



ISSN 2320-7078

JEZS 2014; 2 (4): 129-134

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Received: 12-07-2014

Accepted: 25-07-2014

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## Studies on the diversity and abundance of butterfly (Lepidoptera: Rhopalocera) fauna in and around Sarojini Naidu college campus, Kolkata, West Bengal, India

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**Abstract**

Butterflies are one of the most important assemblages of insects that act as biodiversity indicators as well as nature's gardeners. Owing to habitat destruction for developmental activities in urban environment and unscientific management of natural resources, much of our native butterflies are fast disappearing and at present, their survival is under threat. The objective of the present survey is focussed on the assessment of the diversity and seasonal abundance of butterfly with vegetation composition of habitat and conservation priorities in the study area. A total of 49 species of butterflies under 5 families and 36 genera were recorded during May, 2013 to April, 2014 in the Sarojini Naidu College campus, Dum Dum, Kolkata. Nymphalidae was recorded as the most dominant family in terms of number of species, represented by 20 species followed by Lycaenidae (12), Pieridae (10), Papilionidae (6) and Hesperidae (1). Out of these 49 species, five species come under the Indian Wildlife (Protection) Act, 1972. This study is aimed towards contributing to the plan of biodiversity restoration in our campus and development of management strategies so as to ensure sustenance of butterflies and ecosystem services derived from them.

**Keywords:** Butterfly, Sarojini Naidu College, biodiversity, seasonal abundance, vegetation composition, conservation

**1. Introduction**

Butterflies are generally regarded as one of the best taxonomically studied group of insects [1]. Worldwide there are more than 28,000 species of butterflies, with about 80 percent found in tropical regions. The Indian subcontinent bearing a diverse terrain, climate and vegetation hosts about 1,504 species of butterflies [2]. Butterflies enable sustenance of ecosystem services through their role in pollination and serving as important food chain components. Being potential pollinating agents of their nectar plants as well as indicators of the health and quality of their host plants and the ecosystem as a whole, exploration of butterfly fauna thus becomes important in identifying and preserving potential habitats under threat.

Of late, we are rapidly losing greenery in the name of development. There has also been an alarming rise in industrial and automobile pollution in Indian metropolitan cities. With the shrinking of greenery and increase in pollution, butterflies, birds and all our wildlife are fast disappearing. The net result is a complete imbalance of the ecosystem and extinction of many species. In spite of the fast growth, Indian cities still have diverse serene habitats such as the traffic island gardens in the middle of busy roads, parks or urban forest areas with mixed deciduous and non-deciduous trees and scrubland serving as ideal habitats for various types of insects, especially butterflies. In the recent past, researchers have studied butterflies from some of the urban and sub-urban areas of Kolkata [3-6]. Institutional campuses with undisturbed natural vegetation and seasonal flowering plantation provide potential habitat for butterfly population as they are devoid of any developmental activities and pollution [7-12].

Sarojini Naidu College for Women (SNCW), Dum Dum, (22° 37'12" N and 88° 25' 12" E) is located in a sub-urban belt having a well-wooded campus amidst a mosaic of concrete buildings (**Image. 1**). The campus is spread over an area of 3.5 acres with lush green vegetation having large trees, bushy shrubs and long grasses that provide shelter to the butterflies. The good source of nectar, food plants suitable for egg laying, open sunny space and reduced use of pesticides has resulted in varied species diversity of butterflies in the area. The study area experiences a sub-

tropical climate with hot summers from late March to early June (Temperature range: 25°C-40°C), the humid monsoon season from mid June to late September and a cool dry winter from late November to early February (temperature range: 12°C-25°C). Humidity is generally very high during summer and the area

receives an average rainfall of 170mm. The present survey was aimed to prepare a checklist of the butterflies found in and around our college campus since there was no known published checklist of butterflies in SNCW college campus till date.



**Image 1.** Satellite overview map of study locality

## 2. Materials and Methods

The findings presented here are based on random surveys carried out from May, 2013 -April, 2014. The total college campus was surveyed from morning 9 a.m. till 5 p.m. in the afternoon with the help of a Bushnell binocular (8x40). Butterflies were photographed from different angles as often as possible to obtain sufficient photographs to enable positive identification of species. Photographs were taken with a digital camera (Sony W520). Butterflies were primarily identified directly in the field with the help of field guides followed by photography, and rarely by capture. Collection was restricted to those specimens that could not be identified directly. In such cases, specimens were collected with handheld aerial sweep nets, placed in an envelope and carried to the laboratory for further identification with the help of a field guide [13, 14, 15, 16]. All scientific names followed in the present study are in accordance with Varshney (1983) [17] and common English names follow Wynter-Blyth (1957) [16]. The seasonality was determined using presence-absence scoring method and thereafter % of occurrence was calculated to determine the status. The observed butterflies were categorized in five categories on the basis of their abundance in SNCW campus: VC-very common (> 100

sightings), C-common (50-100 sightings), NR-not rare (15-50 sightings), R-rare (2-15 sightings), VR-very rare (1-2 sightings) [17].

