



# Diversity Assessment Of Lepidoptera (Butterflies) In And Around Belur Village Of Hosanagara Taluk, Shivamogga District, Karnataka

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## Abstract:

Butterflies belongs to order Lepidoptera of class Insecta. They prefers host or nectar plants for growth and development with indicates their diversity of flora of an area. They are major ecological indicators, play an vital role in the food chain and food web. Study on diversity of butterflies conducted from May 2023 to September 2024. Documented a total of 115 butterfly species belonging to 74 genera across five families: Hesperidae (16 species, 13.91%), Lycaenidae (25 species, 21.73%), Nymphalidae (37 species, 32.2%), Papilionidae (17 species, 14.8%), and Pieridae (20 species, 17.4%). Statistical data revealed, Shannon-Wiener Diversity Index ( $H'$ ) of 1.558, indicating moderate diversity across families, with a low Evenness Index ( $J = 0.2222$ ) stating uneven species distribution. Dominance Index (32.2) highlighted Nymphalidae's significant contribution to the overall species diversity. This study underscores the areas significance as a biodiversity hotspot and provides baseline data to monitor anthropological and climatic impacts. The results also contribute to regional biodiversity records, aiding policymakers and conservationists in prioritizing areas for protection.

**Keywords:** Butterfly, Diversity, Shivamogga, Western ghats, Lepidoptera

## Introduction:

The Western Ghat is one among 36 biodiversity hotspots which covers about 60% of the forest area in Karnataka and one among the 8 biodiversity “hottest hotspots” in the world and also designated as UNESCO world heritage site. (State of Environment Report 2003, Myers et al., 2000). India is one of the more biodiversity country with 1,800 species and subspecies of butterflies (Kunte et al., 2015). Westren Ghtas comprises of about 331 species and of which 37 are endemic (Kunte 2000). 317 species from southern Western

Ghats, 316 from the central Western Ghats and 200 have been recorded from northern Western Ghats regions (Gaonkar 1996). Insects are large group of organisms which comprises of Butterflies and moths. Butterflies are most colourfull and tantalizing creatures belongs to order Lepidoptera of class Insecta. Prefers host or nectar pants for growth and development with indicates their diversity of flora of an area (Padhye 2006). They are major ecological indicators, play an vital role in the food chain and food web act as prey species for birds, reptiles, spiders and other predatory insects (Thomas, et al., 1998). Butterflies are very sensitive to the environmental fluctuations able to indicate the small change in their microclimate and environmental parameters hence are also referred as important Flagship (Kumar et al., 2007) and Umbrella species (Padhye et al., 2012). Larvae are primary consumers feed on leaves, foliage and flowers of specific host plants but adult butterfly feed only on liquid food such as nectar and pollen referred as key pollinators. (Ghazoul 2002). Occurrence of butterflies vary with the season very common for few months and rare or absent in others. Months in which the butterflies are highly active is their “flight period” (Kunte, 2000). This survey on butterflies provides information on the ecology of a particular region (Ghazoul, 2002). In this paper an attempt is made to study diversity and seasonal occurrence of butterflies in the study area. It was in this context that the present study was undertaken to generate baseline data of the butterfly fauna of region. By providing baseline data, this research contributes to broader conservation efforts in the Western Ghats and highlights the need for targeted protection of understudied landscapes.

### Materials and Methods:

**Study Area:** Present study was conducted in the Belur Village (N13.54.549', E075.55.790') of Nagodi grama, Hosanagara taluk, Shivamogga. It is located adjacent to Mookambika Wildlife Sanctuary. The area consists of evergreen, semi-evergreen and moist deciduous forests with variety of wildlife (Anonymous.2003). Temperature ranges from 37°C in summer and lowest 10°C in winter. Average humidity is 80% rainfall is about 150cm to 350cm (Ramaswamy et al., 2001). Study area map was prepared with QGIS 3.28.1.

