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## Study of butterfly diversity in college of forestry campus, Sirsi, Uttara Kannada

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### Abstract

Butterflies are the most fascinating group of insects to humankind, often regarded as flagship species. They are the good bio-indicators of the ecosystem and are very sensitive to changes in the environment. They play an important role in food chain and are valuable pollinators in the local environment. Butterflies dependent on specific host plant in their developmental stages and hence their diversity indirectly reflects the plant diversity of a particular area. With this context an investigation was carried out to document and analyze the community structure, richness and diversity of butterflies in forestry college campus, Sirsi, during which 84 butterfly species belonging to six families were recorded by following round walk method through visual observations of their wing color, patterns and also referring to field guides. The species diversity was found to be 3.34, calculated by using Shannon diversity index. *Eurema hecabe* represents highest percentage (18.49) of abundance followed by *Ypthima huebneri* (12.72) in the study area. Nymphalidae family consists of maximum number (33) of butterfly species followed by Lycaenidae (20), Hesperidae (13), Papilionidae and Pieridae (9 respectively).

**Keywords:** butterflies, diversity, abundance, sirsi

### Introduction

Butterflies are the most tantalizing and beautiful creatures among the insect group, they are an often regarded as 'Flagship species' [1]. Among the insect groups butterflies comes under the large group called Lepidoptera. The development of butterflies is thought to be from moths and it is closely linked to the evolution of flowering plants. Butterflies depend on many host and nectar plants in their life time for growth and development. Therefore, host or nectar plants availability and their regeneration status study are essential in understanding the butterfly population in depth. Butterflies helps to monitor climate change and environment degradation and are studied as living ecological components of wide importance. They play an important role in the food chain and act as valuable pollinators in the local environment. Butterflies are sensitive biota, and are severely affected by environmental variations and changes in habitat structure [2]. They respond to disturbances and changes in the habitat quality and landscape structure variations [3]. Habitat enrichment has been found to play a vital role in conserving butterfly species and their abundance. Throughout the world butterflies are seen large in number (About 45,000 species) mainly in tropical belt, which are categorized into 6 different families [4], however they are not found in Antarctica. India is known for its rich heritage of biological diversity, ranking among the top ten species-rich nations, showing high endemism [5]. In India, about 1504 species of butterflies have been identified and documented [6]. In India, Western Ghats is considered as one of the most diversified areas containing a wide variety of species of butterflies [14], hosting 336 species, of which approximately 12% are endemic to the area, and 59 species are legally protected in India [7]. Our study area, College of Forestry, Sirsi is located in the heart of Central Western Ghats. With the above stated background, our study was carried out to calculate the density and abundance of butterflies as percentage compositions of the different families and to analyze the species diversity indices in our campus.

### Materials and Methods

Our campus, College of Forestry, Sirsi, is situated at an elevation of 600m above MSL, having the coordinates 14° 35'59"N; 74° 50'58"E. This lush green campus though small in area is rich in its biodiversity, housing many endemic and endangered species of flora and fauna

towards Having a biologically diverse natural environment for this study.



### Methodology

A regular survey was carried out twice in a week, by round walk method during morning hours from 9 am to 12 pm and in afternoon from 2 pm to 4 pm, for 3 months from July to September. The survey area consists of playground, open nursery, plantations, paddy field and other walking paths. The butterflies were recorded by direct visual encounter and photographic evidences and identified by using the field guides namely 'The Book of Indian Butterflies by Isaac Kehimkar'<sup>[8]</sup> and 'A guide to the Butterflies of Western Ghats (India)' written by Milind Bhakare and Hemant Ogale<sup>[9]</sup>. Diversity indices were calculated by using Shannon-Wieners formula.

$$H = - \sum_{i=1}^S (P_i) \ln P_i$$

H = Shannon diversity index

P<sub>i</sub> = fraction of the entire population made up of species i (P<sub>i</sub> = n<sub>i</sub>/N)

S = numbers of species encountered

### Data collection

Checklists of butterflies observed along with their frequencies (number of individual species encounters) were prepared in the field, later compiled and subjected to statistical analysis.

