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Species Composition and Relative Abundance of Beetles in Non-Crop Habitats
(Study at Myitkyina University Campus)

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Abstract: *A total of 296 beetles belonging to 35 species, 32 genera, 11 families under Order Coleoptera were collected from grasslands, shrub and garden vegetables at Myitkyina University Campus, Kachin State during October 2016 to November 2017. The study site was chosen randomly within the University Campus. The specimens were collected by hand picking and sweep net. The percent composition of species in different families was described as the highest in Family Chrysomelidae (28.57 %), followed by Scarabaeidae (17.14 %), Curculionidae and Coccinellidae (14.29 % each), Carabidae (8.57 %) and the lowest in Families Cerambycidae, Endomychidae, Elateridae, Hydrophilidae, Meloidae and Tenebrionidae (2.86 % each) respectively. Among the collected beetles sampled, Aulacophora foveicollis (6.76 %) was the most abundance while Anomala antiqua (0.68 %) was the least. In the present work, 46% of the studied species was high status of pests and 54% was low. Three species of the genus Sagra, Chrysina and Sphodrus were not clearly identified down to species level. Identification will enable the pest status of the beetles to be established and give the baseline information for future research.*

Keywords: *Beetle, Myitkyina University, Kachin State, Species Composition & Abundance.*

1. INTRODUCTION

There are more than 850,000 species of insects on earth, more than all the other plants and animals combined. Great number of the insects, nearly half are beetles. Contrasting other insects, beetles have a pair of leathery protective wings called elytra that cover their membranous flight wings. Beetles are included in the Order Coleoptera, about 400, 000, the largest of all orders in the Superorder Endopterygota.

Their front pair of wings, elytra is hardened into wing-cases, elytra. Adult beetles are usually easily recognized by their strongly sclerotized forewings, which form a strong protection shield. During flight, elytra are spread apart and two flight wings are unfolded and extended. Beetles come in a variety of shapes and colors, from red "lady bugs" and metallic green fig beetles to lightning beetles that glow in the dark and huge horned beetles resembling a miniature rhinoceros. Colorful beetles are used for jewelry and pins, and shiny tropical scarab beetles are strung together to make unusual necklaces. The beetles range in size from less than a millimeter (1/100 of an inch) to tropical giants over six inches long. The largest giants may weigh 40 million times more than their lilliputian relatives..

The Order Coleoptera is represented by some 370,000 known species (Lawrence *et al*., 1999), but recent estimates suggest that there are hundreds of thousands and even millions of undescribed species. Beetles are not only rich in species, but also, extremely rich with respect to diversity in size, form, and ecological strategies. The largest beetles, Longhorn Beetles (Cerambycidae) from the Amazon, may be as long as 18 cm, while the smallest ones, feather wing beetles (Ptiliidae), measure less than half a millimeter (Sörensson, 1997). The oldest beetle fossils are known from the Lower Permian (~ 280 million years) (Lawrence *et al*., 1999). Beetles are holometabolous insects, i.e. their life stages are egg – larva – pupa – adult. Although the vast majority of beetles are terrestrial, at least 10,000 species are regarded to be aquatic in one or more of their developmental stages (cited by Balke *et al*., 2014).

Myitkyina University is located on the eastward of Myitkyina, west bank of Ayeyawady River, northern Myanmar. Many variety of vegetables, grasslands, shrubs and trees were grown in the University Campus in all the year-round.

This paper reviews the occurrence of beetles prevalent in northern Myanmar and to pay the basic information to students. For these reasons, the aims of this study are:

a. to record and identify the occurrence of some beetles and
b. to analyze the species composition and relative abundance of beetles.

1.1 Statement of the problem

The statement of the problem is a survey of beetles in the Myitkyina University, northern Myanmar.

1.2 Objective

The objective of this study was to survey and record the species composition, relative abundance and the pest status of the species studied.

