Chapter 4

Results

4.1 Identification of Butterfly species

An extensive investigation on ecology and diversity of butterflies was carried out in and around Pavagadh Hill. The study on butterflies in different habitats of Pavagadh Hill was carried out for three consecutive years i.e. from January 2017 to December 2019. The detailed study involved diversity, abundance and seasonal variation of butterflies, coevolutionary relationship among butterflies and plants in various habitats of Pavagadh Hill. The entire study area was divided into different sub-study sites such as forest area, garden area and open scrub land depending on the type of vegetation and diversity of butterflies were observed. The different types of vegetation help the different stages of butterflies to survive and flourish. Hence it is an ideal place to study the ecology and biology of butterflies.

A total of 63 butterflies belonging to 5 families were identified from the study area during the entire study period of 3 years. Sub-study sites of Pavagadh Hill sustain high floral and faunal diversity of invertebrates as they provide sufficient microhabitats for their survival. The climatic condition of Pavagadh Hills helps in sustaining butterflies.

Looking into the percentage distribution of butterflies of Pavagadh Hill, a total of 63 butterfly species were found belonging to 5 families and 48 genera. Table 4 clearly depicts that family Nymphalidae showed the maximum species percentage i.e., 41.266% distribution as compared to all other families followed by Lycaenidae i.e. 22.22%, then Pieridae i.e., 20.64% followed by Papilionidae (9.524%) and least being family Hesperiidae (6.35%). Whereas family Nymphalidae and Lycaenidae showed visible genus percentage occurrence i.e. 39.583% and 27.09% respectively. Family Pieridae, Hesperiidae and Papilionidae showed 18.75%, 8.33% and 6.25% respectively.

4.2 Butterfly Species Abundance in study area of Pavagadh Hill

Butterfly species abundance was studied along with the species distribution in the study area. Butterfly abundance studies were categorized into Very common, Common, Uncommon and Rare. Amongst total of 63 species of butterflies, 24 butterfly species were uncommon, followed by 17 butterfly species being very common and common and 5 species were rare as shown in

Table 5. Observing the individual families, within family Papilionidae 3 species namely *Graphium doson, Graphium agamemnon* and *Pachliopta aristolochiae* were found to be very common and *Pachliopta hector, Papilio polytes* and *Papilio demoleus* were found to be common species of butterflies.

Within family Nymphalidae, the members of genus *Danaus* i.e *D. chrysippus* and *D. genutia* were found to be very common in the study area (Table 5). Whereas in case of genus *Hypolimnias, H. bolina* was found to be common and *H. misippus* to be very common. Amongst 6 different Pansies i.e genus *Junonia, Junonia lemonias* i.e. Lemon Pansy was found to be very common,whereas Peacock Pansy (*Junonia almana*), Chocolate Pansy (*Junonia iphita*) and Blue Pansy (*Junonia orithya*) were uncommon and Grey Pansy and Yellow Pansy were rare.

Amongst the family of Whites and Yellows i.e family Pieridae, Emigrants i.e *Catopsilia pomona* and *Catopsilia pyranthe* and Grass yellows i.e., *Eurema brigitta* and *Eurema hecabe* were found to be very common as shown in Table 5. Within the family of Blues i.e., family Lycaenidae, Table 5 clearly states that Lime Blue (*Chilades lajus*), Dark grass Blue (*Zizeeria karsandra*), Lesser Grass Blue (*Zizina otis*) and Tiny Grass Blue (*Zizula hylax*) were found to be very common whereas *Talicada nyseus* (Red Pierrot) and *Chilades parrhasius* (Small Cupid) were rare.

Mentioning about family Hesperiidae, Indian Palm Bob (*Suastus gremius*) was rare whereas Table 5 also gives the clear picture that the other three species i.e Common Banded Owl (*Hasora chromus),* Small Branded Swift (*Pelopidas mathias*) and Dark Palm Dart (*Telicota bambusae*) were uncommon.

4.3 Seasonal Occurrence of Butterflies in the study area of Pavagadh Hill

The entire study period was divided into four seasons namely: Summer, Monsoon, Post Monsoon and Winter. The summer months are from March to May, monsoon months ranges from June to August, post monsoon months include September to November and December, January, February forms the winter months.

During the post monsoon season, as shown in Table 6, the study area showed the maximum number of 63 butterfly species belonging to 5 different families. Whereas looking into the other seasons, minor difference in occurrence in no. of species was observed in Monsoon and winter

season. During monsoons, total of 34 species of butterflies were observed whereas 35 species of butterflies were observed in winters. The least i.e only 15 species were observed during summer months.

Winters in Pavagadh Hill are quite chilly. Depicted in Table 6, within the total of 35 butterfly species observed during winter mornings- 5 species belong to family Papilionidae, Family Nymphalidae comprises of 16 species, 11 species from family Pieridae, Family Lycaenidae holds 3 butterfly species where no members were noted from Hesperiidae family.

Monsoons are full of humidity and foggy at Pavagadh hill. Out of 35 species documented in the study area, family Papilionidae comprises of 6 species, 13 species from family Nymphalidae, 7 species from family Pieridae, 6 species from family Lycaenidae and 2 species from family Hesperiidae (Table 6).

During summer months, 15 species of butterflies were observed in the study area. Table 6 clearly states that out of 15 species, family Nymphalidae holds 8 species of butterflies, Pieridae family comprises of 5 species and 2 species from family Papilionidae. None of members of family Lycaenidae and Hesperiidae were observed during summers in the study area.

Among the family Papilionidae, *Graphium doson* and *Graphium agamemnon* were observed throughout the year and in all seasons (Table 6). Whereas *Pachliopta aristolochiae, Pachliopta hector* and *Papilio polytes* except for summers, were found in all other seasons i.e., monsoon, post-monsoon and winters.

Table 6 clearly states that within family Nymphalidae, Plain Tiger (*Danaus chrysippus*), Common Castor (*Ariadne merione),* Black Rajah (*Charaxes solon),* Great Eggfly (*Hypolimnas bolina*) and Danaid Eggfly (*Hypolimnas misippus*) were found throughout the year. While among the 6 pansies observed in the study area, Lemon Pansy *Junonia lemonias* was observed throughout the year.

Looking into the details of seasonal occurrences of butterflies in the study area of Pavagadh Hill, Table 6 states that in the family of whites and yellows, emigrants namely *Catopsilia pomona* and *Catopsilia pyranthe* are found throughout the year. Whereas amongst the grass yellows, *Eurema hecabe* and *Eurema brigitta* were observed throughout the year. *Delias eucharis* i.e., Common Jezebel was found commonly throughout the year but was not found during the monsoon months.

As shown in Table 6, amongst the total species observed, all species of family Lycaenidae were observed during the post monsoon season of the year whereas in case of family Hesperiidae, Small Branded Swift *Pelopidas mathias* and Dark Palm Dart *Telicota bambusae* were documented during the monsoon and post monsoon months of the year. But none of the Hesperid species were observed during summer and winter months.

4.4 Species distribution in the selected different habitats of Pavagadh Hill

During the entire study period of three years, a total of 63 butterfly species were observed in selected different habitats of Pavagadh Hill. Amongst 63 species, family Papilionidae comprises of 6 butterfly species, family Nymphalidae comprises of 25 butterfly species, family Pieridae holds 13 butterfly species, 15 species from the family of Blues i.e., Lycaenidae and finally 4 species of skippers from family Hesperiidae.

During the study period, different habitats were selected in the Pavagadh Hill namely Forest Area, Open Scrub Land and Garden Area. As shown in Table 7 maximum number of 63 species were observed in forest area, followed by 49 butterfly species from the open scrub land and the last 36 species of butterflies were observed from the garden area.

Table 7 clearly depicts that total 63 species of butterflies observed during the study period were found in forest area too. Whereas in garden area, amongst the total of 63 species, 36 species were observed from the garden area. Out of 36 butterfly species, 6 species belong to family Papilionidae, 12 species each make up the family Nymphalidae and Pieridae and family Lycaenidae holds 6 butterfly species. None of the members of family Hesperiidae were observed in Garden Area. Hence, out of the total 5 families of butterflies, members of only 4 different families were observed in garden area.

Open Scrub Land showed the presence of 49 different butterfly species belonging to 5 different families as depicted in tabulated form in Table 7. Out of 49 species, 6 species of butterflies belong to family Papilionidae, Family Nymphalidae comprises of 18 species, family of whites and yellows i.e., Pieridae holds 13 different species whereas 10 species were found from family Lycaenidae and 2 species were observed from family Hesperiidae.

While looking into detail the Table 7 clearly shows that *Charaxes solon* and *Vanessa cardui* from family Nymphalidae was observed in forest land and open scrub land but was not found in garden area. Amongst the pansies, *Junonia iphita* and *Junonia lemonias* were found in all

the three selected different habitats, whereas *Junonia almana*, *Junonia hierta* and *Junonia orithya* were found in forest area but were not observed in either open scrub land or the garden area. Similarly, *Ypthima huebneri* and *Ypthima baldus* were observed in forest area but not in open scrub land or the garden area. Within family Nymphalidae, *Euploea core*, *Euthalia aconthea*, *Hypolimnas bolina* and *Hypolimnas misippus* were documented in all 3 selected different habitats of Pavagadh Hill.

Amongst 13 species of family Pieridae, least difference of occurrence was observed (Table 7) except *Leptosia nina* i.e., Psyche was observed in forest area and open scrub land but was not observed in garden area.

From the family of Blues i.e. Lycaenidae - *Chilades lajus, Curetis thetis, Euchrysops cnejus, Zizeeria karsandra, Zizina otis* and *Zizula hylax* were found in all three selected habitats under study of Pavagadh Hill. Whereas *Catochrysops strabo, Spindasis vulcanus, Azanus ubaldus* and *Tarucus nara* were found in forest area and open scrub land but were absent in garden area (Table 7).

4.5 Diversity Indices of Various Seasons

The diversity indices Shannon-Weiner Diversity Index and Pielou's Evenness Index were calculated for all the four seasons (Table.8). Shannon-Weiner Index (H) for the study area ranged between 2.523 and 3.871. The least value was noticed during summer season and the highest value was observed during post-monsoon season followed by monsoon season. The values specify that highest butterfly species diversity occurred during post-monsoon season and least diversification of species occurred during summer season. In Pavagadh Hill there is a trend of increase in the diversity of butterflies after monsoon season. The rainfall supports the growth of nectar host plants and larval food host plants which is a reason that diversity of butterflies increases during post monsoon months. The higher value of Pielou's Evenness index signifies an increase in richness and evenness of species and lower value indicates decrease in richness and evenness of the species. The values ranged between 0.9432 to 0.9591. The value signifies that during post-monsoon season evenness is higher due to the presence species in similar proportions. But during summer season low evenness is reported as the distribution of species not similar due to less diversification of butterfly species. Which is concluded that maximum diversity of butterflies is correlated with availability of sufficient food plants.

4.6 Diversity Indices of Habitats

The study site of Pavagadh Hill was again classified into three different sub-study sites on the basis of the type of vegetation present. They are Garden, Forest and Scrubland. The garden constitutes ornamental and cultivated plants. The Shannon index increases when the richness and the evenness of the community increases and Shannon index decreases when richness and evenness of the community decreases. The higher value of Shannon Weiner was recorded in the forest habitat (3.871) and least value was recorded in the garden area (3.352). When calculated Pielou's Evenness Index, the values ranged between 0.9432 and 0.9524. This index showed that lowest evenness was in Garden area so the diversity of butterfly species was also low. Highest evenness is existing in Forest area due to the presence of diversified species with similar proportion (Table 9).

Graph 1 shows that highest number of butterflies belonged to the family Nymphalidae and least number of representatives were observed from the family Hesperiidae. The graphical representation of seasonal variations of butterflies in all the four seasons had been given in Graph 2 and distribution of butterflies in different habitats had given in Graph 3. It shows that after monsoon there is an increase in the number of species and their abundance. Post monsoon is the most favourable season for the existence of butterflies in Pavagadh Hill. The availability of rainfall plays an important role in diversity and survival of butterflies. Pavagadh is a dry deciduous forest. During summer the maximum average temperature reaches around 38˚C and at times more than that. The plants in the area during summer season got dried up so the availability of nectar plans also reduced. Some of the common nectar plants like *Lantana camara*, *Tridax procumbens* which bear flowers throughout the year and many of the butterflies depend on them for the food. But on the onset of monsoon, the vegetation starts reappearing and the area gets flourished with different types of plants. This also impacts the butterfly diversity.

4.7 Co-evolutionary relationship among Butterflies and Plants

Co-evolution is the reciprocal evolutionary change that occurs between species when they interact each other through the process of natural selection. The mouthparts of insects are adapted themselves to different modes of ingestion of food. The mouthparts of a butterfly is of siphoning and sucking type, which is best suited to draw nectar from the flowers. They feed on liquid diet during the adult stage by feeding on nectar which contains dissolved sugar, salts and

other minerals from a variety of sources ranging from flowers, tree sap, rotting fruit, faeces and so on. When a butterfly finds a potential food source it unfurls its proboscis and uses the tip to feed.

In this study an attempt was made to examine proboscis length and its significance in carrying out activities of the butterflies in relation to their nectar plants. In order to study the corolla proboscis interrelationship, we have examined the morphological features of butterflies and their preferred nectar host plants (Table 10 & 11). Also, a corelation study was carried out between the corolla length of nectar host plants and the proboscis length of the frequently visiting butterflies. A significant positive correlation ($r=0.824$; $R^2=0.679$) in the number of species was detected between the experimental groups (Graph 4). Taking the positive corelation into consideration, it can be concluded that if there's any variation in the corolla length (mostly due to evolutionary processes), it will be reflected in the butterflies' proboscis length too. Moreover, Table 13 shows the frequency of visit of selected butterflies on the nectar host plants. The data substantiates the correlation between nectar host plants and the butterflies and shows a regression fit of 67%. The remainder percentage can be entitled to the factors like colour, fragrance and morphology of the flower that are preferred by the butterflies.

To study the morphology of butterflies, 5 species each from four families Papilionidae, Nymphalidae, Pieridae and Lycaenidae were selected (Table. 10). Butterflies were selected on the basis of their abundance in the study area. The butterflies having the status Very Common and Common for e.g., Common Jay, Plain Tiger, Lemon Pansy, Common Emigrant and Lime Blue (Table. 5) were only considered for performing morphometry. Family Hesperiidae was not considered because of a smaller number of representatives and uncommon trend of butterflies (Table.5). To measure the length of proboscis of butterflies they were captured with the help of insect net. Then they were removed from the net and measurements were taken with the help of Dial Caliper. The measurements of proboscis length, body length and wingspan were taken and after the measurement they were released. Five individual butterflies from each species were selected for morphometric parameters such as proboscis length, body length and wing span of butterflies. A total of 20 butterflies, 5 each from four families were observed in the study area. The proboscis length of butterflies varied from species to species, refer Table.10.

The proboscis length of Papilionidae ranged from 18.0 mm to 25.96 mm (Table 10). Out of the five species examined, *Graphium agamemnon* (25.96 mm) had got the long proboscis and

Papilio polytes (18.0 mm) had got the small proboscis. They were larger butterflies with large wing span. The body length was also measured higher than the proboscis. They were present throughout the year. They visited *Lantana camara* of corolla length 9.96 mm, Ixora coccinea (25.5) and *Catharanthus roseus* of corolla length 23.5 which bore flowers throughout the year (Table 11 &12).

In Nymphalidae the proboscis length varied between 12.14 mm and 23.96 mm. The body length was double the length of proboscis (Table 10). They preferred to visit *Lantana camara* (9.96 mm), *Chromolaena odorata* (10.06 mm), *Sida acuta* (3.75 mm) and *Wedelia trilobata* (2.5mm) (Table 11). All the selected species of Nymphalidae family were sighted throughout the year. They had a preference of selecting nectar host plants of varying flowering period. They preferred to visit them according to the availability of the flowers.

Pierids were brightly colored butterflies. Among the five species examined from the family Pieridae, *Delias eucharis* was a common butterfly in the area had got a longer proboscis with a larger body length. The proboscis length of the selected species of the family ranged between 9.04 mm to 15.98 mm (Table 10). They preferred to visit nectar host plants such as *Tridax procumbens* (5.5 mm) which bore flowers throughout the year and *Chromolaena odorata* (10.06) was seasonal usually appeared after the monsoon (Table 11&12).

