

Occurrence and Composition of Beetles in Yadanabon University Campus and Surrounding Area, Amarapura Township, Mandalay Region

Than Paing*, Hnin Mying**, Htar Htar Lwin***, Khin May Nyo****

Abstract

The present study was conducted in Yadanabon University Campus and surrounding area from May to December 2019. The study area has different ecosystems with diverse floral composition and high plant species diversity. A total of 30 beetle species belonging to 16 subfamilies of nine families were recorded from the study area. Regarding the species composition, Scarabaeidae and Chrysomelidae were the highest (23.33% each), followed by Coccinellidae, Rutilidae, Tenebrionidae and Cerembycidae with the second highest percentage (10% each). The lower composition was recorded in Elateridae (6.67%) and the lowest composition was observed in Carabidae and Curculionidae (3.33% each). When subfamilies were considered, it was recorded that Galerucinae was the highest percentage (13.33%). The lower percentages were observed in Coccinellinae, Dynastinae, Rutilinae, Tenebrioninae and Cassidinae (10 % each) and Scarabaeinae (6.67%). The composition of beetles was recorded to be the lowest in Brachininae, Prosterninae, Agrypinae, Melolonthinae, Cetoniinae, Prioninae, Cerambycinae, Lamiinae and Brachydaeinae (3.33 % each).

Keywords: beetles, occurrence, composition, University Campus, orchards, agricultural fields

Introduction

About 40% of all described insect species are beetles (about 400,000 species) and new species are discovered frequently. The diversity of beetles is very wide. Beetle species contribute as the largest number of total insect biodiversity. Beetles exhibit ecological and biological diversity. Most of the species of beetle are terrestrial and herbivores; many species of beetles are pests; many are predators. They are found in all major habitats, except marine and the Polar Regions (Banerjee, 2014).

Beetles can usually be recognized by their two pairs of wings; the front pair is modified into horny covers (elytra) that hide the rear pair and most of the abdomen and usually meet down the back in a straight line. Beetles occur in nearly all climates and latitudes, except in such extreme environment as Antarctica and at the highest altitudes. Although many species occur in temperate environments, the number of species is the greatest in the tropic (Gressit, 2018).

Many beetle species are phytophagous. They are regarded as major pests for agricultural plants and stored products. Bark beetles can cause great harm to trees. Leaf beetles can cause serious harm to crops. Some species can infest foodstuffs. Many

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beetles are predators. They live in the soil or on vegetation and attack a wide variety of invertebrate hosts. Many beetles are scavengers. They feed on fecal materials, decaying wood or other organic matter and recycle nutrients back into the soil (Meyer, 2016).

Some beetles attack all parts of living plants. Scavengers and wood boring beetles are useful as decomposers and recyclers of organic nutrients. Predatory species are important as biological control agents of the agricultural pests. In the light of above, identification and observation of the beetles are very important. Species composition is the identity of all different organisms that make up a community. Occurrence and compositions of beetle species are very important from economic, agricultural and ecological point of view. Unfortunately, the fauna of these important insects has poorly been studied in this area so the additional studies are necessary. The present research has been conducted with the following objectives;

- to identify and record the different beetle species in the study area
- to investigate the occurrence of beetles in the study period
- to observe composition of beetle species in the study area

Materials and Methods

Study area

The present study was conducted in Yadanabon University Campus and surrounding area, Amarapura Township, Mandalay. It is located at Latitude 21° 52' 28.1" N and Longitude 96° 06' 9.08"E. The area enjoys a semi-tropical climate. The average annual temperature is 27.4 °C. The average annual rainfall is 517 mm (Fig. 1).

