

Seasonal Occurrence and Relative Abundance of Butterfly Species in Sittway University Campus

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Abstract

The present study was conducted the occurrence of the butterfly species in Sittway University Campus. The study period lasted from March 2018 to August 2018. The specimen collection was done by four study sites in Sittway University Campus. The identification of collected specimen from different study sites was made and the abundance of the butterfly species was recorded. A total of 21 species of butterfly under 14 genera belonging to seven families were recorded in this study. Among these families, Nymphalidae was observed as the highest number of species and Acraeidae, Satyridae, Lycaenidae were recorded the lowest number. Monthly surveys were done in four study sites and the data was analyzed. The highest number of butterflies was recorded in March and the lowest number in August.

Keywords: Species, Butterfly, Relative Abundance

Introduction

Butterflies are one of the most beautiful insects in the world and taxonomically well studied groups and have received a reasonable amount of attention throughout the world. They are important pollinators and food chain components of an ecosystem. . Butterflies are strongly associated with flowering plants. The adult butterfly visits to flowers for nectar and are indeed among the dominant cross-pollinators. The relationship between butterfly species and the plants play an important role in an ecosystem. Flowering plants need butterfly species for pollination and the butterflies require suitable plant species to serve as their host plant to complete their life cycle (Kunte, 2000).

Butterflies belong to the class Insecta. They are beautiful, flying insects with large scaly wings. Like all insects, they have a pair of antennae and an exoskeleton. They have two pairs of large wings cover with colorful, iridescent scales in overlapping rows. Butterflies are the most celebrated and the most popular because they are active by day, and are renowned for their beautiful colours, fascinating patterns and graceful flight. Although moths look like butterflies at glance, they have several differences in detail: the antennae of butterflies have clubs or knobs at the tips while those of moths are thread like, feathery or blunt; butterflies are diurnal animals whereas moths are nocturnal; butterflies hold their wings in upright position while moths in spread out position when at rest. There are more than 150,000 described species under the order Lepidoptera, of which about 20,000 species are butterflies (Preston-Mafham, 1999).

Butterflies and moths (order Lepidoptera) offer good opportunities for studies on population and community ecology (Pollard, 1991). They are potentially useful ecological indicators of urbanization because they can be readily surveyed, they are sensitive to change in microclimate, temperature, solar radiation, and the availability of host plants for ovipositing and larval development. Butterflies are recognized as focal species of conservation in several areas of the world. Being good indicators of climatic conditions as well as seasonal and ecological changes, they can serve in formulating strategies for conservation. Butterflies are special interest to biologists because they have been used as studied organisms in a wide range of biological disciplines such as population dynamics, community biology, food plant associations, chemical defence and genetics, sex and communication (Vane-Wright and Ackery, 1984).

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In Myanmar, over 1,200 butterfly species have been recorded by Kinyon (2004). Butterflies are cosmopolitan and are adapted to survive in varying environmental conditions; deserts, mountain peaks, rain forests, field and woodlands, and in well-established gardens. Most people are familiar with the adult butterflies as they are pleasant sight to the onlookers to watch them while visiting from one flower to another for gathering nectar and pollen. Many butterfly species stay close to the ground, or spend more time near it and rarely fly higher. The adult butterflies feed on the different diets. Most of the butterflies suck the nectar from the flowering plants. The nectar is high in sugars that provide energy for flight. Some butterflies are likely to feed on over-ripe fruits and others feed on animal dung and tree sap (Kunte, 2000).

The butterfly species of Sittway University Campus has not been conducted yet. The present study was therefore done to investigate the occurrence of butterfly species in Sittway University Campus and to analyze the relative abundance of the butterfly species in Sittway University Campus

Materials and methods

Study area and study period

Sittway University Campus was chosen as the study area, which was located between (20°08' 44" N, 92°51'56" E) and (20°08' 47" N, 92°51' 34" E) in Sittway Township, Rakhine State.

Four study sites were divided to collect the specimen as study site I (20° 08' 38.5" N, 92° 51' 47.8" E), site II (20° 08' 37.6" N, 92° 51' 38.2" E), site III (N 20° 08' 45.5" N, 92° 51' 37.8" E) and site IV (20° 08' 47" N, 92° 51' 46.9" E). The study period lasted from March, 2018 to August, 2018.