The proboscis length of butterflies selected from Lycaenidae were comparatively smaller. They were small sized butterflies with small proboscis compared to other families. The proboscis length of the selected species of the family ranged between 4.72 mm and 6.6 mm (Table 10). The nectar host plants preferred by the representatives of Lycaenidae were *Tridax procumbens* (5.5 mm), *Tephrosia purpurea* (3.06 mm), *Sida acuta* (3.75 mm), *Emilia sonchifolia* (2.2mm) and *Sida rhombifolia* (5.28 mm). They also preferred nectar host plants of varying flowering seasons. Most of them were low flying butterflies so mostly preferred to visit herbs (Table 11&12).

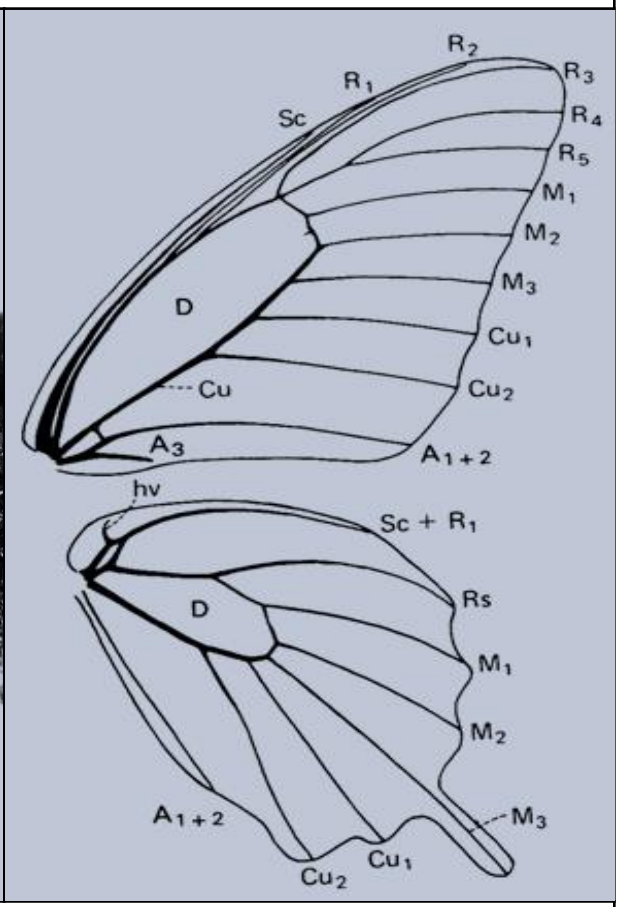
The area of Pavagadh is composed of a mixed vegetation where all kinds of plants such as grasses, herbs, shrubs and trees were present (Table 11). They act as excellent larval host plants as well as nectar resources for the butterflies (Table 2&11). The diversity of flowering plants in each sub-study sites was observed and identified twenty-two prominent nectar plants belonging to ten families. Though the plant diversity of Pavagadh Hill is very high and a detailed checklist of plants was submitted by the Department of Botany, The M. S University of Baroda (Annexure 1), I have examined the nectar plants which were constantly visited by

the butterflies only (Table 11). The phenological components like flower color, corolla shape, type of plant and the cyclicity of their flowering and non-flowering period were observed and noted (Table 11). Out of these twenty-two nectar plants, ten most frequently visited plants were selected for morphometric analysis. In morphometric analysis the length of corolla tube was measured with the help of Dial Caliper. For each plant species five individual flowers from different plants were selected and noted their corolla length (Table 12). The longest corolla length was observed in *Ixora coccinea* and Catharanthus roseus (27.5 mm) (Table 11) which was preferred by Papilionid butterflies. Papilionid butterflies had got comparatively longer proboscis. The smallest corolla length was measured in *Emilia sonchifolia* which were visited by short tongued butterflies belonging to the family Lycaenidae. Lantana camara was found to be the most preferred nectar host plant of three families namely Papilionidae, Nymphalidae and Pieridae. Most of the herbs were visited by low flying butterflies (Table 12). Flower colour was found to be an important factor determining the foraging activity. Though butterflies visit flowers with different colors, but most of the preferred nectar plants had got white, red, yellow or pink flowers (Table 11).

Butterflies depend on different types of plants for nectar. They mostly prefer herbs and shrubs for the nectar. The forest area of Pavagadh Hill is a dry deciduous type and hence during summer the area became dried up and most of the vegetation also got disappeared especially the herbs and shrubs. So, butterflies prefer to forage on plants which bear flowers during summer season and also there are plants which bloomed throughout year. The unavailability or the decrease in the availability of nectar plants directly affected the diversity and abundance of butterflies. It was observed that during summer season the number of sights as well as the diversity went down. On the onset of monsoon, the plants start reappearing and flourish after that and bear flowers. Accordingly, there was an increase in the number of sightings as well as diversity of butterflies.

Family

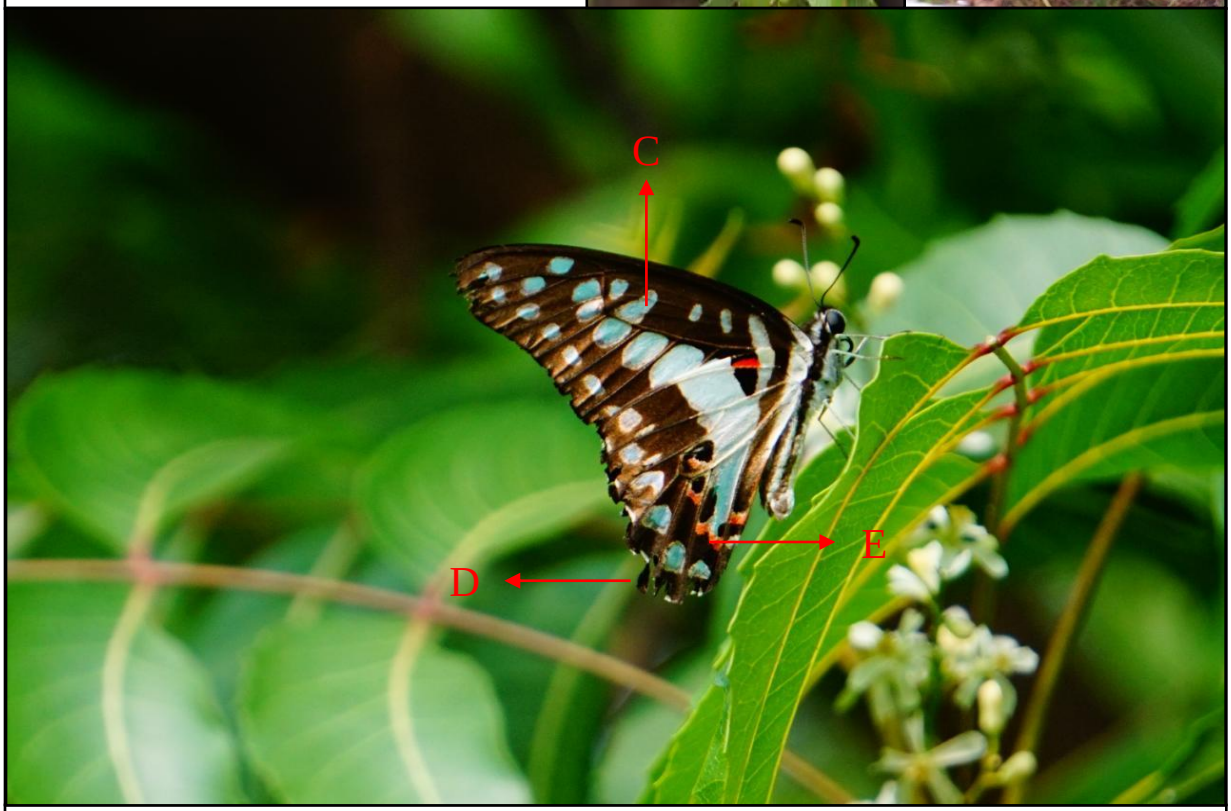
Papilionidae



Identification marks:

1.They are commonly known as swallowtails.
2.Three pairs of legs are well developed and hindwing cannot cover abdomen.
3.The wings are extraordinarily variable in shape and in majority of species, the hind pair is provided with conspicuous tail-like prolongations.
4.Antennae slender with an abrupt club. The bases of the antennae are close together.
5.The proboscis is long.
6. Labial palps are moderately long, more or less rough- haired, terminal segment rather pointed. Maxillary palps obsolete.
7. In the forewing of adult swallowtails, the anal vein marked as 2A does not converge with the first anal vein (1A) and instead extends upto the wing margin.

Scientific Name: *Graphium doson* C. & R. Felder, 1864	**Figure: 14**
Common Name: Common Jay	**Status at Study site:** Very Common
Distribution in Gujarat: Throughout Gujarat except Kutch	 
Nectar Host Plant: *Ziziphus mauritiana* (A), *Lantana camara* (B)	
Flight pattern: Strong, Skipping and rapid flight in lower elevated areas	
Wingspan: 70-80mm	



Identification marks:

1) Upperside of wings

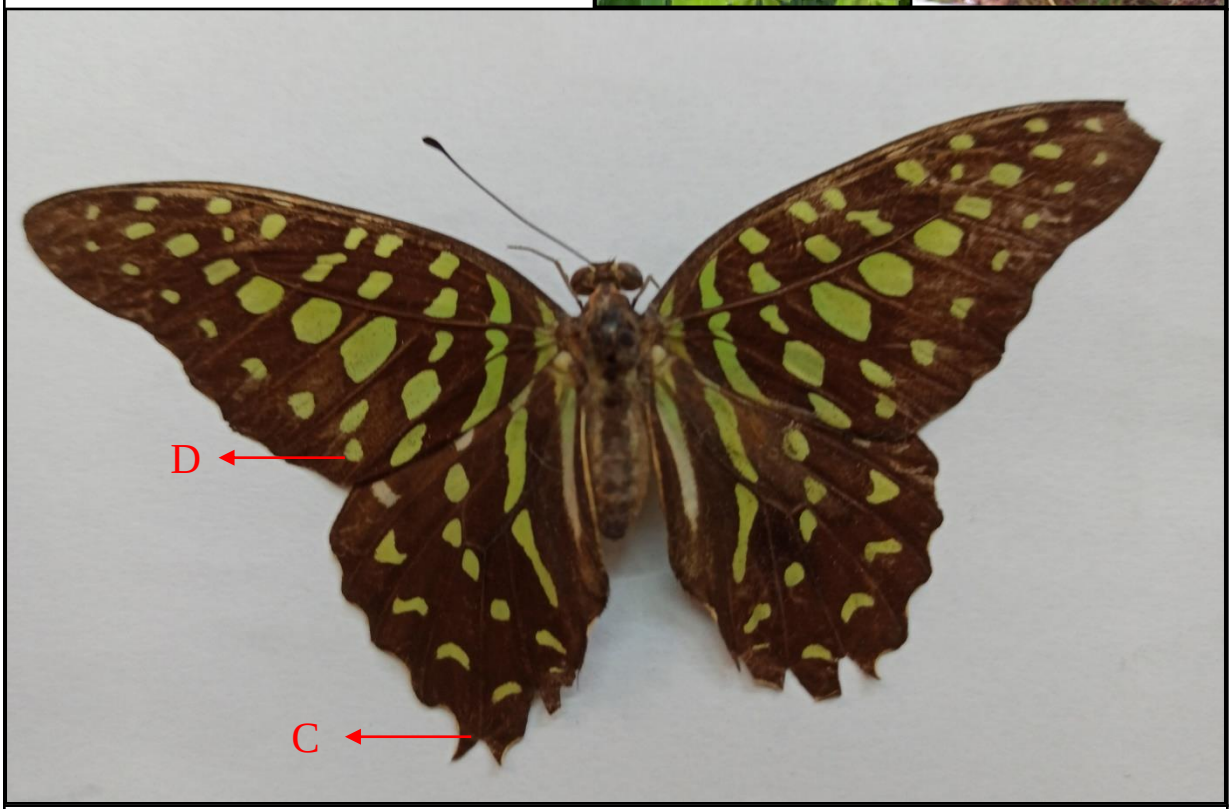
C. Upperside is black with a band of pale blue spots

D. The tail-like projection on the hind wings are absent are present on the upperside. Band narrows into spots near the forewing apex

2) Underside of wings

E. Underside also has the same banding pattern with the spots larger and bluish-white and an additional red and black spots are present

Scientific Name: *Graphium agamemnon* Linnaeus, 1758	**Figure: 15**
Common Name: Tailed Jay	**Status at Study site:** Very Common
Distribution in Gujarat: Throughout Gujarat except Kutch	
Nectar Host Plant*:* *Lantana camara* (A), *Caesalpinia pulcherima* (B)	
Flight pattern: Strong, Skipping and rapid flight in lower elevated areas	
Wingspan: 85-100mm	



Identification marks:

1) Upperside of wings

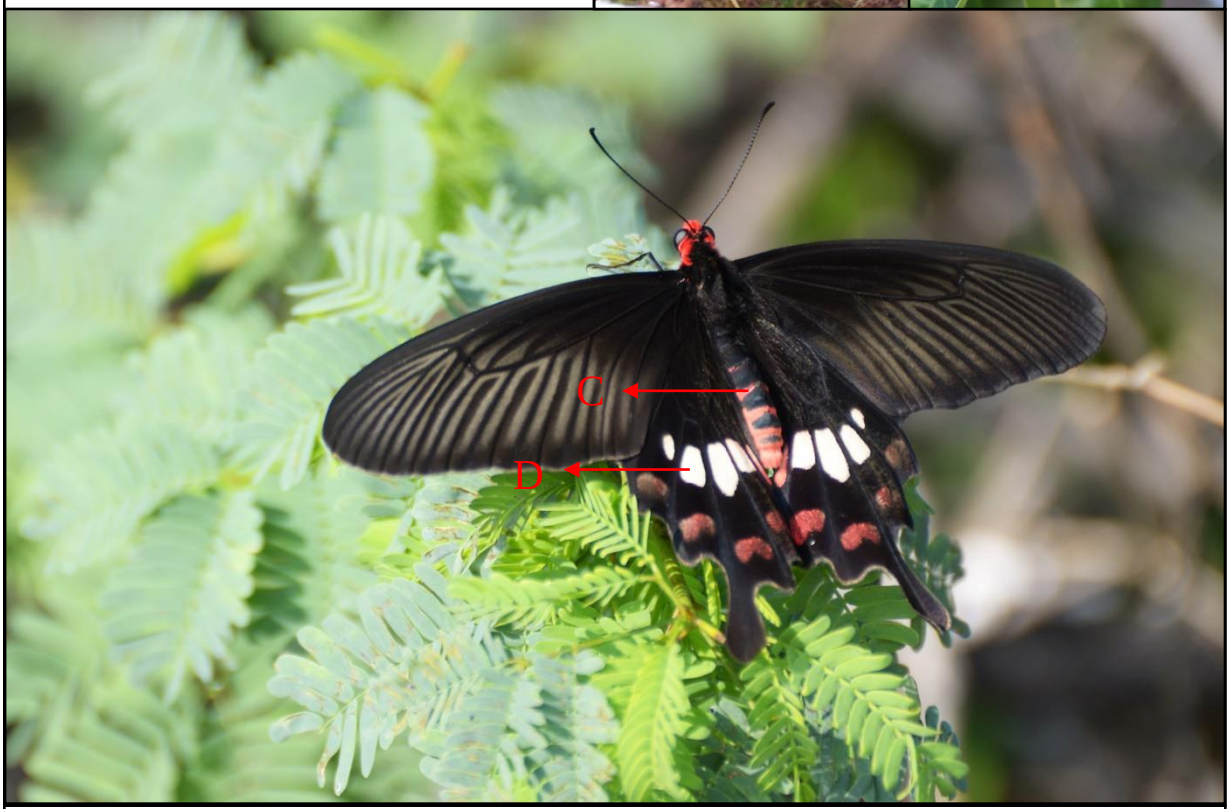
C. Presence of long tail on the hind wings.