## 3. Results and Discussion

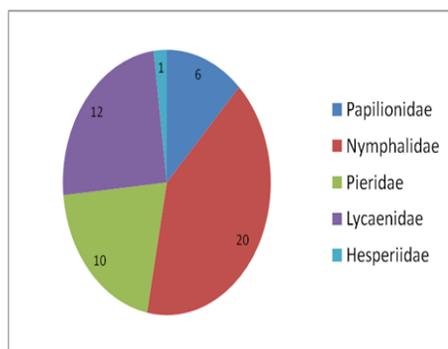
Forty nine species of butterflies representing five families and thirty six genera have been recorded during the study (**Table 1**). The photographs of the observed butterflies are given in **Plate 1**. Nymphalidae showed the maximum species richness, comprising of 20 species (41%), followed by Lycaenidae (12 species, 25%), Pieridae (10 species, 20%), Papilionidae (6 species, 12%) and Hesperidae (1 species, 2%) (**Figure 1**). Among these species, 9 (18%) were very rare, 3 (6%) were rare, 9 (18%) were not rare, 13 (27%) were commonly occurring and 15 (31%) were very common (**Figure 2**). It was also noted that 14 species were present in all seasons. Highest number (41) of species was seen during post monsoon. A total of 31 species were observed during summer and 36 during winter. Least number of species (20) was observed during monsoon. Among these 49 recorded species, Common mormon, Lime butterfly and Psyche were found in high frequencies in the campus.

**Table 1:** List of butterflies recorded from SNCW campus together with status and flight period

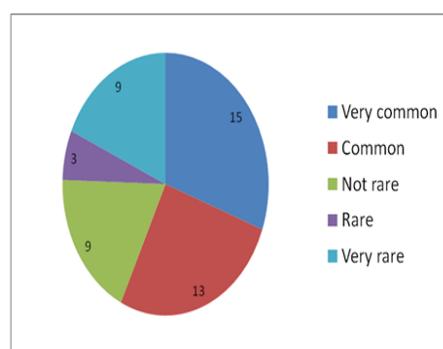
Sl. No.	Common Name	Scientific Name	Status	Flight period
<b>Papilionidae (6)</b>				
1.	Common mormon	<i>Papilio polytes</i> Linnaeus	VC	S, M, PM, W
2.	Spot swordtail	<i>Graphium nomius</i> (Esper)	VR	S
3.	Common jay	<i>Graphium doson</i> (C. & R. Felder)	C	S, M, PM
4.	Lime butterfly	<i>Papilio demoleus</i> Linnaeus	VC	S, M, PM, W
5.	Tailed jay	<i>Graphium agamemnon</i> (Linnaeus)	C	S, W
6.	Blue mormon	<i>Papilio polymnestor</i> Cramer	R	PM, W
<b>Nymphalidae (20)</b>				
7.	Blue pansy	<i>Junonia orithiya</i> (Linnaeus)	NR	S, PM
8.	Commander	<i>Moduza procris</i> (Cramer)	VR	W
9.	Striped tiger	<i>Danaus genutia</i> (Cramer)	VC	S, M, PM, W
10.	Common castor	<i>Ariadne merione</i> (Cramer)	C	S, PM, W
11.	Common palmfly	<i>Elymnias hypermnestra</i> (Linnaeus)	VC	S, M, PM, W
12.	Grey pansy	<i>Junonia atlites</i> (Linnaeus)	C	S, M, PM, W
13.	Lemon pansy	<i>Junonia lemonias</i> (Linnaeus)	NR	W

