



**DIVERSITY AND ABUNDANCE OF RODENTS
USING CAGE TRAP AT KAMPUS JELI,
UNIVERSITY MALAYSIA KELANTAN,
KELANTAN, MALAYSIA**

by

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A report submitted in fulfillment of the requirements for the degree of
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UNIVERSITI MALAYSIA KELANTAN**

2024

DECLARATION

I hereby declare that, with the exception of the information listed in the sources, the thesis "Diversity and Abundance of Rodents at Universiti Malaysia Kelantan, Kampus Jeli, Kelantan, Malaysia" is the product of my own research. The thesis is not being presented concurrently for the candidature of any other degree, nor has it been accepted for any degree.

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Date : 8 August 2024



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**Diversity and Abundance of Rodents using cage traps at Campus Jeli, Universiti
Malaysia Kelantan, Kelantan, Malaysia.**

ABSTRACT

A study on the abundance and diversity of rodents was carried out at the Kampus Jeli, University Malaysia Kelantan. Five cage traps were put up to catch rodents using the 'Golden Banana' (*Musa acuminata*) as bait. Species diversity and abundance were noted. Only eight rodents, representing the families Muridae were found to have entered all. According to the rate of rodent capture, *Rattus tanezumi* is the largest species. Therefore, in order to ensure future studies about the diversity of rodent species, more research at the Kampus Jeli, University Malaysia Kelantan is needed.

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**Kepelbagaian dan kelimpahan tikus menggunakan sangkar di Kampus Jeli, Universiti
Malaysia Kelantan, Kelantan, Malaysia.**

ABSTRAK

Kajian tentang kelimpahan dan kepelbagaian tikus telah dijalankan di Kampus Jeli, Universiti Malaysia Kelantan. Lima perangkap sangkar dipasang untuk menangkap tikus menggunakan 'Pisang Emas' (*Musa acuminata*) sebagai umpan. Kepelbagaian dan kelimpahan spesies telah diperhatikan. Hanya lapan tikus, mewakili keluarga Muridae didapati telah memasuki kesemuanya. Mengikut kadar tangkapan tikus, *Rattus tanezumi* adalah spesies terbesar. Oleh itu, bagi memastikan kajian akan datang tentang kepelbagaian spesies tikus, lebih banyak kajian di Kampus Jeli, Universiti Malaysia Kelantan diperlukan.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

According to Ramli and Hashim (2009), Malaysia was well known as one of southeast asia's tropical biodiversity hotspots. Different species of rodents were among the many habitat types that contribute to the high richness of faunal diversification. Rodents were the largest category of tiny animals in the world, including over 2200 species. They account for over 40% of all currently extant small mammal species, including the tree shrew, the malayan wood rat, and the spiny rat (*maxomys rajah*) (voss & emmons, 1996). With the exception of a few oceanic islands, antarctica, and new zealand, these various rodent species were distributed all over the planet (assefa & chelmala, 2019). Rodents were known to had a great degree of adaptability, and as such, their distribution pattern was widely dispersed. Nevertheless, several rodent species in the population had a preference for a certain area, meaning they require that particular habitat or ecosystem in ordered to lived. Certain rodents, liked kangaroo rats, lived in deserts and mostly consume seeds. These herbivorous rodents had a high requirement for fibre in their diet and were susceptible to illness if their nutritional needed were not met. Some species, liked the brush-furred mouse *lophuromys melanonyx* and the endemic giant mole rat *achyoryctes macrocephalus*, were adapted to the afroalpine environment and lived in their natural habitat because they could hide

in their burrows to avoid temperature fluctuations Bennett, Jarvis & Davies (1988). Rodents' preferred habitats were typically determined by environmental factors such as food availability, predators, climate, and human habitat exploitation.

1.2 Problem Statement

Considering the population density in the campus Jeli, University Malaysia Kelantan sought to determine the variety and abundance of the rodent population.

1.3 Objective

To determine diversity and abundance of rodents used cage trapping at Campus Jeli, University Malaysia Kelantan.

1.4 Scope of study

The main objectives of this project was to assess the variety of rodents in the Kampus Jeli, University Malaysia Kelantan. Rodents were the surveyed's observer subject. Methods for studying the variety of these rodents were based on cage trapping.

1.5 Significant of study

Researching the diversity and abundance of rodents was crucial for a number of reasons. The purpose of the study was to evaluate rodents variety and abundance at campus Jeli, Universiti Malaysia Kelantan. The research's findings could provide the majority of the knowledge and information needed for subsequent studies, as well as data sufficient for controlling the diversity of rodents at campus Jeli, University Malaysia Kelantan.