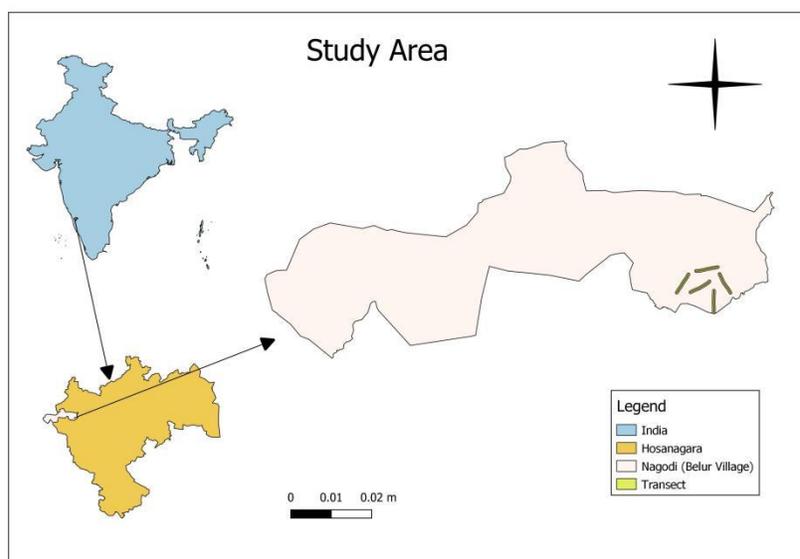


Figure 1: Location of the study area.

## Methodology:

Field observations were made from a period of May 2023 to November 2024. Survey was carried out from 07:00 hrs. to 10:00 hrs. In the morning, the butterflies are generally less active and easy for observation and photography. This study was conducted throughout all four seasons. Butterfly survey was carried out by visual encounter method, in a line transect of 500m and 10m wide travelled about 30min and documentation was made by Photography (DSLR: Nikon D5200, Tamron 300mm lens) collection of specimen was avoided during the study. Butterflies were identified based on characters such as colour pattern, wing span, flight mode etc., compared with multiple field guides (Kasambe 2018), BNHS Field Guide, Butterflies of India by Isaac Kehimkar 2016 and Photographic field guide Wildlife of South India by Surya Ramachandran and David Raju 2021. Based on the abundance and frequency of the species sightings, they were categorized into five categories: very common (VC), common (C), occasional (O), rare (R) and very rare (VR). Diversity indices were calculated by using PAST.03 statistical software.

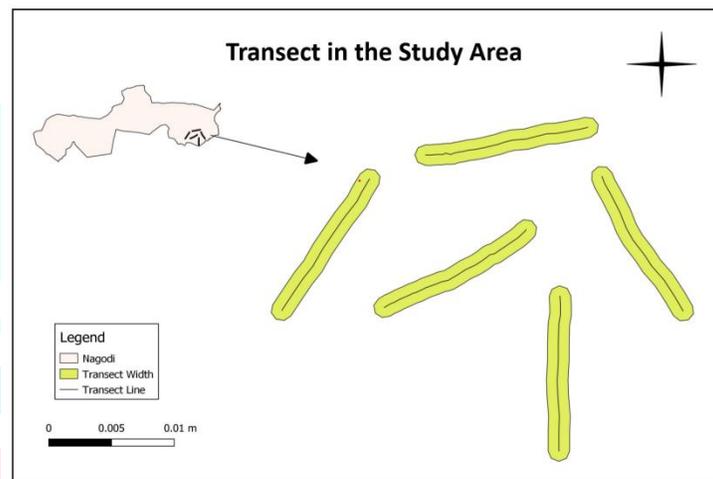


Figure 2: Transect lines in the study area

## Result and Discussion:

Species distribution of butterflies in the study area revealed a total of 115 species belonging to 79 genera across 5 families: HesperIIDae, Lycaenidae, Nymphalidae, Papilionidae, and Pieridae. Distribution of species among families was as follows: HesperIIDae (16 species, 13.91%), Lycaenidae (25 species, 21.73%), Nymphalidae (37 species, 32.17%), Papilionidae (17 species, 14.78%), and Pieridae (20 species, 17.39%). Nymphalidae was the most dominant family, accounting for nearly one-third of the total recorded species, followed by Lycaenidae and Pieridae. Together, these three families constituted 71.29% of the butterfly fauna observed. In contrast, HesperIIDae and Papilionidae collectively contributed 28.69% of the total diversity. Some review reports shows butterfly diversity varies across Karnataka 84 species were recorded in Sirsi during 2019 (Uday et al., 2019), 48 species were recorded in Puhpagiri Wildlife Sanctuary during 2016 to 2017 (Krishna 2018), 172 species recorded in Dakshina Kannada district during September 2012 to December 2015 (Deepak and Mohammed 2016), 33 species were recorded in Sahyadri college campus, Shimoga during June to December 2013 (Sayeswara 2014), 95 species of butterflies were recorded from agri-horticulture ecosystems of Chamarajanagar district, Karnataka during December, 2012 to July, 2013. (Santhosh and Basavarajappa 2015), 115 species were recorded in Kuvempu University campus, Karnataka during 2010 to 2013 (Harisha and Hosetti 2021), 151 species documented in Shettihalli Wildlife Sanctuary during the year 2010 to 2011 (Harisha et al., 2019), 52 species recorded in Mandagadde, Shimoga during 2010 to 2011 (Jeevan et al., 2013), 54 species recorded in Lakkavalli range Bhadra Wildlife Sanctuary during 2009 to 2010 (Raghavendra et al., 2011)