**Butterfly count requirements:** Notebook, Pen, Mobile, Camera (Nikon), & Field guide.

### Results and Discussion

A total of 84 butterfly species belonging to six families were recorded through visual observations of their wing color, patterns and also referring to field guides. Diversity indices attempt to incorporate both richness<sup>[15]</sup> (Total number of different species) and abundance or evenness (how equally

the individuals represented from each species) into a single numerical value. Using Shannon diversity index, the species diversity of butterflies in our campus was calculated to be 3.34, The species namely, *Eurema hecabe* (Common Grass Yellow) represents highest percentage (18.49) of abundance followed by *Ypthima huebneri* (Common Four-ring) (12.72), *Aeromachus pygmaeus* (Pygmy Scrub Hopper) (6.51), *Delias eucharis* (Common Jezebel) (4.94) and *Catopsilia Pomona* (Common Emigrant) (3.59) in the study area (Table 1). The Family Nymphalidae consists of maximum number (33) of butterfly species followed by Lycaenidae (19), Hesperidae (13), Papilionidae (9), Pieridae (9) and Riodinidae (1) (Table 2) and their percent occurrence of butterfly species under different families were graphically represented (Fig. 1). The result of this survey at Forestry college campus shows that, the family Nymphalidae is abundant among the six families. The rich diversity of the butterflies in the campus can be attributed to the floristic diversity of the campus which provides suitable larval host plants, nectar plants and protection from predators. In three months duration from July to September, by adding up the total number of counts, it was seen that Common grass yellow was the most observed butterfly with a maximum count of 247 followed by common four ring (170) (Fig. 2). Some rare butterflies such as Clipper and Orchid tit were observed with a minimum count number of 2 each (Fig. 3) and butterflies species found in the campus were photographed and pictorially depicted (Fig. 4). This variation in the counts is mainly due seasonality, availability of host plants and adaptability character of the butterflies.

Dayanand reported that, a total of 115 species of butterflies belonging to 78 genera and 5 families were recorded in which Nymphalidae contributed to maximum number of species<sup>[10]</sup>. Higher abundance of Nymphalidae can be due to the presence of flowers belonging to families Fabaceae, Rutaceae, Euphorbiaceae, Compositae and Rubiaceae. Lekshmi Priya stated that, flowers belonging to families Euphorbiaceae, Compositae, Rubiaceae and Verbinaceae can result in higher Nymphalid diversity<sup>[11]</sup>, this is on par with the present study. The host plants play a vital role in butterflies growth and development by providing food, especially caterpillars are fully dependent on host plants<sup>[12]</sup>. The diversity and richness of butterflies are dependent on availability of nectar and host plants. Different nectar and host plants present in the campus were recorded (Table 3 and 4 respectively) and butterflies approach to a particular nectar plant is visually observed and pictorially depicted (Fig.5) along with early stages of butterflies on their host plants found in the campus were also pictorially depicted (Fig.6).

**Table 1:** Showing the Relative abundance of butterflies present in the campus

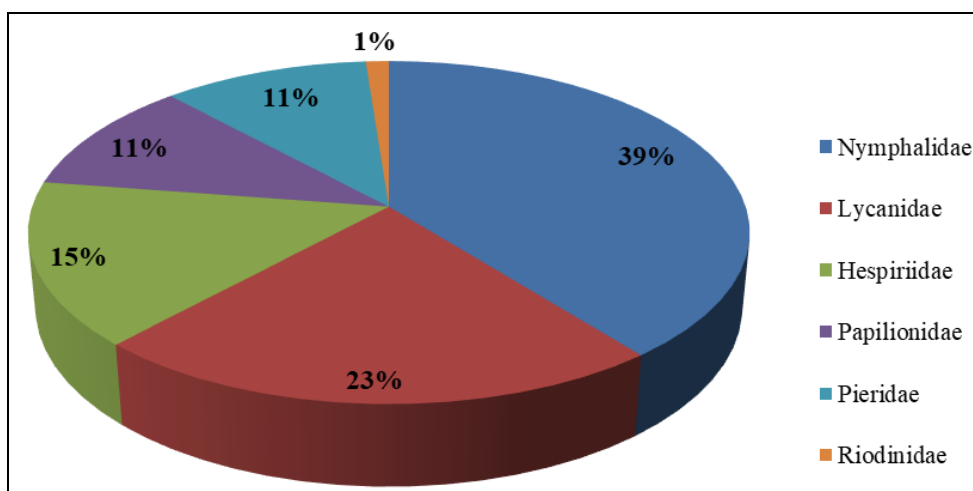
Hesperiidae-Skippers					
Sl. No	Common name	Scientific name	Status	Total no individuals sighted	Distribution of density pattern (%)
1	Common banded Awl	<i>Hasora chromus</i>	Common	5	0.37
2	Brown Awl	<i>Badamia exclamationis</i>	Not rare	3	0.22
3	Indian skipper	<i>Spialia galba</i>	Common	19	1.42
4	Tricolored pied flat	<i>Coladenia indrani</i>	Common	1	0.07
5	Suffused snow flat	<i>Tagiades gana</i>	Not rare	4	0.30
6	Water snow flat	<i>Tagiades litigiosa</i>	Not rare	2	0.15
7	Tamil grassdart	<i>Taractrocera ceramas</i>	Common	20	1.50
8	Dark Palm Dart	<i>Telicota ancilla</i>	Common	4	0.30
9	Straight swift	<i>Parnara guttatus</i>	Common	4	0.30
10	Rice Swift	<i>Borbo cinnara</i>	Common	6	0.45