D. Upperside is black with basal green strips and green spots

2) Underside of wings (Not shown)

E. Underside is darker with dark green basal and discal spots.

Scientific Name: *Pachliopta aristolochiae* Fabricius, 1775	**Figure: 16**
Common Name: Common Rose	**Status at Study site:** Very Common
Distribution in Gujarat Throughout Gujarat except Kutch	 
Nectar Host Plant*:* *Lantana camara* (A), *Ixora coccinea* (B)	
Flight pattern: . Slow and gliding flight. Common in lower elevations	
Wing Span: 80-110mm	



Identification marks:

1) Upperside of wings

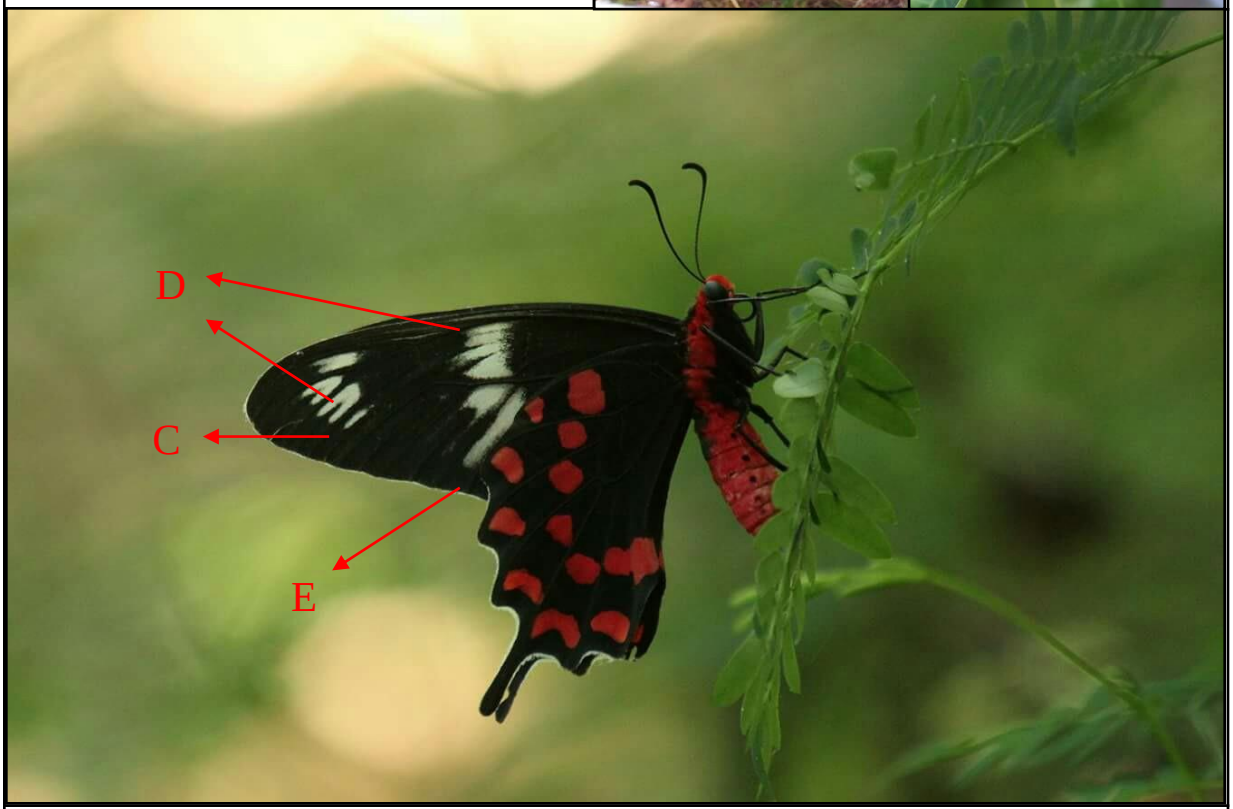
C. Body red with black markings. Hindwing tailed.

D. Upperside black with pale outer half forewing. Upperside of hindwings have five white elongated discal spots in spaces 2 to 5.

2) Underside of wings (not shown)

E. Black underside with a series of red or pink sub-marginal spots and white discal band of variable width and length

Scientific Name: *Pachliopta hector* Linnaeus, 1758	**Figure: 17**
Common Name: Crimson Rose	**Status at Study site:** Common
Distribution in Gujarat: Throughout Gujarat except Kutch	 
Nectar Host Plant*:* *Lantana camara* (A), *Ixora coccinea* (B)	
Flight pattern: . Slow and gliding flight; Common at low elevations	
Wing Span: 90-110mm	



Identification marks:

1) Upperside of wings

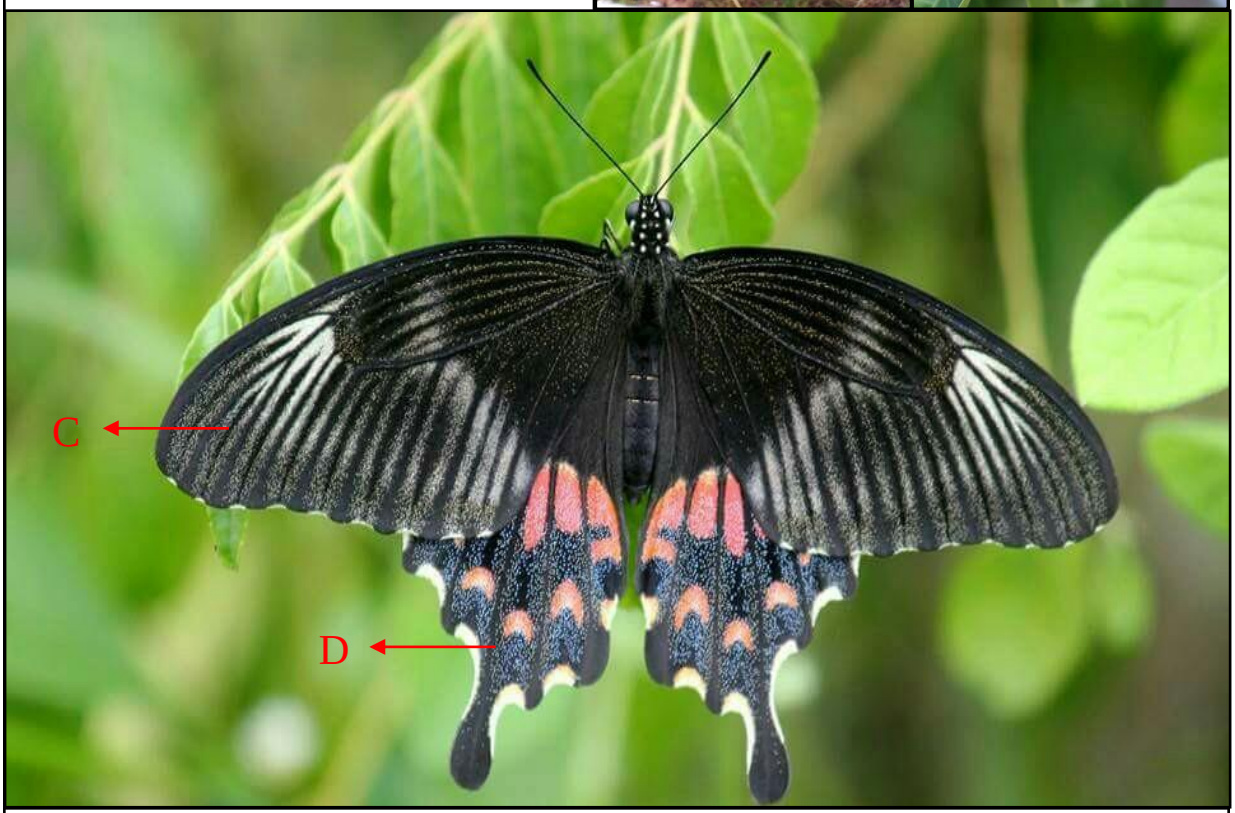
C. Body red with black patch on upperside.

D. Upperside of forewing prominent apical and discal band formed of white irregular stripes and with a complete discal row of bright crimson crescents.

2) Underside of wings

E. Underside black with similar markings.

Scientific Name: *Papilio polytes* Linnaeus, 1758	**Figure: 18**
Common Name: Common Mormon	**Status at Study site:** Common
Distribution in Gujarat: Entire Gujarat except Kutch	
Nectar Host Plant*:* *Lantana camara* (A), *Ixora coccinea* (B)	
Flight pattern. Fast fliers and fly close to the ground. Found in all elevations	
Wing Span: 90-100mm	



Identification marks:

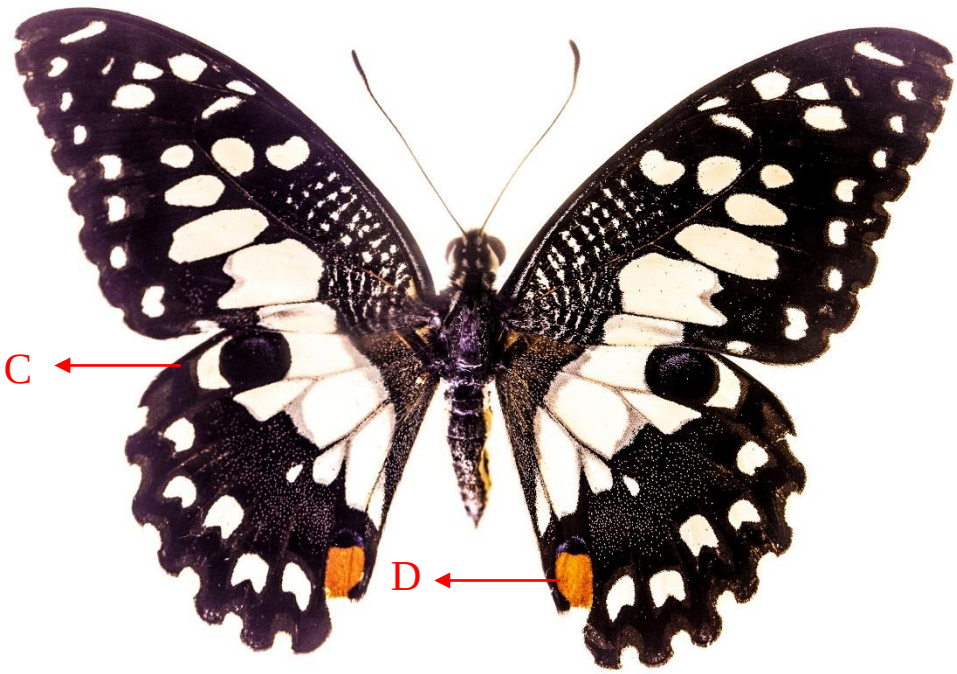
1) Upperside of wings

C. The body and wings are black in colour with row of white spots along the central region of the hind wing and smaller white spots on the margin of forewing.

D. A tail-like projection is present on the hind wings. Upperside of hindwings with large black spot and a row of sub-marginal black spots.

2) Underside of wings (not shown)

Scientific Name: *Papilio demoleus* Linnaeus, 1758	**Figure: 19**
Common Name: Lime Swallowtail	**Status at Study site:** Common
Distribution in Gujarat: Throughout Gujarat except Kutch	
Nectar Host Plant*:* *Lantana camara* (A), *Ixora coccinea* (B)	
Flight pattern: Strong, Skipping and rapid flight in lower elevated areas	
Wing Span: 80-100mm	



Identification marks:

1) Upperside

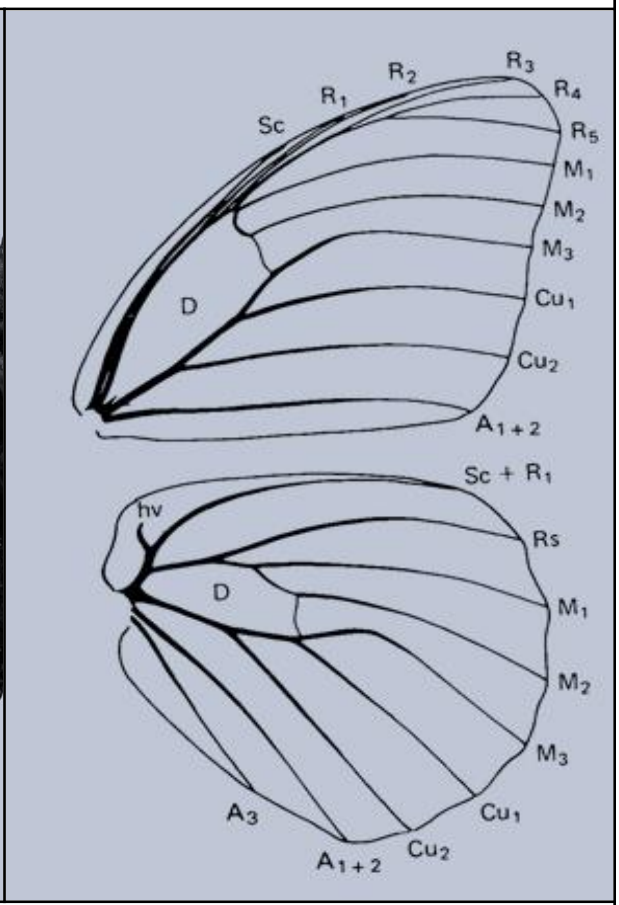
C. Tailless black spotted butterfly.

D. Upperside of both sexes are black with pale yellow to white markings

2) Underside of wings (not shown)

Family

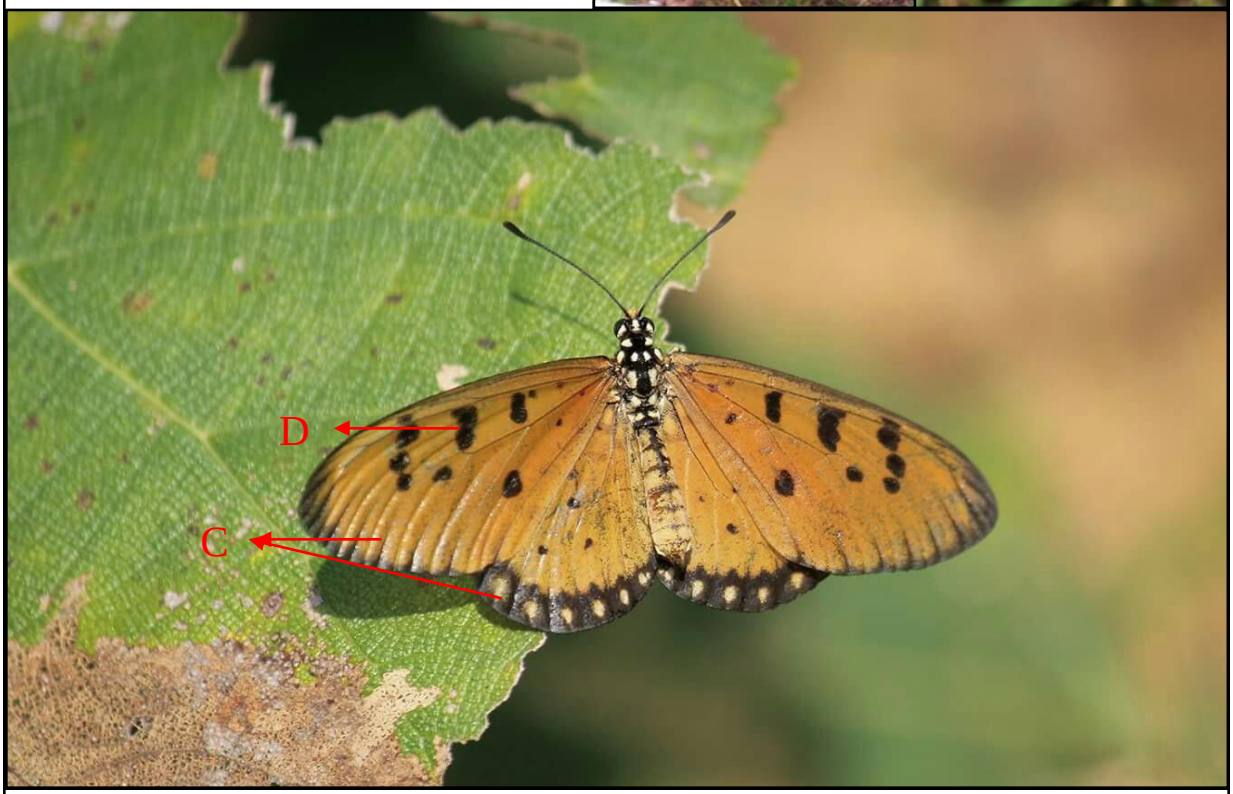
Nymphalidae



Identification marks:

1. All species of Nymphalidae are united by a single morphological character, the tricarinate ridges found on the adult butterfly's antennae.
2. Most of them also exhibit extreme reduction in the size of the forelegs, particularly in males (this feature is also exhibited by members of Riodinidae family).
3. Anterior legs of both sexes are useless for walking.
4. They are reduced in size, usually held press against the underside of the thorax,
5. They are functionally impotent: the tibiae are short and clothed with long hairs, hence they are known as brush-footed butterflies.
6. Antenna is devoid of scales.