and 142 species recorded in Mookambika Wildlife Sanctuary during 2003 to 2005 (Mohandas and Ramadevi 2019).

Table 1: Checklist of Butterflies with status recorded during May 2023 to November 2024 in Belur village

Sl. No.	Scientific Name	Common Name	Status
<b>FAMILY – HESPERIIDAE</b>			
1	<i>Aeromachus pygmaeus</i> (Fabricius, 1775)	Pygmy Scrub Hopper	O
2	<i>Ampittia dioscorides</i> (Fabricius, 1793)	Bush Hopper	C
3	<i>Borbo cinnara</i> (Wallace, 1866)	Rice Swift	C
4	<i>Celaenorrhinus leucocera</i> (Kollar, [1844]) *	Common Spotted Flat	VR
5	<i>Gangara thyrasis</i> (Fabricius, 1775) *	Giant Redeye	VR
6	<i>Halpe hindu</i> Evans, 1937	Sahyadri banded ace	C
7	<i>Hasora chromus</i> (Cramer, [1780])	Common Banded Awl	C
8	<i>Hasora taminatus</i> (Hübner, 1818)	White banded awl	O
9	<i>Hesperia comma</i> (Linnaeus, 1758)	Chequered Darter	C
10	<i>Iambrix salsala</i> (Moore, [1866])	Chestnut bob	VC
11	<i>Oriens goloides</i> (Moore, [1881])	Smaller Dartlet	R
12	<i>Spialia galba</i> (Fabricius, 1793)	Asian Grizzled Skipper	R
13	<i>Taractrocera ceramas</i> (Hewitson, 1868) *	Tawny-spotted Grass Dart	VR
14	<i>Taractrocera maevius</i> (Fabricius, 1793)	Grey-veined Grass Dart	R
15	<i>Tagiades litigiosa</i> (Moschler, 1878)	Water snow flat	VC
16	<i>Udaspes folus</i> (Cramer, [1775])	Grass demon	C
<b>FAMILY- LYCAENIDAE</b>			
17	<i>Abisara echerius</i> (Stoll, [1790])	Plum judy	VC
18	<i>Acytolepis puspa</i> (Horsfield, [1828])	Common Hedge blue	C
19	<i>Arhopala amantes</i> (Hewitson, 1862)	Large Oak Blue	R
20	<i>Caleta decidia</i> (Hewitson, 1876)	Angled Pierrot	R
21	<i>Castalius rosimon</i> (Fabricius, 1775)	Common Pierrot	VC
22	<i>Celastrina lavendularis</i> (Moore, 1877)	Plain hedge blue	C
23	<i>Chilades lajus</i> (Stoll, [1780])	Lime blue	C
24	<i>Chilades pandava</i> (Horsfield, [1829])	Plains cupid	C
25	<i>Cigaritis vulcanus</i> (Fabricius, 1775)	Common Silverline	R
26	<i>Discolampa ethion</i> (Westwood, [1851])	West wood Banded Blue Pierrot	C
27	<i>Euchrysops cnejus</i> (Fabricius, 1798)	Gram Blue	C
28	<i>Freyeria trochylus</i> (Freyer, 1845)	Orange spotted grass jewel	VC
29	<i>Jamides bochus</i> (Stoll, [1782])	Dark Cerulean	VC
30	<i>Lampides boeticus</i> (Linnaeus, 1767)	Pea Blue	C
31	<i>Leptotes plinius</i> (Fabricius, 1793)	Zebra blue	C
32	<i>Loxura atymnus</i> (Stoll, 1780)	Yamfly	O
33	<i>Prosotas nora</i> (C. Felder, 1860)	Common Lineblue	VC
34	<i>Rapala varuna</i> (Horsfield, [1829])	Indigo flash	O
35	<i>Rathinda amor</i> (Fabricius, 1775)	Monkey Puzzle	C
36	<i>Spalgis epius</i> (Westwood, [1851])	Apefly	R
37	<i>Talicauda nyseus</i> (Guérin-Méneville, 1843)	Red Pierrot	C
38	<i>Tarucus ananda</i> (de Nicéville, [1884])	Dark Pierrot	C
39	<i>Zizula hylax</i> (Fabricius, 1775) *	Tiny grass blue	VR
40	<i>Zizeeria karsandra</i> (Moore, 1865)	Dark Grass Blue	VC
41	<i>Zizina otis</i> (Fabricius, 1787)	Lesser grass blue	C
<b>FAMILY – NYMPHALIDAE</b>			
42	<i>Acraea terpsicore</i> (Linnaeus, 1758)	Tawny Coster	C
43	<i>Ariadne merione</i> (Cramer, [1777])	Common Caster	C
44	<i>Byblia ilithyia</i> (Drury, 1773)	Spotted joker	C
45	<i>Charaxes bhārata</i> C. & R. Felder, [1867]	Indian nawab	R
46	<i>Cirrochroa thais</i> (Fabricius, 1787) *	Tamil yeoman	VR
47	<i>Cupha erymanthis</i> (Drury, 1773)	Rustic	C
48	<i>Danaus chrysippus</i> (Linnaeus, 1758)	Plain Tiger	R
49	<i>Danaus genutia</i> (Cramer, [1779])	Striped Tiger	C