11	Chestnut Bob	<i>Iambrix salsala</i>	Common	33	2.47
12	Grass demon	<i>Udaspes folus</i>	Common	3	0.22
13	Pygmy scrub hopper	<i>Aeromachus pygmaeus</i>	Common	87	6.51
<b>Papilionidae-Swallotails</b>					
14	Common Bluebottle	<i>Graphium sarpedon</i>	Common	3	0.22
15	Common Jay	<i>Graphium doson</i>	Common	7	0.52
16	Tailed Jay	<i>Graphium Agamemnon</i>	Common	26	1.95
17	Common Mormon	<i>Papilio polytes</i>	Common	22	1.65
18	Red Helen	<i>Papilio helenus</i>	Common	6	0.45
19	Blue Mormon	<i>Papilio polymnestor</i>	Not rare	38	2.84
20	Common rose	<i>Atrophaneura aristolochiae</i>	Common	3	0.22
21	Crimson rose	<i>Atrophaneura hector</i>	Common	2	0.15
22	Southern birdwing	<i>Troides minos</i>	Common	4	0.30
<b>Pieridae-Whites and Yellows</b>					
23	Three spot Grass Yellow	<i>Eurema blanda</i>	Common	4	0.30
24	Small Grass Yellow	<i>Eurema brigitta</i>	Common	1	0.07
25	Common Grass Yellow	<i>Eurema hecabe</i>	Common	247	18.49
26	Common Emigrant	<i>Catopsilia pomona</i>	Common	48	3.59
27	Mottled Emigrant	<i>Catopsilia pyranthe</i>	Common	3	0.22
28	Great orange tip	<i>Hebomoia glaucippe</i>	Common	1	0.07
29	Common gull	<i>Cepora nerissa</i>	Common	2	0.15
30	Common Jezebel	<i>Delias eucharis</i>	Common	66	4.94
31	Pioneer	<i>Belenios aurota</i>	Common	3	0.22
<b>Lycaenidae-Blues</b>					
32	Common Apefly	<i>Spalgis epius</i>	Not Common	2	0.15
33	Indian sunbeam	<i>Curetis thetis</i>	Not rare	2	0.15
34	Monkey puzzle	<i>Rathinda amor</i>	Not rare	2	0.15
35	Common imperial	<i>Cheritra freja</i>	Common	3	0.22
36	Peacock royal	<i>Tajuria cippus</i>	Uncommon	2	0.15
37	Orchid tit	<i>Chliaria othona</i>	Rare	2	0.15
38	Slate flash	<i>Rapala manea</i>	Common	3	0.22
39	Angled Pierrot	<i>Caleta caleta</i>	Not rare	5	0.37
40	Common Pierrot	<i>Castalius rosimon</i>	Common	46	3.44
41	Transparent six lineblue	<i>Nacaduba kurava</i>	Not rare	2	0.15
42	Metallic cerulean	<i>Jamides alecto</i>	Common	5	0.37
43	Common Cerulean	<i>Jamides celeno</i>	Common	39	2.92
44	Pea blue	<i>Lampides boeticus</i>	Common	8	0.60
45	Dark grass blue	<i>Zizeeria karsandra</i>	Common	2	0.15
46	Pale grass blue	<i>Pseudozizeeria maha</i>	Common	3	0.22
47	Lesser grass blue	<i>Zizina otis</i>	Common	3	0.22
48	Tiny grass blue	<i>Zizula hylax</i>	Common	2	0.15
49	Common Hedge blue	<i>Acytolepis puspa</i>	Common	16	1.20
50	Lime blue	<i>Chilades lajus</i>	Common	4	0.30
<b>Nymphalidae-Brush-footed butterflies</b>					
51	Oriental blue tiger	<i>Tirumala limniace</i>	Common	7	0.52
52	Dark blue tiger	<i>Tirumala septentriontis</i>	Common	2	0.15
53	Striped tiger	<i>Danaus genutia</i>	Common	2	0.15
54	Plain tiger	<i>Danaus chrysippus</i>	Common	18	1.35
55	Glassy Tiger	<i>Parantica aglea</i>	Common	34	2.54
56	Common Indian Crow	<i>Euploea core</i>	Common	10	0.75
57	Common nawab	<i>Polyura athamas</i>	Common	4	0.30
58	Common Evening Brown	<i>Melanitis leda</i>	Common	31	2.32
59	Common bushbrown	<i>Mycalesis perseus</i>	Common	4	0.30
60	Dark banded bushbrown	<i>Mycalesis mineus</i>	Common	5	0.37
61	Tailed Palmfly	<i>Elymnias caudata</i>	Common	13	0.97
62	Nigger	<i>Orsotrioena medus</i>	Common	5	0.37
63	Common Four Ring	<i>Ypthima huebneri</i>	Common	170	12.72
64	Common Five Ring	<i>Ypthima baldus</i>	Common	6	0.45
65	Tawny Coster	<i>Acraea violae</i>	Common	3	0.22
66	Cruiser	<i>Vindula erota</i>	Not rare	2	0.15
67	Rustic	<i>Cupha erymanthis</i>	Common	7	0.52
68	Commander	<i>Moduza procris</i>	Common	6	0.45
69	Clipper	<i>Parthenos sylvia</i>	Rare	2	0.15
70	Common baron	<i>Euthalia aconthea</i>	Common	2	0.15
71	Baronet	<i>Euthalia nais</i>	Common	3	0.22
72	Grey count	<i>Tanaecia lepidea</i>	Rare	2	0.15
73	Redspot duke	<i>Dophla evelina</i>	Not common	1	0.07
74	Chestnut Streaked Sailer	<i>Neptis jumbah</i>	Common	2	0.15