Study period

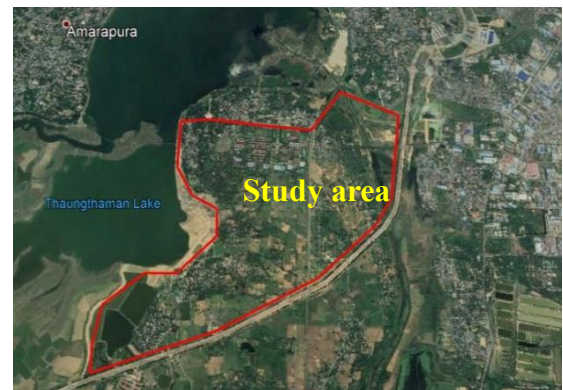
The study was made from May to December 2019

Specimen collection

Specimen collection was performed once in the middle of the month. Beetles were collected by means of net sweeping method, trapping method and hand picking method for good collection of specimens. Some individuals were collected with "sweep nets" made up of nylon mesh bag and aluminum handle. Some individuals were collected with "pitfall traps", constructed with plastic containers. The traps were buried with the openings at the ground level, permitting the entry of the entomofauna. Some individuals were collected near electric bulbs and light strips. Hand picking method was mostly adopted for collection.

Preparation and preservation of specimens

Some specimens were anaesthetized with chloroform in killing bottles. The dead specimens were pinned down and mounted by insect pins of appropriate sizes. The pins were inserted on the right elytra. The legs and antennae were spread and properly



Source: Google Earth

Fig. 1 Map of study area

arranged. The dried specimens were kept in the insect collection box. The box was applied with naphthalene powder to prevent from ants and fungus contamination.

Identification

Photographs and observations were taken in the Zoology Department in University. Specimens were identified by cross-checking with standard references and photo guides. Identification of the specimens was made according to Gahan (1906), Marshall (1916), Arrow (1917), Maulik (1919, 1936), Pope (1953), Borror *et al.* (1989), Saha *et al.* (1992), Choate (1999), Boo-Hee Jung (2012) and Creedy and Mann (2012).

Results

A total of 30 beetle species of 16 subfamilies belonging to nine families were recorded in the study period (Table 1 and Plate 1). Regarding the species composition, the highest composition (23.33%) was observed in Scarabaeidae (dung beetles) and Chrysomelidae (leaf beetles) and the lowest (3.33%) in Carabidae (ground beetles) and Curculionidae (the snout beetles). When subfamilies were considered, the highest percentage was (13.33%) in Galerucinae and the lowest (3.33%) in Brachiniinae, Prosterninae, Agrypinae, Melolonthinae, Cetoniinae, Prioninae, Cerambycinae, Lamiinae and Brachydaeinae were observed (Table 2 and Fig. 2 and 3).

Table 1 List of beetle species recorded in Yadanabon University Campus and surrounding area

