



Diversity of Butterflies from District Solan, Himachal Pradesh, India

Saveena Bogtapa

High Altitude Regional Centre, Zoological Survey of India, Saproon, Solan
(Himachal Pradesh), India

*Corresponding author: saveenabogtapa@gmail.com

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ABSTRACT

Solan district is situated in the northeast region of Himachal Pradesh. During the present study, One hundred and five species of butterflies belonging to 5 families of 72 genera are recorded. The most abundant family is Nymphalidae followed by Lycaenidae, Hesperidae, Pieridae and Papilionidae. Analysis of these species for abundance revealed that 54 species (51.42%) were common, 16 (15.23%) fairly common, 22 (20.9%) uncommon and 13 (12.38%) were rare. Moreover, 13 species were placed under Wild Life Protection Act (1972). The relative percentage of scheduled species is maximum in Lycaenidae (5.71%) followed by Nymphalidae (4.76 %), Hesperidae is equal to Papilionidae (0.95%) and lastly Pieridae (0%).

Key Words: Lepidoptera, butterflies, district Solan, diversity, scheduled species.

INTRODUCTION

Among insects, the order Lepidoptera is the third largest insect order which comprises butterflies and moths. It comprises 1, 57,424 species out of which 16,440 are butterflies belonging to super family Papilionoidea. In India, 1502 species of butterflies while in Himachal only 288 species are reported till date. The importance of butterflies in the ecosystem is many folds. They are the indicators of healthy environment and ecosystem. Their distribution over a wide geographical area forms an important component of biodiversity. They collectively provide a wide range of environmental benefits, including pollination and natural pest control. They are also playing a role in food chain, as they are the prey of birds, bats and other insectivorous animals. The present paper presents a checklist and diversity of butterfly population in the Solan district. Only one published data of butterfly species of this area is known till date. Hence, an attempt has been made to update and document the richness of butterflies in Solan area.

MATERIALS AND METHODS

Study Area

The present study was taken at district Solan which lies at 30.90° North and 77.09° East of Himachal Pradesh. The area covers 1936 km² and nestles in Siwalik ranges of Himalaya with dominant Chir pine forests. Its altitude ranges between 1500-2000 masl. The climate of Solan is temperate kind where temperature ranges from 4°C to 28°C.

Methods

The butterfly fauna was surveyed from August 2013 to May 2015. The specimens were collected with the help of insect net by sweeping method. Sidewise, photographic documentation was also done by using Canon Camera Zoom lens EF 75-300mm. Collected adults were killed in killing bottles by using chemical Ethyl acetate. The specimens were stretched and preserved in fumigated insect box following Arora (1990).

Identification of specimens was done with the help of following books by Evans (1932); Wynter-Blyth (1957); Kunte (2000); Kehimker (2008) and Singh (2010). Butterflies observed were categorized into groups based on their relative numbers, Common >9-10, Fairly Common 6-8, Uncommon 3-5, Rare 0-2 during the study period.

RESULTS AND DISCUSSION

In present survey, 105 species of butterflies belonging to 5 families of 74 genera have been recorded from Solan (Table 1 & Plate 1). The family Nymphalidae including Danaidae and Satyridae appears to be most species rich (n=40, 38.09%) with 24 genera, followed by Lycaenidae including Riodinidae (n= 30, 28.57%) with 25 genera, Hesperidae (n=15, 14.28%) with 13 genera and Pieridae (n=15, 14.28%) with 10 genera. The family Papilionidae with lowest species richness (n=5, 5%) with 2 genera (Figure 1, 2). Analysis of these species for relative abundance revealed that

54 species (51.42%) were common, 16 (15.23%) fairly common, 22 (20.9%) uncommon and 13 (12.38%) were rare (Figure 3). Moreover, 13 species were placed under Wild Life Protection Act 1972 (Table 1). The number and percentage of scheduled species in Lycaenidae (including Riodinidae) is n=6, 5.71%, Nymphalidae (including Danaidae and Satyridae) n=5, 4.76 %, Hesperidae and Papilionidae n=1, 0.95% and finally Pieridae n=0 (Figure 4).