Scientific Name: *Acraea terpsicore* Linnaeus, 1758	**Figure: 20**
Common Name: Tawny Coster	**Status at study site:** Uncommon
Distribution in Gujarat: Entire Gujarat except Kutch	
Nectar Host Plant*:* *Lantana camara* (A), *Tridax procumbens* (B)	
Flight pattern: Slow and fluttering flight	
Wingspan: 50-65mm	



Identification marks:

1) Upperside of wings

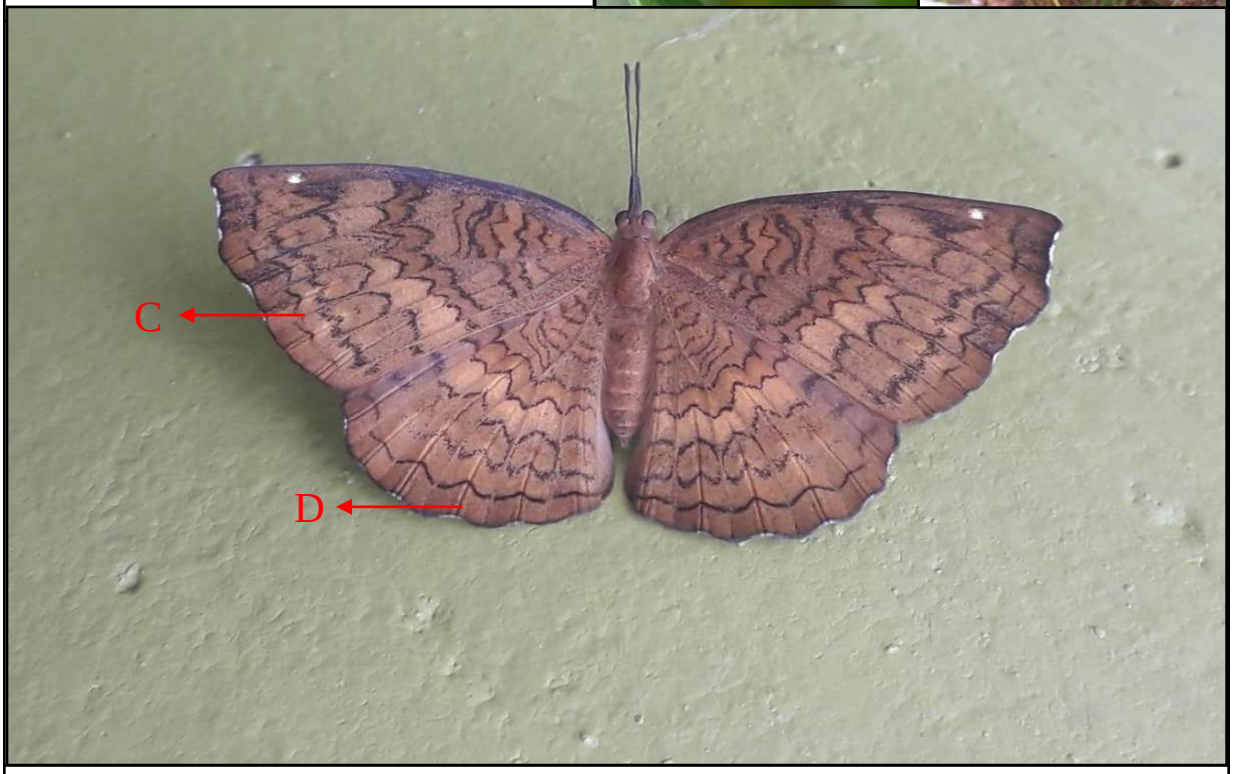
C. Forewings are orange red, semi-transparent with a black border. Hindwing with a black border bearing white spots.

D. Upperside of hindwings with large black spot and a row of sub-marginal black spots.

2) Underside of wings (Not shown)

E. Underside is pale orange with black spots. White spots on body and basal area.

Scientific Name: *Ariadne merione* Cramer, 1777	**Figure: 21**
Common Name: Common Castor	**Status at study site:** Uncommon
Distribution in Gujarat: North and Central Gujarat	 
Nectar Host Plant: *Sida acuta* (A), *Lantana camara* (B)	
Flight pattern: Short flight.	
Wingspan: 45-60mm	



Identification marks:

1) Upperside of wings

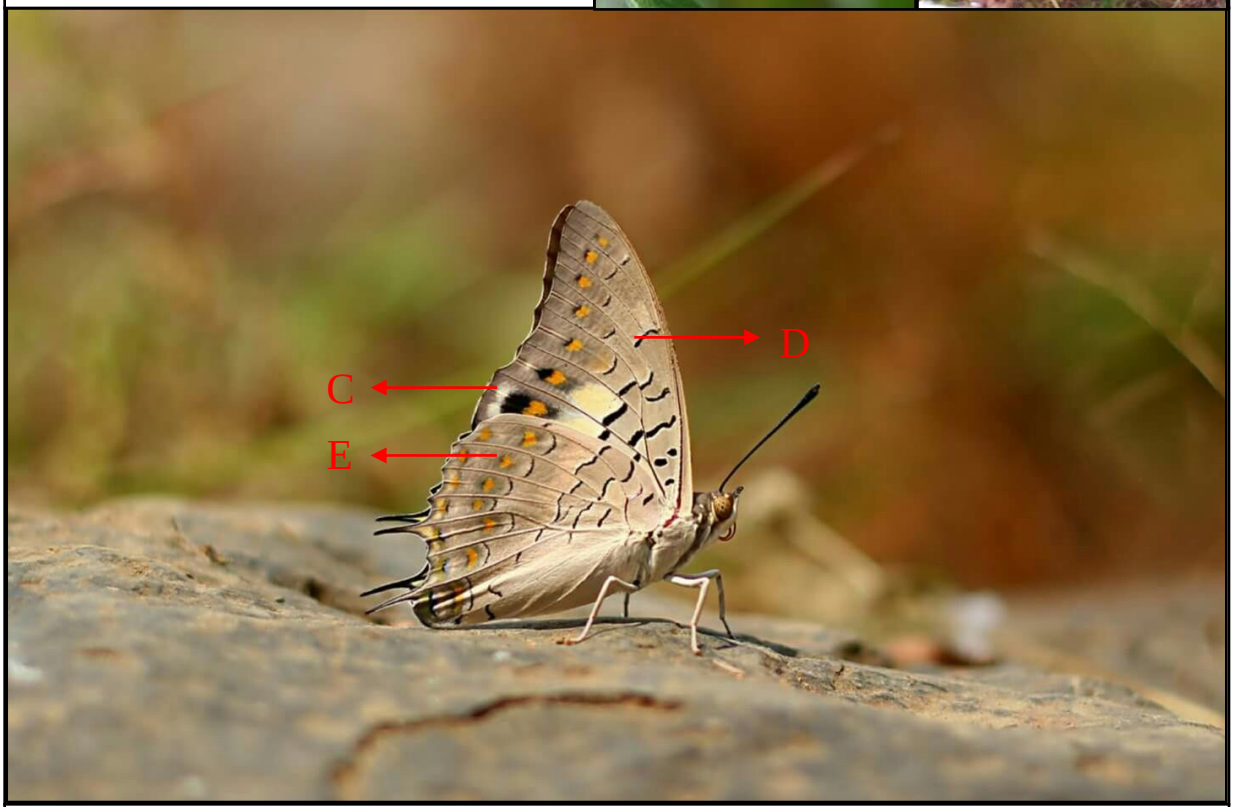
C. Upperside is reddish brown with thin black lines on both wings.

D. All black lines wavy and crowded towards the base. One white sub-apical spot present.

2) Underside of wings (Not shown)

E. Underside dark reddish brown with dark bands and white mottling

Scientific Name: *Charaxes solon* Fabricius, 1793	**Figure: 22**
Common Name: Black Rajah	**Status at study site:** Common
Distribution in Gujarat: Common in South and Central Gujarat.	 
Nectar Host Plant*:* *Sida acuta* (A), *Lantana camara* (B)	
Flight pattern: Fast and powerful flyers	
Wingspan: 70-80mm	



Identification marks:

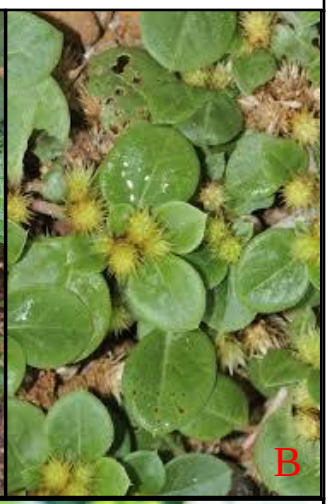
1) Upperside of wings (Not shown)

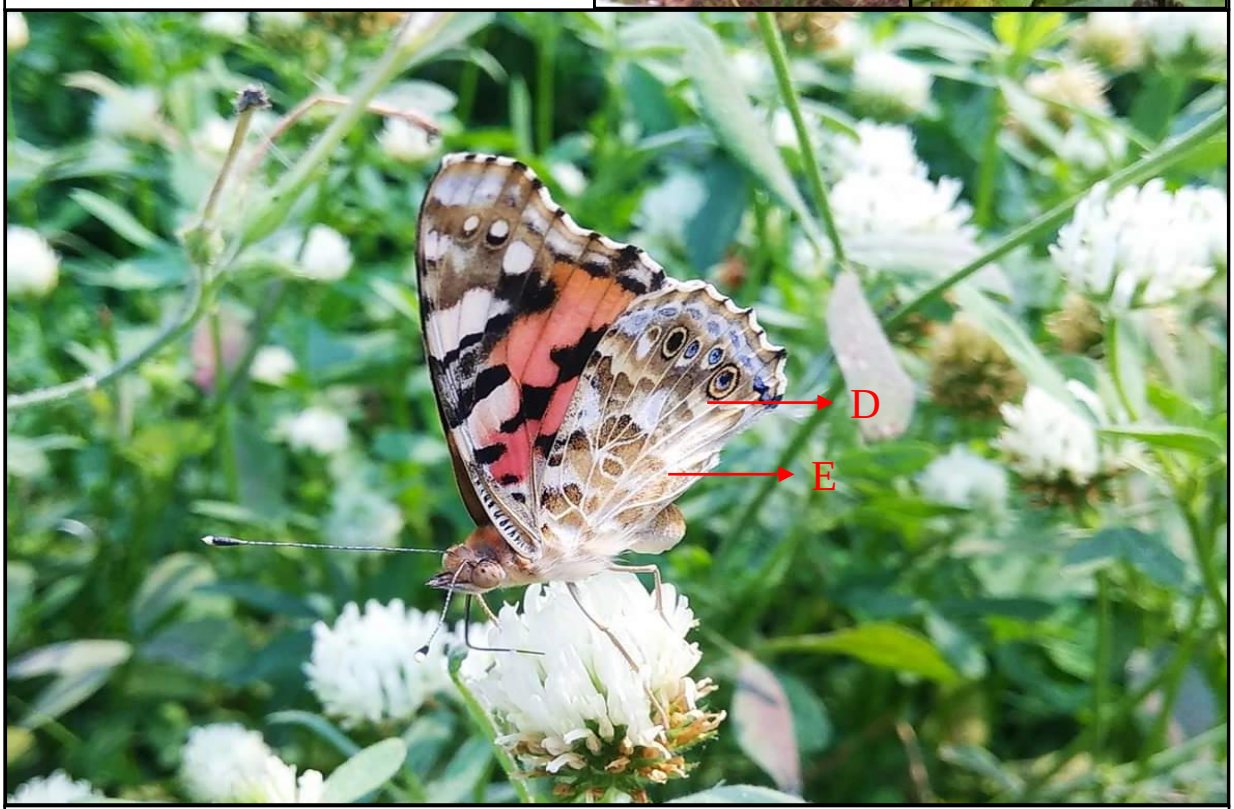
C. Upperside dark brown to black with a yellow or yellowish white discal band curved towards apex

2) Underside of wings

D. Wavy black lines and few basal black spots

E. A series of yellow sub-marginal spots on both wings.

Scientific Name: *Vanessa cardui* Linnaeus, 1758	**Figure: 23**
Common Name: Painted Lady	**Status at study site:** Common
Distribution in Gujarat: Throughout Gujarat except Coastal areas	 
Nectar Host Plant: *Lantana camara* (A), *Alternanthera pungent* (B)	
Flight pattern Flies very fast.	
Wingspan: 55-70mm	



Identification marks:

1) Upperside of wings (Not shown)

C. Upperside is orange-yellow with broad black apex. Forewings bear 3 conjoined apical, 4 sub-marginal white spots. 3 central black spots. Upperside of the hindwings are yellow orange with 3 rows of black spots.

2) Underside of wings

D. Underside of hindwings are brown with prominent pale veins and wavy bands.

E. A series of yellow sub-marginal spots on both wings.

Scientific Name: *Danaus chrysippus* Linnaeus, 1758	**Figure: 24**
Common Name: Plain Tiger	**Status at study site:** Very Common
Distribution in Gujarat: Throughout Gujarat	
Nectar Host Plant: *Lantana camara* (A), *Caesalipinia pulcherima* (B)	
Flight pattern: Flies very fast.	
Wingspan: 70-80mm	

Identification marks:

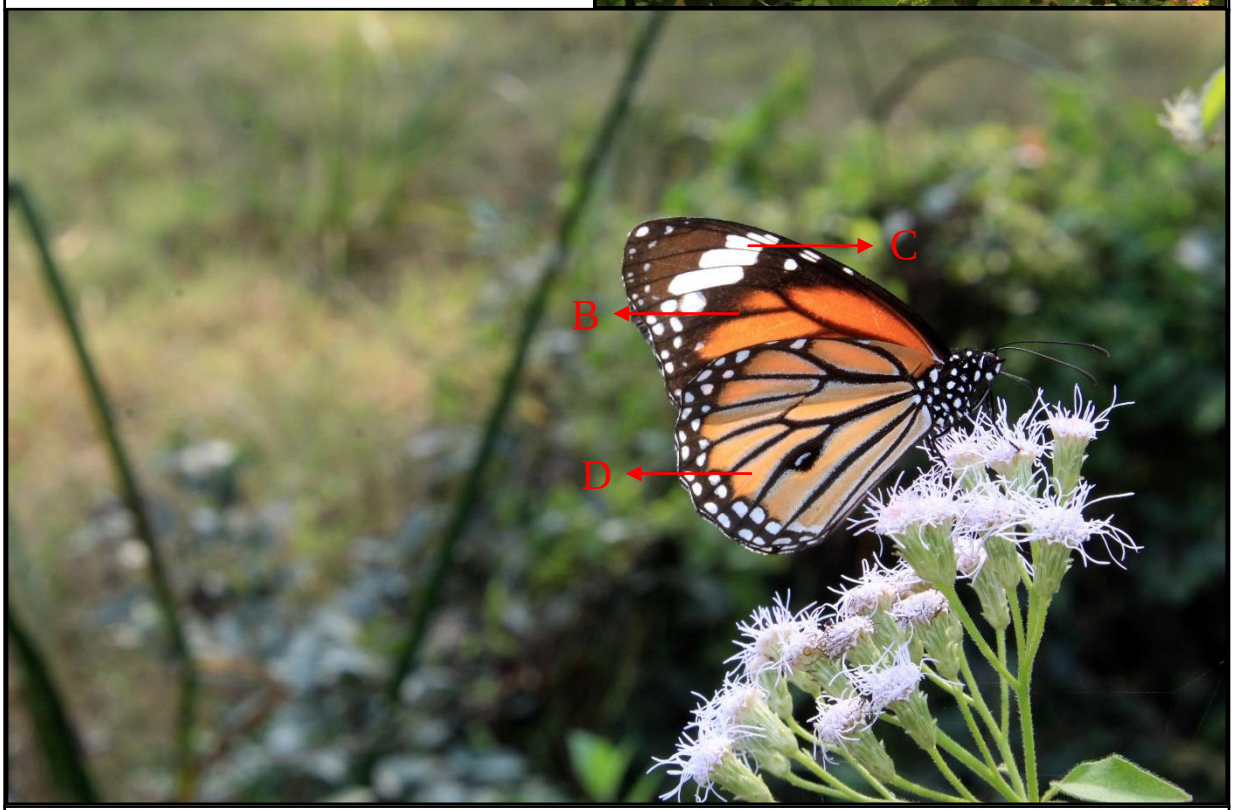
1)Upperside of wings

C. Upperside of the forewings are orange yellow with broad black apical area bearing a broad white post-discal band and few white spots.

