SPECIES COMPOSITION AND BIODIVERSITY OF ORGANISMS IN UNIVERSITY OF TECHNOLOGY MARA (UiTM) KUALA PILAH, NEGERI SEMBILAN, MALAYSIA

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Abstract

The knowledge of biological diversity serves new insights and opportunities for sustainable environment. However, information pertaining to the species composition and biodiversity of University of Technology MARA (UiTM) Kuala Pilah, Negeri Sembilan is scanty. Hence, this study was conducted to assess the species and diversity of organisms at UiTM Kuala Pilah. Using the quadrat sampling technique, 4 plots (labelled as A, B, C and D) with a size of 50 m^2 were established to obtain the organisms present in the study area. Twelve different plant species (Sensitive plant, White Spider Lily, Golden Trumpet, Weeds, Dandotapala, Camphor Grass, Love Grass, Evergreen Rose, Dandelion, Closed Gentian, Flatweed and Chinese Violet) were observed. Meanwhile, a total of ten species were identified as animals (toad, snail, earthworm, grasshopper, millipede, carpenter bee, moth, rhinoceros beetle, bird and gray's leaf). However, only four species were obtained as fungi (mushroom, orange sea lichen, tree-dwelling lichen and button jelly lichen) in the entire plots. The findings of this study suggest that UiTM Kuala Pilah environments can provide baseline information as well as offers the contemporary strategies for preserving cultural and ecological diversity.

Introduction

University of Technology MARA (UiTM) Kuala Pilah, Negeri Sembilan began operating June 1, 2009. This university is mainly located at an area of 160 acres in Mukim Parit Tinggi and surrounded by hill forest. The biotic and abiotic components of the environment function together as an ecological system. Several activities such as agriculture, deforestation, burning and rearing livestock especially from the local people are also a part, have been involved in environmental modification (Bamidele *et al*., 2017; Shah *et al*., 2016).   It was reported that some species of birds are presence in the university for many years (Zawawi *et al*., 2016). The ecological changes as well as biodiversity of flora and fauna may influence the species to survive. Biodiversity refers to the variety of life found on earth or all of the natural processes (Pereira *et al*., 2018). The variety of life includes plants, animals, fungi, bacteria and microorganisms (Marques, 2001). The variability among living organisms from all sources such as terrestrial, soil, wetland, forest and other aquatic ecosystems (Titley *et al*., 2017; Nur Hasyimah *et al*., 2013). To some authors, biodiversity appear as the purview of biological diversity, from intraspecific genetic variation to the species richness, connectivity and spatial arrangement of entire ecosystems at a landscape level scale (Dencer-Brown *et al*., 2018). Species diversity is the number and abundance of different organisms that occupy a location (Li *et al*., 2010). The interactions between and among organisms within their environment is frequently classified as symbiont, competition, predation, parasitism as well as mutualism (Mehrabi *et al*., 2014). In general, organisms include animals, plants and fungi are individual entities that possess the properties of life. Animals can be divided into groups of invertebrate and vertebrate. This group further classified into Phylum such as Annelida, Arthropoda and Chordate. Meanwhile, plants are divided into vascular and non-vascular. In addition, fungi might

be somewhat like plants and they sprout from the ground (Ruggiero *et al*., 2015; Guala, 2016; Lance *et al*., 2013). In this regards, Malaysia comprised of west (including Negeri Sembilan) and east is a country, where rich species of animals, plants as well as fungi diversities are recognized. Several methods can be used in order to measure or obtain biodiversity such as canopy fogging, netting, transect and quadrat sampling (Smith *et al*., 2013). Loss of biodiversity from natural ecosystems can detrimentally affect both humans and nature (Vijay *et al*., 2016). Study need to be done in order to observe and identified the biodiversity for natural sustainability of life. The article later presents the findings of biodiversity at UiTM Kuala Pilah.

Methods

Study Area
UiTM Kuala Pilah is situated at an area of 160 acres in Mukim Parit Tinggi and about 8 km from Kuala Pilah town (2.7415628° N, 102.248835° E) (Figure 1). The university is surrounded by hill forest and the temperatures range from 29 ℃ to 38 ℃.