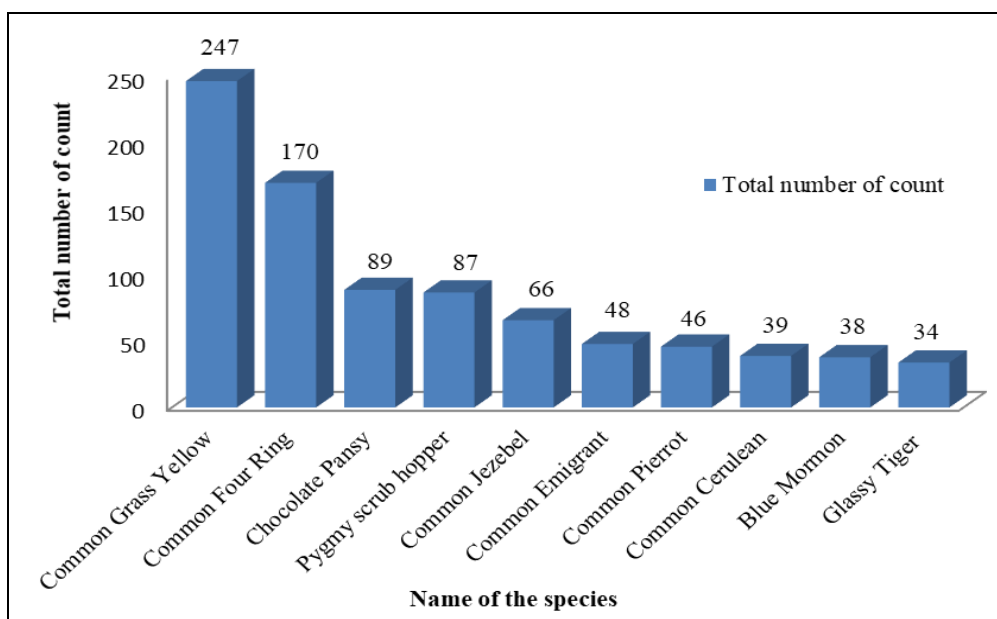
75	Common sailer	<i>Neptis hylas</i>	Common	10	0.75
76	Painted Lady	<i>Vanessa cardui</i>	Common	2	0.15
77	Blue pansy	<i>Junonia orithiya</i>	Common	1	0.07
78	Chocolate Pansy	<i>Junonia iphita</i>	Common	89	6.66
79	Grey Pansy	<i>Junonia atlites</i>	Common	10	0.75
80	Peacock Pansy	<i>Junonia almana</i>	Common	11	0.82
81	Lemon Pansy	<i>Junonia lemonias</i>	Common	22	1.65
82	Great Eggfly	<i>Hypolimnas bolina</i>	Common	17	1.27
83	Danaid eggfly	<i>Hypolimnas misippus</i>	Common	2	0.15
<b>Ridionidae-Judies and Metalmarks</b>					
84	Suffused double-banded judy	<i>Abisara bifasciata suffusa</i>	Common	3	0.22