50	Euthalia aconthea (Cramer, [1777])	Common baron	C
51	Euploea core (Cramer, 1780)	Common Crow	VC
52	Hypolimnas bolina (Linnaeus, 1758)	Great Egfly	C
53	Hypolimnas misippus (Linnaeus, 1764)	Danaid Egfly	C
54	Ideopsis vulgaris (Butler, 1874) *	Blue Glassy Tiger	VR
55	Junonia almana (Linnaeus, 1758)	Peacock Pansy	C
56	Junonia atlites (Linnaeus, 1763)	Gray Pansy	R
57	Junonia hierta (Fabricius, 1798)	Yellow Pansy	C
58	Junonia iphita (Cramer, 1779)	Chocolate Pansy	C
59	Junonia lemonias (Linnaeus, 1758)	Lemon Pansy	VC
60	Junonia orithya (Linnaeus, 1758)	Blue Pansy	C
61	Melanitis leda (Linnaeus, 1758)	Common Evening brown	VC
62	Melanitis phedima (Cramer, 1780)	Dark evening brown	R
63	Moduza procris (Cramer, 1777)	Commander	R
64	Mycalesis mineus (Linnaeus, 1758)	Dark-brand Bushbrown	R
65	Mycalesis patnia (Moore, 1857)[	Malabar glad eye bushbrown	C
66	Mycalesis perseus (Fabricius, 1775)	Common bushbrown	C
67	Neptis hylas (Linnaeus, 1758)	Common Sailor	VC
68	Orsotriaena medus (Fabricius, 1775) *	Medus Brown	VR
69	Pantoporia hordonia (Stoll, 1790)	Common lascar	R
70	Parantica aglea (Stoll, 1782) *	Glassy tiger	VR
71	Phalanta phalantha (Drury, [1773])	Common Leopard	VC
72	Symphaedra nais Forster, 1771	Baronet	C
73	Tirumala limniace (Cramer, [1775)	Blue Tiger	C
74	Tirumala septentrionis (Butler, 1874)	Dark Blue Tiger	C
75	Vanessa cardui (Linnaeus, 1758)	Painted lady	R
76	Vanessa indica (Herbst, 1794) *	Indian red admiral	VR
77	Ypthima baldus (Fabricius, 1775)	Common Five ring	VC
78	Ypthima huebneri Kirby, 1871	Common Four Ring	VC
<b>FAMILY – PAPILIONIDAE</b>			
79	Graphium agamemnon (Linnaeus, 1758)	Tailed Jay	VC
80	Graphium antiphates (Cramer, 1775)	Five-bar Swordtail	C
81	Graphium doson (C. & R. Felder, 1864)	Common Jay	C
82	Graphium nomius (Esper, 1793)	Spot Swordtail	C
83	Graphium tereon (C. & R. Felder, [1865])	Narrow-banded Bluebottle	O
84	Graphium sarpedon (Linnaeus, 1758)	Common Blue Bottle	R
85	Pachliopta aristolochiae (Fabricius, 1775)	Common Rose	R
86	Pachliopta hector (Linnaeus, 1758)	Crimson Rose	C
87	Pachliopta pandiyana (Moore, 1881) *	Malabar rose	VR
88	Papilio clytia Linnaeus, 1758	Common Mime	R
89	Papilio crino (Fabricius, 1792) *	Common banded peacock	VR
90	Papilio demoleus (Linnaeus, 1758)	Common Lime Butterfly	VC
91	Papilio dravidarum (Wood-Mason, 1880)	Malabar Raven	R
92	Papilio helenus (Linnaeus, 1758)	Red helen	C
93	Papilio polymnestor (Cramer, 1775)	Blue Mormon	R
94	Papilio polytes (Linnaeus, 1758)	Common Mormon	C
95	Troides minos (Cramer, 1779)	Southern Birdwing	R
<b>FAMILY – PIERIDAE</b>			
96	Belenois aurota (Fabricius, 1793)	Pioneer White	VC
97	Catopsilia pomona (Fabricius, 1775)	Lemon Emigrant	VC
98	Catopsilia pyranthe (Linnaeus, 1758)	Mottled Emigrant	C
99	Cepora nadina (Lucas, 1852) *	Lesser gull	VR
100	Cepora nerissa (Fabricius, 1775)	Common gull	O
101	Colotis aurora (Cramer, [1780])	Plain orange tip	C
102	Colotis amata (Fabricius, 1775)	Small salmon arab	R
103	Colotis danae (Fabricius, 1775)	Crimson tip	C
104	Colotis etrida (Boisduval, 1836)	Little orange tip	C
105	Colotis fausta (Olivier, 1804)	Large salmon arab	R
106	Delias eucharis (Drury, 1773)	Common Jezebel	C