Data Collection
A non-destructive method through the quadrat sampling technique was employed in this study. A total of 4 plots (50 m^2, respectively) were established for this research, which was labelled as A, B, C and D. A digital camera was used to capture the organisms found in four plots. The physical characteristic of organisms was immediately recorded. After the observation was done, the organisms were discussed and classified into their own group.

Identification of Organisms
Organisms found in four different plots were identified according to the Taxonomy scientific method in describing, naming and classifying characteristics. Some references such as books, journals and photographs of identified organisms were used in the process of identification and confirmed by the first author.
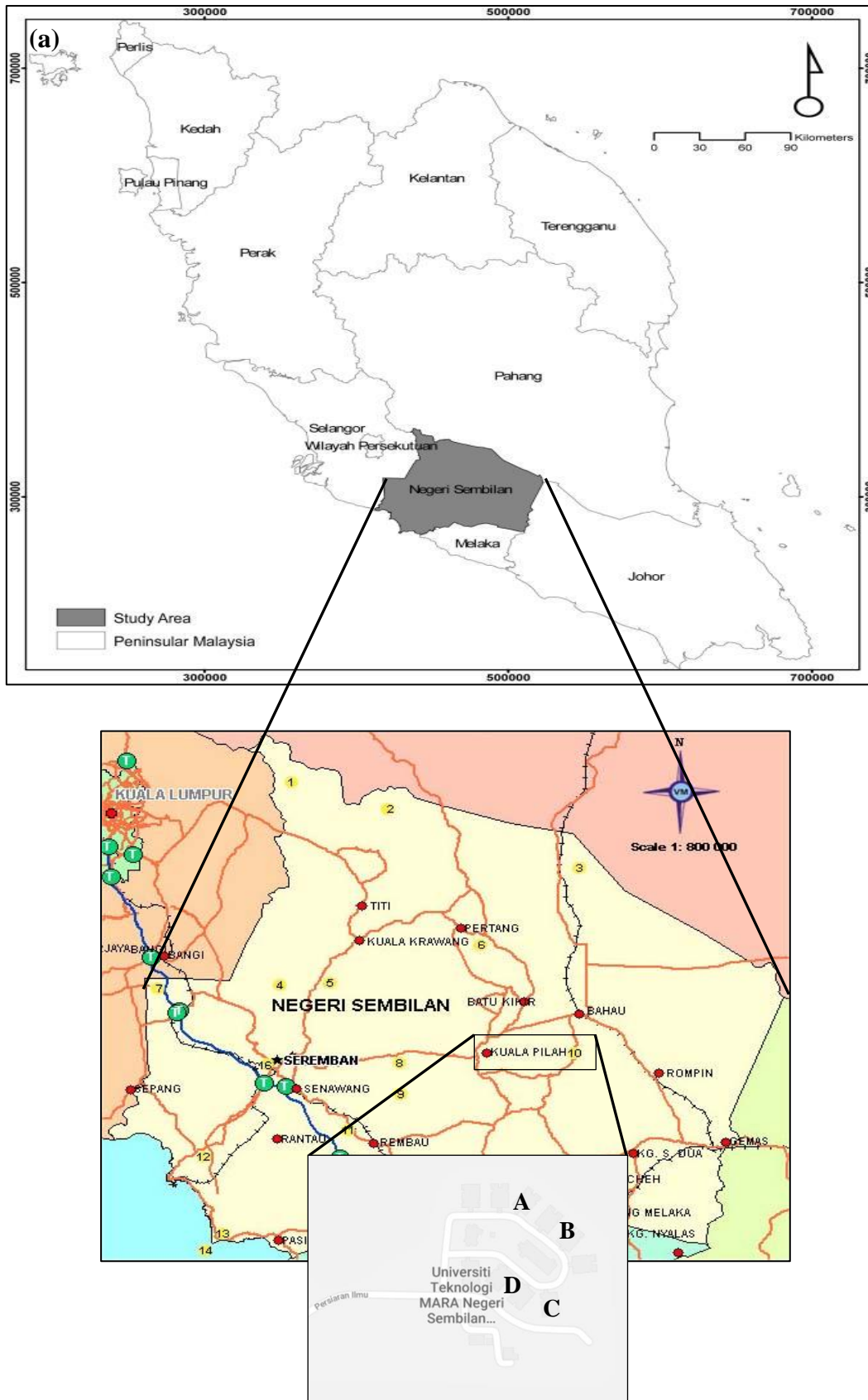
Figure 1 Map of (a) Peninsular Malaysia showing the location of the study area in the district of (b) Kuala Pilah, specifically to show the (c) University of Technology MARA (UiTM) campus. A total of 4 plots at UiTM were established in this study, which was labelled as A, B, C and D.