Previously, Arora *et al.*, (2009) has reported 89 species of butterflies from Solan area and in the present study, 105 species in which 16 species were extra newly recorded (Plate 1). Therefore, the study reflects the baseline information on the butterflies and enriches the checklist of Himachal Pradesh. Moreover, 12.38% of species comes under the category of rare species and 13 species were placed under Wild Life Protection Act, 1972. This suggests that more studies and proper strategies are needed for sustainable conservation in this area.

Table 1. A Checklist of Butterflies from district Solan (H.P.) recorded during August 2013- May 2015.

S.No.	Scientific name	Common name	Family	Status in IWPA 1972	Abundance
1	<i>Papilio polyctor</i> Boisduval	Common Peacock	Papilionidae		C
2	<i>Papilio polytes romulus</i> Cramer	Common Mormon	Papilionidae		C
3	<i>Papilio demoleus</i> Linnaeus	Common Lime Butterfly	Papilionidae		C
4	<i>Papilio machaon</i> Mene	Common Yellow Swallowtail	Papilionidae	Schedule II	R
5	<i>Graphium sarpedon</i> Fruhstorfer*	Common Blue-Bottle	Papilionidae		R
6	<i>Delias belladonna</i> Gray	Himalayan Hill Jezebel	Pieridae		C
7	<i>Delias eucharis</i> Drury	Common Jezebel	Pieridae		C
8	<i>Cepora nerissa phryne</i> Fabricius	Common Gull	Pieridae		U
9	<i>Pieris canidia</i> Evans	Indian Cabbage white	Pieridae		C
10	<i>Pieris brassicae</i> Doubleday	Large white	Pieridae		C
11	<i>Pontia daplidice</i> Rober*	Common Bath white	Pieridae		U
12	<i>Ixias pyrene</i> Moore	Yellow Orange Tip	Pieridae		C
13	<i>Pareronia valeria</i> Lesson	The Common Wanderer	Pieridae		U
14	<i>Catopsilia crocale</i> Cramer	Common Emigrant	Pieridae		FC
15	<i>Catopsilia pyranthe</i> Linnaeus*	Mottled Emigrant	Pieridae		FC
16	<i>Gonopteryx rhamni</i> Doubleday	Common Brimstone	Pieridae		FC
17	<i>Eurema brigitta</i> Wallace	Small Grass Yellow	Pieridae		C
18	<i>Eurema laeta laeta</i> Boisduval	Spotless Grass Yellow	Pieridae		C
19	<i>Eurema hecabe</i> Wallace	Large Grass Yellow	Pieridae		C
20	<i>Colias erate</i> Esper	Pale Clouded Yellow	Pieridae		FC
21	<i>Danus chrysippus</i> Linnaeus	Plain Tiger	Danaidae		C
22	<i>Danus genutia</i> Cramer	Striped Tiger	Danaidae		C
23	<i>Tirumala limniace</i> Butler	Blue Tiger	Danaidae		C
24	<i>Tirumala hamata</i> Butler	Dark Blue Tiger	Danaidae		C
25	<i>Parantica aglea</i> Moore	Glassy Tiger	Danaidae		C