2. REVIEW OF LITERATURE

Leather *et al*. (1999) published the distribution and abundance of ladybirds (Coleoptera: Coccinellidae) in non-crop habitats. They informed coccinellids were most frequently found on grassland habitats. In 1999, Waterhouse described major arthropod pests and weeds of agriculture in Southeast Asia. In 2002, Rao *et al*. reviewed the population of different insect pests was reduced in intercropping if suitable intercrop was selected.

Chanthy *et al*. (2010) described Insects of Upland crops in Combodia. A field guide to identifying insect pests and beneficial insects and spiders in the upland cropping systems of Cambodia. Mulerčikas *et al*. (2012) documented Species Composition and Abundance of Click-Beetles (Coleoptera, Elateridae) in Agrobiocenozes in Southern Lithuania in which 13 species and 10 genera examined and the highest abundance of click-beetles was detected in the seminatural meadow with light granulometric structure soil.

Jagdale and Magdum (2017) studied the diversity and abundance of Coleopteran insects belonging to Family Scarabaeidae, Geotrupidae, Hybosoridae from Nashik, Maharashtra, India in which they identified the 24 types of dung beetles.

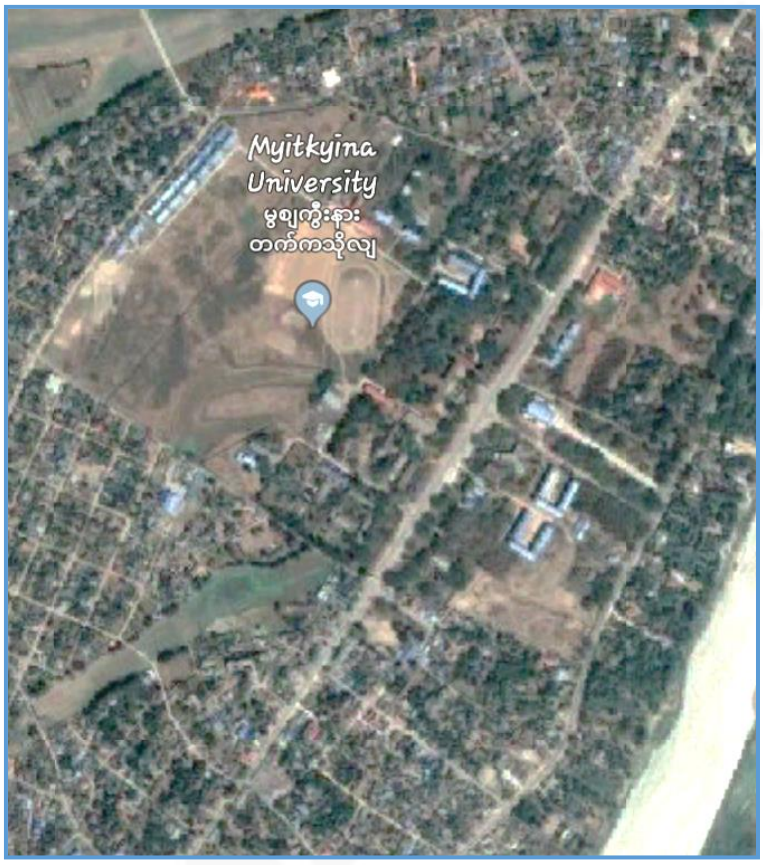
3. Materials and Methods

3.1 study area

The study area was located at Myitkyina University Campus (25˚ 26′18.928″ N latitude and 97˚ 25′51.901″ E longitude), Kachin State, northern Myanmar (Fig.1).

3.2 Study period

Survey period was lasted during October 2016 to March 2017.



Source: Google Earth

Fig. 1 Map of study site (Myitkyina University Campus, northern Myanmar)

3.3 Specimen Collection

The specimens were collected randomly by hand picking and insect net. The collected specimens were placed in the plastic containers and transported to Department of Zoology for identification. The specimens were examined and recorded the size, antennae, coloration and the patterns on the wings. Then, the specimens were taken photo, measured and killed by soap solution and mounted for further study (Hopkins *et al*., 2012).

