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Diversity of Butterflies in All Saints' College Campus, Thiruvananthapuram, Kerala, Southern India

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Abstract

The Butterfly diversity of All Saints' College campus, Thiruvananthapuram, Kerala, India, was documented for 1 year from June 2022 to May2023. The rich floral diversity and water bodies on the campus provided an excellent habitat for butterflies. Overall, 81 species belonging to five families were documented. Rarely spotted butterflies dominated in the abundance studies of diversity. The butterfly diversity density is high in the campus when compared with the diversity studies in other campuses. More number of butterflies is reported from Nymphalidae family. A comparison of butterfly diversity reported from different locations across the state signifies the importance of conserving habitats and flora for the insects.

Keywords: butterfly, abundance, butterfly diversity density, abundance, distribution

1. Introduction

Butterflies which are part of food chain linked with vertebrates and invertebrates have been recognised as important bioindicators as they are very much responsive to changes in environmental factors such as temperature, humidity, light, and rainfall patterns [1, 2, 3]. The insects in its different metamorphic stages depend on various host plants and so the diversity of butterflies depend indirectly on plant diversity of a specific area [4]. Around 1501 species of butterflies are

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reported from India and of 334 reported from Western Ghats, 316 species have been reported from Kerala [5]. In Kerala, and particularly in Thiruvananthapuram, very little documentation has been done on butterfly fauna [6, 7, 8, 9, 10, 11, 12]. All Saints' College (ASC) is located in the coastal belt of Thiruvananthapuram District, Kerala. The college campus has many fresh water sources, temporary pools, marshes, rich flowering plants and trees. The habitat and rich floral diversity which are host plants for caterpillars enhance the butterfly diversity in the campus. The current study aims to document the diversity of butterflies for the first time from the diverse habitat with in the campus of All Saints' College (ASC).

2. Methodology

2.1 Study area

The study area, All Saints' College Campus is located at Chackai of Thiruvananthapuram district in the state of Kerala, India. This coastal ecosystem complex, lies between $8^0$15'0''N and $8^0$30'0''N and $76^0$45'0''E and $77^0$0'0''E (Figure 1). Some of the main habitats on campus include freshwater ponds, marshes, temporary pools, Garden grounds, botanical garden, medicinal garden, vegetable garden, coconut, plantain, and mango orchards, which spans 14.57ha. The average lowest temperature is 23.40°C, with a high of 32.3°C.The identification of butterflies in the All Saints' College campus was done for a period of one year from June 2022-May 2023.

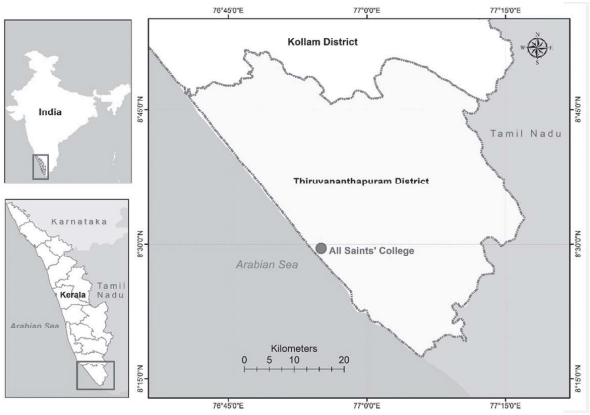


Fig-1 Location map of All Saints College, Thiruvananthapuram, Kerala

2.2 Relative Abundance and Butterfly Diversity Density (BDD)

The relative abundance of butterflies indicates the frequency at which each species is found in the study area. Based on this, the Lepidopteran species were categorized into four, namely very common (VC), common (C), occasional (O), and rare (R), [13, 14, 15]. A relative index called BDD was used to compare the diversity in the area studied [16]. BDD is defined as the ratio of the number of species of Lepidopterans to the area of inhabitance.

3. Results and Discussion

The butterfly diversity density of the 14.57 ha campus (ASC) is 55.60%. The study reports 81 species of butterflies from ASC (Table 1, Plate 1). Nymphalidae are the most abundant Lepidopteran family, represented by thirty five species, followed by Lycaenidae consisting of sixteen species, followed by Hesperiidae with twelve species, followed by Pieridae with eight species and Papiliionidae with ten species, (Figure 2). The butterfly diversity density of All Saints College campus is 5.49, KAU is 0.36 and KU campus is 0.35 (Figure 3). The insect diversity specifically the odonate diversity of the campus is reported before [16] and it emphasises the fact the campus provides a good habitat for insects.