26	<i>Parantica sita</i> Kollar	Chest nut Tiger	Danaidae		C
27	<i>Euploea core</i> Cramer	Common Crow	Danaidae	Schedule IV	U
28	<i>Euploea mulciber</i> Cramer*	Striped Blue Crow	Danaidae	Schedule IV	R
29	<i>Lethe rohria</i> Fabricius	Common Tree Brown	Satyridae		C
30	<i>Aulocera swaha</i> Kollar	Common Satyr	Satyridae		U
31	<i>Calerebia scanda</i> Kollar	The Pallid Argus	Satyridae		C
32	<i>Ypthima nareda nareda</i> Kollar*	Large Three- Ring	Satyridae		C
33	<i>Ypthima sakra</i> Moore*	Himalayan Five- Ring	Satyridae		R
34	<i>Melanitis leda</i> Cramer	Common Evening Brown	Satyridae		FC
35	<i>Diagora persimilis</i> Westwood	The Siren	Nymphalidae	Schedule II	R
36	<i>Athyma opalina</i> Kollar	Himalayan Sergeant	Nymphalidae		FC
37	<i>Neptis mahendra</i> Moore	Himalayan Sailor	Nymphalidae		C
38	<i>Neptis hylas</i> Moore	Common Sailor	Nymphalidae		C
39	<i>Neptis yerburyi</i> Butler	Yerbury's Sailor	Nymphalidae		FC
40	<i>Neptis ananta</i> Moore	Yellow Sailor	Nymphalidae	Schedule II	R
41	<i>Kallima inachus</i> Boisduval*	Orange Oakleaf	Nymphalidae		R
42	<i>Junonia hierta</i> Fabricius	Yellow Pansy	Nymphalidae		C
43	<i>Junonia orithya</i> Linnaeus	Blue Pansy	Nymphalidae		C
44	<i>Junonia lemonias</i> Fruhstorfer	Lemon Pansy	Nymphalidae		C
45	<i>Junonia almana</i> Linnaeus	Peacock Pansy	Nymphalidae		C
46	<i>Junonia altites</i> Linnaeus	Grey Pansy	Nymphalidae		FC
47	<i>Junonia iphita</i> Stichel	Chocolate Pansy	Nymphalidae		FC
48	<i>Vanessa cardui</i> Linnaeus	Painted Lady	Nymphalidae		C
49	<i>Vanessa indica</i> Herbst.	Indian Red Admiral	Nymphalidae		C
50	<i>Vanessa cashmirensis</i> Kollar	Indian Tortoiseshell	Nymphalidae		C
51	<i>Kaniska canace</i> Linnaeus	Blue Admiral	Nymphalidae		U
52	<i>Symbrenthia hippoclus</i> Cramer	Common Jestor	Nymphalidae		C
53	<i>Argyreus hyperbius</i> Johan.	Indian Fritillary	Nymphalidae		FC
54	<i>Childrena childreni</i> Gray.	Large Silverstripe	Nymphalidae		C
55	<i>Issoria lathonia</i> Linnaeus	The Queen of Spain Fritillary	Nymphalidae		FC
56	<i>Phalanta phalanta</i> Drury	Common Leopard	Nymphalidae		C
57	<i>Ariadne merione</i> Cramer*	Common Castor	Nymphalidae		C
58	<i>Acrarea issoria</i> Collar	Yellow Coster	Nymphalidae		C
59	<i>Libythea myrrha</i> Godart*	The Club Beak	Nymphalidae		FC
60	<i>Libythea lepita</i> Moore*	Common Beak	Nymphalidae	Schedule II	FC
61	<i>Dodona dipoea</i> Hewitson	The Lesser Punch	Riodinidae	Schedule II	U
62	<i>Dodona durga</i> Kollar*	Common Punch	Riodinidae		C
63	<i>Castalius rosimon</i> Fabricius	The Common Pierrot	Lycaenidae	Schedule I	C
64	<i>Tarucus nara</i> Kollar	Rounded Pierrot	Lycaenidae		FC
65	<i>Everes argiades</i> Chapman*	Chapman's Cupid	Lycaenidae		U
66	<i>Udara albocerulea</i> Moore	Albocerulean	Lycaenidae		R
67	<i>Celastrina huegelli</i> Moore	The Large Hedge Blue	Lycaenidae		C
68	<i>Aricia agestis</i> Moore*	Brown Argus	Lycaenidae		U
69	<i>Chilades lajus</i> Cramer	The Lime Blue	Lycaenidae		C
70	<i>Freyeria trochilus</i> Freyer	Grass Jewel	Lycaenidae		C
71	<i>Pseudozizeeria maha</i> Kollar	Pale Grass Blue	Lycaenidae		C
72	<i>Zizeeria karsandra</i> Moore	Dark Grass Blue	Lycaenidae		C
73	<i>Zizula gaika</i> Trimen	Tiny Grass Blue	Lycaenidae		R
74	<i>Zizula otis</i> Fabricius	Lesser Grass Blue	Lycaenidae		U
75	<i>Euchrysops cnejus</i> Fabricius	Gram Blue	Lycaenidae		FC
76	<i>Heliophorus sena</i> Kollar	Sorrel Sapphire	Lycaenidae		C
77	<i>Lampid boeticus</i> Linnaeus*	Common Pea Blue	Lycaenidae	Schedule II	U
78	<i>Lycaena phlaeas</i> Linnaeus*	Common Copper	Lycaenidae		C
79	<i>Curetis acuta</i> Moore	Angled Sunbeam	Lycaenidae		U