Collection of specimens

The butterflies were recorded for four days per month, 10:00AM - 12:00AM (2 hours) for each collection under predominantly sunny conditions. From each study site, the location points were set up for the collection of specimens. The sampled fields were selected randomly and independently from each location points. The specimens were collected using the tool to catch butterflies is a long handled butterfly net. The collected specimens were anaesthetized with chloroform vapor or immobile by pinching. When anaesthetizing with chloroform vapour, a piece of cotton wool were soaked with chloroform and dropped into a wide mouthed bottle before placing the captured specimens in it to prevent excessive flapping of wings. Larger specimens were immobilized by pinching the underside of the thorax. The butterflies had to be immobilized in order to prevent them from mechanical injuries due to this activity.



Fig. 1. Map of Sittway University Campus (Source from Google earth, 2018)

Identification of specimens

All specimens were conducted and identified at least to species level by following references Collins & Morris 1985; Evans 1932; Haribal 1994; IUCN 2009; Kunte 2005; Mani 1986. As the key characteristics for identification species were based on their wing venation, coloration, size and parts of the head and legs were conducted according to Bingham (1907) and Kinyon (2004) and Talbot (1939, 1947).

Data analysis

Relative abundance of butterfly species was also calculated based on each species under seven families. (Kumar and Sivaperuman, 2005)

$$\text{Relative abundance} = \frac{\text{Total number of particular species}}{\text{Total species}} \times 100$$

Abundance categories were determined based on index values as follow:

Rare species = 0.1-2.0

Uncommon = 2.1-4.0

Frequent = 4.1-6.0

Common = 6.1-8.0, Abundant = 8.1-Above

Materials used in the study sites

A digital camera, butterfly net, GPS, hand lens, butterfly cage and note book were used to collect the specimens in the field study.

Results

Recorded butterfly species from Sittway University Campus

During the 6 months of study period, a total of 21 species of butterfly under 14 genera belonging to seven families were recorded in this study (Table 1).

Table 1. Recorded butterfly species in Sittway University Campus

Order	Family	Scientific Name	Common Name
Lepidoptera	Acraeidae	<i>Acraea violae</i>	Tawny Coster
	Danaiidae	<i>Danaus chrysippus</i>	Plain Tiger
		<i>D. genutia</i>	Striped Tiger
		<i>D. limniace</i>	Blue Tiger
	Nymphalidae	<i>Cethosia cyane</i>	Leopard lacewing
		<i>Hypolimnas bolina</i>	Great Eggfly
		<i>Junonia almana</i>	Lemon Pansy
		<i>J. atlites</i>	Grey Pansy
		<i>J. hierta</i>	Yellow Pansy
		<i>Neptis mahendra</i>	The Himalayan Sailor
		Lycaenidae	<i>Castalius rosimon</i>
	Pieridae	<i>Appias libythea</i>	Stripped Albatross
		<i>Catopsilia pyranthe</i>	Mottled Emigrant
		<i>C. Pomona</i>	The Lemon Emigrant
		<i>Delias decombesi</i>	Red-Spot Jezebel
		<i>D. hyparete</i>	The Painted Jezebel
		<i>Eurema hecabe</i>	Common Grass Yellow
		<i>Leptosia nina</i>	Psyche
	Papilionidae	<i>Papilio polytes</i>	Common Mormon
		<i>P. demoleus</i>	Lime Butterfly
	Satyridae	<i>Ypthima baldus</i>	Common Five-ring

Species composition of recorded butterfly species

Seven of recorded species were under family Pieridae, six species were under family Nymphalidae, three species of Danaiidae and two species of Papilionidae. Only one species was recorded each under Acraeidae, Lycaenidae and Satyridae family. Among them, Pieridae (33%) was the highest species composition which was followed by Nymphalidae (28%) and then Danaiidae (14%). Papilionidae (9%) and (5%) of Acraeidae, Lycaenidae, Satyridae were the lowest species respectively (Fig. 2).