14.	Tawny coster	<i>Acraea violae</i> (Fabricius)	VC	S, M, PM
15.	Glassy tiger	<i>Parantica aglea</i> (Stoll)	NR	S, M, PM, W
16.	Great eggfly	<i>Hypolimnas bolina</i> (Linnaeus)	C	M, PM, W
17.	Common crow	<i>Euploea core</i> (Cramer)	VC	S, PM, W
18.	Plain tiger	<i>Danaus chrysippus</i> (Linnaeus)	VC	S, PM, W
19.	Common bushbrown	<i>Mycalesis perseus</i> (Fabricius)	C	PM, W
20.	Peacock pansy	<i>Junonia almana</i> (Linnaeus)	NR	PM, W
21.	Common baron	<i>Euthalia aconthea</i> (Cramer)	VR	PM
22.	Blue tiger	<i>Tirumala limniace</i> (Cramer)	C	S, PM, W
23.	Common fourring	<i>Ypthima huebneri</i> Kirby	C	S, M, PM, W
24.	Common evening brown	<i>Melanitis leda</i> (Linnaeus)	VC	S, M, PM, W
25.	Common fivering	<i>Ypthima baldus</i> (Fabricius)	NR	PM, W
26.	Chestnut-streaked sailer *	<i>Neptis jumbah</i> Moore	VR	PM, W
<b>Pieridae (10)</b>				
27.	Common grass yellow	<i>Eurema hecabe</i> (Linnaeus)	VC	S, M, PM
28.	Psyche	<i>Leptostia nina</i> (Fabricius)	VC	S, PM, W
29.	Common jezebel	<i>Delias eucharis</i> (Drury)	VC	S, PM, W
30.	Striped albatross *	<i>Appias libythea</i> (Fabricius)	C	S, M, PM, W
31.	Mottled emigrant	<i>Catopsilia pyranthe</i> (Linnaeus)	VC	S, M, PM, W
32.	Common emigrant	<i>Catopsilia pomona</i> (Fabricius)	C	S, M, PM, W
33.	Yellow orange tip	<i>Ixias pyrene</i> (Linnaeus)	VR	PM, W
34.	Striped albatross 'olferna'	<i>Appias olferna</i>	C	PM, W
35.	Indian cabbage white	<i>Pieris canidia</i> (Sparman)	NR	S, PM, W
36.	Three spot grass yellow	<i>Eurema blanda</i> (Boisduval)	NR	S, M, PM
<b>Lycaenidae (12)</b>				
37.	Long-banded silverline *	<i>Spindasis lohita</i> (Horsfield)	VR	S
38.	Common pierrot *	<i>Castalius rosimon</i> (Fabricius)	VC	S, M, PM, W
39.	Plains cupid	<i>Chilades pandava</i> (Horsfield)	C	PM, W
40.	Tiny grass blue	<i>Zizula hylax</i> (Fabricius)	VC	S, M, PM, W
41.	Lime blue	<i>Chilades lajus</i> (Stoll)	R	W
42.	Common cerulean	<i>Jamides celeno</i> (Cramer)	VR	W
43.	Dark grass blue	<i>Zizeeria karsandra</i> (Moore)	VR	PM, W
44.	Pale grass blue	<i>Pseudozizeeria maha</i> (Kollar)	VC	S, M, PM, W
45.	Apefly	<i>Spalgis epius</i> (Westwood)	VR	PM
46.	Tailless lineblue	<i>Prosotas dubiosa indica</i> Evans	R	S
47.	Forget-me-not	<i>Catochrysops strabo</i> (Fabricius)	NR	PM
48.	Gram blue *	<i>Euchrysops cnejus</i> (Fabricius)	C	S, M, PM
<b>Hesperiidae (1)</b>				
49.	Small branded swift	<i>Pelopidas mathias</i> (Fabricius)	NR	PM

\*Listed in Indian Wildlife (Protection) Act, 1972 VC-Very Common (> 100 sightings), C-Common (50-100 sightings), NR-Not Rare (15-50 sightings), R-Rare (2-15 sightings), VR-Very Rare (1-2 sightings) S-Summer, M-Monsoon, PM-Post Monsoon, W-Winter