D. Upperside of hindwing orange with a narrow black border bearing small white spots. Veins are not black.

2) Underside of wings (Not shown)

Scientific Name: *Danaus genutia* Cramer, 1779	**Figure: 25**
Common Name: Striped Tiger	**Status at study site:** Very Common
Distribution in Gujarat: Throughout Gujarat except Coastal areas.	
Nectar Host Plant: *Lantana camara* (A)	
Flight pattern: Slow and gliding flight.	
Wingspan: 72-100mm	



Identification marks:

1) Upperside of wings

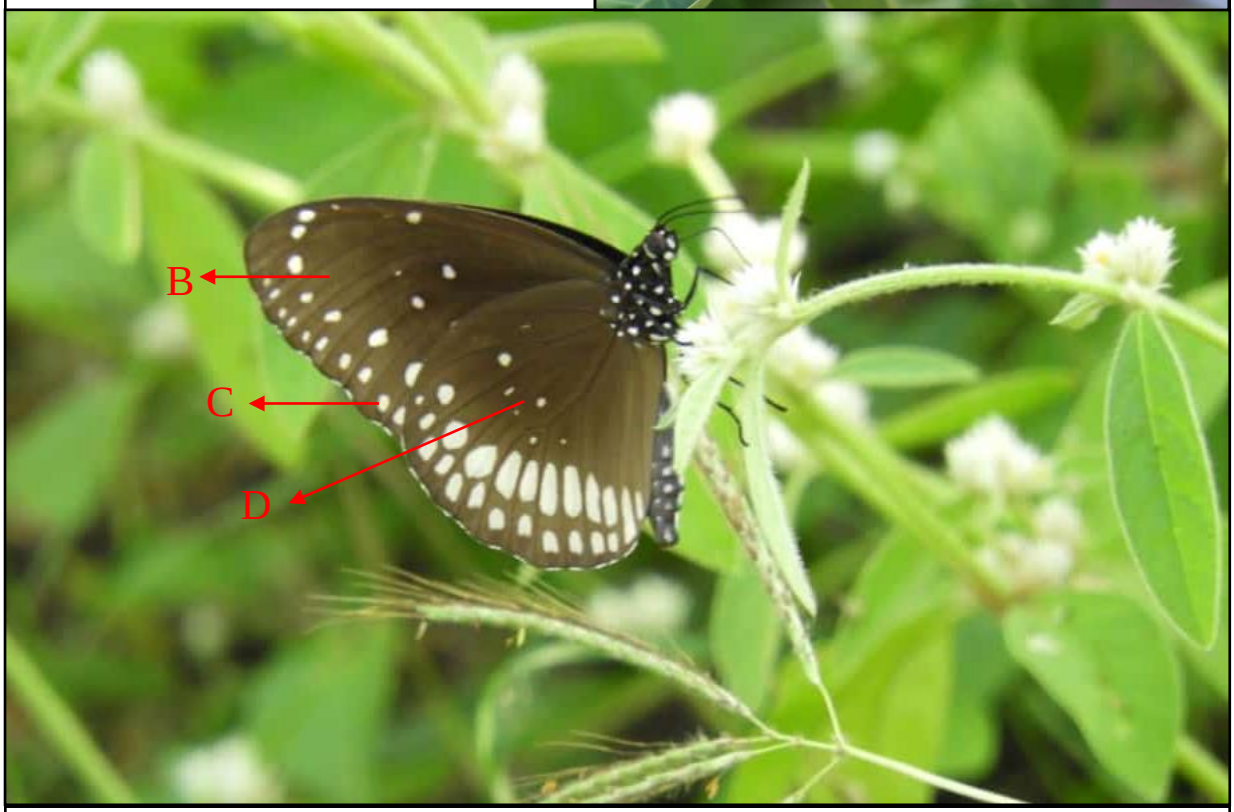
B. Both wings are orange-yellow with all the veins are broad black.

C. Upperside of forewing broad black apex bearing white subapical and marginal spots.

2) Underside of wings (Not shown)

D. Underside similar but paler.

Scientific Name: *Euploea core* Cramer, 1780	**Figure: 26**
Common Name: Indian Common Crow	**Status at study site:** Common
Distribution in Gujarat: Throughout Gujarat except Kutch	
Nectar Host Plant*:* *Ixora coccinea* (A)	
Flight pattern: Slow and gliding flight.	
Wingspan: 85-95mm	



Identification marks:

1) Upperside of wings (Not shown)

B. Dark brown to black in colour

C. A row of prominent post-discal and sub-marginal spots with post-discal spots elongated on hindwing.

2) Underside of wings

D. Underside a few discal and end-cell white spots.

Scientific Name: *Euthalia aconthea* Cramer, 1777	**Figure: 27**
Common Name: Common Baron	**Status at study site:** Uncommon
Distribution in Gujarat: Central and South Gujarat	
Nectar Host Plant*:* *Ixora coccinea* (A)	
Flight pattern: Slow and gliding flight.	
Wingspan: 55-88mm	

Identification marks:

1) Upperside of wings

B. Dark brown to black in colour

C. A row of prominent post-discal and sub-marginal spots with post-discal spots elongated on hindwing.

2) Underside of wings (Not shown)

D. Underside a few discal and end-cell white spots.

Scientific Name: *Hypolimnas bolina* Linnaeus, 1758	**Figure: 28**
Common Name: Great Eggfly	**Status at study site:** Common
Distribution in Gujarat: Throughout Gujarat except Kutch	
Nectar Host Plant: *Eupatorium odoratum* (A)	
Flight pattern: Fast gliding flight	
Wingspan: 70-110mm	

Identification marks:

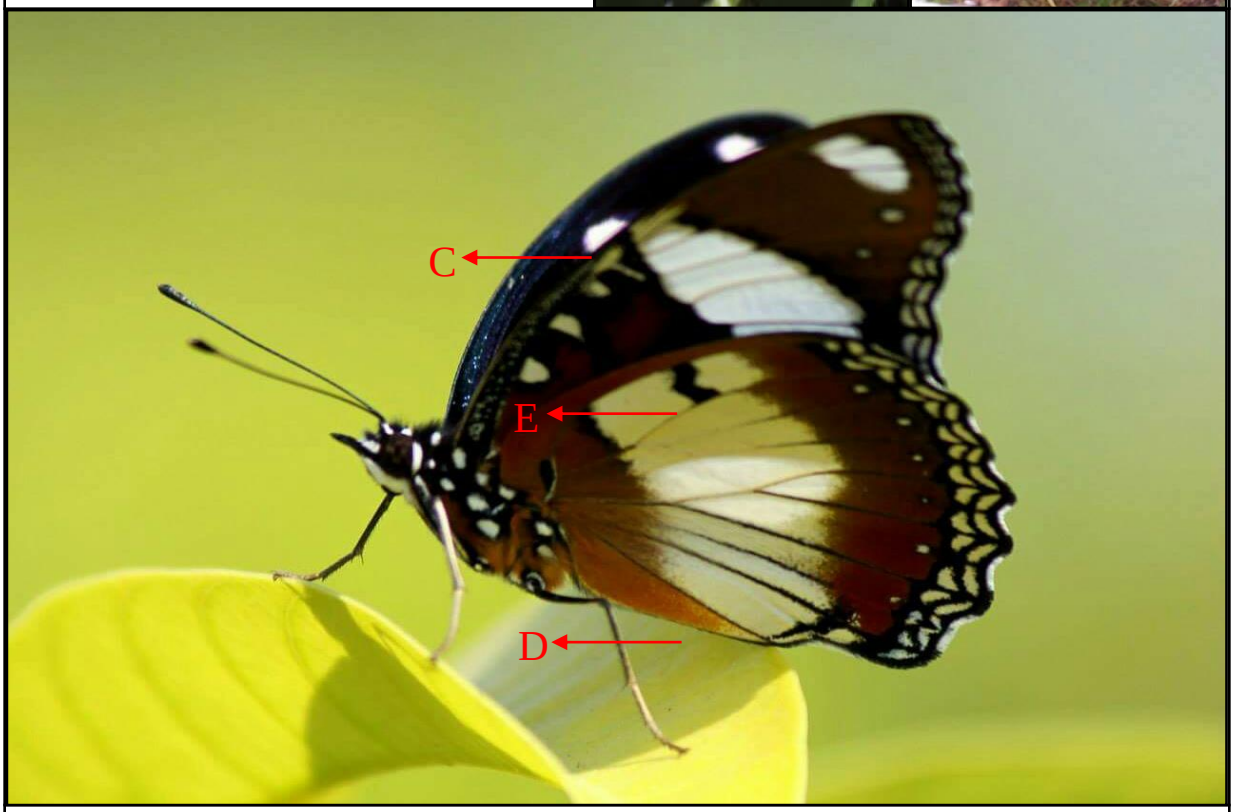
1) Upperside of wings

B. Underside brown with a discal band on both wings.

C. Band variable from a prominent white band to a faint band or may be absent. A pale white marginal band and a row of sub-marginal dots. In males, upperside has an oblique band of fused white large discal spots. And that is absent in females.

2) Underside of wings (Not shown)

Scientific Name: *Hypolimnas misippus* Linnaeus, 1764	**Figure: 29**
Common Name: Danaid Eggfly	**Status at study site:** Very Common
Distribution in Gujarat: Central Gujarat, Saurashtra	
Nectar Host Plant: *Eupatorium odoratum* (A), *Lantana camara* (B)	
Flight pattern: Short and sustained flight	
Wingspan:70-85mm	



Identification marks:

1)Upperside of wings

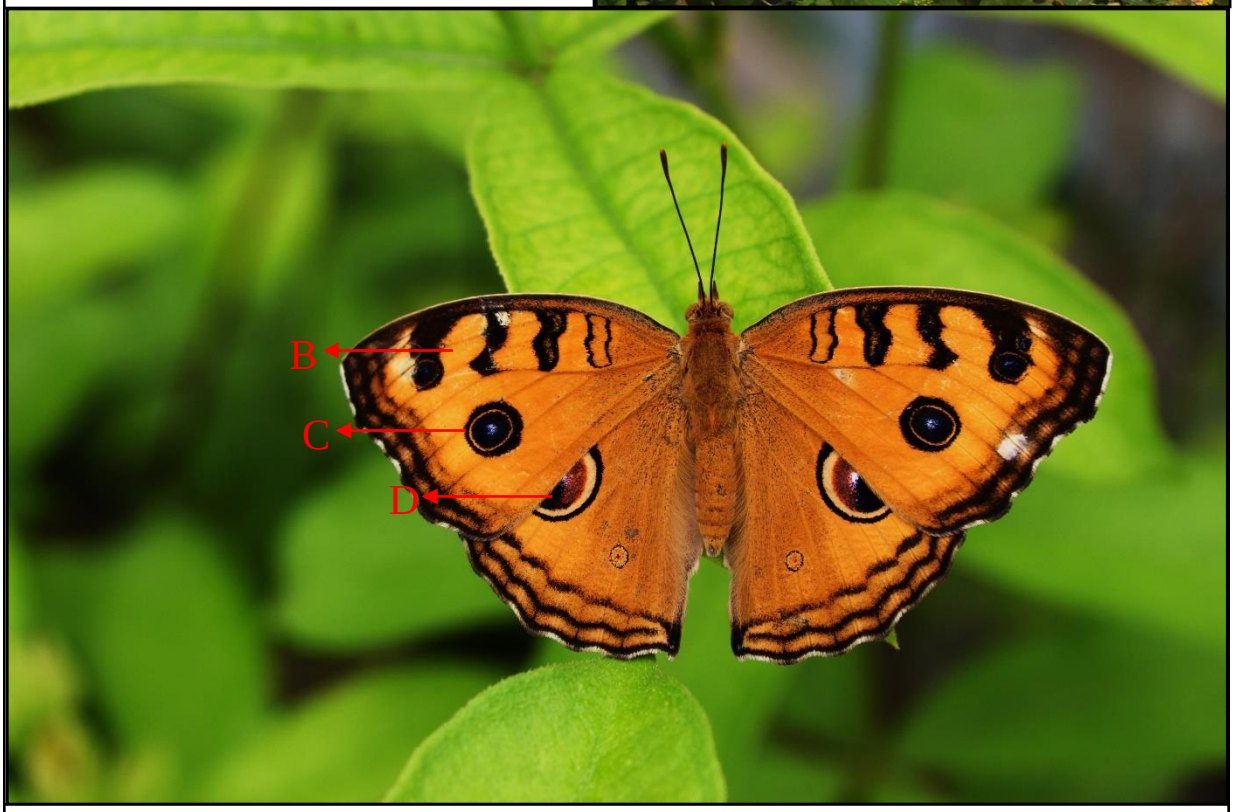
C. Upperside black with a large, white oval discal patch both wings on a shot blue area

2) Underside of wings (Not shown)

D. Underside yellowish brown and the forewings have 3 white spots in upper cell, a broad oblique white band and sub-marginal white spots.