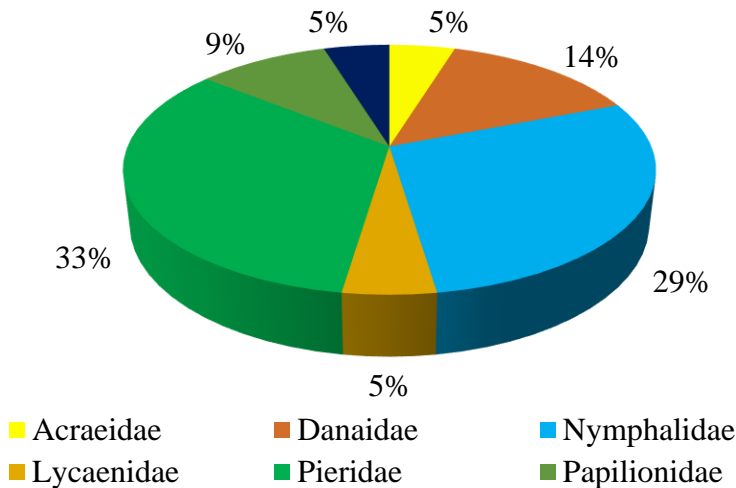


Fig. 2. Family wise butterfly species composition in Sittway University Campus

Monthly occurrence of butterfly species and number of individual at study site I

The total number of (16) butterfly species were recorded at site I. During the study period, the highest number of (72) individuals were collected in March, 2018. The second highest number of (67) individuals were collected in June, 2018. The lowest number of (17) individuals were collected in May, 2018 (Table 2).

Monthly occurrence of butterfly species and number of individual at study site II

The total number of (12) butterfly species were recorded at site II. During the study period, the highest number of (46) individuals were collected in June, 2018. The second highest number of (29) individuals were collected in March, 2018. The lowest number of (19) individuals were collected in July, 2018 (Table 3).

Monthly occurrence of butterfly species and number of individual at study site III

The total numbers of eight butterfly species were recorded at site III. During the study period, the highest number of (20) individuals were collected in May 2018. The second highest number of (17) individuals were collected in March, 2018. The lowest number of (15) individuals were collected in April, 2018 (Table 4).

Monthly occurrence of butterfly species and number of individual at study site IV

The total number of (11) butterfly species were recorded at site IV. During the study period, the highest number of (27) individuals were collected in March, May, 2018. The second highest number of (20) individuals were collected in July and August. The lowest number of (15) individuals were collected in April, 2018 (Table 5).

Monthly occurrence of butterfly species and number of individual in Sittway University Campus

The total number of (534) individuals were observed in the study periods. The highest number of (145) individuals were found in March, 2018. The second highest number of (113) individuals were found in May, 2018. The lowest number of (34) butterfly species were observed in August, 2018 (Table 6).

Among those recorded families, Pieridae was observed as the highest number of species and Acraeidae was recorded the lowest number. The highest population of butterflies was recorded in March and the lowest number in August.

Table 2. Monthly occurrence of butterfly species at study site I

Sr. No.	Species	Site I						Total
		March	April	May	June	July	August	
1	<i>Acraea violae</i>	18	8	5	4	3	-	38
2	<i>Danaus limniace</i>	-	-	-	-	2	-	2
3	<i>Hypolimnias bolina</i>	-	-	-	3	-	-	3
4	<i>Junonia almanac</i>	-	-	-	1	-	-	1
5	<i>Junonia hierta</i>	-	-	-	12	4	-	16
6	<i>Castalius rosimon</i>	3	-	4	-	-	-	7
7	<i>Appias libythea</i>	13	6	3	6	2	-	30
8	<i>Catopsilia pyranthe</i>	-	-	-	15	3	-	18
9	<i>Catopsilia Pomona</i>	-	-	-	9	2	-	11
10	<i>Delias decombsei</i>	8	2	-	-	-	-	10
11	<i>Delias hyparete</i>	9	-	-	-	-	-	9
12	<i>Eurema hecabe</i>	4	-	-	3	3	-	10
13	<i>Leptosia nina</i>	5	8	3	3	-	-	19
14	<i>Papilio polytes</i>	-	2	-	1	2	-	5
15	<i>Papilio demoleus</i>	-	-	2	3	-	-	5
16	<i>Ypthima baldus</i>	12	-	-	7	5	-	24
	Total individuals	72	26	17	67	26	-	208
	Total species	8	5	5	12	9		

Table 3. Monthly occurrence of butterfly species at study site II

Sr. No.	Species	Site II						Total
		March	April	May	June	July	August	
1	<i>Acraea violae</i>	-	5	9	7	2	-	23
2	<i>Danaus chrysippus</i>	-	1	-	-	-	-	1
3	<i>Junonia atlites</i>	-	1	-	-	-	-	1
4	<i>Junonia hierta</i>	1	-	-	1	-	-	2
5	<i>Neptis mahendra</i>	1	-	-	-	-	-	1
6	<i>Castalius rosimon</i>	3	2	2	10	-	-	17
7	<i>Catopsilia pyranthe</i>	-	-	-	10	7	-	17
8	<i>Catopsilia Pomona</i>	-	-	-	-	2	-	2
9	<i>Delias decombesei</i>	-	-	-	-	-	2	2
10	<i>Delias hyparete</i>	-	3	-	-	-	-	3
11	<i>Eurema hecabe</i>	16	7	5	9	1	-	38
12	<i>Ypthima baldus</i>	8	5	8	9	7	-	37
	Total individuals	29	24	26	46	19	-	144
	Total species	5	7	4	6	5	1	