No.	Family	Subfamily	Scientific name		
1	Carabidae	Brachininae	<i>Pheropsophus occipitalis</i> (Macleay, 1825)		
2	Elateridae	Prosterninae	<i>Paraphotistus impressus</i> (Fabricius, 1792)		
3		Agrypinae	<i>Lanelater luridus</i> (Fabricius, 1781)		
4		Coccinellidae	Coccinellinae	<i>Micraspis discolor</i> (Fabricius, 1798)	
5			<i>Cheilomenes sexmaculata</i> (Fabricius, 1789)		
6			<i>Coccinella transversalis</i> (Linnaeus, 1767)		
7	Scarabaeidae	Scarabaeinae	<i>Catharsius molossus</i> (Linnaeus, 1758)		
8				<i>Onitis virens</i> Lansberge, 1875	
9			Dynastinae	<i>Oryctes rhinoceros</i> (Linnaeus, 1758)	
10			<i>Xylotrupes ulysses</i> Guerin-Meneville, 1830		
11			<i>Eutheola humilis</i> (Burmeister, 1847)		
12			Melolonthinae	<i>Phyllophaga crinita</i> (Burmeister, 1855)	
13			Cetoniinae	<i>Protaetia fusca</i> (Herbst, 1790)	
14		Rutelidae	Rutelinae	<i>Anomala pallida</i> (Fabricius, 1775)	
15					<i>Anomala dubia</i> (Scopoli, 1763)
16					<i>Anomala varicolor</i> (Gyllenhal, 1817)
17		Tenebrionidae	Tenebrioninae	<i>Gonocephalum tuberculatum</i> (Hope, 1831)	
18					<i>Gonocephalum bilineatum</i> (Walker, 1858)
19				<i>Dendarus zariquieyi</i> Espanol, 1937	
20	Cerambycidae	Prioninae	<i>Dorysthenes granulatus</i> (Thomson, 1860)		
21		Cerambycinae	<i>Stromatium longicorne</i> (Newman, 1842)		
22		Lamiinae	<i>Gerania bosci bosci</i> (Fabricius, 1781)		
23	Chrysomelidae	Cassidinae	<i>Aspidomorpha miliaris</i> Fabricius, 1775		
24				<i>Aspidomorpha circumdata</i> (Thunberg, 1789)	
25				<i>Charidotella sexpunctata</i> (Fabricius, 1781)	
26			Galerucinae	<i>Aulacophora foveicollis</i> Lucas, 1849	
27				<i>Aulacophora lewisii</i> Baly, 1886	
28				<i>Monolepta signata</i> Oliver, 1808	
29				<i>Altica lythri</i> Aube, 1843	
30	Curculionidae	Brachyderinae	<i>Hypomeces squamosus</i> Fabricius, 1792		

Table 2 Species composition of beetles in different families and subfamilies

Family	No. of species	Composition %	Subfamily	No. of species	Composition %
Carabidae	1	3.33	Brachininae	1	3.33
Elateridae	2	6.67	Prosterninae	1	3.33
			Agrypinae	1	3.33
Coccinellidae	3	10.00	Coccinellinae	3	10.00
Scarabaeidae	7	23.33	Scarabaeinae	2	6.67
			Dynastinae	3	10.00
			Melolonthinae	1	3.33
			Cetoniinae	1	3.33
Rutilidae	3	10.00	Rutilinae	3	10.00
Tenebrionidae	3	10.00	Tenebrioninae	3	10.00
Cerembycidae	3	10.00	Prioninae	1	3.33
			Cerambycinae	1	3.33
			Lamiinae	1	3.33
Chrysomelidae	7	23.33	Cassidinae	3	10.00
			Galerucinae	4	13.33
			Brachydaeinae	1	3.33
Curculionidae	1	3.33	Brachydaeinae	1	3.33
Total	30	100		30	100