**Table 2:** Number and percent distribution of species under different families

Sl. No.	Family	Species	
		Number	Percentage
1	Nymphalidae	33	39.28
2	Lycanidae	19	22.61
3	Hesperiidae	13	15.47
4	Papilionidae	9	10.71
5	Pieridae	9	10.71
6	Riodinidae	1	1.19



**Fig 1:** Percent occurrence of butterfly species under different families



**Fig 2:** Top ten maximum encountered Butterfly species

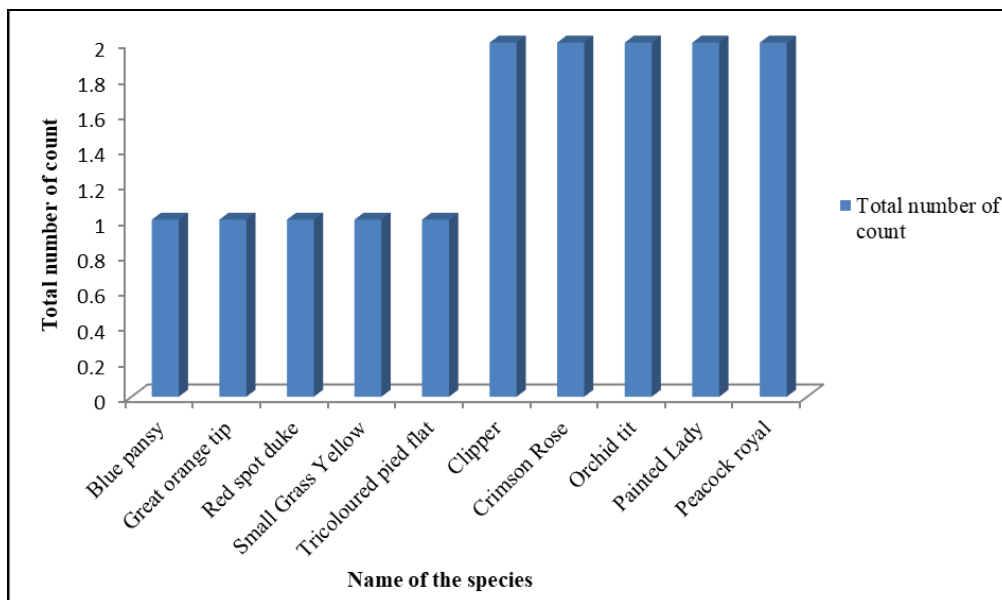


Fig 3: Top ten minimum encountered Butterfly species

Table 3: List of nectar plant present in the campus

Sl. No	Common name	Scientific name	Family	Name of the butterflies
1	Hill Glory Bower	<i>Clerodendrum viscosum</i>	Verbenaceae	Blue Mormon, Southern birdwing
2	Rattleweed	<i>Crotalaria retusa</i>	Fabaceae	Striped tiger, Oriental Blue tiger, Dark Blue tiger
3	Smooth Rattlepod	<i>Crotalaria pallida</i>	Fabaceae	Pea Blue
4	Lantana	<i>Lantana camera</i>	Verbenaceae	Common jezebel, Peacock pansy
5	Sky flower	<i>Duranta erecta</i>	Verbenaceae	Metallic Cerulean, Chestnut Bob
6	Pagoda flower	<i>Clerodendrum paniculatum</i>	Verbenaceae	Southern birdwing
7	Tridax Daisy	<i>Tridax procumbens</i>	Asteraceae	Common Grass Yellow
8	Creeping Daisy	<i>Wedelia trilobata</i>	Asteraceae	Common Cerulean, Red Pierrot
9	Blue Snakeweed	<i>Stachytarpheta jamaicensis</i>	Verbenaceae	Common Cerulean, Dark Palm Dart
10	Blue Fountain Bush	<i>Rothea serrata</i>	Verbenaceae	Common Small Flat
11	Purple Sow Thistle	<i>Emilia sonchifolia</i>	Asteraceae	Lesser grass blue, Pale grass blue
12	Common Wireweed	<i>Sida acuta</i>	Malvaceae	Plain tiger, Indian Skipper

Table 4: List of host plants present in the campus

Sl. No	Common name	Scientific name	Family	Butterflies name
1	Karanj	<i>Millettia pinnata</i>	Fabaceae	Common Banded Awl, Common Cerulean
2	Dhobi tree	<i>Mussaenda frondosa</i>	Rubiaceae	Commander
3	Kadamb tree	<i>Anthocephalus cadamba</i>	Rubiaceae	Commander
5	Mango	<i>Mangifera indica</i>	Anacardiaceae	Common Baron
6	Smooth Rattlepod	<i>Crotalaria pallida</i>	Fabaceae	Pea blue
7	Ashok	<i>Polyalthia longifolia</i>	Annonaceae	Common bluebottle, Common jay, Tailed jay
8	Knicker nut	<i>Ceasalpinia bunduc</i>	Fabaceae	Three-spotted grass yellow
10	Giant granadilla	<i>Passiflora quadrangularis</i>	Passifloraceae	Tawny coster
11	Mountain sweet thorn	<i>Flacourtia monata</i>	Salicaceae	Rustic
12	Air plant	<i>Kalanchoe pinnata</i>	Crassulaceae	Red Pierrot
13	Kassod tree	<i>Cassia siamia</i>	Fabaceae	Common Emigrant