CHAPTER 2

LITERATURE REVIEW

2.1 Literature review

2.1.1 Rodents bad impact on the environment

Rodents' urine, faeces, and furs pose serious environmental hazards. According to Frankova et al. (2016)'s assessment, a single caged rat excretes an average of sixty-six pieces of waste per day, however Chame (2003) calculated that a caged mouse excretes seventy pieces of waste per day. Because mice were known to coexist with humans in all crevices and spaces in structures, a mouse alone may theoretically defecate at least 30,000 droppings in a single year in a given location. This could lead to serious issues. For instance, because roof rats were renowned for having excellent climbing abilities, they were typically located on the higher levels of any construction or building. Thus, people did not interfere with their ecosystems. It was unavoidable that these locations may become contaminated if the droppings fell and released an unpleasant stink due to the volume of droppings in any given building. Additionally, the accumulation of droppings may result in additional secondary illnesses

2.1.2 Rodents in Malaysia

According to Payne, Francis & Philips (1998) and Francis & Barret (2008), there were generally about 440 species of mammals known to exist in Malaysia, of which 66 species (15%) were endemic to the nation. The most common animal in the world, rodents played significant roles in all types of ecosystems, but they were particularly vital in tropical rainforests. Due to their high degree of adaptation, rodents could live in a wide range of settings, including forests, deserts, and even locations where people had built buildings and residences. The choice and preference of habitats was important for rodent populations since certain species of rodents could only survive in particular environments and locations, while other species were dispersed throughout multiple locations. Rats and mice were among the most adaptable species in terms of diet and habitat, yet most species prefer to dwell in natural environments like forests, mountains, and meadows.

2.1.3 Ecology of Habitat

Certain indigenous species, such as the brush-furred rodent *lophuromys melanonyx* and the giant mole rodent *tachyoryctes macrocephalus*, were only permitted to remain in their original habitat since they were already acclimated to the afroalpine environment and could hide in tunnels to avoid temperature variations (Bennett, Jarvis & Davies (1988)). Two indigenous species were successfully captured by Jayaraj, Tahir, Udin, Baharin, Ismail, and Zakaria (2012) in a sizable forest in Gunung Stong State Park, Kelantan, Malaysia. The discovery of six *leopoldamys sabanus* and two *maxomys whiteheadi* deep into the forest demonstrates that these species were

restricted to tall, old secondary woods that were isolated from human effects. At Kuala Selangor state park in Selangor, Malaysia, Chuluun, Mariana, Ho, and Mohd Kulaimi (2005) reported finding *maxomys whiteheadi* in a mangrove swamp and secondary forest. Wilson, Helgen, Yun, and Gimán (2006) also found the species in a Borneo forest remnant. Because *leopoldamys sabanus* and *maxomys whiteheadi* were endemic rodent species that could only find certain foods in the forest, such as the fruits of shrubs, mushrooms, and other small invertebrates, they were common in Malaysia's numerous types of forests. These species would not have to hunt for food in other habitats, particularly near human populations, because they could live in forests. Moreover, rodent species had great ecological, scientific, social, and economic significance in our ecosystem. When they stayed in their natural habitat, rodents could disperse seeds and spores, aid in pollination, circulate energy and nutrients, and provide as a food supply for several predators (Dickman, 1999). However, in order to determine these species' preferred habitats, more thorough research was required in the future. Determining the elements that contribute to the dispersion of the local fauna—particularly rodents—and developing conservation actions planned were crucial.

2.1.4 Roles of Rodent

It seems that rodents played a few important roles in their burrowing operations. They moved materials throughout the soil profile, particularly in arid environments like grasslands where deep subsurface water could not rise and where the physiochemical conditions of the top soil layer changed (Bennett et al., 1988). This process had an indirect impact on how water was stored in the soil and how organic matter

decomposes. Gillison and Anderson (1981) measured the reaction of the plant community, soil fungal abundance, microbial activity, and potential net nitrogen (n) mineralization in order to investigate the structure and function of the above- and below-ground communities. They discovered that the confinement of rats had no influence on the quantity of bacteria and fungi or on the possibility of nitrogen mineralization. They did discover, however, that there was an increase in c3 graminoids, which indicates a higher level of extracellular enzyme activity.