Result and Discussion

Species Composition

In this study, the total number of 12 plants species was recorded in A, B, C and D. The plant species obtained such as Sensitive plant (*Mimosa pudica*), White Spider Lily (*Hymenocallis durangoensis*), Golden Trumpet (*Allamanda cathartica*), Weeds (*Ageratum conyzoides*), Dandotapala (*Vernonia cinerea*), Camphor Grass (*Cinnamomum camphora*), Love Grass (*Chrysopogon aciculatus*), Evergreen Rose (*Rosa sempervirens*), Dandelion (*Taraxacum officinale*), Closed Gentian (*Gentiana andrewsii*), Flatweed (*Hypochaeris radicata*) and Chinese Violet (*Asystasia gangetica*). Meanwhile, a total of 10 species were identified as animals such as toad (*Buffo spp.*), snail (*Cornu aspersum*), earthworm (*Lumbricus terrestris*), grasshopper (*Zonocerus variegatus*), millipede (*Trigonilus spp.*), carpenter bee (*Xylocopa spp.*), moth (*Lepidoptera spp.*), rhinoceros beetle (*Xyloryctes jamaicensis*), bird (*Aves spp.*) and gray's leaf (*Phyllium bioculatum*). However, only 4 species was found as fungi in the entire plots, which was identified as mushroom, orange sea lichen (*Caloplaca marina*), tree-dwelling lichen (*Flavoparmelia caperata*) and button jelly lichen (*Collema nigrescens*).

As shown in Figure 2, the highest diversity of plant was observed in A (21 organisms). This was followed by D, C and B with 19, 13 and 11 of organisms, respectively. The group of animals was represented by 11 numbers of organisms from Interval D. Meanwhile, a total of 6 organisms were collected from A and B. In addition, a total number of 3 organisms were observed in C. In this study, a total of 4 fungi species was recorded in the entire plots. A total number of 4 and 3 fungi were collected from B and D, respectively. Meanwhile, the least number of 1 fungi was recorded from A and C.
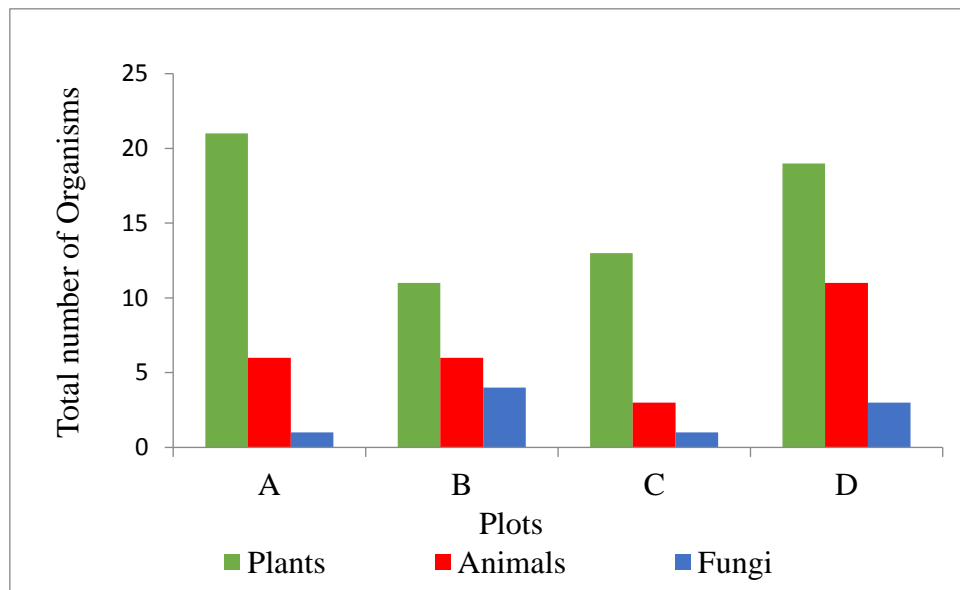

Figure 2 A total numbers of organisms found in four plots.

