, Pomegranate trees are susceptible to many pests (Kahramanoglu and Usanmaz, 2013)

Rodents cause serious problems to human communities in Africa as a result of their involvement in the spread of diseases (Katakweba *et al.* 2012) and in the losses of crops through direct consumption (Mulungu et al. 2003; Bekele *et al*. 2003)

Rodents considered as one the most important pest in Egypt. That caused great economic loss to farmers (damage the growing crops, stored products, poultry and animals farm), (Abdel-Gawad and Farghal, 1982).

Rodenticides are likely to remain the center management tool for controlling rodent damage in agriculture (Buckle, 1999 and Wood and Fee, 2003). Successful management of pomegranate fruit damaging pests is important for the production of marketable fruits. Therefore, this study aimed to determine successful management strategies for the main fruit damaging pests of pomegranates, including rodents.

MATERIALS AND METHODS

The study was conducted to control rodents through consumer food baits at pomegranate farm at Sohag district - an area of 5 feddans, starting from 28/9/2019-2/11/2019.Three rodenticides and a mechanical control method were evaluated by (destroying burrows and nests) by controlling rodents in pomegranate trees using a food consumer method.

These pesticides are

Racumin 0.0375% (Coumatetralyl) "*first-generation* anticoagulant" carried on wheat bait

Difenacom (RTAC 0.005%), *second-generation* anticoagulant, carried on wheat bait

Zinc phosphide 2% (Acute Toxicity) carried on wheat bait

Mechanical control by (destroying burrows and nests)

The bait stations were distributed to the rodenticide in three replications over three weeks. Also, 3 replicates of mechanical control were used during the study period. Data were analyzed according standard procedures for analysis of variance Duncan's (1955) and (Steel and Torrie, 1980).

Inhibition= After treatment/ Before

*Inhibition= Before- After/Before*100*

RESULTS AND DISCUSSION

The results showed in Table (1) and Figure (1) revealed the survey of three types of rodents. It was also found that the gray-bellied rat is the most common species in the study area, because the gray-bellied rat is considered a household climbing rodent Abdel-Gawad (1974) and 2010) & Desoky and Baghdadi (2020).

Data in Table (2) and Figure (2) The results showed that there were significant differences between different proved that bait of 2% zinc phosphide and other baits using as control methods in study area. 2% zinc phosphide carried on whole wheat has effective control method against rodents in pomegranate orchards, and the use of elevated bait stations was effective in providing bait to target rodents. Difenacoum was the second one with 77.71% as rodent inhibition; the third one was Racumin with 43.70%. While the last treatment is mechanical control with 29.79% in rodent inhibition rate. The use of elevated bait stations should greatly limit access to rodenticides by many non-target species that may have previously been susceptible. Population reduction of rats in date palm and orange trees may be due to the toxic effect of zinc phosphide and the taste of diphacinone. (Khan, 2007) was found to reduce the number of mice by using some rodent compounds such as zinc phosphide and bromadiolone (Desoky, 2013).

The obtained data from Table (2) and Figure (3) revealed that the rodent species is able to consume high baits in the first week of treatment as compared with the other two weeks. This may be due to the death of a number of rodents in the treated area as a result of feeding on the poison baits provided in the previous weeks.

CONCLUSION

High damage caused by rodent was observed in pomegranate orchards cultivated in Sohag Governorate. The rodents attacked Pomegranate fruits, bark and branches from planting till the harvest fruits. The grey billed rat *Rattus rattus alexandrines* was the most dominant species in study area. Using of zinc phosphide giving high inhibition in rodent species on the study area. The rodent species is able to consume high baits in the first week of treatment as compared with the other two weeks. The control of rodents depends upon the locality, neighboring and available food and can be used effectively in an Integrated Pest Management Approach (IPMA) for the regulation of the rodents population density.

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Table1: Incidence of rodents recorded in pomegranate orchards at Sohag Governorate, during 2019.

Rodent	Common name	(Percentage %)
Rattus rattus frugivorus	White bellied rat and date palm rat	20
Rattus rattus alexandrines	The gray bellied rat or *alexandrinus rat*	60
Arvicanthis niloticus	Field rat, grass rat, Nile rat and Nile grass rat	20

Table 2: Effect of using various control methods against rodent species at Pomegranate orchards at Sohag Governorate, during 2019.