2.1.5 Cage Trapping Technique

An inhumane method of capturing animals without harming them is the cage trap. Basically, it's just a wire cage with a door that closes when the animal does anything, like pull on the bait or step on a pressure plate. For reasons like population control, study, or relocation, small to medium-sized animals like rats, raccoons, or stray cats are frequently captured in cage traps. After being captured, the animal is usually released unharmed. The purpose of cage traps is to securely hold the animal until it can be transferred or released. They come in different sizes based on the kind of animal you plan to catch. These traps are typically built with a strong design, using materials like heavy-duty wire mesh or galvanised steel to thwart the animal's attempts to escape.

Common sense should be used while selecting a trapping technique by considering a few crucial elements that will increase the trap's effectiveness and reduce the likelihood of capturing non-target persons. Consequently, this will raise the capture rate and speed up the process of gathering data. Research objectives, research design, and the study site should all be taken into account to guarantee that

the best approach is selected (Luanne, 2017). Cage traps come in a variety of sizes and shapes and are often constructed with wire or nylon mesh for the walls and tops. The animal must enter the trap through the aperture in this type of trap. Usually, it is drawn to the bait hook and pulls a trigger, which shuts and locks the door. The main reason this trap is regarded as the best option is that, unlike some other traps, it shields the animals caught from suffering severe trauma. Take the limb-holding trap, for example. Other than that, it is collapsible and portable in addition to being simple to set up (WDM, 2019).

Aside from cage traps, other types of live traps include longworth traps, sherman traps, and havahart. Because they are composed of aluminium, Longworth traps are strong and lightweight. The cost is substantial, though, and the larger species might trigger the trap without getting caught. Sherman traps are lightweight and simple to operate, but because they are constructed of aluminium, the animal within may die from exposure if it is trapped for an extended period of time. The handler must typically conduct routine checks when using this type of trap (Cramer, 2017). Steel is used to construct havahart traps.



Figure 2.1 Cage trap for rodents.

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CHAPTER 3

MATERIAL AND METHOD

3.1 Study area

This study was conducted at Universiti Malaysia Kelantan, Faculty of Earth Sciences, Jeli Campus. Then, place the trap near the earth science faculty using the map as a guide. Traps were placed near the cabins, and traps were also installed in the small forest behind each cabin located in the faculty of earth sciences. Setting the trap at 15m x 15m. The University Malaysia Kelantan, Kelantan, which opened for business in January 2012. In Kelantan, Malaysia, there was a public university called Universiti Malaysia Kelantan. The university's establishment was suggested during the Ninth Malaysia Plan's table and was authorised by the Malaysian government on June 14, 2006. In June (2007) semester saw the enrollment of the first pupils. The administrative office and the FASA department of sciences and technology were situated on the 270 acres that made up the campus. FASA was abolished in April 2012, and two new faculties were established.

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(Source: Google)

Figure 3.1 shows the maps of Campus Jeli, University Malaysia Kelantan.

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3.2 Material

The material had been separated into two types: species identification and rodent captured.

In this field study, rodents were captured using cage traps, and *Musa acuminata*, popularly known as "golden banana," was utilised as bait.

The sample was then removed from the cage trap. The rodents were imprisoned in cages in order to identify the sample and speed up the process of identifying the species. After the data collection was finished, the rodents had been released once again in order to maintain the sample.

The key form was utilized to identify the species. Baker (2021) and all data, including measurements from every sample, was documented.