The highest plant biodiversity species was observed is Love Grass with a total of 12 individuals in the entire plots. This plant was classified as a species of grass native from the family of Poaceae. Some of the plants observed in the sampling area were a common plant species such as Sensitive plant (7 individuals), Camphor Grass (5 individuals) and Flatweed (4 individuals). These plants growth very wide spread within the plotting area. Plant biodiversity of Sensitive plant can showed interaction between the biotic or abiotic environment. The leave of the Sensitive plant usually protect themselves from predators and environmental conditions by folding in response to touch or shaking (Braam, 2005).

The plotting area also has several plant species with herbal or traditional medicine uses to meet the needs of local people such as Chinese Violet (7 individuals), Dandotapala (6 individuals) as well as

White Spider Lily (1 individual). It was reported that the Chinese Violet contains flavonoids, saponins, triterpenoides and others substances, which make plant useful in analgesic or anti-inflammatory activity (Tilloo *et al*., 2012). Meanwhile, Dandotapala and White Spider Lily has been reported to possess anti-inflammatory, antidiabetic, renoprotective, anticancer, antiviral and antimicrobial activities (Dogra and Kumar, 2015; Ndip *et al*., 2013; Sundarasekar *et al*., 2013; Arifullah *et al*., 2014).

In this study, the family Apocynaceae, represented by Golden Trumpet (3 individuals) was found in A and D. It has sharply toothed, lance-shaped green leaves and bears large, showy as well as bright Golden Yellow Trumpet-shaped flowers. It is drought-tolerant and grows well in university environment. It was reported that the yellow color of Golden Trumpet can attract bees, butterflies, and hummingbirds (Barrios *et al*., 2016). Apart from this plant, Dandelion, Weeds, Evergreen Rose and Closed Gentian were recorded in the entire study area. It was found that these plants species was categorized as flowering plants with a simple leaves, growing in roadside and have the ability to withstand harsh environment. The list of plant species with the number of individuals obtained in the study area are presented in Figure 3. Meanwhile, the images of several plant species found in the entire plots are shown in Figure 4.
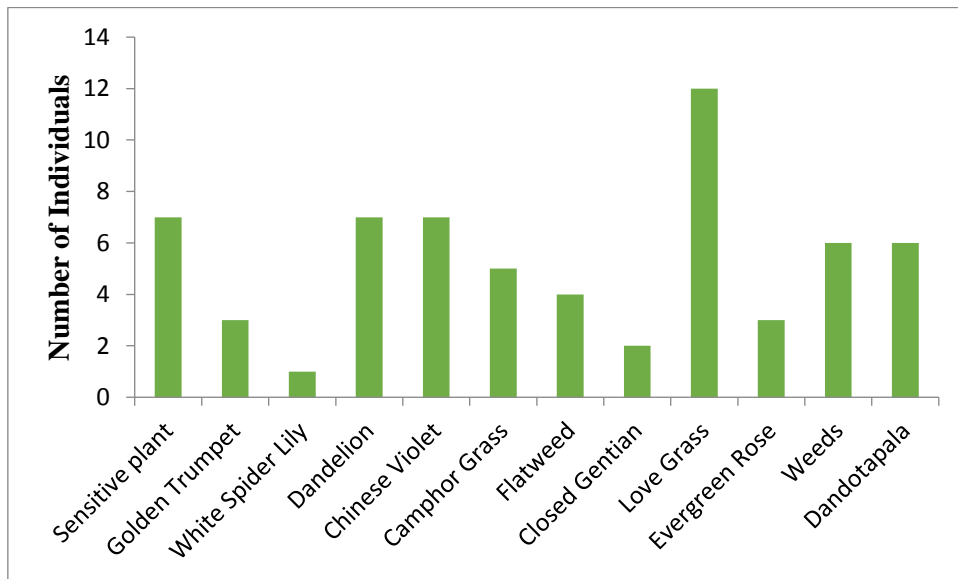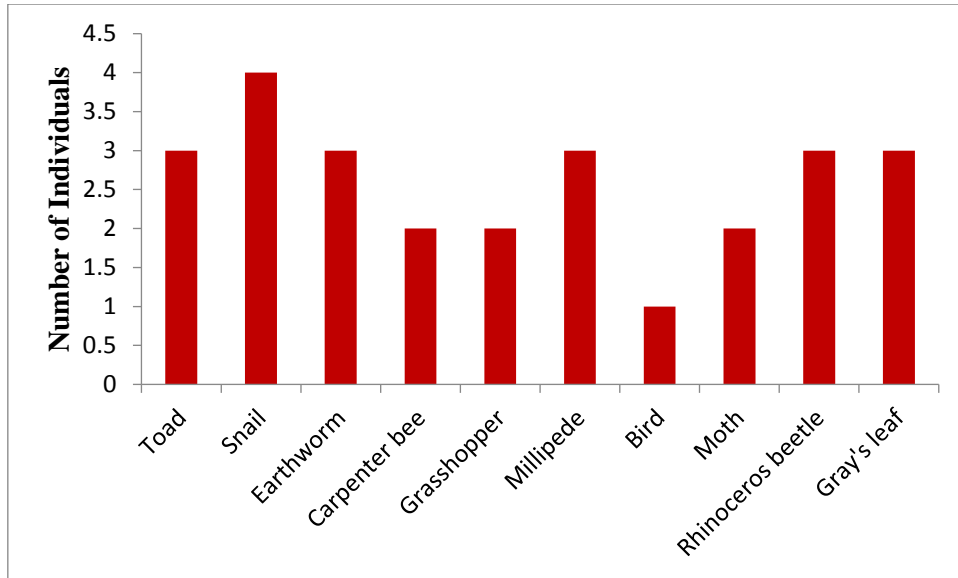