Table 1. List of butterflies identified from the ASC campus

Sl. No.	Scientific Name	Common Name	Family	Subfamily	Relative Abundance
1	Troides minos	Southern Birdwing	Papilionidae	Papilioninae	O
2	Pachliopta hector	Crimson Rose	Papilionidae	Papilioninae	C
3	Pachliopta aristolochiae	Common Rose	Papilionidae	Papilioninae	C
4	Graphium sarpedon	Common Bluebottle	Papilionidae	Papilioninae	VR
5	Graphium doson	Common Jay	Papilionidae	Papilioninae	R
6	Graphium agamemnon	tailed jay	Papilionidae	Papilioninae	R

Sl. No.	Scientific Name	Common Name	Family	Subfamily	Relative Abundance
7	Papilio clytia	Common Mime	Papilionidae	Papilioninae	VR
8	Papilio demoleus	Lime Butterfly	Papilionidae	Papilioninae	C
9	Papilio polytes romulus	Common Mormon	Papilionidae	Papilioninae	C
10	Papilio polymnestor polymnestor	Blue Mormon	Papilionidae	Papilioninae	O
11	Catopsilia pomona pomona	Common Emigrant	Pieridae	Coliadinae	VC
12	Eurema hecabe hecabe	Common Grass Yellow	Pieridae	Coliadinae	VC
13	Eurema brigitta rubella	Small Grass yellow	Pieridae	Coliadinae	C
14	Delias eucharis	Common Jezebel	Pieridae	Coliadinae	O
15	Belenois aurota aurota	Pioneer	Pieridae	Coliadinae	O
16	Leptosia nina nina	Psyche	Pieridae	Coliadinae	VC
17	Pieris brassicae	cabbage butterfly	Pieridae	Coliadinae	VC
18	Eurema laeta	Spotless grass yellow	Pieridae	Coliadinae	C
19	Melanitis leda	Common Evening Brown	Nymphalidae	Satyrinae	VC
20	Elymnias hypermnestra undularis	Common Palmfly	Nymphalidae	Satyrinae	C
21	Ypthima baldus madrasa	Common Five-ring	Nymphalidae	Satyrinae	VC
22	Ypthima ceylonica	White four ring	Nymphalidae	Satyrinae	C
23	Mycalesis perseus	Common bush brown	Nymphalidae	Satyrinae	VC
24	Mycalesis subdita	Tamil bush brown	Nymphalidae	Satyrinae	C
25	Charaxes athamas athamas	Common Nawab	Nymphalidae	Charaxinae	VR

Sl. No.	Scientific Name	Common Name	Family	Subfamily	Relative Abundance
26	Charaxes solon	Black Rajah	Nymphalidae	Charaxinae	VR
27	Mycalesis mineus	Dark branded bush brown	Nymphalidae	Charaxinae	C
28	Acraea violae	Tawny Coster	Nymphalidae	Heliconiinae	VC
29	Phalanta phalantha phalantha	Common leopard	Nymphalidae	Heliconiinae	O
30	Euthalia aconthea	Common Baron	Nymphalidae	Limenitidinae	O
31	Ariadne ariadne indica	Angled Castor	Nymphalidae	Biblidinae	R
32	Ariadne merione merione	Common Castor	Nymphalidae	Biblidinae	R
33	Junonia hierta hierta	Yellow Pansy	Nymphalidae	Nymphalinae	VR
34	Junonia orithya	Blue Pansy	Nymphalidae	Nymphalinae	R
35	Junonia lemonias lemonias	Lemon Pansy	Nymphalidae	Nymphalinae	C
36	Junonia atlites	Grey Pansy	Nymphalidae	Nymphalinae	VR
37	Junonia almana	Peacock pansy	Nymphalidae	Nymphalinae	R
38	Neptis hylas	Common sailor	Nymphalidae	Nymphalinae	VC
39	Vanessa cardui	Painted lady	Nymphalidae	Nymphalinae	R
40	Symphaedra nais	Baronet	Nymphalidae	Nymphalinae	R
41	Elimnias hypermnestra caudata	Tailed palm fly	Nymphalidae	Nymphalinae	R
42	Junonia iphita iphita	Chocolate Pansy	Nymphalidae	Nymphalinae	VC
43	Hypolimnas misippus	Danaid Eggfly	Nymphalidae	Nymphalinae	R
44	Hypolimnas bolina jacintha	Great Eggfly	Nymphalidae	Nymphalinae	VR
45	Tirumala limniace exoticus	Blue Tiger	Nymphalidae	Danainae	R
46	Ideopsis vulgaris	Glassy Blue Tiger	Nymphalidae	Danainae	R