E. Underside of hindwing with a prominent black costal spot in mid space 7. A broad white discal band present..

Scientific Name: *Junonia almana* Linnaeus,1758	**Figure: 30**
Common Name: Peacock Pansy	**Status at study site:** Uncommon
Distribution in Gujarat: Entire Gujarat except Kutch	
Nectar Host Plant: *Lantana camara* (A)	
Flight pattern: Short and sustained flight, Settles on grasses and bushes	
Wingspan: 60-65mm	



Identification marks:

1)Upperside of wings

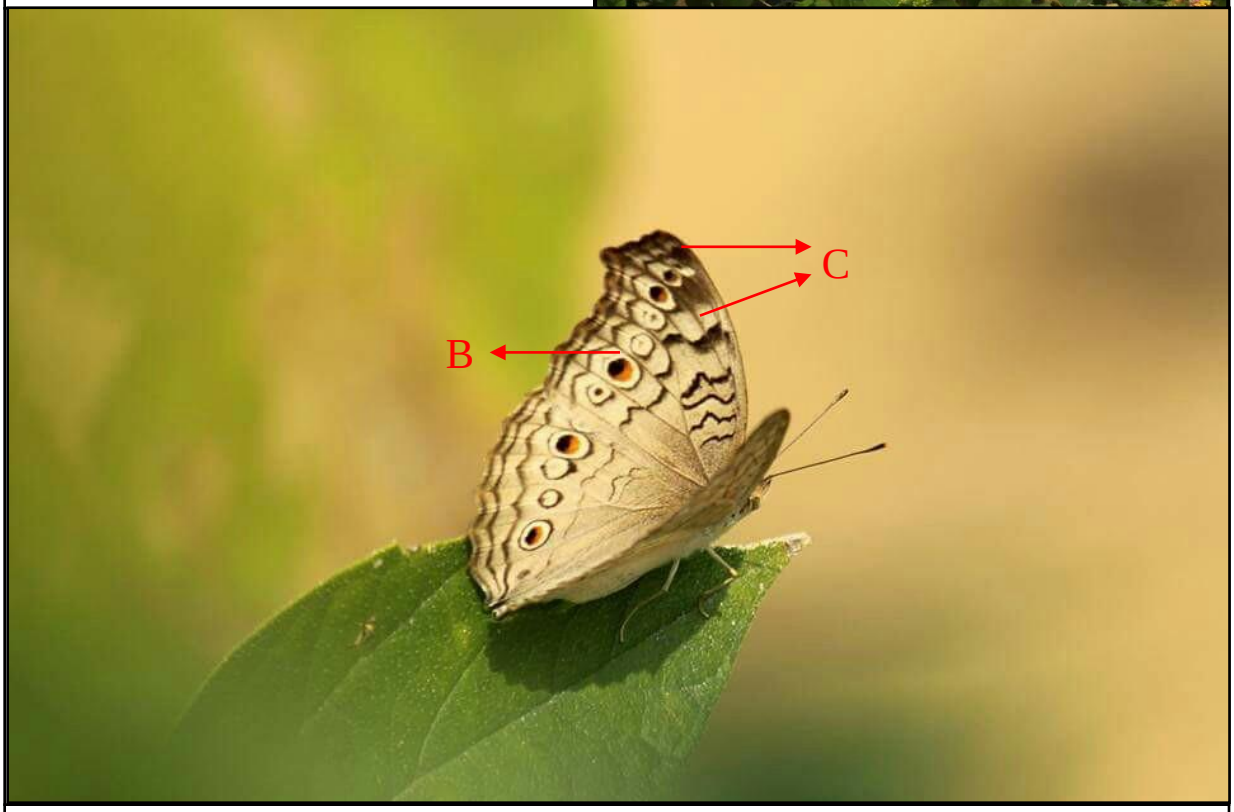
B. Upperside orange yellow with dark termen and 2 dark sub-marginal, one marginal line

C. Upperside of forewing has ocelli in space 2 and 5

D. Upperside of hindwing has small ocellus in space 2 and a large ocellus covering spaces 4 to 7.

2) Underside of wings (Not shown)

Scientific Name: *Junonia atlites* Linnaeus,1763	**Figure: 31**
Common Name: Grey Pansy	**Status at study site:** Rare
Distribution in Gujarat: South Gujarat, Saurashtra, Central Gujarat	
Nectar Host Plant: *Lantana camara* (A)	
Flight pattern: Short and sustained flight, Settles on grasses and bushes	
Wingspan: 55-65mm	



Identification marks:

1) Upperside of wings

B. Grey with dark brown markings and a complete row of ocelli on both wings.

C. Upperside of forewings darker. Both wings with discal, 2 submarginal dark wavy lines.

2) Underside of wings (Not shown)

D. Underside variable.

Scientific Name: *Junonia hierta* Fabricius, 1798	**Figure: 32**
Common Name: Yellow Pansy	**Status at study site:** Rare
Distribution in Gujarat: South Gujarat and Saurashtra	
Nectar Host Plant: *Sphagneticola trilobata* (A)	
Flight pattern: Fast and restless	
Wingspan: 45-60mm	

Identification marks:

1) Upperside of wings

B. Upperside dark or pale brown. Upperside of forewing has broad dark brown apex with yellowish-white spots.

C. Upperside of hindwing has a very large ocellus in space 5 and a very small one in space 2.

2) Underside of wings (Not shown)

D. Underside grey or brown or may be rusty in colour with variable markings.

Scientific Name: *Junonia iphita* Cramer, 1779	**Figure: 33**
Common Name: Chocolate Pansy	**Status at study site:** Uncommon
Distribution in Gujarat: North and Central Gujarat.	
Nectar Host Plant: *Lantana camara* (A)	
Flight pattern: Fast flyers	
Wingspan: 55-80mm	

Identification marks:

1) Upperside of wings

B. Upperside chocolate-brown with an irregular dark brown postmedial line and a paler bent discal band.

C. Two dark sub-marginal lines.

2) Underside of wings (Not shown)

Scientific Name: *Junonia lemonias* Linnaeus, 1758	**Figure: 34**
Common Name: Lemon Pansy	**Status at study site:** Very Common
Distribution in Gujarat: Entire Gujarat except coastal area.	
Nectar Host Plant: *Sphagneticola trilobata* (A)	
Flight pattern: Fast and restless	
Wingspan: 40-60mm	

Identification marks:

1) Upperside of wings

B. Upperside dark or pale brown. Upperside of forewing has broad dark brown apex with yellowish-white spots.

C. Orange ringed ocelli in spaces 2 and 5. Upperside of hindwing has a very large ocellus in space 5 and a very small one in space 2.

2) Underside of wings (Not shown)

D. Underside grey or brown or may be rusty in colour with variable markings.

Scientific Name: *Junonia orithya* Linnaeus, 1758	**Figure: 35**
Common Name: Blue Pansy	**Status at study site:** Uncommon
Distribution in Gujarat: Throughout Gujarat except Kutch	
Nectar Host Plant: *Sida acuta* (A)	
Flight pattern: Fast and strong flight	
Wingspan: 45-60mm	

Identification marks:

1) Upperside of wings

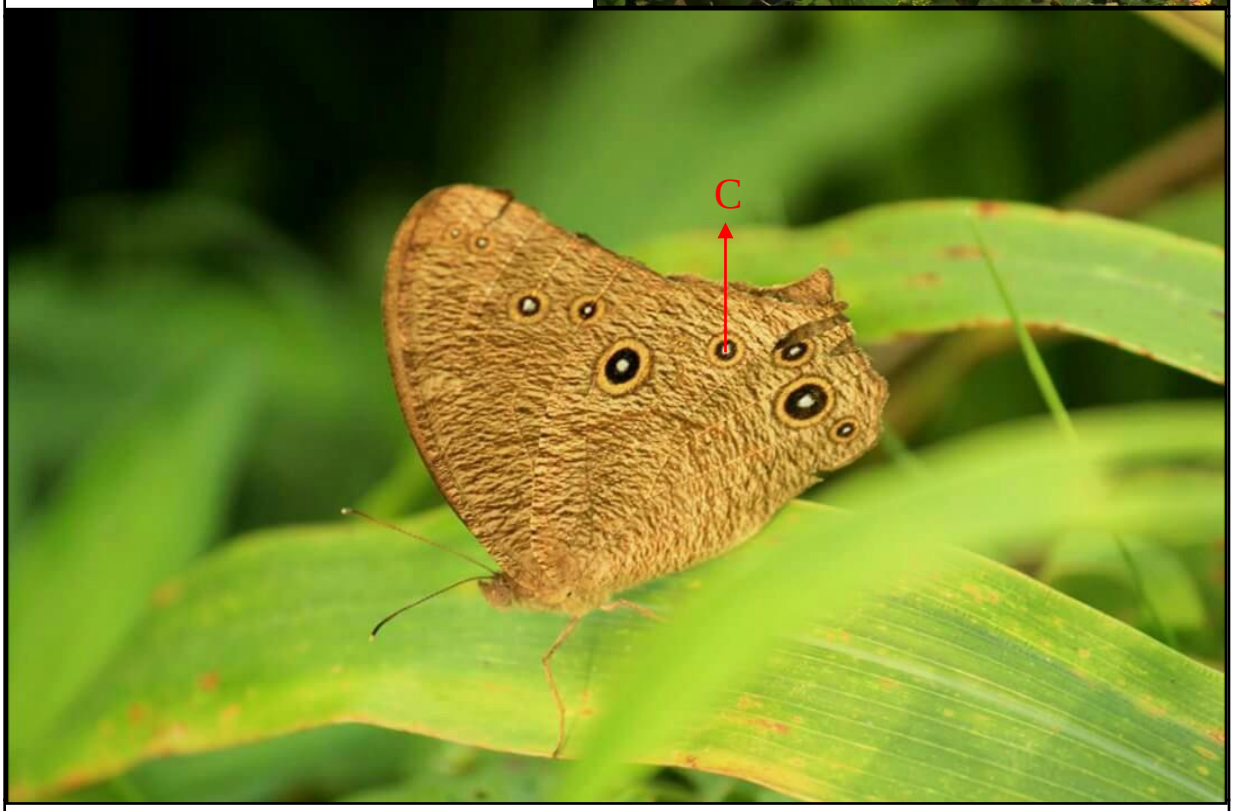
B. Upper hind wings are brilliant blue and upper forewings are velvet black, while apex pale and white bands.

C. Pair of blue-centered red eyespots on all wings.

2) Underside of wings (Not shown)

D. Underside dirty white with alternate blue and pale orange basal bands.

Scientific Name: *Melanitis leda* Linnaeus, 1758	**Figure: 36**
Common Name: Common Evening Brown	**Status at study site:** Common
Distribution in Gujarat: North Gujarat, Central Gujarat and South Gujarat	
Nectar Host Plant: *Lantana camara* (A)	
Flight pattern: Rapid and hopping flight	
Wingspan: 60-80mm	



Identification marks:

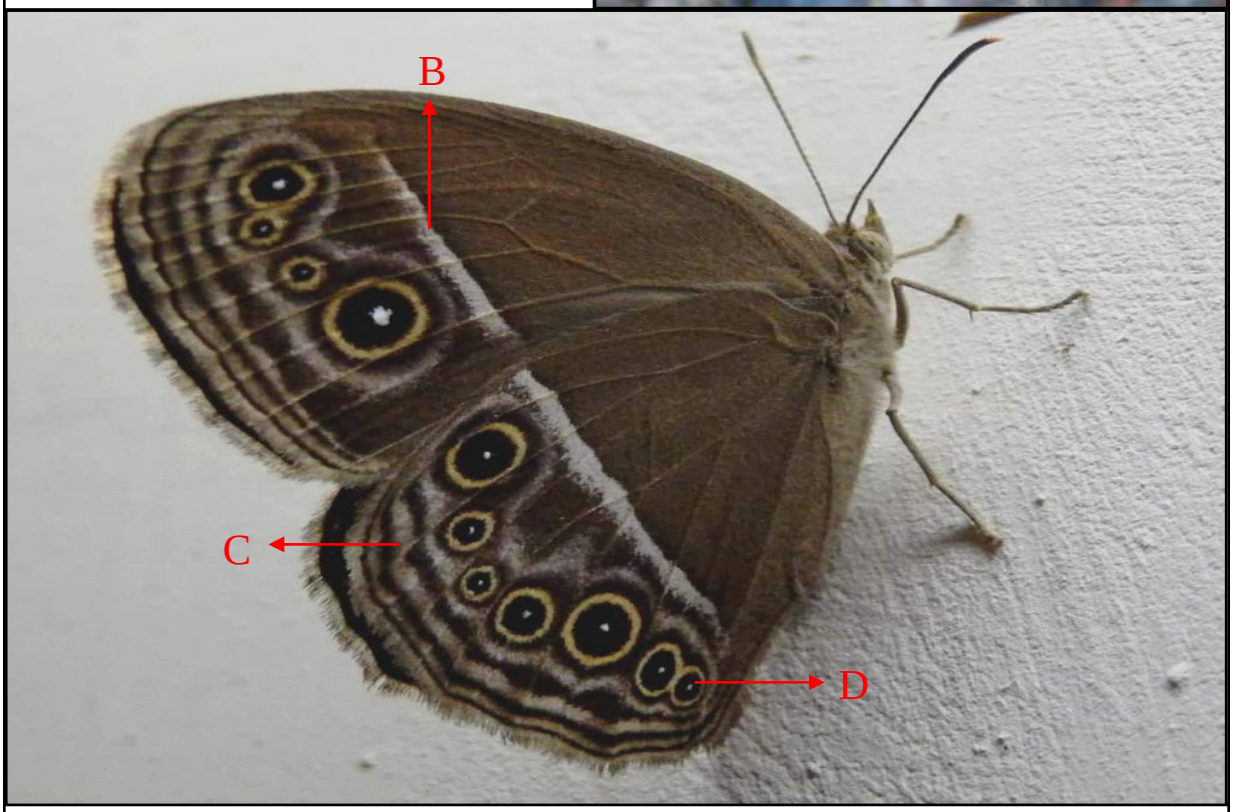
1) Upperside of wings (Not shown)

2) Underside of wings

B. Hindwing toothed at vein 1 and vein 3. Upperside brown. Upperside of forewing large black sub-apical ocellus bearing two white spots in space 3 and 4 and an orange band on inner and upper side, not reaching costa. A black diffuse sub-apical patch above the ocellus.

C. Hindwing with sub-marginal ocelli or white spots.

Scientific Name: *Mycalesis perseus* Fabricius, 1775	**Figure: 37**
Common Name: Common Bushbrown	**Status at study site:** Uncommon
Distribution in Gujarat: Throughout Gujarat except Kutch	
Nectar Host Plant: *Euphorbia hirta* (A)	
Flight pattern: Weak flight, settles frequently on the stems of bamboos	
Wingspan: 38-55mm	



Identification marks:

1) Upperside of wings (Not shown)

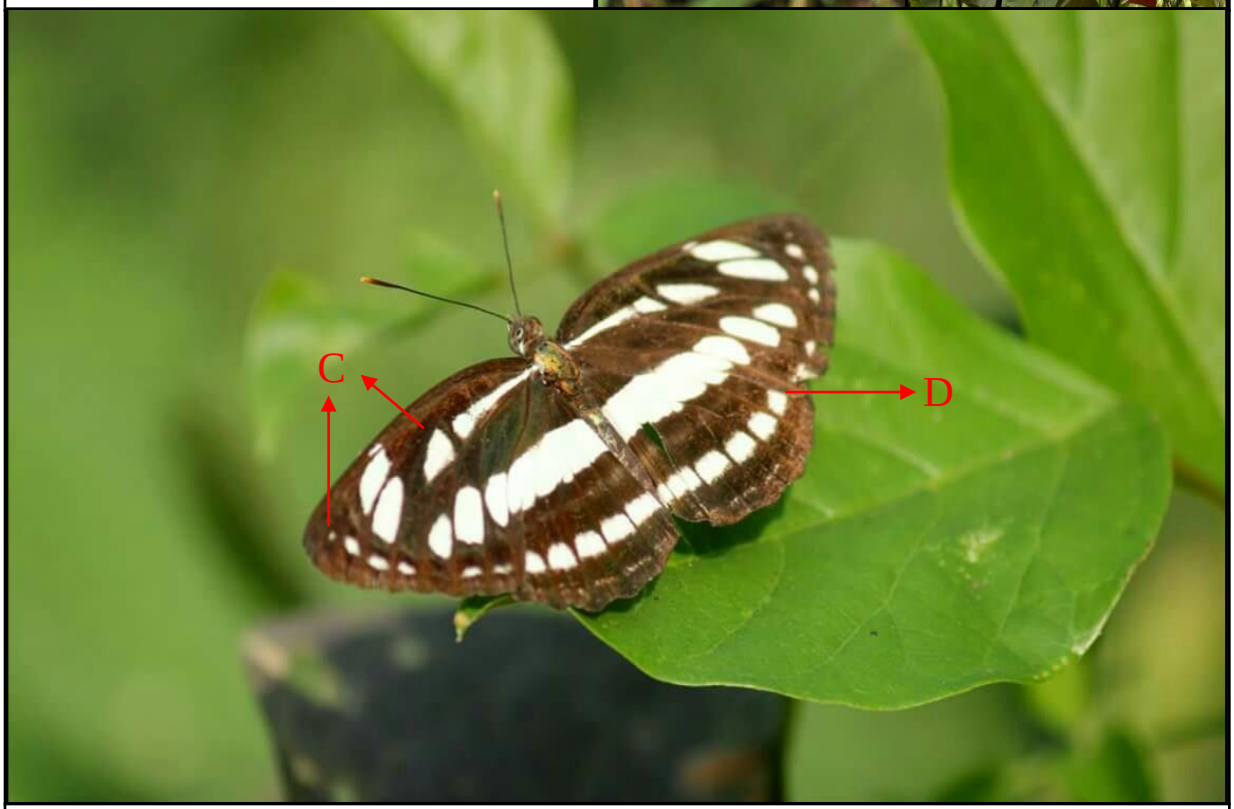
B. Dull brown upperside with an eyespot on forewing in space 2. In wet season form, white lines runs across both the wings from forewing to hindwing.