Table 4. Monthly occurrence of butterfly species at study site III

Sr. No.	Species	Site III						Total
		March	April	May	June	July	August	
1	<i>Acraea violae</i>	-	-	-	-	4	-	4
2	<i>Danaus chrysippus</i>	2	-	-	-	-	4	6
3	<i>Castalius rosimon</i>	-	-	5	-	-	1	6
4	<i>Catopsilia pyranthe</i>	-	-	-	-	-	3	3
5	<i>Catopsilia Pomona</i>	-	-	-	-	-	1	1
6	<i>Eurema hecabe</i>	10	5	8	-	5	3	31
7	<i>Leptosia nina</i>	-	-	-	-	-	2	2
8	<i>Ypthima baldus</i>	5	3	7	-	5	-	20
	Total individuals	17	8	20	-	14	14	73
	Total species	3	2	3	-	3	6	

Table 5. Monthly occurrence of butterfly species at study site IV

Sr. No.	Species	Site IV						Total
		March	April	May	June	July	August	
1	<i>Acraea violae</i>	-	-	-	-	1	-	1
2	<i>Danaus genutia</i>	-	1	-	-	-	-	1
3	<i>Danaus limniace</i>	1	-	-	-	-	-	1
4	<i>Cethosia cyane</i>	-	1	-	-	-	-	1
5	<i>Junonia almanac</i>	1	-	-	-	-	-	1
6	<i>Castalius rosimon</i>	3	9	11	-	-	3	26
7	<i>Catopsilia pyranthe</i>	3	2	3	-	5	2	15
8	<i>Catopsilia pomnon</i>	-	-	3	-	3	4	10
9	<i>Eurema hecabe</i>	12	-	5	-	8	6	31
10	<i>Leptosia nina</i>	-	2	-	-	-	-	2
11	<i>Ypthima baldus</i>	7	-	5	-	3	5	20
	Total individuals	27	15	27	-	20	20	109
	Total species	6	5	5	-	5	5	

Table 6. Total number of monthly occurrence of butterflies in Sittway University Campus

Months	Site I	Site II	Site III	Site IV	Total
March	72	29	17	27	145
April	26	24	8	15	73
May	17	26	20	27	90
June	67	46	-	-	113
July	26	19	14	20	79
August	-	-	14	20	34

Relative abundance of butterfly species in Sittway University Campus

During the study period, *Eurema hecabe* (110 individuals) were the highest relative abundance (20.6%) of butterfly species. The second highest relative abundance (18.91%) was *Ypthima baldus* (101 individuals). *Danaus genutia*, *Cethosia cyane*, *Junonia atlites*, *Neptis mahendra* (each of only one individual) were the lowest relative abundance (0.19%) only one individual in each species.

Table 7. Abundance categories of recorded butterfly species in Sittway University Campus

No.	Species	Relative abundance (%)	Categories
1	<i>Acraea violae</i>	12.36	Abundant
2	<i>Danaus chrysippus</i>	1.31	Rare
3	<i>Danaus genutia</i>	0.19	Rare
4	<i>Danaus limniace</i>	0.56	Rare
5	<i>Cethosia cyane</i>	0.19	Rare
6	<i>Hypolimnas bolina</i>	0.56	Rare
7	<i>Junonia almana</i>	0.37	Rare
8	<i>Junonia atlites</i>	0.19	Rare
9	<i>Junonia hierta</i>	3.37	Uncommon
10	<i>Neptis mahendra</i>	0.19	Rare
11	<i>Castalius rosimon</i>	10.49	Abundant
12	<i>Appias libythea</i>	5.62	Frequent
13	<i>Catopsilia pyranthe</i>	9.93	Abundant
14	<i>Catopsilia Pomona</i>	4.49	Frequent
15	<i>Delias decombesi</i>	2.25	Uncommon
16	<i>Delias hyparete</i>	2.25	Uncommon
17	<i>Eurema hecabe</i>	20.6	Abundant
18	<i>Leptosia nina</i>	4.31	Frequent
19	<i>Papilio polytes</i>	0.94	Rare
20	<i>Papilio demoleus</i>	0.94	Rare
21	<i>Ypthima baldus</i>	18.91	Abundant
	Total	100	