80	<i>Iraota timoleon</i> Stoll.	Silverstreak Blue	Lycaenidae		U
81	<i>Surendra vivarana</i> Horsfieldi	The Acacia Blue	Lycaenidae		FC
82	<i>Spindasis lilacinus</i> Moore	Indian Sunbeam	Lycaenidae		U
83	<i>Spindasis vulcans vulcans</i> Fabricius	Common Silverine	Lycaenidae		C
84	<i>Spindasis elima</i> Moore	Scarce Shot Silverine	Lycaenidae	Schedule II	U
85	<i>Spindasis nipalicus</i> Moore	Silver-grey Silverine	Lycaenidae	Schedule II	U
86	<i>Creon cleobis</i> Godart	Broadtail Royal	Lycaenidae		U
87	<i>Tajuria cippus</i> Fabricius	Indian Peacock Royal	Lycaenidae	Schedule II	U
88	<i>Virachola perse</i> Hewitson	Large Guava Blue	Lycaenidae		U
89	<i>Talicaada nyseus</i> Guerin-Meneville*	The Red Pierrot	Lycaenidae		R
90	<i>Rapala iarbus sorya</i> Kollar	Common Red Flash	Lycaenidae		C
91	<i>Pseudocoladenia dan</i> Fabricius	Fulvous Pied Flat	Hesperiidae		C
92	<i>Odontoptilum angulata</i> Felder	Chestnut Angle	Hesperiidae		U
93	<i>Spialia galba</i> Fabricius	Indian Grizzled Skipper	Hesperiidae		C
94	<i>Ismene aedipodea aegina</i> Plotz	Branded Orange Awlet	Hesperiidae		C
95	<i>Bibasis jaina</i> Moore	Orange Awlet	Hesperiidae		R
96	<i>Choaspes benjamini</i> Guerin	Indian Awlking	Hesperiidae		U
97	<i>Taractrocera danna</i> Moore	Himalayan Grass Dark Dart	Hesperiidae		C
98	<i>Taractrocera maevius</i> Fabricius	Common Grass Dart	Hesperiidae		C
99	<i>Aeromachus stigmatus</i> Moore	Veined Scrub Hopper	Hesperiidae		C
100	<i>Pelopidas assamensis</i> W.M & deN.	Great Swift	Hesperiidae	Schedule IV	U
101	<i>Pelopidas mathias</i> Fabricius	Small-Branded Swift	Hesperiidae		C
102	<i>Parnara guttatus</i> Bremer & Grey	Straight Swift	Hesperiidae		C
103	<i>Pseudoborbo bevani</i> Moore	Bevan's Swift	Hesperiidae		C
104	<i>Udaspus folus</i> Cramer	Grass Demon	Hesperiidae		R
105	<i>Achalarus bifasciatus</i> Moore	Banded Awl	Hesperiidae		R

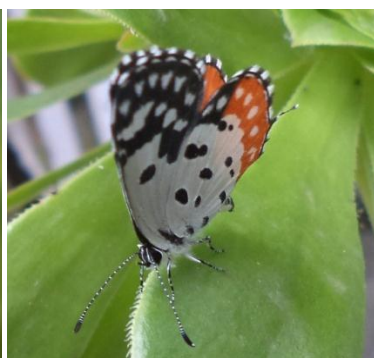
C-Common, FC-Fairly Common, U-Uncommon, R-Rare

*-indicates new record of species from Solan district.

Plate 1. Pictures of 16 species of Butterflies extra recorded from Solan during survey period