Figure 3 The list of plant species with the number of individuals found in the study area.
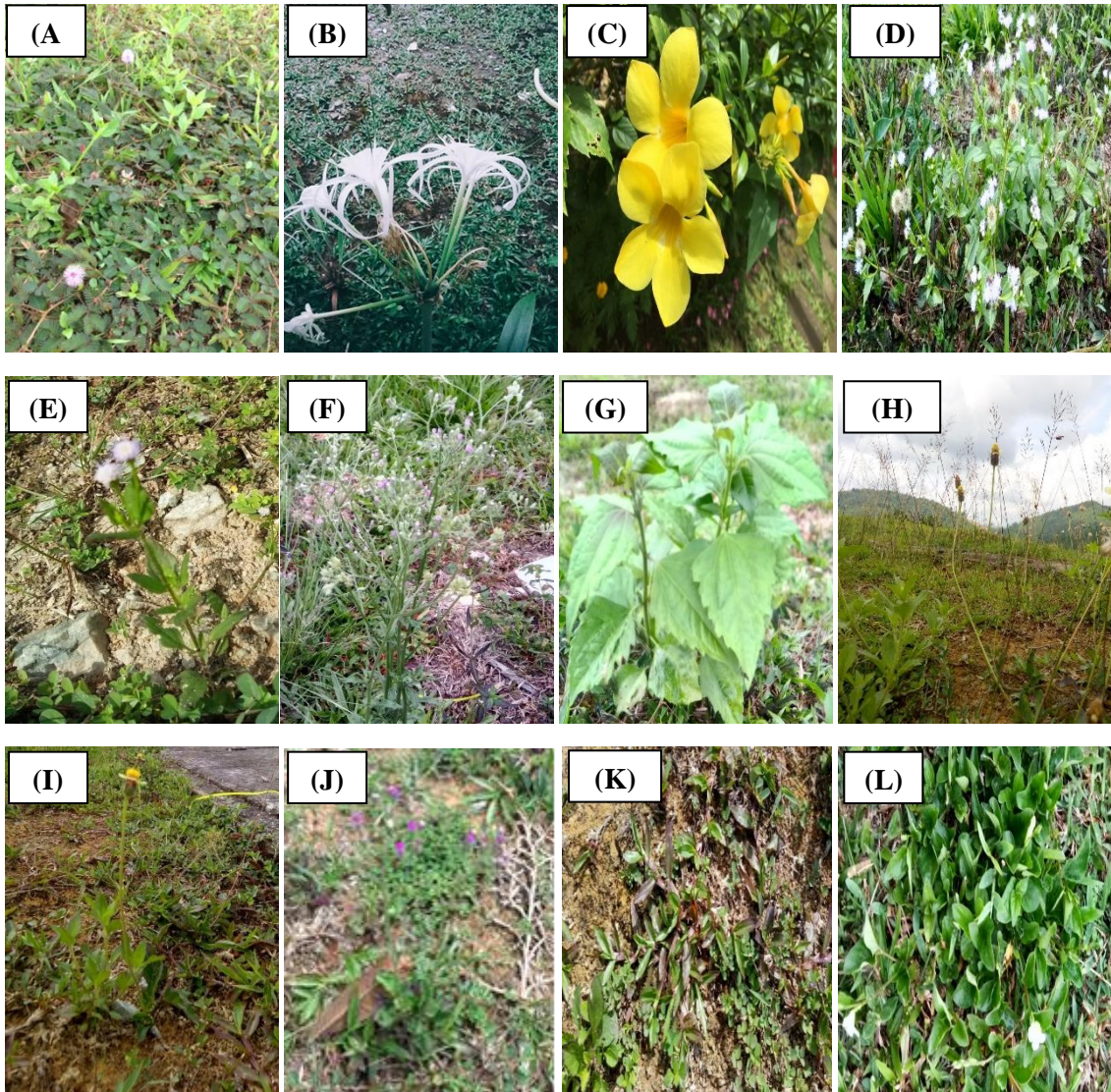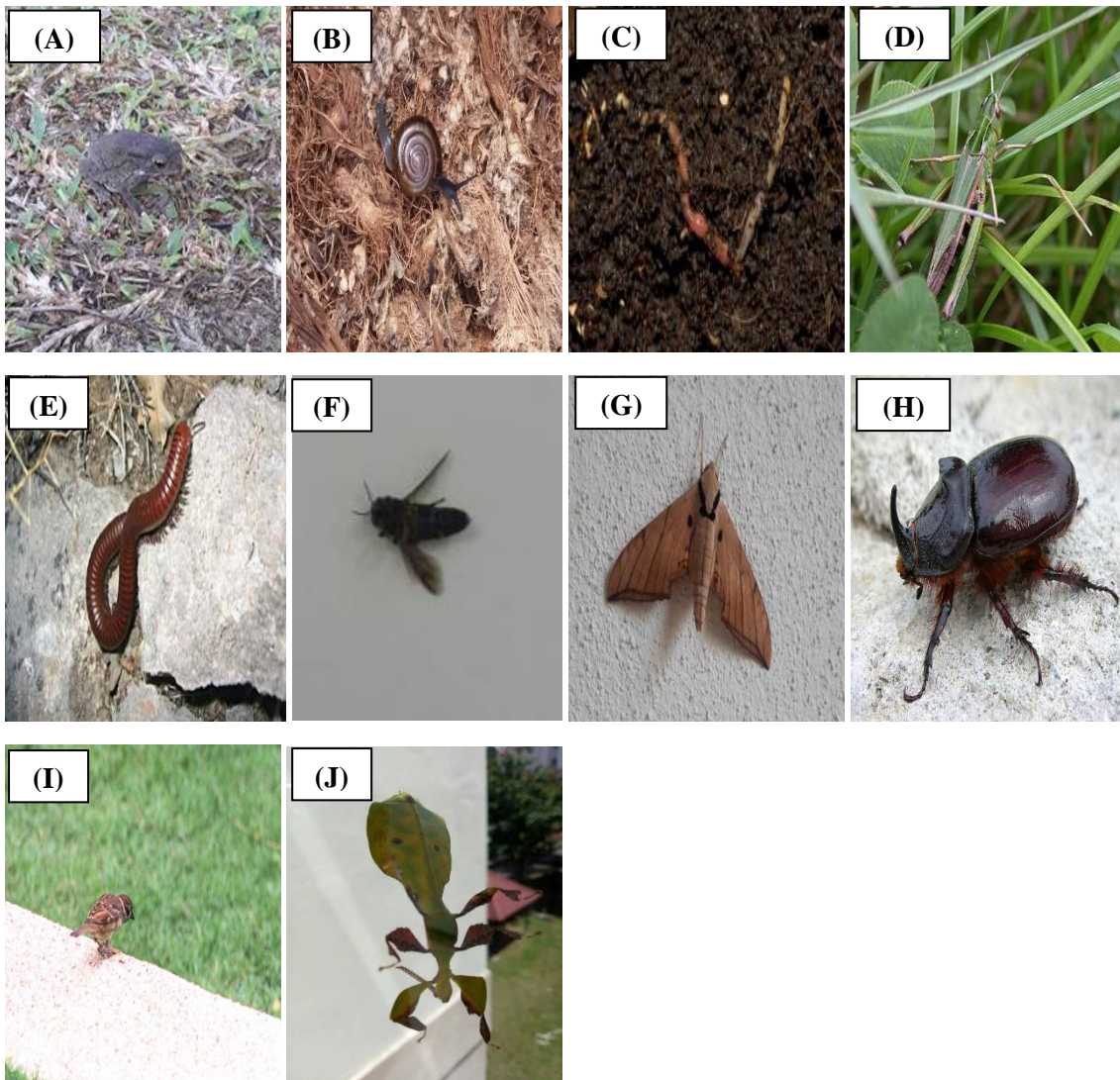
Figure 4 The study area has several plant species such as (A) sensitive plant (B) White spider lily (C) Golden trumpet (D) Weeds (E) Dandotapala (F) Camphor grass (G) Love grass (H) Evergreen rose (I) Dandelion (J) Closed gentian (K) Flatweed (L) Chinese violet