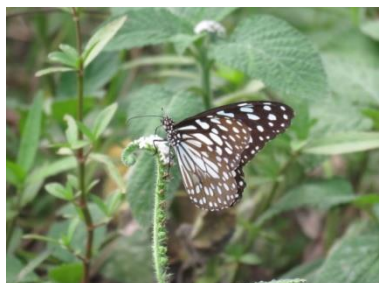
A. *Acraea violae*



B. *Danaus chrysippus*



C. *Danaus genutia*



D. *Danaus limniace*



E. *Cethosia cyane*



F. *Hypolimnas bolina*



G. *Junonia almanac*



H. *Junonia atlites*



I. *Junonia hierta*



J. *Neptis mahendra*



K. *Castalius rosimon*



L. *Appias libythea*



M. *Catopsilia pyranthe*



N. *Catopsilia Pomona*



O. *Delias decombesi*

Plate 1. Recorded butterflies in nature

P. *Delias hyparete*Q. *Eurema hecabe*R. *Leptosia nina*S. *Papilio polyte*T. *Papilio demoleus*U. *Ypthima baldus*

Plate 1. Continued

Discussion

Myanmar possesses varied fauna including many species of butterfly. According to the forest department, nine families and 1014 species can be found in Myanmar. In the present study, a total of 21 species belonging to the 14 genera, seven families under order Lepidoptera were recorded in Sittway University Campus. The study period was lasted from March, 2018 to August, 2018.

The butterfly families of Papilionidae (9)%, Pieridae (33) %, Nymphalidae (29)%, Satyridae (5)%, Lycaenidae (5)% and Acraeidae (5)% were observed in the study area.

In the present study, the data collection was done by four study sites. During the study period 534 individual numbers of butterflies were collected. Among those study sites, 208 individuals of 16 species from study site I, 144 individuals of 12 species from study site II, 73 individuals of eight species from study site III, and 109 individuals of 11 species from study site IV were observed respectively. In the study site I, the highest number of species and individual number were found and this may be due to the good condition of food source including flowering plants and host plants for the butterflies.

According to the total number of four study sites, the highest number of butterflies, (145) individuals was recorded in March of hot season and the lowest number, (34) individuals, in August of the rainy season. It may be correlated with climatic condition and the presence of their host plants at the study area.

Among the recorded 21 species, the species of *Eurema hecabe*, Common Grass Yellow was commonly found in the study site II, III and IV and frequently found in study site IV. It may relate to the abundance of food plants at the study sites. This species was recorded as the highest number throughout the study period. The second largest population number was found as *Ypthima baldus*, Common Five Rings butterfly, recorded in all study sites. Some of the species were rarely found in the study area. It may coincide with the decline period of their populations.

The highest number of relative abundance of *Eurema hecabe* (family- Pieridae) as 20.6%, followed by *Ypthima baldus* (family- Satyridae) as 18.91%, *Acraea violae* (family- Acraeidae) as 12.36%, *Castalius rosimon* (family- Lycaenidae) as 10.49% and *Catopsilia pyranthe* (family- Pieridae) as 9.93% were commonly found in study area. The species *Catopsilia pomona*, *Leptosia nina* and *Appias libythea* were frequently found in the study period. The other species of *Junonia hierta*, *Delias decombesi* and *D. hyparete* were observed as uncommon species. The lowest percentage, (0.19%), was found in the rare species as *Danaus genutia* (family- Danaidae), *Cethosia cyane*, *Junonia atlites* and *Neptis mahendra* (family-Nymphalidae) respectively.

Conclusion

In the present study, a total of 21 butterfly species belonging to 14 genera, seven families under order Lepidoptera were recorded. The composition of butterfly species was found to be highest in family Pieridae (33%) which followed by Nymphalidae (29%), Danaidae (14%), Papilionidae (9%), and lowest in family Acraeidae, Lycaenidae, and Satyridae (each with 5%). Among four study sites, the highest number of butterfly species was recorded in site I and the lowest number in site III. During the study period, the highest number of (145) individuals were observed in March and the lowest number of (39) individuals were observed in August. The pierid butterfly species of *Eurema hecabe* (110) individual were the highest relative abundance (20.6%) as common species and *Danaus genutia*, *Cethosia cyane*, *Junonia atlites*, and *Neptis mahendra* were the lowest relative abundance(0.19%) as rare species in the study area.

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