3.4 Species Identification

The identification was followed after Ghosh, (1940), Imms (1963), Borror and Delong, (1964), Heisswolf *et al*. (2010) and Nair (2012). The physical appearances of insects were noted down and photos were also taken immediately after capturing the insects. The collected specimens were mounted for further studies.

3.5 Killing and mounting methods

Collected insects were killed in a jar containing ethyl acetate following after Hopkins *et al.* (internet accessed Hopkins *et al*., July 25, 2012). Leaf beetles were pinned down and stored in insect box

and moths were dried and mounted. Some of the pests collected at nymph or larval stages were reared in the laboratory until the adults emerged.

Insects were collected alive for study alive. To do this, the specimens were collected into suitable plastics containers and transport them. For preservation, the specimens collected were killed rapidly to prevent damage.

Large specimens were killed in a jar with closely fitting lid using a volatile toxicant such as 70% alcohol or soapy water. Plastic vials were very useful in the field.

3.6 Data Analysis

Data obtained was analyzed using Microsoft Excel (2013). Descriptive statistics, the relative abundance and percent composition of species were presented. Relative abundance (dominance or relative density) was calculated following the formula of Fager (1957) and Wallwork (1976).

$$\text{Relative abundance} = \frac{\text{No. of individuals in each species}}{\text{Total no. of individuals in all species}} \times 100$$

4. RESULTS AND DISCUSSION

In the field survey, a total of 296 specimens belonging to 35 species, 32 genera, 11 families under Order Coleoptera were collected and identified from Myitkyina University Campus during October 2016 to November 2017 (Table 1). The colored photos of each species were presented in Appendix. A total of 35 coleopteran species from 11 families were recorded during the present investigation (Table 2). Of these 32 coleopteran insects were identified up to the species level and three up to the genus level. Three species of the genus *Sagra*, *Chrysina* and *Sphodrus* were not clearly identified down to species level.

In the present investigation, family Chrysomelidae showed prominent species richness and abundance amongst the eleven families trailed by Scarabaeidae with 6 species, Curculionidae and Coccinellidae were with 5 species each, Carabidae with three species and the least prominent families Cerambycidae, Endomychidae, Elateridae, Hydrophilidae, Meloidae and Tenebrionidae with one species each respectively. The percent composition of species in different families was described as the highest in Family Chrysomelidae (10 species, 28.57 %), followed by Scarabaeidae (6 species, 17.14 %), Curculionidae and Coccinellidae (5 species, 14.29 % each), Carabidae (3 species, 8.57 %) and the lowest in Families Cerambycidae, Endomychidae, Elateridae, Hydrophilidae, Meloidae and Tenebrionidae (one species, 2.86 % each) respectively (Table 2 & Fig. 2). Among the collected beetles sampled, *Aulacophora foveicollis* (6.76 %) was the most abundance while *Anomala antiqua* (0.68 %) was the least. Concerning with pest status, 46% of the studied species showed high status of pests and 54% was low status (Fig. 3).

During the study period, *Aulacophora foveicollis* was the most abundant species (20 individuals, 6.76%) while *Anomala antiqua* was the least one (2 individuals, 0.68%) (Table 3). The coleopteran beetle collection at Myitkyina University Campus were dominated by family Chrysomelidae.

In this study, the highest number of species was found in January 2017 while the lowest number of that in December 2016. This could be the reason why low temperature and humidity seems to be favorable for the species occurred during this month.

It was seem to be considerable variation in composition and abundance in different collection time of the study period. Within the time limits of the present work it was impossible to identify the some specimens. The species composition of beetles may be different among different time of the year in any long-term study depending on the amount of rainfall, temperature and humidity.