3.3 Method

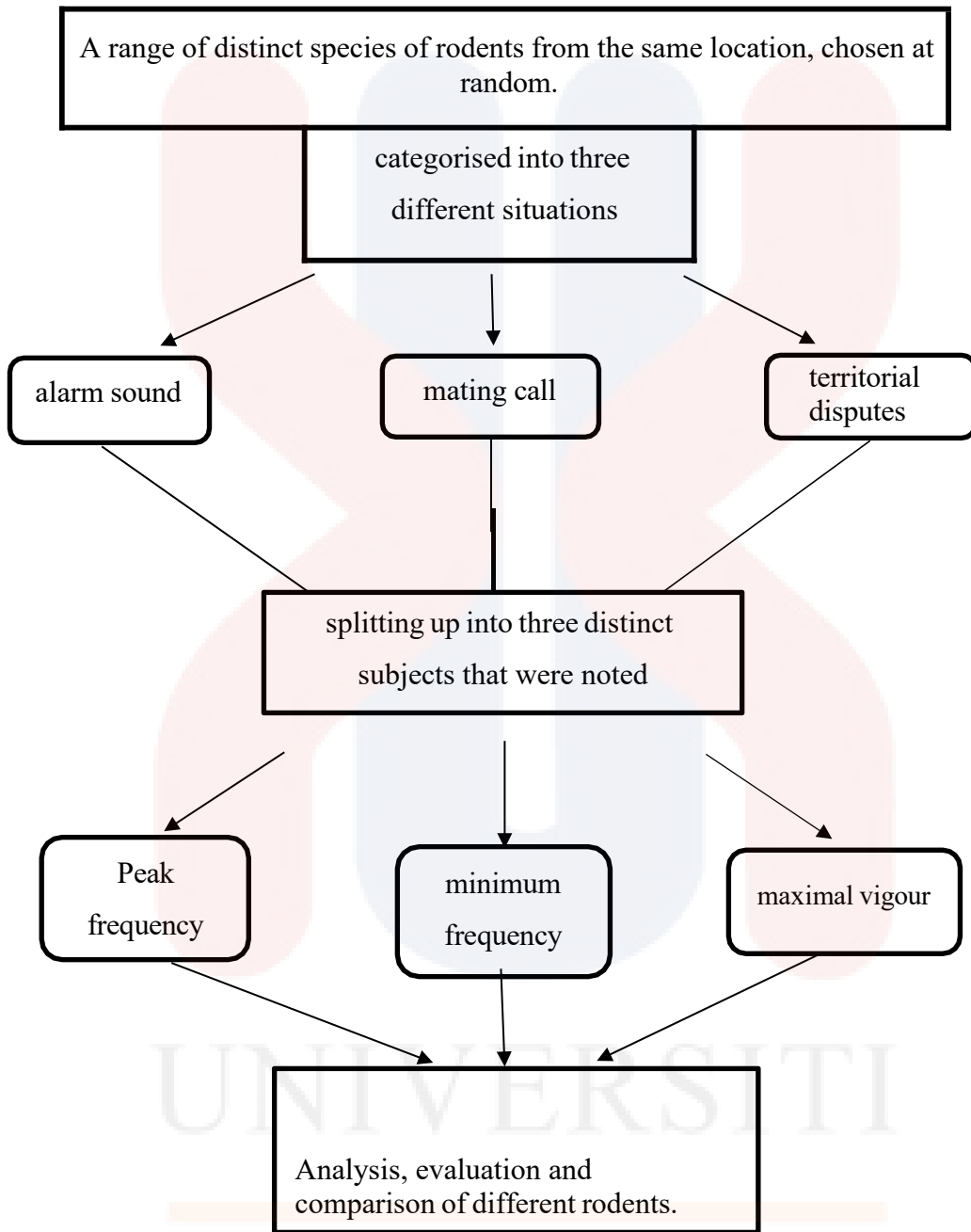
3.3.1 Data Analysis

Data collected in the field was analysed to calculate caught rates and analysed data related to trapping operations. A cumulative species curve was created to assess species adequacy from the data obtained, and the total abundance was used to quantify the variety of rodents in Campus Jeli, University Malaysia Kelantan.

3.3.2 Cage trapping of rodents

The researched method was been conducted for this studied was the cage trapping. The cage was set up by applying the random sampling technique. 5 cage traps had been installed at each designated location with trap for capturing the rodents. Banana was used as bait and changed for a week of sampling periods. The cage trap, which is positioned beneath the live trap, is the trapping method utilised in this boxing. This method of setting traps is also used to catch animals without harming or killing them. Because it can release animals that have been caught especially those that were mistakenly caught this procedure is consequently extremely safe. During rodents capturing, physical harm and stress are regular occurrences. It is also possible that the rodents being caught will be injured or under strain when it is released. Make sure cage traps are appropriate before using them to keep animals from coming into touch with or spreading possibly dangerous organisms. First things, set cage traps. A cage trap should be set in the animal's path. Fix the cage if it has tripped and fallen multiple times to ensure that it is stable and functioning correctly. Use the hanger that is attached to the trap's surface, put the tip through the cage's side, and step down on the trap to trip it. 5. The second stage involves observing cage traps. As soon as the rodent is trapped, move the trap to a safe place, and wait for the appropriate moment to release it. Other than that, setting the cage trap with 15m x 15m. Place the bait at 6:00 PM and inspect the trap the next morning at 8:00 AM. Rodents are nocturnal creatures and will be trapped during this time, which explains why. To lessen the risk to the rodents, check the trap first thing in the morning to make sure the rodents aren't inside for an extended period of time.