107	Eurema andersonii (Moore, 1886)	One spot grass yellow	C
108	Eurema blanda (Boisduval, 1836)	Three spot Grass Yellow	C
109	Eurema brigitta (Stoll, [1780])	Small grass yellow	C
110	Eurema hecabe (Linnaeus, 1758)	Common grass yellow	VC
111	Hebomoia glaucippe (Linnaeus, 1758) *	Great Orange Tip	<b>VR</b>
112	Ixias pyrene (Linnaeus, 1764)	Yellow orange tip	R
113	Leptosia nina (Fabricius, 1793)	Psyche	O
114	Pareronia hippia (Fabricius, 1787)	Indian Wanderer	C
115	Prioneris sita (C. & R. Felder, [1865]) *	Painted sawtooth	<b>VR</b>

**Note:** VC- Very Common, C- Common, R- Rare, **VR**- Very Rare, O- Occasional

\* - Very Rare species highlighted

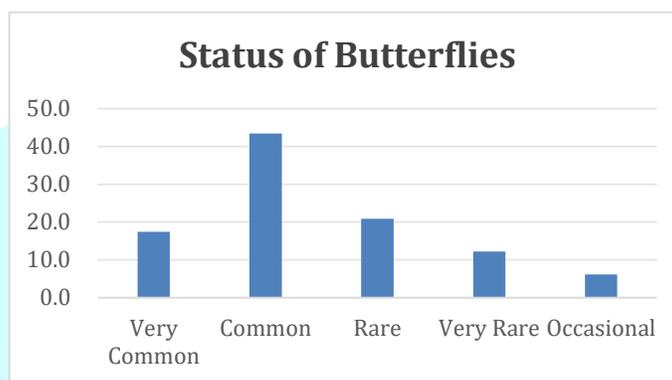


Figure 2 : Status of Butterflies in the study area

17.4% are very common, 43.5% were common, 20.9% rare, 12.2% were very rare butterfly species such as *Celaenorrhinus leucocera*, *Gangara thyrasis*, *Taractrocera ceramas*, *Zizula hylax*, *Cirrochroa thais*, *Ideopsis vulgaris*, *Orsotriaena medus*, *Parantica aglea*, *Vanessa indica*, *Pachliopta pandiyana*, *Papilio crino*, *Cepora nadina*, *Hebomoia glaucippe* and *Prioneris sita*. 6.1% of occasional species were recorded.

**Statistical Analysis:**

**1. Shannon-Wiener Diversity Index (H'): 1.558**

$$H' = - \sum (p_i \cdot \ln p_i)$$

This index measures the overall diversity of butterfly families, considering both richness and evenness. A value of 1.558 indicates the documented butterfly families has moderate diversity.