Table 1 Number of Coleopteran beetles collected at Myitkyina University Campus during the present study

Sr. No.	Family	Genus	Scientific Name	Common Name	No. of specimens
1	Carabidae	*Cicindela*	*Cicindela flavomaculata*	Tiger beetle	10
2	Carabidae	*Ophionea*	*Ophionea nigrofasciata*	Ground beetle	10
3	Carabidae	*Pheropsophus*	*Pheropsophus verticalis*	Bombardier beetle	5
4	Cerambycidae	*Batocera*	*Batocera tigris*	Long Horn beetle	8
5	Chrysomelidae	*Aulacophora*	*Aulacophora foveicollis*	Pumpkin beetle	20
6	Chrysomelidae	*Aulacophora*	*Aulacophora lewisii*	Pumkin beetle	15
7	Chrysomelidae	*Cassida*	*Cassida circumdata*	Green tortoise beetle	15
8	Chrysomelidae	*Chatochnema*	*Chatochnema pulicaria*	corn flea beetle	5
9	Chrysomelidae	*Chrysolina*	*Chrysolina polita*	Leaf beetle	5
10	Chrysomelidae	*Charidotella*	*Charidotella sexpunctata*	Golden tortoise beetle	5
11	Chrysomelidae	*Dicladispa*	*Dicladispa armigera*	Rice hispa	14
12	Chrysomelidae	*Monolepta*	*Monolepta signata*	White spotted leaf beetle	10
13	Chrysomelidae	*Phyllotreta*	*Phyllotreta striolata*	Striped flea beetle	12
14	Chrysomelidae	*Sagra*	*Sagra sp.*	Frog legged leaf beetle	5
15	Curculionidae	*Curculio*	*Curculio gladium*	Acorn weevil	4
16	Curculionidae	*Sitophilus*	*Sitophilus zeamis*	Rice weevil	15
17	Curculionidae	*Otiorhynchus*	*Otiorhynchus ligustici*	Alfafa snout beetle	12
18	Curculionidae	*Sphenophorus*	*Sphenophorus callosus*	Southern corn billbug	4
19	Curculionidae	*Hypomeces*	*Hypomeces squamosus*	Shoot borer weevil	7
20	Coccinellidae	*Chelomenes*	*Chelomenes sexmaculata*	Six-spotted zigzay lady beetle	10
21	Coccinellidae	*Coccinella*	*Coccinella septempunctata*	Seven spotted lady beetle	10
22	Coccinellidae	*Coccinella*	*Coccinella transversalis*	Transverse lady beetle	12
23	Coccinellidae	*Epilachna*	*Epilachna indica*	Twelve spotted melon beetle	12
24	Coccinellidae	*Micraspis*	*Micraspis discolor*	Ladybird beetle	8
25	Endomychidae	*Ancylopus*	*Ancylopus pictus*	Handsome fungus beetle	8
26	Elateridae	*Oxynopterus*	*Oxynopterus mucronatus*	Snapping beetle	6
27	Hydrophilidae	*Hydrophilus*	*Hydrophilus triangularis*	Giant black water beetle	6
28	Meloidae	*Epicauta*	*Epicauta tibialis*	Black blister beetle	6
29	Scarabaeidae	*Anomala*	*Anomala antiqua*	Sesame black beetle	2
30	Scarabaeidae	*Cyclocephala*	*Cyclocephala lurida*	Southern masked chafer beetle	4
31	Scarabaeidae	*Chrysina*	*Chrysina gorda*	Jewel scrab beetle	5
32	Scarabaeidae	*Chrysina*	*Chrysina sp*	Jewel scrab beetle	7

33	Scarabaeidae	*Sphodrus*	*Sphodrus sp.*	Ground beetle	4
34	Scarabaeidae	*Gymnopleurus*	*Gymnopleurus mopsus*	Dung beetle	7
35	Tenebrionidae	*Gonocephalum*	*Gonocephalum hoffmausegyi*	Soil beetle	8
			Total no. of specimens		296