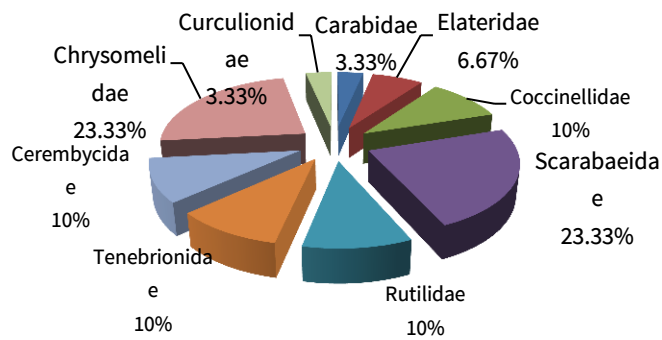


Fig. 2 Species composition of beetles in different families

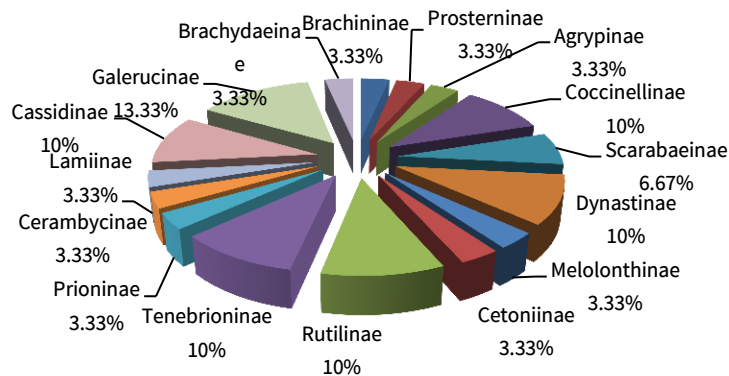


Fig. 3 Species composition of beetles in different subfamilies



A. *Pheropsophus occipitalis*



B. *Paraphotistus impressus*



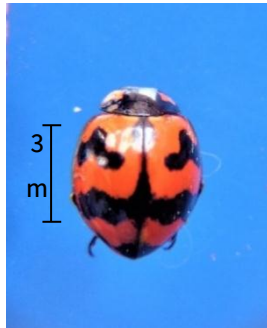
C. *Lanelate luridus*



D. *Micraspis discolor*



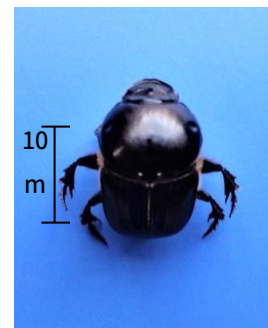
E. *Chilomenes*



F. *Coccinella transversalis*



G. *Catharsius*



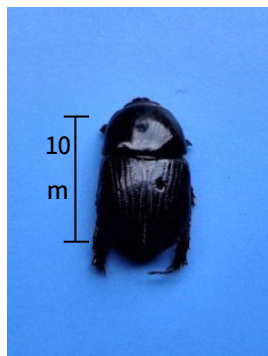
H. *Onitis virens*



I. *Oryctes rhinoceros*



J. *Xylotrupes ulysseus*



K. *Euateola humilis*



L. *Phyllophaga crinata*



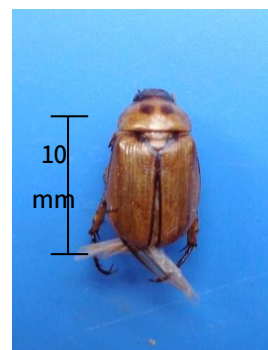
M. *Protaetia fusca*



N. *Anomala pallida*



O. *Anomala dubia*



P. *Anomala varicolor*



Q. *Gonocephalum tuberculatum*



R. *Gonocephalum bilineatum*



S. *Dendarus zariquieyi*



T. *Aspidomorpha miliaris*



U. *Aspidomorpha circumdata*



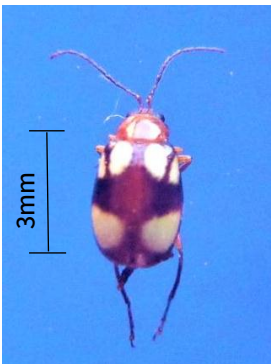
V. *Charidotella sexpunctata*



W. *Aulacophora*



X. *Aulacophora*



Y. *Monolepta signata*



Z. *Altica lythri*



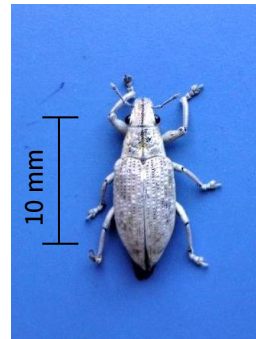
AA. *Dorystenes granulatus*



AB. *Stomatium longicorne*



AC. *Gerania bosci bosci*



AD. *Hypomeces squamosus*

Discussion

The present study was conducted in Yadanabon University Campus and the surrounding area from May to December 2019. A total of 30 beetle species belonging to 16 subfamilies of nine families were recorded from the study area.