Sl. No.	Scientific Name	Common Name	Family	Subfamily	Relative Abundance
47	Danaus chrysippus chrysippus	Plain Tiger	Nymphalidae	Danainae	VC
48	Danaus genutia genutia	Striped Tiger	Nymphalidae	Danainae	VC
49	Euploea core	Common Crow	Nymphalidae	Danainae	VC
50	Tanaecia lepidea	Grey count	Nymphalidae	Danainae	VR
51	Moduza procris	Commander	Nymphalidae	Limenitidinae	VR
52	Pantoporia hordonia	Common lascar	Nymphalidae	Limenitidinae	R
53	Cupha erymanthis	Southern rustic	Nymphalidae	Heliconiinae	VR
54	Spalgis epius epeus	Apefly	Lycaenidae	Miletinae	R
55	Castalius rosimon rosimon	Common Pierrot	Lycaenidae	Polyommatinae	C
56	Zizina otis indica	Lesser Grass Blue	Lycaenidae	Polyommatinae	C
57	Zizula hylax hylax	Tiny Grass Blue	Lycaenidae	Polyommatinae	C
58	Euchrysops cnejus cnejus	Gram Blue	Lycaenidae	Polyommatinae	R
59	Pseudozizeeria maha ossa	Pale Grass Blue	Lycaenidae	Polyommatinae	C
60	Leptotes plinius	Zebra blue	Lycaenidae	Polyommatinae	VR
61	Lampides boeticus	Pea blue	Lycaenidae	Polyommatinae	R
62	Freyeria putli	Grass Jewel	Lycaenidae	Polyommatinae	VC
63	Jamides celeno celeno	Common Cerulean	Lycaenidae	Polyommatinae	C
64	Talicada nyseus nyseus	Red Pierrot	Lycaenidae	Polyommatinae	R
65	Chilades lajus lajus	Lime Blue	Lycaenidae	Polyommatinae	C
66	Spinda sisvulcanus vulcanus	Common Silverline	Lycaenidae	Theclinae	R
67	Loxura atymnus atymnus	Yamfly	Lycaenidae	Theclinae	R

Sl. No.	Scientific Name	Common Name	Family	Subfamily	Relative Abundance
68	Rapala manea schistacea	Slate Flash	Lycaenidae	Theclinae	R
69	Rathinda amor	Monkey Puzzle	Lycaenidae	Theclinae	VR
70	Udaspes folus	Grass Demon	Hesperiidae	Hesperiinae	R
71	Gomalia elma	African-Marbled Skipper	Hesperiidae	Hesperiinae	C
72	Taractrocera maevius	Common Grass Dart	Hesperiidae	Hesperiinae	VC
73	Telicota ancilla	Dark Palm Dart	Hesperiidae	Hesperiinae	R
74	Ampittia dioscorides	Bush Hopper	Hesperiidae	Hesperiinae	C
75	Badamia exclamationis	Browm Awl	Hesperiidae	Hesperiinae	VR
76	Hasora chromus	Common Banded Awl	Hesperiidae	Hesperiinae	VR
77	Borbo cinnara	rice swift	Hesperiidae	Hesperiinae	C
78	Caltoris kumara	Blank swift	Hesperiidae	Hesperiinae	R
79	Polytremis lubricans	contiguous swift	Hesperiidae	Hesperiinae	R
80	Tagiades litigiosa	Snow flat	Hesperiidae	Hesperiinae	VR
81	Erionota thrax	Banana swift	Hesperiidae	Hesperiinae	VR