The animal biodiversity study included classes of amphibians, mammals under vertebrates and Arthropoda as well as Annelida under invertebrates (Myers *et al*., 2018). Among the animals found in the study area, snail was recorded as a highest animal species (4 individuals). The class of Annelida, represented by earthworm (3 individuals) was observed in A and D. In this study, the earthworm present in moist areas of plots. This was attributed to the moist nature of the surrounded environment. The activities of earthworms could be connected with their role in the degradation of soil humidification and their pedobiological roles (Bamidele *et al*., 2017). Most of the total animal species observed in study area were Arthropods such as rhinoceros beetle (3 individuals), gray's leaf (3 individuals), millipede (3 individuals), carpenter bee (2 individuals), grasshopper (2 individuals) and moth (2 individuals). These Arthropods can be predated upon by several higher animal species. Such animal species as observed include the toad and bird. Organism such as carpenter bee and birds are important pollinators that are responsible for the pollination of crops especially from the local people activities. In addition, survival of living organisms usually depends on other animals or plants for food. The list of animals species with the number of individuals obtained in the entire plots are presented in Figure 5. Meanwhile, the images of animals species found in the study area are shown in Figure 6.
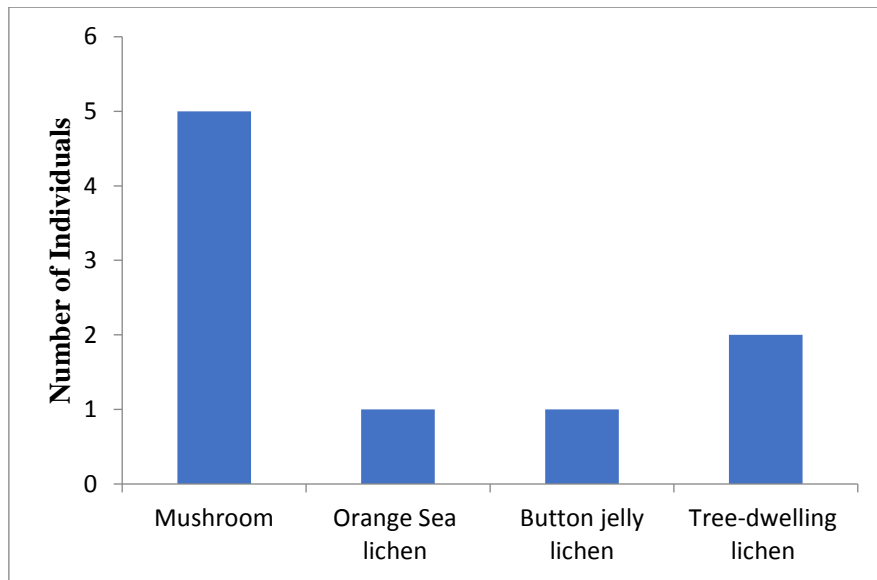
Figure 5 The list of animal species with the number of individuals found in the study area.