Table 2 Total number and percentage of species, genera and individuals observed per family

Sr. No.	Family	Genera		Species		Individual	
		No.	%	No.	%	No.	%
1	Carabidae	3	9.38	3	8.57	25	8.45
2	Cerambycidae	1	3.13	1	2.86	8	2.70
3	Chrysomelidae	9	28.13	10	28.57	106	35.81
4	Curculionidae	5	15.63	5	14.29	42	14.19
5	Coccinellidae	4	12.50	5	14.29	52	17.57
6	Endomychidae	1	3.13	1	2.86	8	2.70
7	Elateridae	1	3.13	1	2.86	6	2.03
8	Hydrophilidae	1	3.13	1	2.86	6	2.03
9	Meloidae	1	3.13	1	2.86	6	2.03
10	Scarabaeidae	5	15.63	6	17.14	29	9.80
11	Tenebrionidae	1	3.13	1	2.86	8	2.70
	Total (11)	32	100	35	100	296	100.00

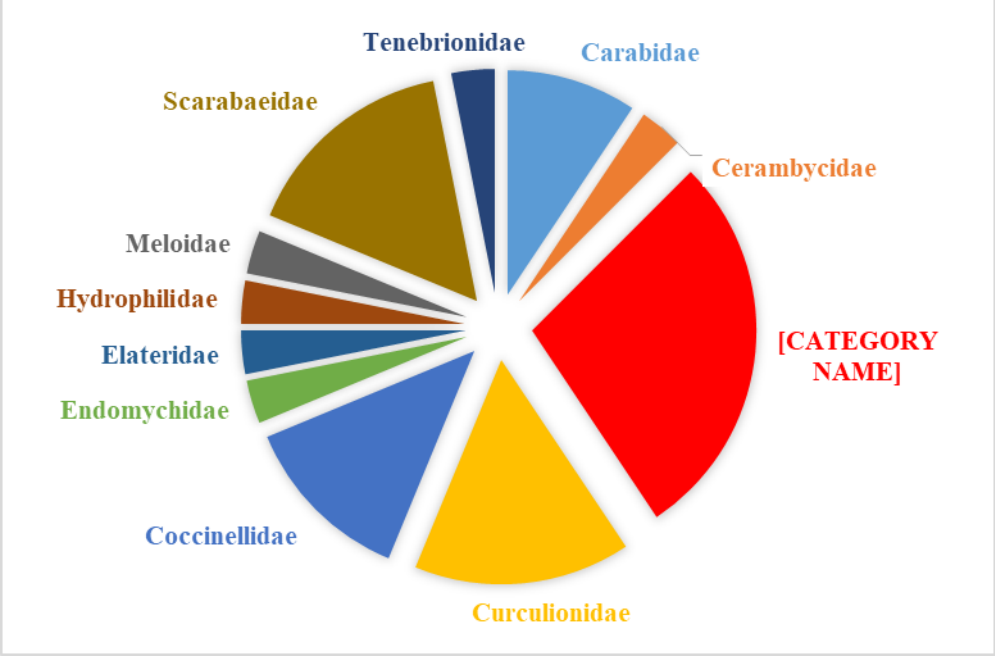


Fig. 2 Percent composition of species in different families

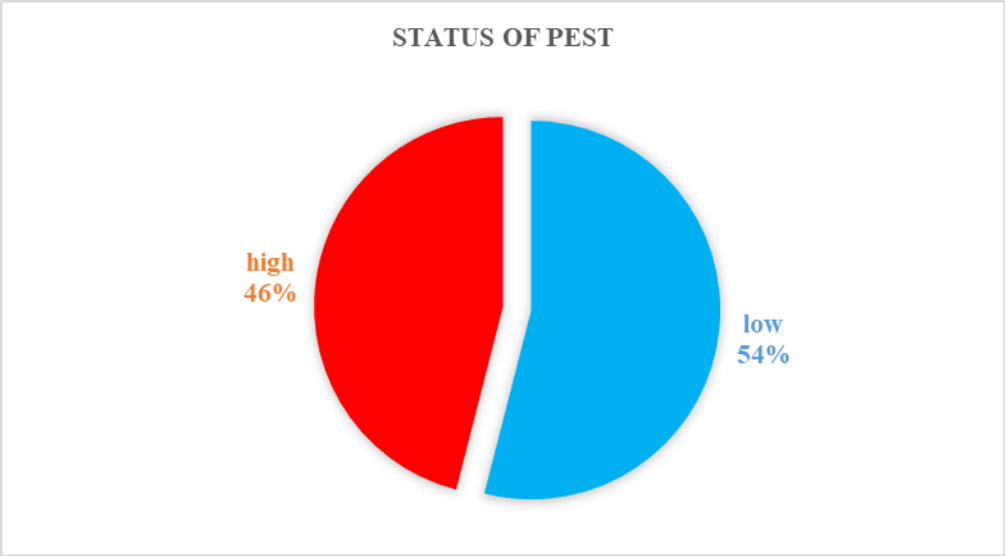


Fig. 3 Percentage of pest status in the beetles collected

Table 3 Relative abundance of beetles sampled during the study period

Sr. No.	Scientific Name	No. of specimens	Relative abundance (%)	Pest Status
1	*Cicindela flavomaculata*	10	3.38	low
2	*Ophionea nigrofasciata*	10	3.38	high
3	*Pheropsophus verticalis*	5	1.69	high
4	*Batocera tigris*	8	2.70	high
5	*Aulacophora foveicollis*	20	6.76	high