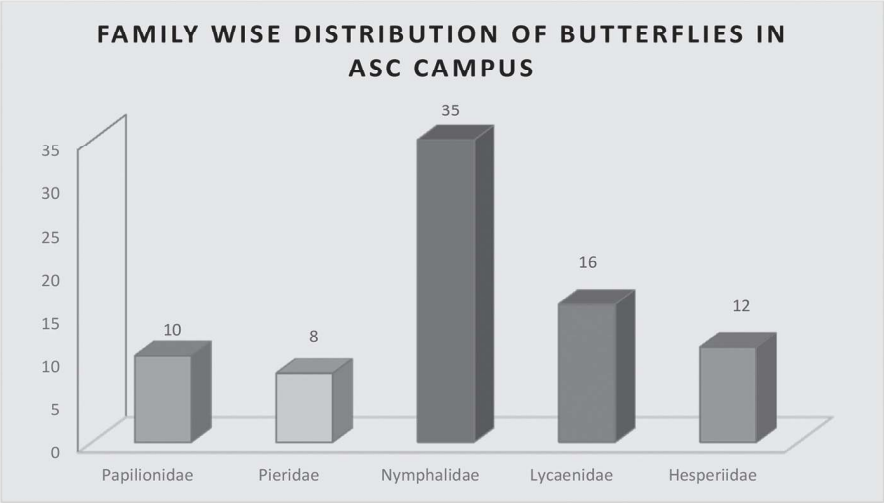


Figure 2 Family wise distribution of Butterflies identified

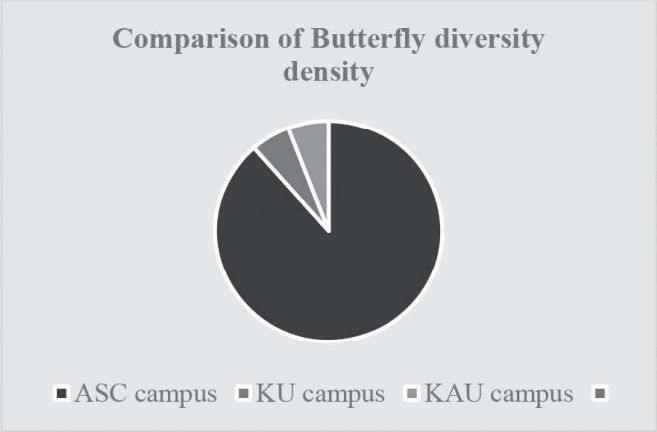


Figure 3 Comparison of Butterfly diversity density

Butterflies that were observed in ASC campus were categorized into five groups based on their abundance during the period of study. Accordingly, number of species observed during the survey days were categorized as very common (VC) with 15, 20 common (C), 6 occasional (O), 24 rare (R) and 16 very rare (VR) (Figure 4). Compared to two other campuses in Kerala which is taken into consideration during the study, the ASC campus has a rarer abundant group of butterflies. Nymphalidae members dominated the campus butterfly diversity with thirty-five species and the least number of species was found in Pieridae with eight species. Four species identified in the campus was reported as endemic in western Ghats as reported from KAU campus [11].