Hesperiidae-Skippers



Chestnut bob



Tamil grass dart



Grass demon



Water snow flat



Suffused snow flat



Pygmy scrub hopper



Tri-coloured pied flat



Straight swift

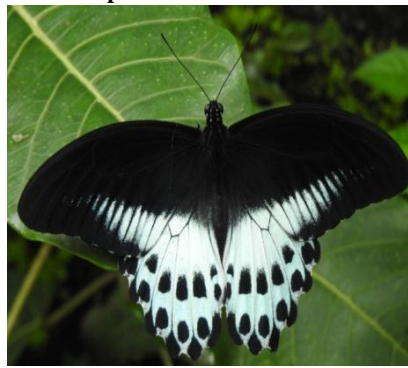


Brown awl

**Papilionidae-Swallowtails**



Tailed jay



Blue Mormon



Red Helen



Southern birdwing



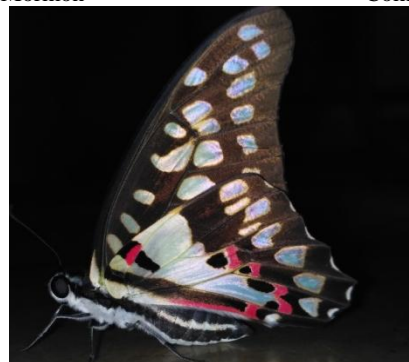
Common Mormon



Common rose



Common bluebottle



Common jay

**Pieridae-Whites and Yellows**



Common jezebel



Common emigrant



Three-spot grass yellow



Common grass yellow



Common gull



Pioneer



Mottled emigrant



Great orange tip



Suffused double banded judy  
Family: Riodinidae

**Lycaenidae-Blues**



Common imperial



Monkey puzzle



Common Pierrot



Angled Pierrot



Orchid tit



Lime blue



Common Cerulean



Lesser grass blue



Slate flash



Common hedge blue



Transparent six lineblue



Pea blue

**Nymphalidae-Brush footed butterflies**



Baronet



Striped tiger



Painted lady



Great eggfly



Danaid eggfly



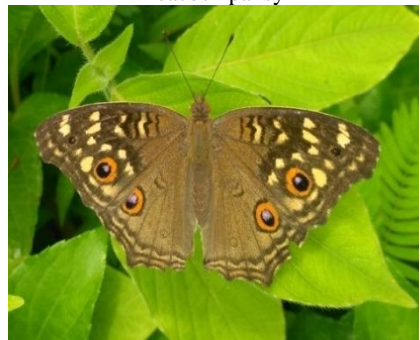
Peacock pansy



Blue pansy



Rustic



Lemon pansy





Cruiser



Grey count



Commander

**Fig 4:** Butterflies species found in the campus



*Clerodendrum viscosum*



*Duranta erecta*



*Rotheca serrata*



*Crotalaria retusa*



*Lantana camera*



*Wedelia trilobata*



*Emilia sonchifolia*



*Tridox procumbens*



*Sida acuta*

**Fig 5:** Nectar plant found in the campus



**Fig 6:** Early stages of butterflies on their host plants found in the campus

**Conclusion**

This study indicates that, butterfly diversity is high in the campus and have a greater ecological significance, as various higher groups of organisms such as lizards, birds and some mammals feed on butterflies and their caterpillars, thus forming more than one link in the food web, hence there is a need to conserve both butterflies and host plants for conserving the population. Maintaining high plant diversity and different types of habitats is a good option for the conservation of species in human dominated landscape or any institutional campus<sup>[13]</sup>.

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**References**

1. Gowda HT, Vijayakumara, Pramod AF, Hosetti BB. Butterfly diversity, seasonality and status in lakkavalli range of Bhadra wildlife sanctuary, Karnataka. World Journal of Science and Technology. 2011; 1(11):67-72.