Pontia daphidice



Talicaada nyseus



Ariadne merione



Everes argiades



Kallima inachus



Ypthima nareda



Aricia agestis



Ypthima sakra



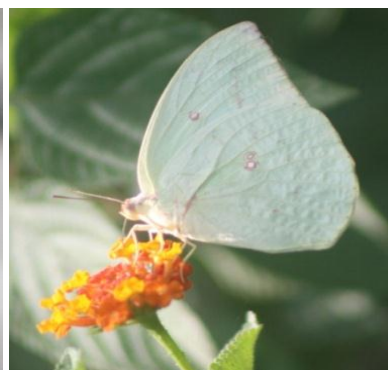
Dodona durga



Lampid boeticus



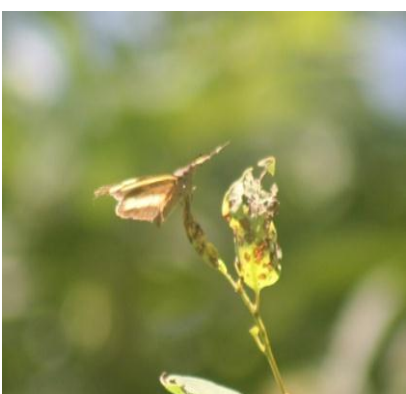
Libythea lepita



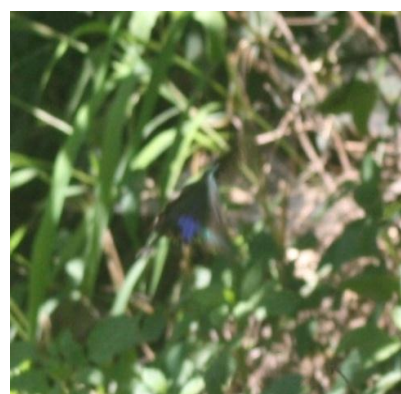
Catopsilia pyranthe



Graphium sarpedon



Libythea myrrha



Euploea mulciber
(Picture not clear)



Lycaena phleas

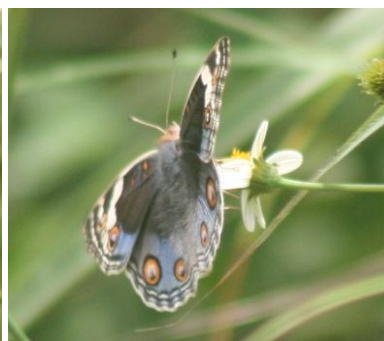
Plate 2. Pictures of other Butterflies species recorded from Solan during survey period



Heliophorus sena



Junonia almana



Junonia orithiya



Junonia lemonias



Junonia iphita



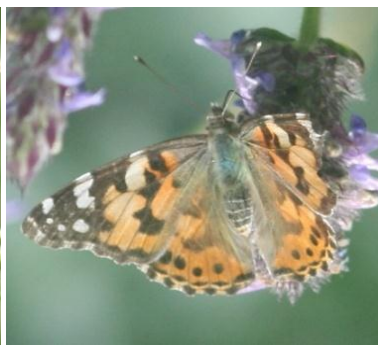
Junonia hierta



Vanessa cashmiriensis



Acraea issoria



Vanessa cardui



Celastrina huegelii



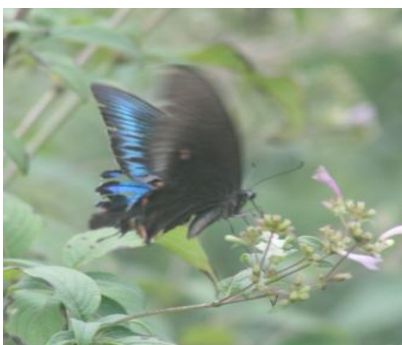
Pierris canidia



Pieris brassicae (Preserved)



Eurema laeta (preserved)



