

Review article

The most important methods used to estimate the population density of rodents

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Abstract

This paper summarizes the most important method of estimating the population density for rodents. These methods are wire-box traps, Active burrows method, Food consumption method and by examining the effects of rodent and can be used to evaluate the efficiency of rodent control. Methods of estimating the density of rodents vary depending on the nature and location.

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Introduction

Worldwide, there are about 1700 species of rodents, but only 10–5% are major pest species in agricultural and urban environments, and even fewer cause problems over larger geographic areas. Some of these consume substantial amounts of agricultural produce, and in many developing countries, farmers consider rodents the main impediment to higher yields (Makundi *et al.*, 1999). Every year, rats in Asia consume food crops that could feed 200 million people for an entire year (Singleton 2003).

In Indonesia, rodents are the most important pre-harvest pests in economic terms, causing on average at least 15% annual losses of rice (Geddes 1992). In Africa, the numbers are similar. Damage due to rodents in Tanzania causes an estimated annual yield loss of 5–15% of maize (corn), corresponding to about \$45million, and food which could feed about 2 million people (Leirs 2003). In parts of South America, native rodents cause crop

damage varying between 5–90% of total production (Rodriquez 1993). Obviously, we need better pest control strategies than we have today.

The design of rodent control strategies has both an ecological dimension, relating to the interaction of the pest population and its resources and enemies (Singleton *et al.*, 1999) and an economic dimension, relating to crop damage, which affects yield, and the use of pesticides, which in turn affects production costs (Carlson and Wetzstein 1993). Bio-economic analysis of pest control has been related primarily to invertebrate pests and weeds, whereas vertebrate pests have been largely ignored. Here we show how ecological and economic factors may be incorporated in bio-economic models aimed at improving control strategies of agricultural rodent pests (Stenseth *et al.*, 2003).

. The main objectives of this studies aim to summarize the most important method of estimating the population density for rodents for implementation of rodent management programs.

1-Trapping method:

Wire-box traps are one of the best methods that are used in survey, classification and estimate the population density of rodents. Also, can be used in the evaluation of rodenticides efficient and sometimes can be used as a method to rodent control.

Example: numbers of wire-box traps were baited and distributed twice every 15 days at 6pm and collected at 7am.

The captured rodents were classified and recorded. The Percentage of every species was estimated as a percent from total rodents captured during the study period as follows.

$$\text{Population density} = \text{Number of rodent species} / \text{Total rodents captured} \times 100$$

$$\text{Trap index} = \text{No. rodent captured} / \text{Total traps distributed}$$

These results with agreement with Howrad (1985); Asran *et al.*, (1985); Asran (1994); El-Deeb *et al.*, (1999) and Baghdadi (2006).

2-Active burrows method:

This method can be used in difficult areas such as modern land reclamation and desert and is characterized by burrows active presence of fecal talk as well as the existence of modern soil at the entrance to the burrow by footprints and the presence of traces of food in their burrows and can identify burrows active lock all burrows at night and examined in the morning and see the active burrows and when measuring the efficiency of pesticide active burrows being counted before and after treatment.

The number of active burrows was counted during study period by using the sand to close all burrows then count the opened ones at the next day during four consecutive days every month. The population of active burrows percentage in the area was estimated as follows.

Population of active burrows% = Number of active burrows / Total burrows examined all over $\times 100$.

These results with agreement with Jackson (1979); Abdel-Gawad & Maher Ali (1982); Dowing & Murphy (1994); Feliciano *et al.*, (2002) and Desoky (2007).

3-Food consumption method:

This method summarizes the increase or decrease from the rodents population was estimated as percent from the initial food distributed as follows:

The distributed amounts of bait in stations or on a mattress plastic weights 250 gram in station, for example, in the presence places of rats and placed for a limited period.

Total number of rodent = consumer of stations a day / 10 rodent dominant weight in the region.

Population density = Total food consumption (gm) during month / Total food consumption (gm) all over the year $\times 100$.

So, on the basis that the mouse eats 1/10 of weight per day and can be used this way in public places such as schools and important buildings, hotels, hospitals, for example, ... etc.

This method is a process when measuring the efficiency of any pesticide mice where the consumer is calculated from the bait before treatment in a limited period and then the taste of the consumer after the transaction during this period and which can calculate the efficiency of the pesticide.

The efficiency of pesticide = consumer taste before treatment - consumption of bait after the transaction / consumer of bait before treatment $\times 100$.

These result agreements with Tabeni & Ojeda (2005) and Desoky (2007).

4. Examine the effects of the rats:

4.1. Squares method

Affects that such footprints mice and rats tails can be seen in the soft land or sand. We work squares in the area to measure the intensity of each square feet and these squares covered with lime or sand or the soft powder and that when rats roam leave their impact on those squares and so can the population density calculation follows as. If we assume 40 squares worked in one area and were footprints in mice 10 squares calculated density, $10/40 \times 100$. These result agreement with Tabeni & Ojeda (2005).

4-2- Feces method

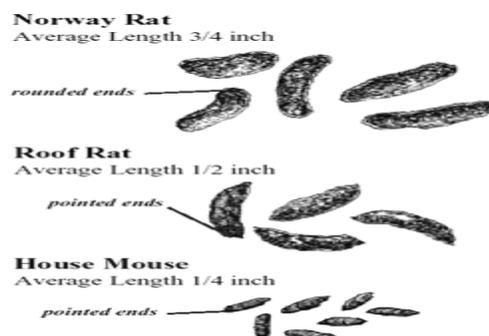
The wilted mice of the key things to deduce the presence of rats in burrows or in the region, using these feces can find out if the burrows active or inactive. If the feces soft and shiny shows that mice are still living in these burrows if either stool dry and dark color indicates that burrows inactive and the presence of different sizes of feces of the same shape indicates the presence of different ages of mice.

Example: In each site, feces in three square meters were collected and counted as an index for the changes in rodent population at each inspected date (once monthly). The percent of feces was estimated as a percent for overall year total as follows:

Rodent numbers = Total number of feces / Number of feces of rodent dominant individual per day x 100.

Population density %= Number of feces in area unit during month / Total number of feces during year x 100.

This method can be used in the classification of mice. These results with agreement with Ahmed (2001); El-Deeb *et al.*, (1996) and Desoky (2007).



Important Note:

all methods to estimate the density of rats indicates the density of virtual or approximate density and not the truth. Is a discretionary process demonstrates the preparation of almost mice.

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