RESEARCH FLOW CHART



CHAPTER 4

RESULT AND DISCUSSION

4.1 Result

8 rodents from each of the one species that were identified within from the Muridae family were caught during the course of 20 days of sampling. The species captured is *Rattus Tanezumi* only. There are no others animal that had been recaptured throughtout the sampling days.

4.2 Data Analysis

4.2.1 Species Accumulation Curve

Figure 4.0 displays the species accumulation curve for rodents. Between the sixteenth and eighteenth days, the curve stabilised. On the 16th through 18th day, the graph indicates a rise in the number of species captured. It indicates that there is no asymptotic level for the curve. The asymptotic level shows that the number of species found in the region is adequate. Because, the graph is inconsistent, the curve indicates that the 20 days of total trapping effort were insufficient to document the diversity of rodents in the area. In this investigation, one distinct rodents species were identified.

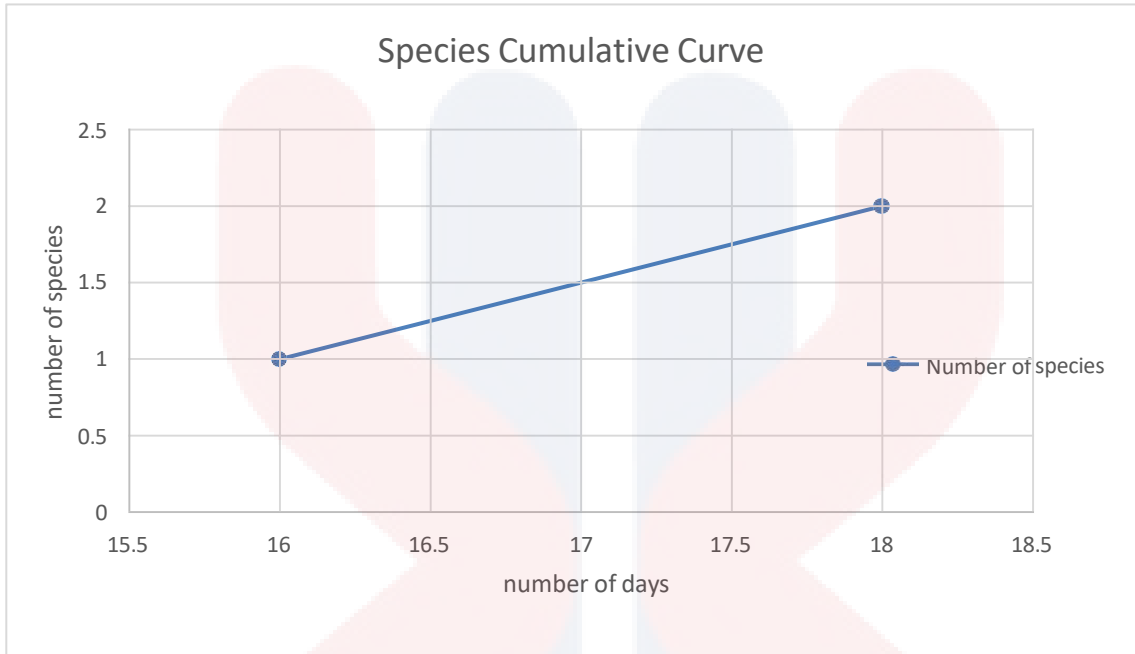


Figure 4.0 Species Accumulation Curve for Rodents at Kampus Jeli.

Table 4.1 The species diversity and abundance of rodents in Kampus Jeli, University Malaysia Kelantan.

Species	Number of Individuals	IUCN status
Rodentia		
Muridae		
<i>Rattus Tanezumi</i>	8	least concern
Total number of individuals	8	
Total number of species	1	
Total traps	5	
Captured rates	1.6 %	

The diversity and abundance of rodents was captured rates is 1.6% only. This data shows that there is not enough for the abundance of rats found in the Kampus Jeli of University Malaysia Kelantan.

4.3 Species account

4.3.1 *Rattus tanezumi* (Temminck, 1845)

Eight *Rattus tanezumi* individuals in all were caught in cage traps that were baited with bananas. Originating in India, this medium-sized rat is also referred to as the Asian house rat (Musser, 2018). Due to human introductions made without intention, this species has become invasive in several countries (Shiels & Draker, 2010). Furthermore, Stuart, Singleton, and Prescott (2015) state that it is recognised as a major pest in agriculture throughout Southeast Asia. *Rattus tanezumi* belongs to the order Rodentia, family Muridae. The family Muridae, which includes around 560 species, is unique among rodent families (Francis, 2019). Among the most common species captured during sampling is this one.