Dunxiao *et al.* (1999) reported that the abundance and the structure of the edaphic insect communities depended on the alimentary supply and on the environmental properties conditioned by the local vegetation. The environmental conditions of study area favoured the presence of a large number of fauna nesting sites and feeding areas. The study area had different ecosystems with diverse floral composition and high plant species diversity. In the University Campus, a total number of 51 tree species belonging to 44 genera and 18 families (Thin Nu Swe Zin, 2018) and 86 herb and shrub species belonging to 67 genera and 26 families (Kyi Hlaing Oo, 2018) were reported. In the surrounding area of the Campus, there were mango orchards and agricultural fields. Farmers in the study area cultivated the various types of crops such as rice, corn, sorghum and legumes. Some farmers cultivated lemons and vegetables. The floral compositions and the availability of food resources were distinct in the University Campus and its surrounding area. The floral composition was constant in the Campus and orchards and changed with seasons in the surrounding agricultural area.

In the present study, ground beetles, *Pheropsophus occipitalis* were noticed in soil and debris of study area. Click beetles, *Paraphotistus impressus* and *Lanelater luridus* were found among leaf litters on the ground. The individuals of these species were collected with hand picking methods. Only a small number of individuals were observed in the University Campus but they were not noticed in crop cultivars. Coccinellid beetles were very common insects found in agricultural fields. The individuals of these species were collected with sweep net. Three lady beetle species, *Micraspis discolor*, *Cheilomenes sexmaculata* and *Coccinella transversalis* were recorded in all crop cultivars in the study area. They were not noticed in the University Campus.

During the study period, seven species of dung beetles were recorded. Among, them, *Catharsius molossus*, *Onitis virens*, *Oryctes rhinoceros*, *Xylotrupes ulysses* and *Euethiola humilis* were found in dung piles of cattles, on the ground and among decaying plant matters. They were collected with hand picking methods. Although there were no big dung piles of livestock in Campus, a considerable number of individuals were collected. The individuals of *Phyllophaga crinita* and *Protaetia fusca* were found in legumes cultivars, mango orchards and in Campus. Three species of beetles under Rutilidae, *Anomala pallida*, *Anomala dubia* and *Anomala varicolor*, were observed in the study area but a small number of individuals were collected.

Three species of darkling beetles, *Gonocephalum ruberculatum*, *Gonocephalum bilineatum* and *Dendarus zariquieyi* were noticed among leaf litters and on the ground.

Most individuals were collected with pitfall traps. These species were abundant and they were observed throughout the study area. The longhorn beetles, *Dorysthenes granulosus*, *Stromatium longicorne* and *Gerania bosci bosci*, were recorded in University Campus and orchards but they were not noticed in crop cultivars.

Maulik (1919) reported that members of cassidines were serious pests of economically important plums and they attacked Asian and African food crops including corn, rice, sugarcane, bamboo, date palm, and coconut. Both larvae and adults feed on foliage. This finding is in agreement with the present observations in which a large number of individuals of tortoise beetles, *Aspidomorpha miliaris*, *Aspidomorpha circumdata*, and *Charidotella sexpunctata*, were observed on legumes, corn and vegetables. They were not noticed in University Campus.

The leaf beetles, *Aulacophora foveicollis*, *Aulacophora lewisii* and *Altica lythri* were found in agricultural fields and they were pests of crops. These species were noticed on rice, legumes and vegetables. *Monolepta signata* were very abundant on rice. They were collected with sweep net. The individuals of snout beetle, *Hypomeces squamosus* were noticed throughout the study area.

There were many beetle species in Yadanabon University Campus and surrounding area. The ladybird beetles were predators and they were the important natural enemies of insect pests and have potential in biological control of plant pests. Leaf beetles and the snout beetle were abundant in agricultural fields and these species were pests of many plant species. Click beetles and longhorn beetles were observed in the orchards and in the University Campus. Darkling beetles and dung beetles were found throughout the study area. They were useful as decomposers and recyclers of organic nutrients. In the light of above, identification and observation of occurrence and compositions of beetle species are very important from economic, agricultural and ecological point of view.

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