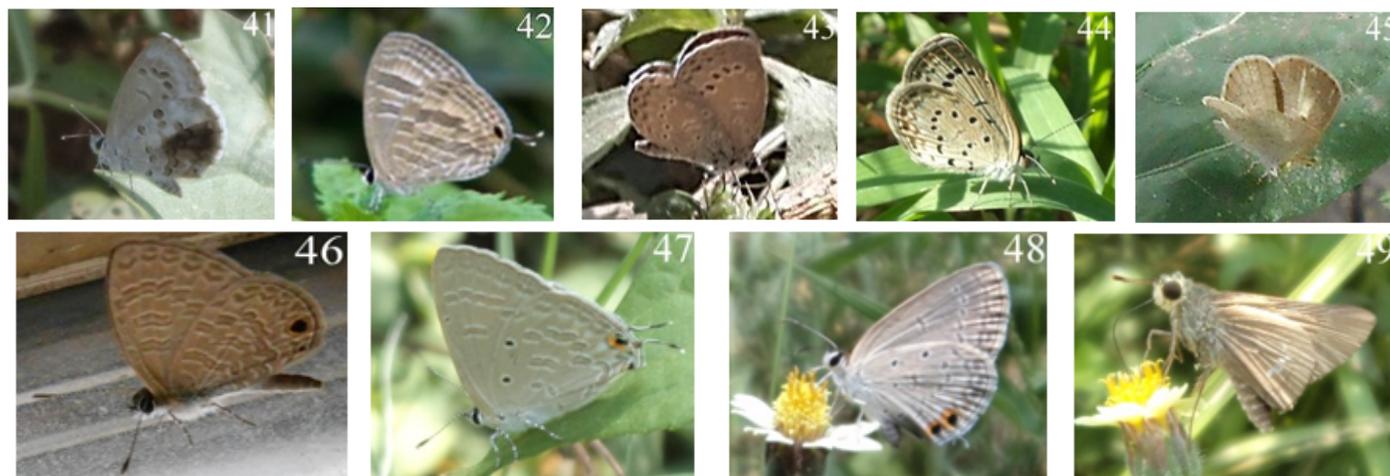


**Fig 1:**Family-wise composition of butterfly species at SNCW, Kolkata



**Fig 2:**Status of butterfly species at SNCW, Kolkata





**Plate 1:** Photographs of the butterflies observed at SNCW campus (see Table 1 for corresponding names)

A total of five species of butterflies from the study area are designated rare, suggesting the need for strict conservation measures. Two species, Common pierrot and Chestnut-streaked sailer belong to Schedule I, Long-banded silverline and Gram blue belong to Schedule II and Striped Albatross belongs to Schedule IV of the Indian Wildlife (Protection) Act, 1972. As reported by Kunte (2000), an objective revision of the scheduled list is necessary in providing appropriate and adequate legal protection to Indian butterflies.

The preference of butterflies for particular habitats is associated with the availability of larval host plants and adult nectar plants. The rich diversity of butterflies, especially the Nymphalids and Lycaenids in SNCW indicates a varied assemblage of floral species. The flora in our campus is a mixed type with herbs and shrubs dominating the vegetation in the tropical climate. Trees are comparatively lesser in number. The study area is dominated by plant species belonging to families Annonaceae, Apocynaceae, Fabaceae, Malvaceae, Acanthaceae, Rubiaceae etc. namely *Ficus sp*, *Calotropis sp*, *Tridax sp*, *Polyalthia longifolia*, *Cassia fistula*, *Tabernaemontana sp*, *Alstonia scholaris*, *Ixora sp*, *Lantana camara*, *Cleome viscosa*, *Aegle sp*, *Citrus sp*, *Terminalia arjuna*, *Murraya sp*, *Psidium guajava*, *Areca catechu*, *Cocos nucifera*, *Mangifera indica*, *Hibiscus sp*, *Zizyphus jujuba*, *Justicia sp*, *Sida sp*, *Nerium sp*, *Mussaenda frondosa*, *Cosmos sp*, *Zinnia sp*, *Bougainvillea sp* and grasses which provide diverse habitat, food and breeding sites for butterflies.

Butterfly diversity varies with season. They are abundant for only a few months and rare or absent during other months of the year [14]. Wynter-Blyth (1957) had identified two seasons as peaks, March-April and October for butterfly abundance in India. The abundances of diverse species were positively affected by approaching summer, high relative humidity and more rainfall. During the present study, the numbers of the butterflies were peaked during post-monsoon season (late August to October) which was similar to the findings of Tiple et al, 2007, Tiple, 2012, Tiple & Khurad, 2009 [8, 9, 18]. The species abundance was less during monsoon.

Apart from being one of the most prominent biodiversity indicators [14], butterflies also act as our native gardener for their dependence on indigenous plants for completion of the life cycle. Therefore, an abundance

of butterflies usually indicates a healthier ecosystem. Butterflies also serve as major pollinators of both wild and cultivated plants [7]. With the pressing needs of the growing human population in India, natural greeneries are being clear-felled giving way to urbanization, pollution and overgrazing. Loss of prime habitat is the major threat to all wildlife including butterflies. In addition to these, a variety of threats from human recreational activities, trampling, run-off from roads, litter deposition and weeds are common factors which affect butterfly populations. Although we cannot completely nullify the ill effects of urbanization and development, we can at least try to reduce them by planting endemic trees and plants supporting the local wildlife. This will make sure that at least the common species will not go on to the verge of extinction.

#### 4. Conclusion

The findings of the present study underline the importance of institutional campuses as a preferred habitat for butterflies. If the landscaping and maintenance of gardens are carefully planned, the diversity of butterflies may increase in our college campus providing a rich ground for butterfly conservation as well as for research. This study will also add to our future attempts in understanding the complex nature of mutualistic interaction between butterflies and flowering plants that is essential for continuity of ecosystem services. This is the first effort in exploring the butterfly wealth of SNCW. The present list of butterfly species is not conclusive and exhaustive and future exploration will be continued to update this checklist.

#### 5. Acknowledgement

The authors are grateful to the Principal, Sarojini Naidu College for Women, Dum Dum, for providing facilities to carry out the survey in the college campus. The authors like to thank Dr. Dipanwita Bhattacharya, Associate Professor, Dept. of Botany, SNCW, for extending kind help in identification of the host plants.

#### 6. Conflict of interest

The authors declare that there is no conflict of interest.

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