Control methods		Before treatments	Time of treatments			After treatments	Inhibition%
			1st week	2nd week	3rd week		
Chemical control	Difenacoum	242.04	154.36	99.52	66.52	53.96d	77.71**
	Racomin	230.48	162.48	177.0	149.24	129.76c	43.70*
	Zn-ph	253.84	140.84	87.32	46.56	30.60e	87.95**
Mechanical control		240.12	210.84	199.52	181.76	168.91b	29.79*
Untreated		244.12	292.60	308.16	314.56	346.36a	-

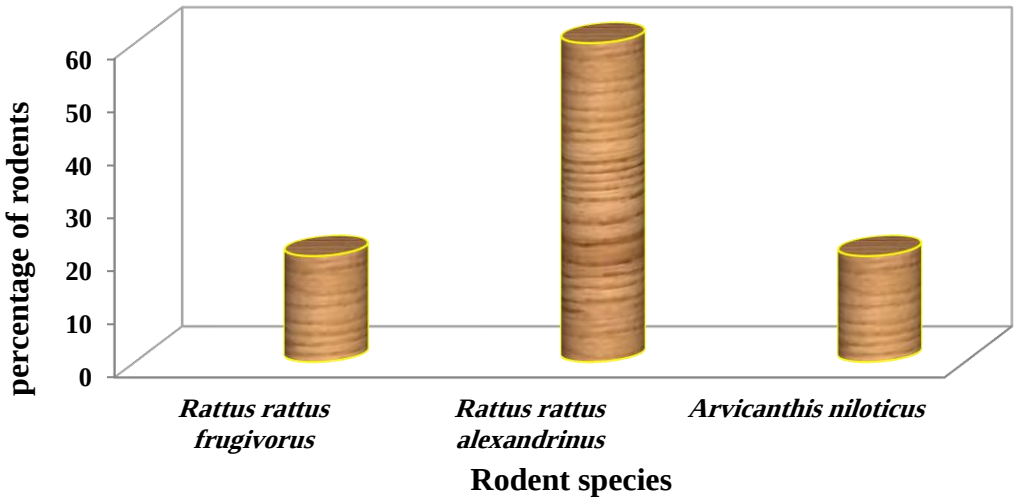
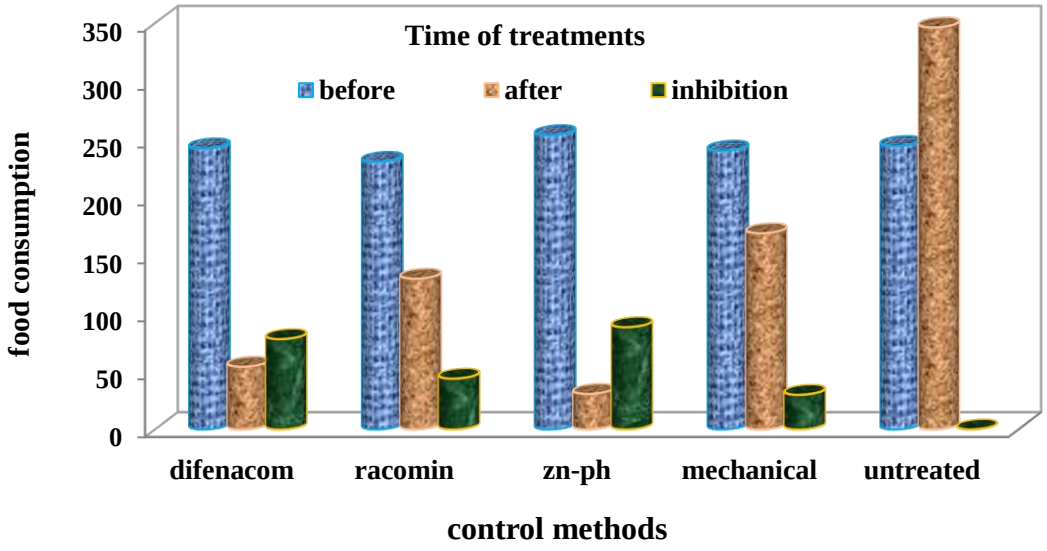


Figure 1: Incidence of rodents recorded in pomegranate orchards at Sohag Governorate, during 2019.