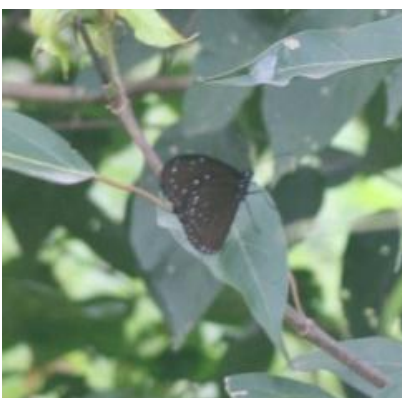
Papilio polyctor



Gonopteryx rhamnii



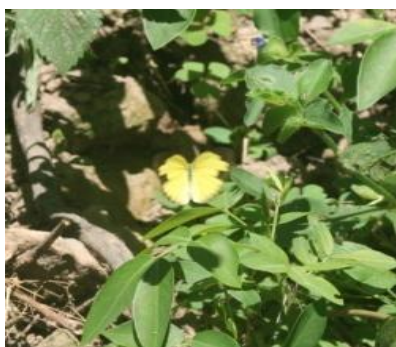
Issoria lathonia



Euploea core



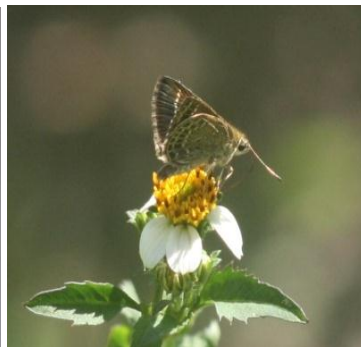
Pseudocoladenia dan



Eurema hecabe



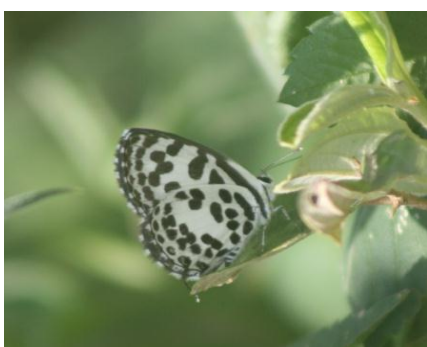
Eurema briggita (preserved)