Figure 6 The study area has several animal species such as (A) Toad (B) Snail (C) Earthworm (D) Grasshopper (E) Millipede (F) Carpenter bee (G) Moth (H) Rhinoceros beetle (I) Bird (J) Gray's leaf

In this study, the group of fungal species is determined by the descriptive appearance, size, shape and color. The category of mushroom (5 individuals) was observed in B and D. The structure and the morphology of the mushroom, reveals that it is one of the members of Basidiomycota. Meanwhile, the phylum of Ascomycota was represented by orange sea lichen, tree-dwelling lichen and button jelly lichen. In this study, lichens as symbiotic associations between mycobiontic and photobiontic, was found at the bark of trees. It was reported that the main reasons for the richness of lichen species in a caused by human interference such as disturbances by people activities or air pollution (Boch *et al.*, 2013; Boch *et al.*, 2011). The list with the number of individuals and the images of fungal species obtained in the entire plots are presented in Figure 7 and Figure 8.

Figure 7 The list of fungal species with the number of individuals found in the study area.
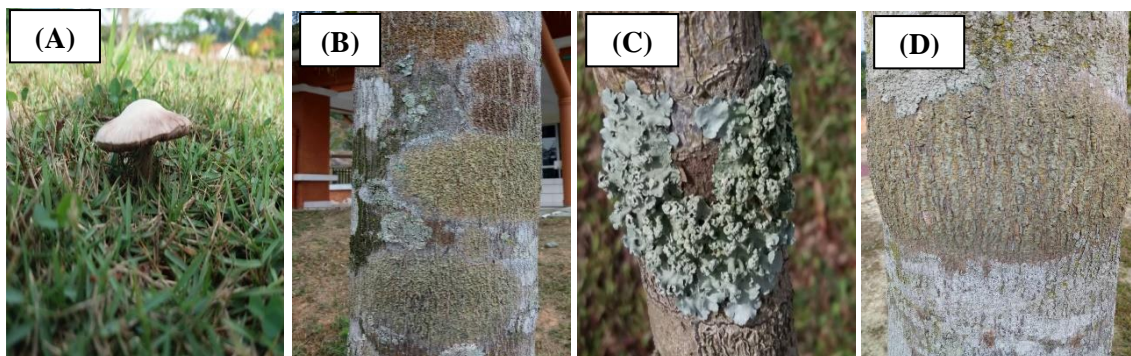
Figure 8 The species of fungi obtained in the study area include (A) Mushroom (B) Orange Sea lichen (C) Tree-dwelling lichen (D) Button jelly lichen

Conclusion

A total of twelve different plant species were obtained. Meanwhile, a total of ten and four were identified as animals and fungal species, respectively. UiTM Kuala Pilah environment could be regarded as a biotic community consisting's the different species of organisms interacting together. The findings of this study could be used as baseline information for assessing the biodiversity. Detailed research on biological ecosystems also is importance to maintain and ensure continued existence of organisms.

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