C. Marginal series of eyespots of variable sizes and with white pupils, from along wing margins and above this white line. In dry season form, eye spots reduced to dots and white line absent.

2) Underside of wings

D. Hindwing with sub-marginal ocelli or white spots.

Scientific Name: *Neptis hylas* Linnaeus, 1758	**Figure: 38**
Common Name: Common Sailer	**Status at study site:** Uncommon
Distribution in Gujarat: Central and South Gujarat	
Nectar Host Plant: *Tridax procumbens* (A), *Jatropha gossipifolia* (B)	
Flight pattern: Weak flight	
Wingspan: 50-60mm	



Identification marks:

1) Upperside of wings

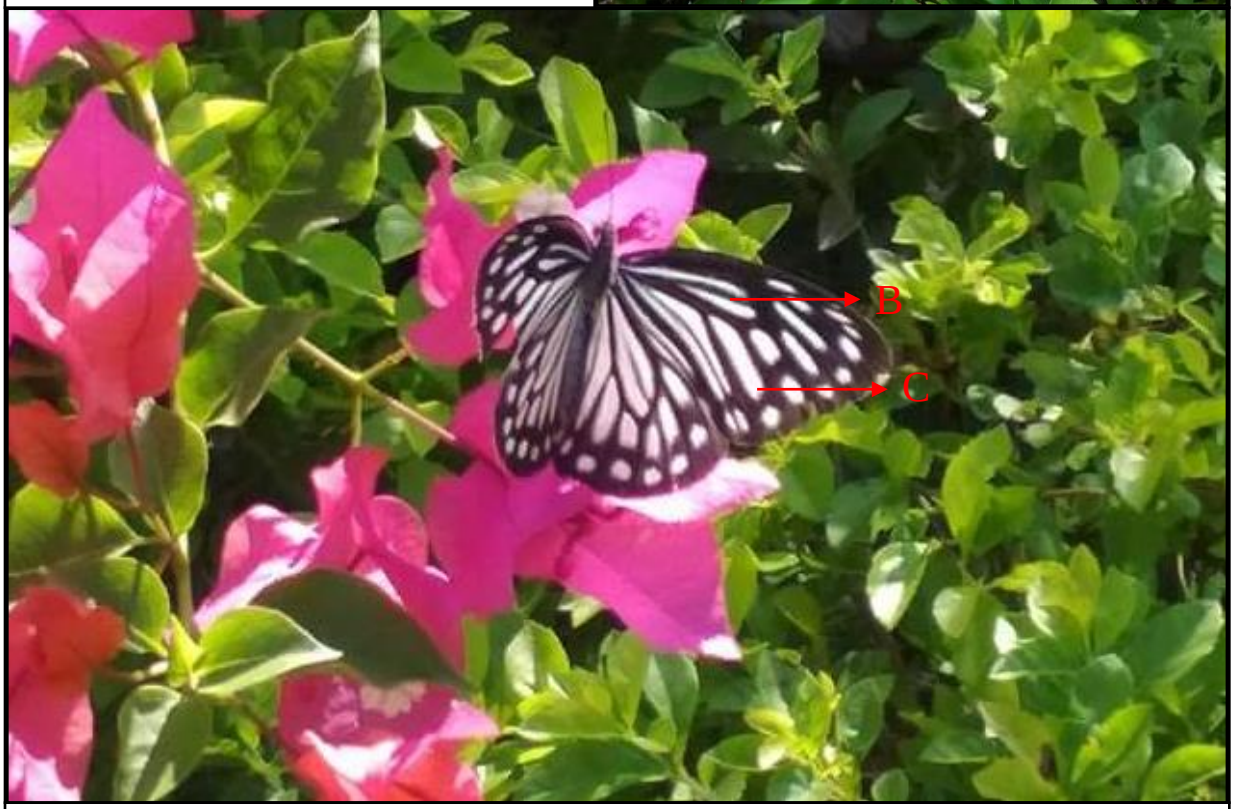
B. Upperside dark brown to black with white markings. Upperside of forewing cell strak divided into a basal strak and a spot beyond.

C. Prominent discal and post-discal row of white spots. Upperside of hindwing have broad discal bands and post-discal spots are prominent

2) Underside of wings (Not shown)

D. Underside is dark yellowish.

Scientific Name: *Parantica aglea* Stoll, 1782	**Figure: 39**
Common Name: Glassy Tiger	**Status at study site:** Uncommon
Distribution in Gujarat: Central and South Gujarat	
Nectar Host Plant: *Bougainvillea* (A)	
Flight pattern: Weak flight	
Wingspan: 70-85mm	



Identification marks:

1) Upperside of wings

B. Dark brown to black with white markings. Pale long streak in forewing cell, divided by two thin dark lines.

C. Basal spots streaks like, discal spots quadrate and rows of oval sub-marginal spots.

2) Underside of wings (Not shown)

D. Underside of forewing cell with 2 long white streaks

Scientific Name: *Phalanta phalantha* Drury, 1773	**Figure: 40**
Common Name: Common Leopard	**Status at study site:** Uncommon
Distribution in Gujarat: Throughout Gujarat except Kutch	
Nectar Host Plant: *Lantana camara* (A)	
Flight pattern: Rapid flights	
Wingspan: 50-60mm	

Identification marks:

1) Upperside of wings

B. Upperside is orange yellow with black markings.

C. Forewing with 4 dark lines within cell and an end- cell bar.

2) Underside of wings (Not shown)

D. Underside pale yellow with a row of discal black centered orange spots.

Scientific Name: *Symphaedra nais* Forster, 1771	**Figure: 41**
Common Name: Baronet	**Status at study site:** Uncommon
Distribution in Gujarat: Entire Gujarat except Kutch and Saurashtra	
Nectar Host Plant: *Lantana camara* (A)	
Flight pattern: Rapid flights	
Wingspan: 60-70mm	

Identification marks:

1) Upperside of wings

B. Orange-yellow with thin diffuse black border

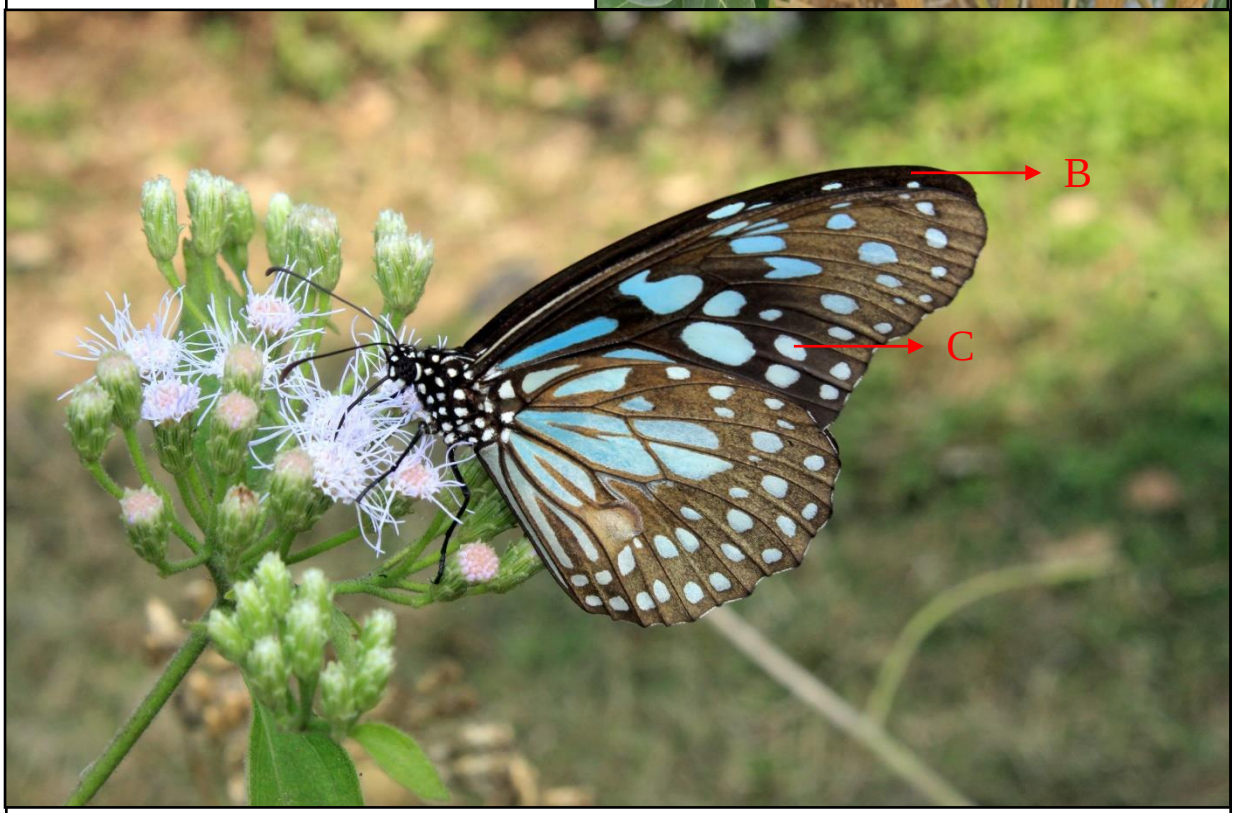
C. Upperside of hindwings with large black spot and a row of sub-marginal black spots.

2) Underside of wings (Not shown)

D. Pinkish brown colouration

E. Underside of hindwings with a white discal band of variable width and length

Scientific Name: *Tirumala limniace* Cramer, 1775	**Figure: 42**
Common Name: Blue Tiger	**Status at study site:** Very Common
Distribution in Gujarat: South Gujarat, Central Gujarat and Saurashtra	
Nectar Host Plant: *Calotropis procera* (A)	
Flight pattern: Slow and gliding flight	
Wingspan: 90-100mm	



Identification marks:

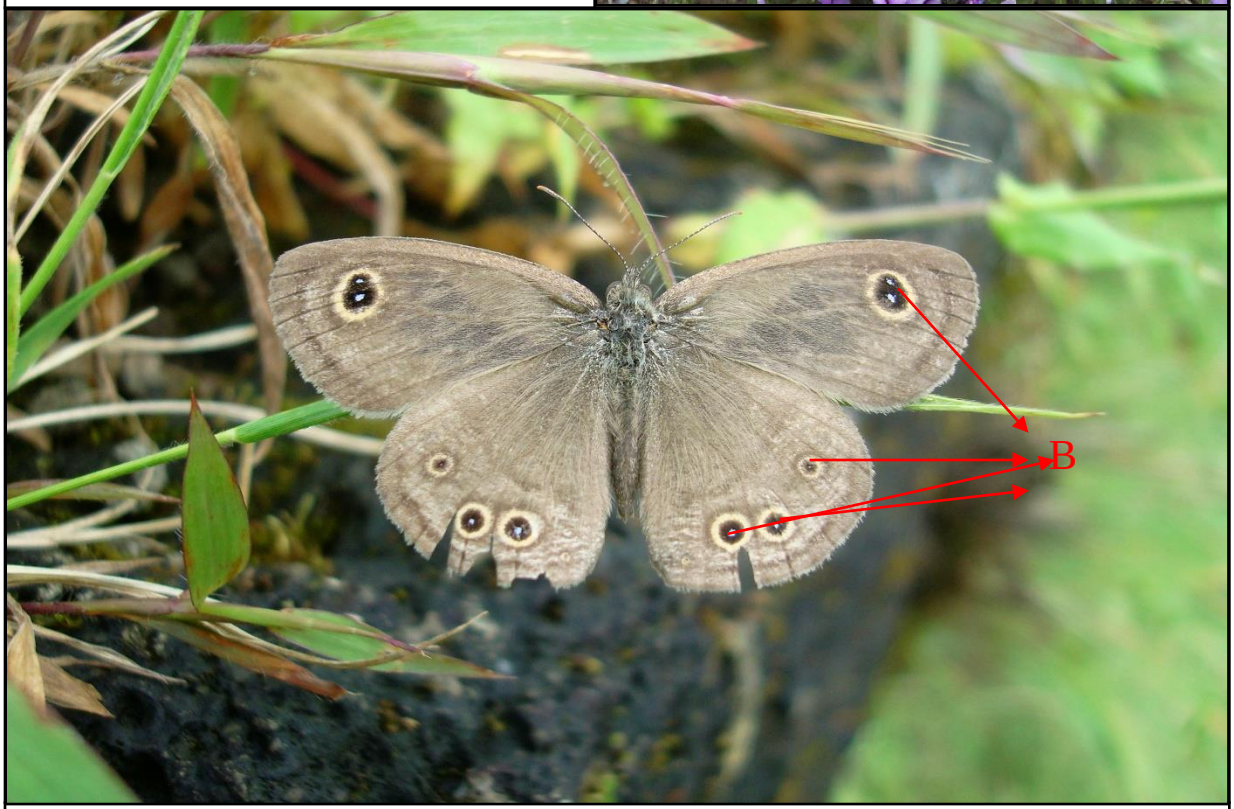
1) Upperside of wings

B. Upperside is dark brown to black with large irregular pale blue or white markings.

2) Underside of wings

C. Underside markings are white or pale blue in colour.

Scientific Name: *Ypthima huebneri* Kirby, 1871	**Figure: 43**
Common Name: Common Four Ring	**Status at study site:** Uncommon
Distribution in Gujarat: South Gujarat and Central Gujarat	
Nectar Host Plant: *Catharanthus roseus* (A)	
Flight pattern: Weak and bouncing flight	
Wingspan: 30-40mm	



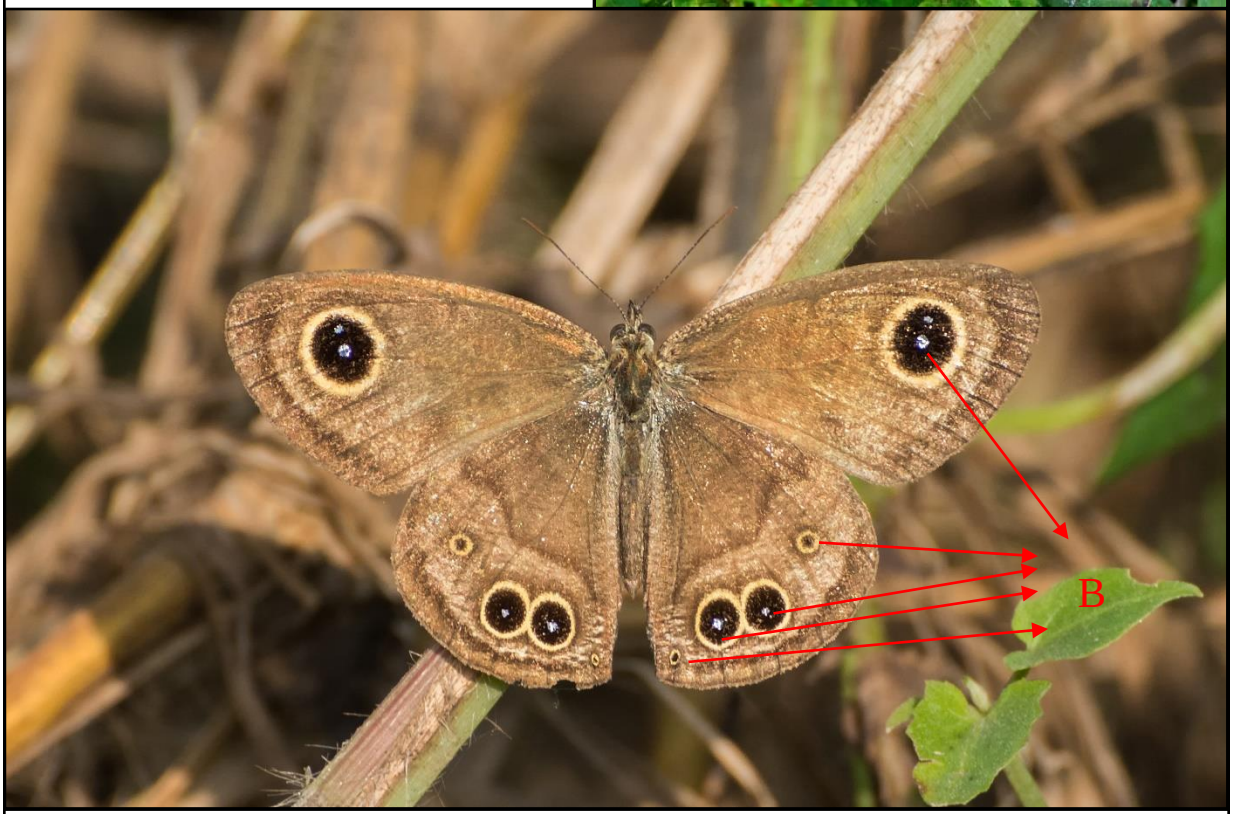
Identification marks:

1) Upperside of wings

B. Greyish brown with small dark striations and four yellow ringed black ocelli. In males no brand and females are larger and paler. Commonly seen in lower elevations.