6	*Aulacophora lewisii*	15	5.07	high
7	*Cassida circumdata*	15	5.07	low
8	*Chatochnema pulicaria*	5	1.69	low
9	*Chrysolina polita*	5	1.69	low
10	*Charidotella sexpunctata*	5	1.69	low
11	*Dicladispa armigera*	14	4.73	low
12	*Monolepta signata*	10	3.38	low
13	*Phyllotreta striolata*	12	4.05	high
14	*Sagra buqueti*	5	1.69	low
15	*Curculio gladium*	4	1.35	low
16	*Sitophilus zeamis*	15	5.07	high
17	*Otiorhynchus ligustici*	12	4.05	low
18	*Sphenophorus callosus*	4	1.35	high
19	*Hypomeces squamosus*	7	2.36	low
20	*Chelomenes sexmaculata*	10	3.38	high
21	*Coccinella septempunctata*	10	3.38	high
22	*Coccinella transversalis*	12	4.05	low
23	*Epilachna indica*	12	4.05	low

24	*Micraspis discolor*	8	2.70	low
25	*Ancylopus pictus*	8	2.70	low
26	*Oxynopterus mucronatus*	6	2.03	low
27	*Hydrophilus triangularis*	6	2.03	high
28	*Epicauta tibialis*	6	2.03	low
29	*Anomala antiqua*	2	0.68	high
30	*Cyclocephala lurida*	4	1.35	low
31	*Chrysina gorda*	5	1.69	high
32	*Chrysina sp*	7	2.36	low
33	*Sphodrus sp.*	4	1.35	high
34	*Gymnopleurus mopsus*	7	2.36	high
35	*Gonocephalum hoffmausegyi*	8	2.70	high
	Total no. of specimens	296	100	