Aeromachus stigmatus



Papilio polytes romulus



Castalius rosimon



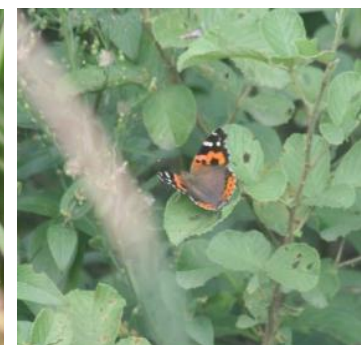
Tarucus nara



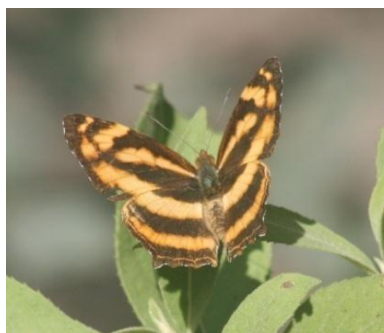
Parnara guttatus



Zizeeria karsandra



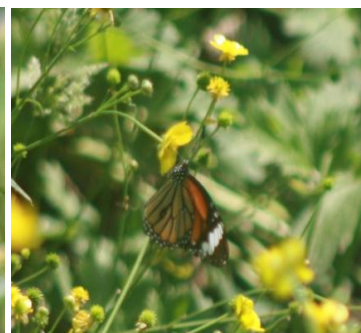
Vanessa indica



Symbrenthia hippocclus



Colias erate



Danus genutia

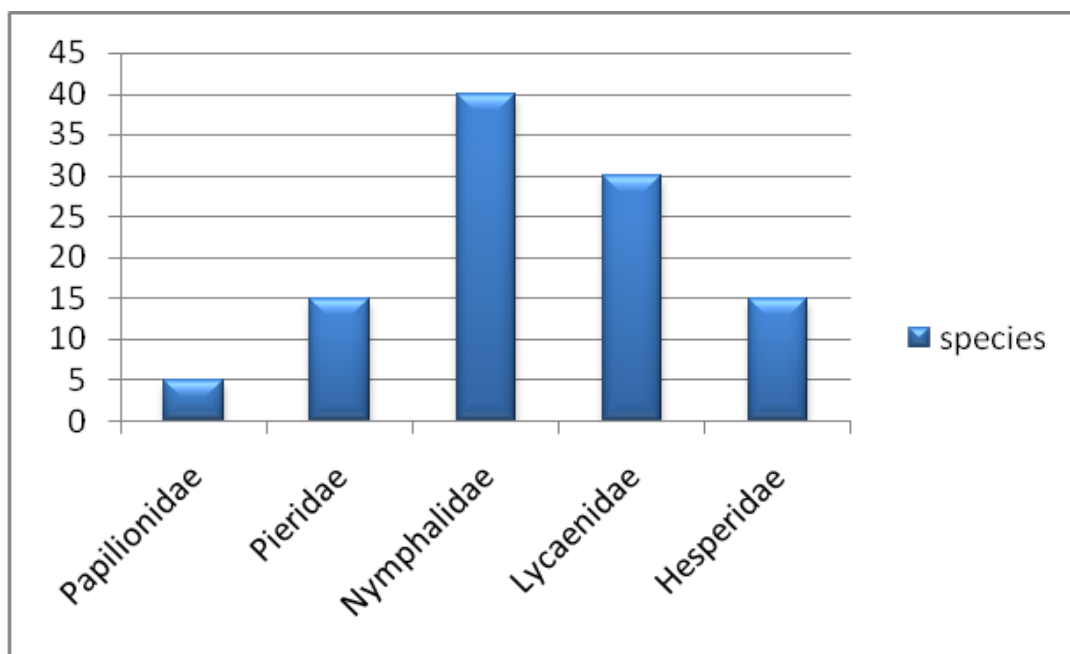


Figure 1. Butterfly families at Solan district

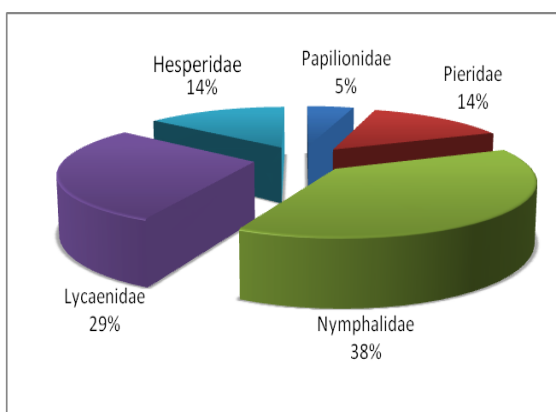


Figure 2. Family wise representation

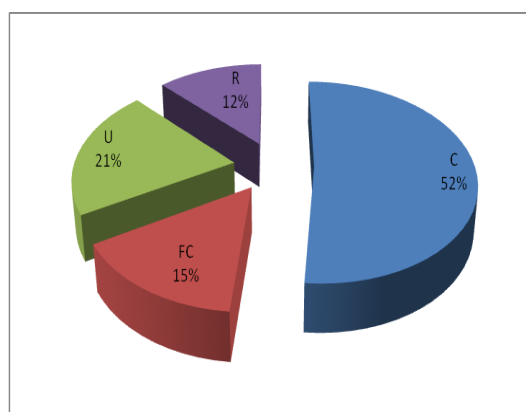


Figure 3. Percentage of Butterfly abundance

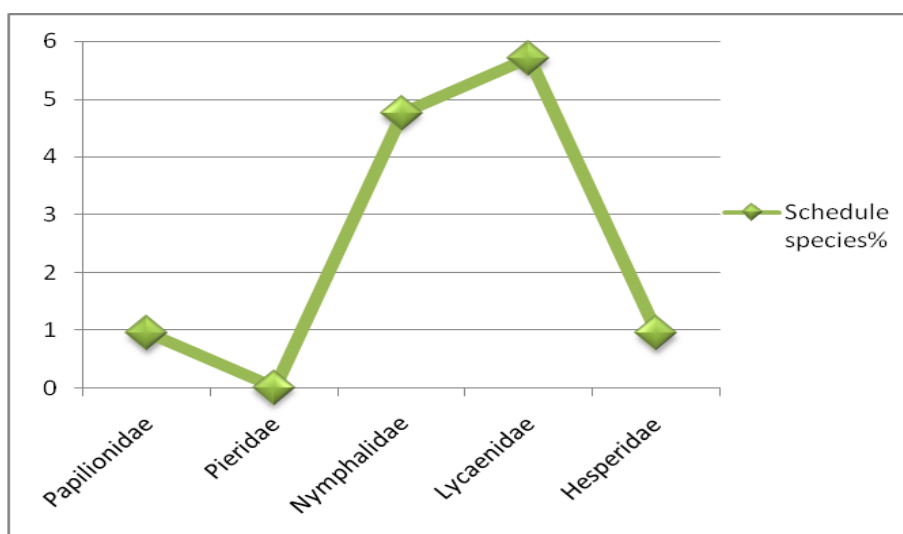


Figure 4. Percentage of Scheduled species in butterfly family

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