2. Aneesh KS, Adarsh CK, Nameer PO. Butterflies of Kerala Agricultural University (KAU) campus, Thrissur, Kerala, India. Journal of Threatened Taxa. 2013; 5(9):4422-4440.
3. Kocher SD, Williams EH. The diversity and abundance of North American butterflies vary with habitat disturbances and geography. Journal of Biogeography. 2000; 27:785-794.
4. Ehrlich PR. The comparative morphology, phylogeny and higher classification of butterflies (Lepidoptera: Papilionidea). University of Kansas Science Bulletin. 2008; 39:305-370
5. Dayananda G. Diversity of butterfly fauna in and around Gudavi bird sanctuary, Sorab, Karnataka. Journal of Entomology and Zoology Studies. 2014; 2(5):376-380.

6. Kunte K. Butterflies of Peninsular India. Universities Press (Hyderabad) and Indian Academy of Sciences (Bengaluru), 2000, 270.
7. Nitin R, Balakrishnan VC, Churi PV, Kalesh S, Prakash S, Kunte K. Larval host plants of the butterflies of the Western Ghats, India. *Journal of Threatened Taxa*. 2018; 10(4):11495-11550.
8. Kehimkar I. *The Book of Indian Butterflies*. Bombay Natural History Society, Mumbai. 2008, 497.
9. Bhakare M, Ogale H. *A guide to the butterflies of Western Ghats (India)*. First edition. 2018, 496.
10. Dayananda G. Diversity of butterfly fauna in and around Gudavi bird sanctuary, Sorab, Karnataka. *Journal of Entomology and Zoology Studies*. 2014; 2(5):376-380.
11. Priya L, Krishnaraj V, Janaranjini, Sutharsan, Lakeshmanaswamy. Studies on butterfly diversity in Adichanalloor Village, Kollam District, Kerala. *Journal of Entomology and Zoology Studies*. 2008; 5(5):73-81
12. Aneesh KS, Adarsh CK, Nameer PO. Butterflies of Kerala Agricultural University (KAU) campus, Thrissur, Kerala, India. *Journal of Threatened Taxa*. 2013; 5(9):4422-4440.
13. Harsh S. Butterfly diversity of Indian institute of Forest Management, Bhopal, Madhya Pradesh. *Journal of Insects*. 2014, 4.
14. Umapati Y, Usha DN, Vedavati GN, Girimalleshwar B, Veeranagoudar DK, Pulikeshi MB. Butterfly Diversity of Karnatak University Campus, Dharwad. *IOSR Journal of Environmental Science, Toxicology and Food Technology*. 2016, 77-83.
15. Roulledge RD. Diversity indices: which ones are admissible. *Journal of Theoretical Biology*. 1979; 76:503-515.