**2. Evenness Index (J): 0.9497**

$$J = \frac{H'}{\ln S}$$

This index measures how evenly species are distributed across the different butterfly families, evenness with respect to butterfly diversity was also high 0.9497 indicates stable community

**3. Dominance Index: 0.2222**

$$\text{Dominance} = \frac{\text{Number of species in most abundant family}}{\text{Total species}}$$

This index shows the proportion of the total species diversity represented by the most abundant family. The Dominance Index of 0.2222 means low dominance and species are relatively evenly distributed.

Table 2: Data of diversity indices

Taxa_S	5
Individuals	115
Dominance_D	0.2222
Simpson_1-D	0.7778
Shannon_H	1.558
Evenness_e^H/S	0.9497

**4. Relative Diversity Index:**

This index calculates the ratio of absolute diversity to the maximum possible diversity. Nymphalidae (32.2) contributes more is followed by Lycaenidae (21.73), Pieridae (17.4), Papilionidae (14.8) and lowest contributed by Hesperidae (13.91).

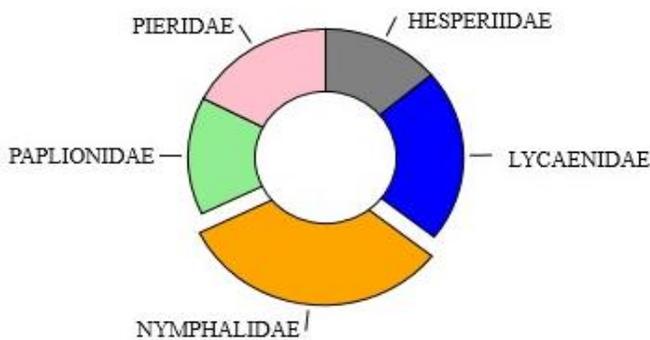


Figure 3: Species contribution of each family

Shannon-Wiener Diversity Index (H') of 1.558 suggests moderate diversity among butterfly families, indicating a fair representation of species without complete dominance by any single family. However, the Evenness Index (J) of 0.9497 reflects low evenness, suggesting that species were not evenly distributed across families, some families had many more species than others. The Relative Diversity Index values offer additional insights into genus-level diversity. Nymphalidae (32.2) and Lycaenidae (21.73) demonstrated the highest relative genus diversity, reflecting both species richness and a wider representation of genera within these families. In contrast, Papilionidae (14.8) showed the lowest genus diversity, likely a consequence of fewer species and genera in this family, which is typically more specialized in habitat and host plant preferences. The Dominance Index of 0.2222 further confirms this pattern, showing that the most abundant family Nymphalidae alone accounts for about 32% of the recorded species. Such dominance is common in tropical butterfly communities, where certain families exploit available resources more effectively than others. The flowers of Euphorbiaceae, Compositae, Rubiaceae and Verbinaceae can attract higher number of Nymphalidae butterflies (Priya et al., 2008). Larval host plants are very important for the growth and development of caterpillars. Abundance in number of host plants and availability of nectar can leads to increase in diversity of dependent butterfly species (Aneesh et al., 2013). The wide variety of flora and different kinds of vegetation like semi evergreen, evergreen forests in the Western Ghats can contribute to abundance of host plants for the survival of dependent species.

The present study reports for the baseline information on butterfly species diversity of Belur Village. Occurrence of schedule and endemic species indicates ecological importance of the area.

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Plate 1

				
<b>Glossy Blue Tiger</b> (Ideopsis vulgaris)	<b>Lemon Pancy</b> (Junonia lemonias)	<b>Chocolate Pancy</b> (Junonia iphita)	<b>Plum judy</b> (Abisara echerius)	<b>Wter Snow Flat</b> (Tagiades litigiosa)
				
<b>Rustic</b> (Cupha erymanthis )	<b>Common Sailor</b> (Neptis hylas)	<b>Common Leopard</b> (Phalanta phalantha)	<b>Common Blue Bottle</b> (Graphium sarpedon)	<b>Common Crow</b> (Euploea core)
				
<b>Great Eggfly</b> (Hypolimnas bolina)	<b>Tawny Coster</b> (Acraea terpsicore )	<b>Tailed Jay</b> (Graphium agamemnon )	<b>Red Pierrot</b> (Talicada nyseus)	<b>Common Lime Butterfly</b> (Papilio demoleus)