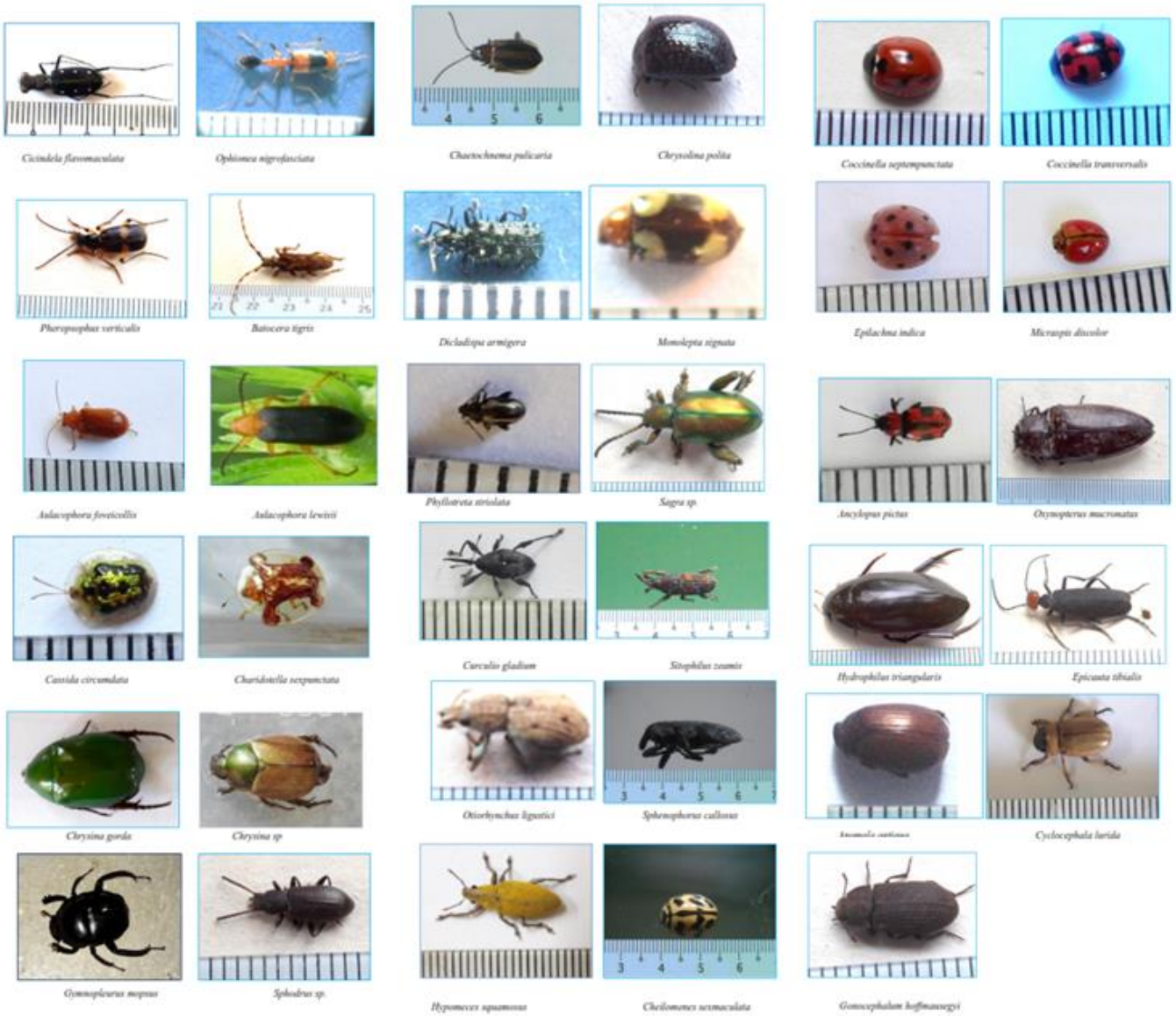


Fig 4. Beetles Species

5. CONCLUSION

The results of this survey will be contributed to the basic information to the students in teaching aids and for future researches. Further works are still needed to fulfill the complete information of beetles.

6. RECOMMENDATIONS

a. This survey should be the baseline information for students and researchers.
b. Further surveys are clearly needed of those areas that were not covered in this study to fully evaluate the beetle fauna of the University Campus.

7. ACKNOWLEDGMENT

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