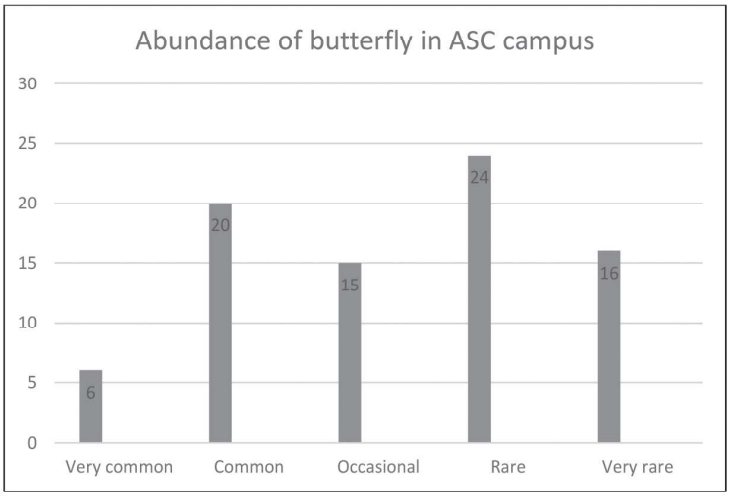


Figure 4 Abundance of butterflies in ASC campus

PLATE 1- BUTTERFLIES OF ASC CAMPUS

PAPILIONIDAE


Southern birdwing


Blue Mormon


Common Jay


Common mime


Common mormon


Crimson rose


Lime butterfly


Common Rose


Common Bluebottle


Tailed jay

PIERIDAE


Common Emigrant


Common Grass Yellow

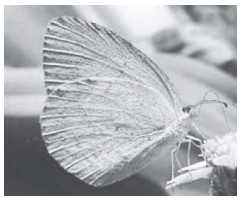

Small Grass yellow


Common Jezebel

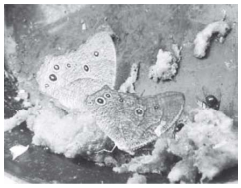

Pioneer

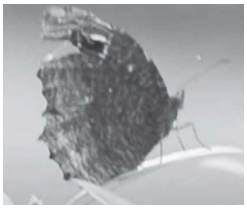

Psyche


cabbage butterfly


Spotless grass yellow

NYMPHALIDAE


Common Evening Brown


Common Palmfly

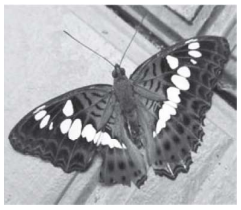

Common Five-ring


White four ring

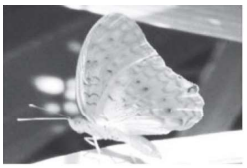

Common Nawab


Black rajah


Common bush brown


Commander


Tawny Coster


Common leopard

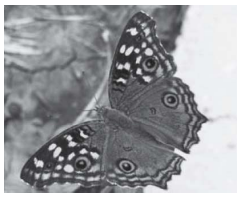

Common Baron


Angled Castor


Common Castor


Yellow Pansy


Blue Pansy


Lemon Pansy


Common sailor


Painted lady


Baronet


Tailed palm fly


Chocolate Pansy


Danaid Eggfly


Great Eggfly


Blue Tiger


Peacock Pansy


Tamil bush brown


Grey count


Dark brand bush brown


Glassy Blue Tiger


Plain Tiger


Striped Tiger

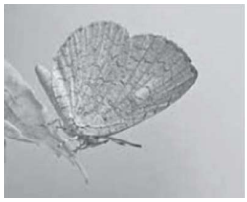

Common Crow


Grey Pansy


Common lascar


Southern rustic

LYCAENIDAE

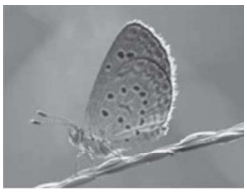

Apefly


Common Pierrot


Lesser Grass Blue


Tiny Grass Blue


Gram Blue


Pale Grass Blue


Zebra blue


Pea blue


Grass Jewel


Common Cerulean

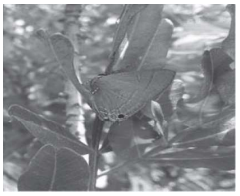

Red Pierrot


Monkey Puzzle


Lime Blue

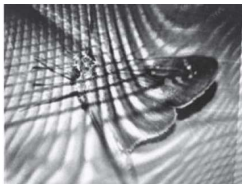

Common Silverline


Yamfly


Slate Flash

HESPERIIDAE


Grass Demon


rice swift

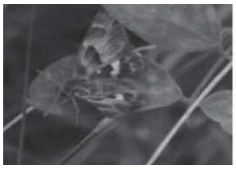

Blank swift


Banana Swift


Water snow flat


Contiguous swift


Common Grass Dart


African-Marbled Skipper


Dark Palm Dart


Common Banded Awl


Bush Hopper


Browm Awl

4. Conclusion

The results of the current study demonstrated that All Saints College Campus is a thriving habitat for butterflies because of its rich floral diversity. The environmental circumstances in the campus is quite conducive for butterflies to finish its cycle of life. Despite being in an urban environment, there are 81 butterfly species, which highlights the ecological significance of this region and demands more conservation measures, such as by building gardens and butterfly parks and by protecting the existing plant life in general. Floral diversity of the campus enhanced the diversity of the insects by completing its life cycle by depending on various host plants. This research is really important and it highlights the value of campuses for environmental preservation of a region's biological variety. By keeping butterflies alive indirectly, we are preserving the natural balance.

5. Conflict of Interest

The authors declare no competing financial interest for the present manuscript

6. Author Contributions

All the authors have equally contributed in the work and in drafting the manuscript.

7. Funding Disclosure

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