Additionally, according to musser (2018), house rats are present almost everywhere that human populations have lived, particularly in gardens and plantations where they pose a serious threat to agriculture. this is because they mostly eat a variety of plants in their diet. Because house rats resemble several other rat species, such as *Rattus tiomanicus* (the Malaysian wood rat) and *Rattus exulans* (the Pacific Rat), it might be difficult to identify them. 'Least Concern (LC)' is the IUCN Red List classification for house rats (Francis, 2019).

4.4 Discussion

The diversity and abundance of catch rates of rodents at the Faculty of Earth Sciences, Campus Jeli, are influenced by the following factors. Generally speaking, it can be found wherever that can sustain an omnivorous diet Corbet and Selatan (1977). The variety and accessibility of food, such as fruits, nuts, and other foods, influence the availability of the rat population, and the quality of the habitat influences the food sources. A lot of food may attract more rats to the area. they also take seeds and various plant materials and human scraps. Water availability may have an impact on the spread of mice since they also require water to stay hydrated. thus, modifications to the land's cover and use may significantly affect the quantity of rodents captured. For instance, modifications to human activities in forests, such as development or agriculture, may also have an impact on the availability of food sources and habitat for rodents, which in turn may have an impact on the number and variety of these animals in the area.

Other than that, in Faculty of Earth Sciences, Campus Jeli, human activities and disturbance. Maintaining proper hygiene, including effective waste management, can also lessen the amount of food that rodents have access to, which hinders their capacity to procreate. Next, predation. Depending on the habitat, different predators are known to exist. The biggest danger to its existence is from house cats. They are preyed upon by birds and other carnivorous creatures in less crowded areas. This species' variety of colour patterns could be an anti-predator adaption. According to some research, colour and geographic location are associated, which affects a color's ability to blend in with the surroundings. Rodents are also frequently hostile towards other rodents. according to research conducted in captivity. The classic threat position for a standing on its hind legs and baring its teeth. However, these rodents might end up as food for savage creatures like snakes (Nowak,

1999). This is because, during the conduct of this study, there are predators that are snakes in the study area.

The rate of capture and the foraging habits of rodents are also influenced by weather-related factors. More prone to mild temperatures are rodents. Consequently, inclement weather also makes it difficult for rodents to carry out some activities, such foraging. Rodents are more inclined to seek out warmer shelter and to be less active in their search for food during cold weather. Rather, they operate during the night to avoid excessive heat. The catch rate is also impacted by rain. Rodents look for cover from the rain to keep their bodies from becoming wet. This makes it more difficult to identify their movements. Therefore, it is well known that the weather has a significant impact on rodent activity and catch rate, according to Vickery & Rivest (1992). In the faculty of earth science study of the variety and quantity of rodents, bait reliance is also crucial. Thus, in this investigation, "Golden banana" (*Musa acuminata*) was employed as bait. This is because, when using crackers as bait, no rodents were recorded entering the trap.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.0 Conclusion

To conclude, the data on diversity and abundance at the Faculty of Earth Sciences, Campus Jeli, has been provided by this final year research. Additionally, this information covers the species account, natural habitat, and variables influencing the rodents catch rate. 'Least concern' (LC) is applied to two of the study's documented species, *Rattus tanezumi*. This study's diversity and abundance index shows that the species discovered at the Faculty of Earth Sciences, Campus Jeli, have the lowest diversity. Not all rodent species observed in this research area are represented in the incomplete species accumulation graph, which records the entire amount of capture effort after reaching its asymptotic level.

5.1 Recommendation

The main objective of the study is to use cage traps at the Faculty of Earth Science, Campus Jeli, University Malaysia Kelantan to measure the diversity and quantity of rodents. This research will provide the site with further data and information. There may yet be additional species in the area that have not yet been identified for this study, therefore more research is necessary. While doing research on diversity, there are a few suggestions that should be taken into account. To reduce the restriction, using a different kind of trap is advised.


The sampling will be less biased if a variety of trap types are used, as the animals that are caught may belong to different groups or species. In addition, to enhance the likelihood of recording various species in the region, the position of the cage traps should be relocated and altered multiple times. Furthermore, extending the sampling period by a few days and employing a range of baits or distinct kinds of baits are advantageous. To get more accurate data, certain sampling techniques are necessary.

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APPENDIX

No.	Picture	Species name
1		<i>Rattus Tanezumi</i>