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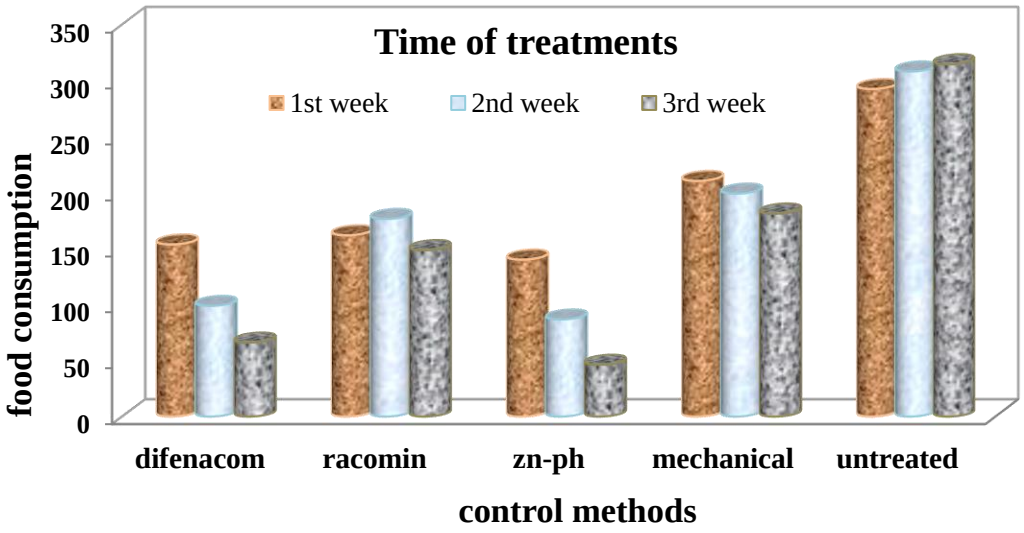

Figure 3: Effect of weekly bait consumption of various rodenticides species under Field conditions.

استخدام بعض وسائل المكافحة المختلفة للقوارض في حدائق الرمان بمحافظة سوهاج، مصر.

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الملخص العربي

تعتبر القوارض من أهم الآفات الحيوانية التى تهاجم حدائق الفاكهة وتحدث بها أضرار جسيمة ومن المحاصيل التي تضررت بشده في الآونة الأخيرة محصول الرمان المنزرع بمحافظه سوهاج. لذا كان من الأهمية بمكان أن نلقى بعض الضوء فى هذا البحث على الخسائر التى تسببها القوارض لهذا المحصول الهام. فقد تم تسجيل ثلاثة أنواع من القوارض التي تسببت في أضرار شديدة لمحصول الرمان وهي والجرذ المتسلق ذو البطن الرمادي *Rattus rattur alexandrines* وجرذ الحقل النيلي *Arvicanthis niloticus* والجرذ المتسلق ذو البطن البيضاء *Rattus rattur frugivorius*. وقد تم تقييم ثلاثه أنواع من وسائل المكافحة الكيميائية وهي فوسفيد الزنك كمبيد حاد السمية. الراكومين من مبيدات الجيل الأول والديفيناكوم من مبيدات الجيل الثاني كمبيدات مزمنة السمية وكذلك تم تقييم تاثير المكافحة الميكانيكية وذلك بهدم الجحور وإزالة العشوش بالمنطقه المعاملة. وتركت مساحة بدون معاملة للمقارنة. وكانت النتائج علي النحو التالي.

كانت المعاملة بفوسفيد الزنك أكثر المعاملات فاعلية في خفض أعداد القوارض في المنطقة المعاملة به. وأدت الي خفض القوارض بمعدل 87.95 % وجاء الديفناكوم تاليا بمعدل 77.71% بينما أدت المعاملة بالراكومين الي حماية النباتات المعاملة بمعدل 43.70% وكانت المكافحة الميكانيكية الأقل في معدل الحماية بمعدل 29.79%. لذا يجب الاهتمام باتباع برامج مكافحه فاعلة عند زراعة حدائق الرمان فى محافظة سوهاج.

الكلمات الاسترشادية : القوارض، بساتين الرمان، مكافحة، سوهاج