2) Underside of wings (Not shown)

Scientific Name: *Ypthima baldus* Fabricius, 1775	**Figure: 44**
Common Name: Common Five Ring	**Status at study site:** Uncommon
Distribution in Gujarat: Entire Gujarat except Kutch	
Nectar Host Plant: *Sida acuta* (A)	
Flight pattern: Weak and bouncing flight	
Wingspan: 32-48mm	



Identification marks:

1) Upperside of wings

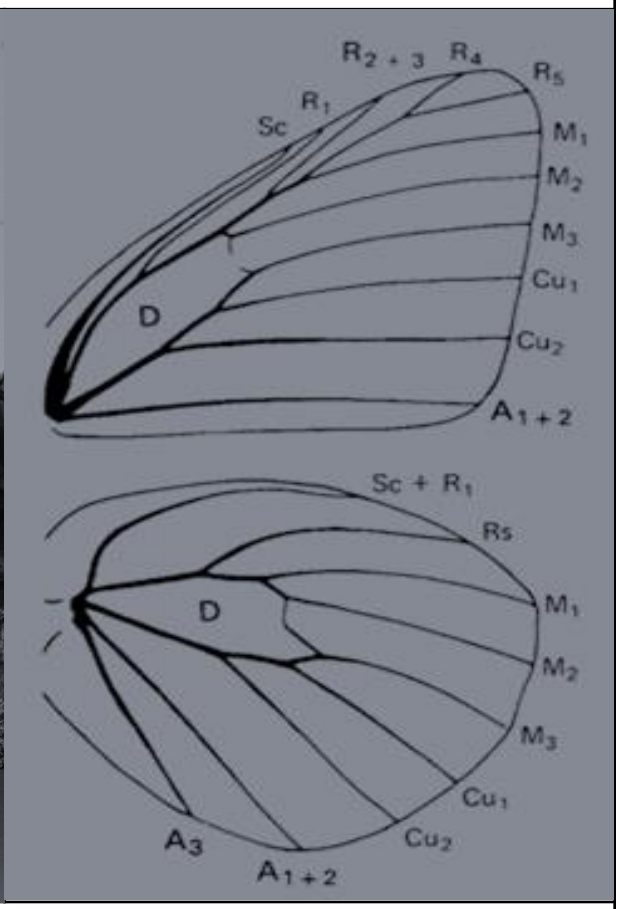
B. Greyish white underside, prominent dark bands and yellow ringed black ocelli.

2) Underside of wings (Not shown)

C. Underside of hindwing with three tornal ocelli not in line

Family

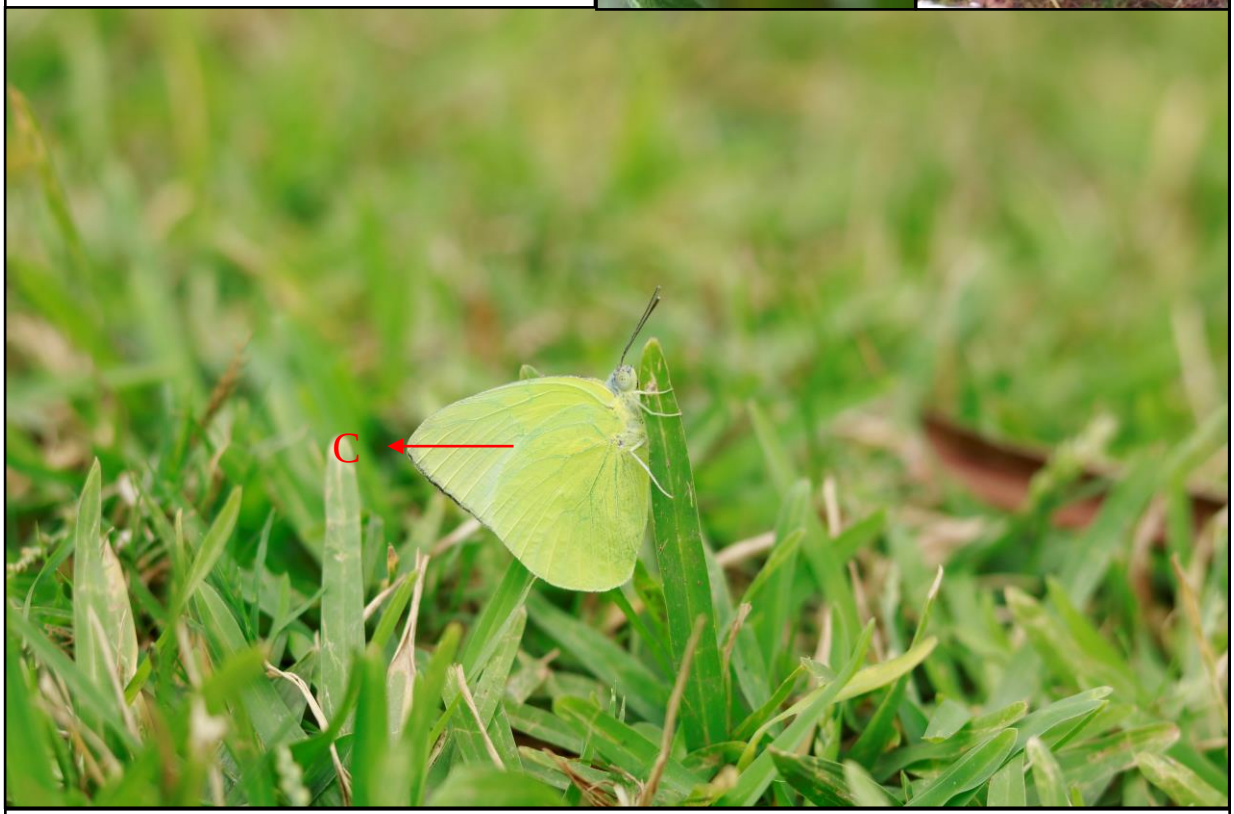
Pieridae



Identification marks:

1. Most of the butterflies are white or yellow and many with black, orange markings.
2. The unique pigments pterins which are responsible for these colours which are known to absorb or reflect a variable amount of UV light.
3. Three pairs of legs well developed and hindwings cover abdomen.
4. The forewing has one anal vein and 3-5 radial veins.
5. Hindwing has 2 anal veins.
6. Most of these are strong fliers and prefer open lands.
7. Anterior legs of both sexes are useless for walking.

Scientific Name: *Catopsilia pomona* Fabricius, 1775	**Figure: 45**
Common Name: Common Emigrant	**Status at study site:** Very Common
Distribution in Gujarat: Entire Gujarat except Kutch	 
Nectar Host Plant: *Sida acuta* (A), *Lantana camara* (B)	
Flight pattern: Strong and erratic flight	
Wingspan: 55-80mm	



Identification marks:

1) Upperside of wings (Not shown)

C. Multiple forms of variable species in both the sexes. Colouration and markings vary considerably in this species, from yellow to translucent greenish white. Common in dense forest areas as well as plains. Uncommon in higher elevations.

2) Underside of wings

D. Underside of the wings may be unmarked or with red-ringed sliver spots in centre. Female of form Catilla has purple-brownish patches on the underside of wings

Scientific Name: *Catopsilia pyranthe* Linnaeus,1758	**Figure: 46**
Common Name: Mottled Emigrant	**Status at study site:** Very Common
Distribution in Gujarat: South Gujarat, Central Gujarat, Saurashtra	 
Nectar Host Plant: *Lantana camara* (A), *Tridax procumbens* (B)	
Flight pattern: Strong and erratic flight	
Wingspan: 50-70mm	

Identification marks:

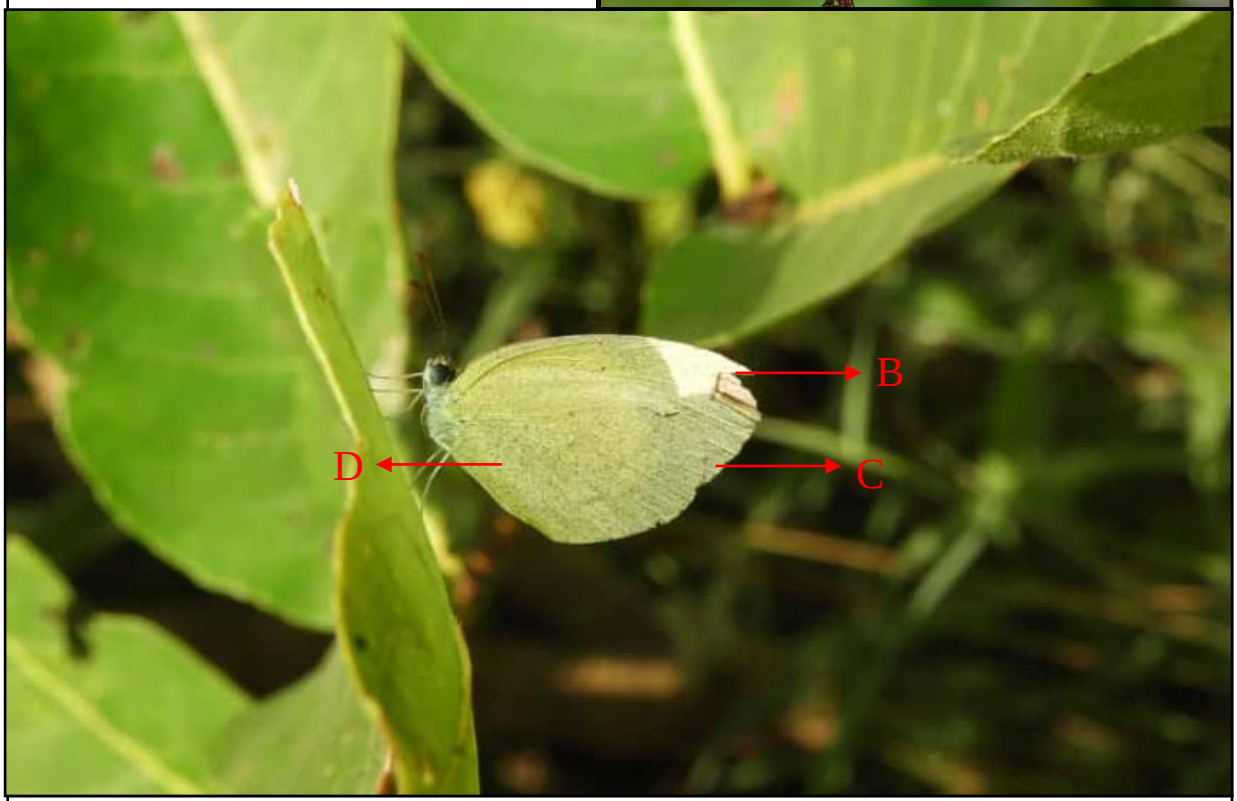
1) Upperside of wings (Not shown)

C. Chalky white or greenish with black apical and marginal border on upper-forewing. Common in plain as well as dense forest areas..

2) Underside of wings

D. Underside mottled with brown lines and red-ringed silver spots in centre of wings. Males have white or greenish white with narrow apical and terminal black border. In females broader black markings and larger cell spot are present on the upper-forewing.

Scientific Name: *Eurema brigitta* Stoll, 1780	**Figure: 47**
Common Name: Small Grass Yellow	**Status at study site:** Very Common
Distribution in Gujarat: Throughout Gujarat except Bhal	
Nectar Host Plant*:* *Senna occidentalis* (A)	
Flight pattern: Slow and fluttering flight	
Wingspan: 40-50mm	



Identification marks:

1) Upperside of wings

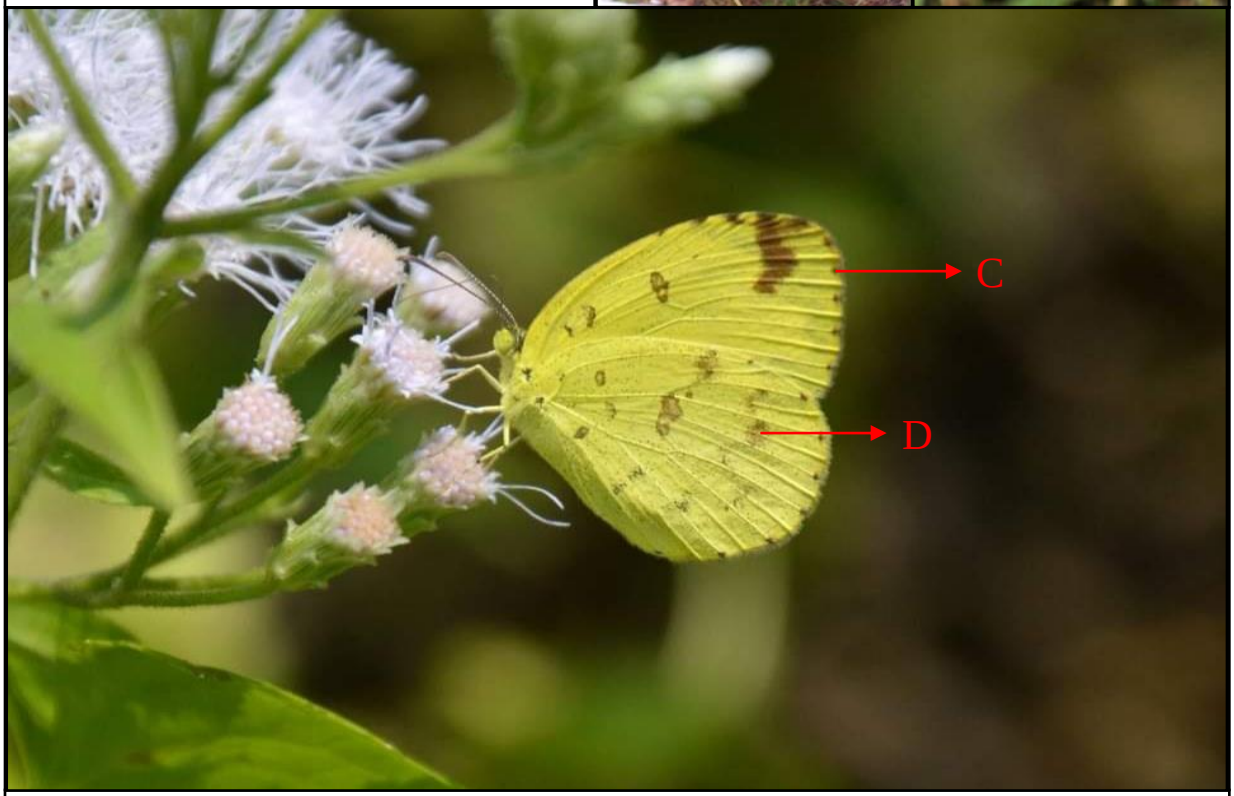
B. Bright yellow butterfly with forewing apex rounded. Upperside of both wings basal black scaling.

C. Upperside of forewing is broad black border with evenly dentate inner edge not continued along vein.

2) Underside of wings

D. Light yellowish in colour

Scientific Name: *Eurema hecabe* Linnaeus, 1758	**Figure: 48**
Common Name: Common Grass Yellow	**Status at study site:** Very Common
Distribution in Gujarat: Throughout Gujarat except coastal areas	 
Nectar Host Plant*:* *Lantana camara* (A), *Tridax procumbens* (B)	
Flight pattern: Slow and fluttering flight	
Wingspan: 40-50mm	



Identification marks:

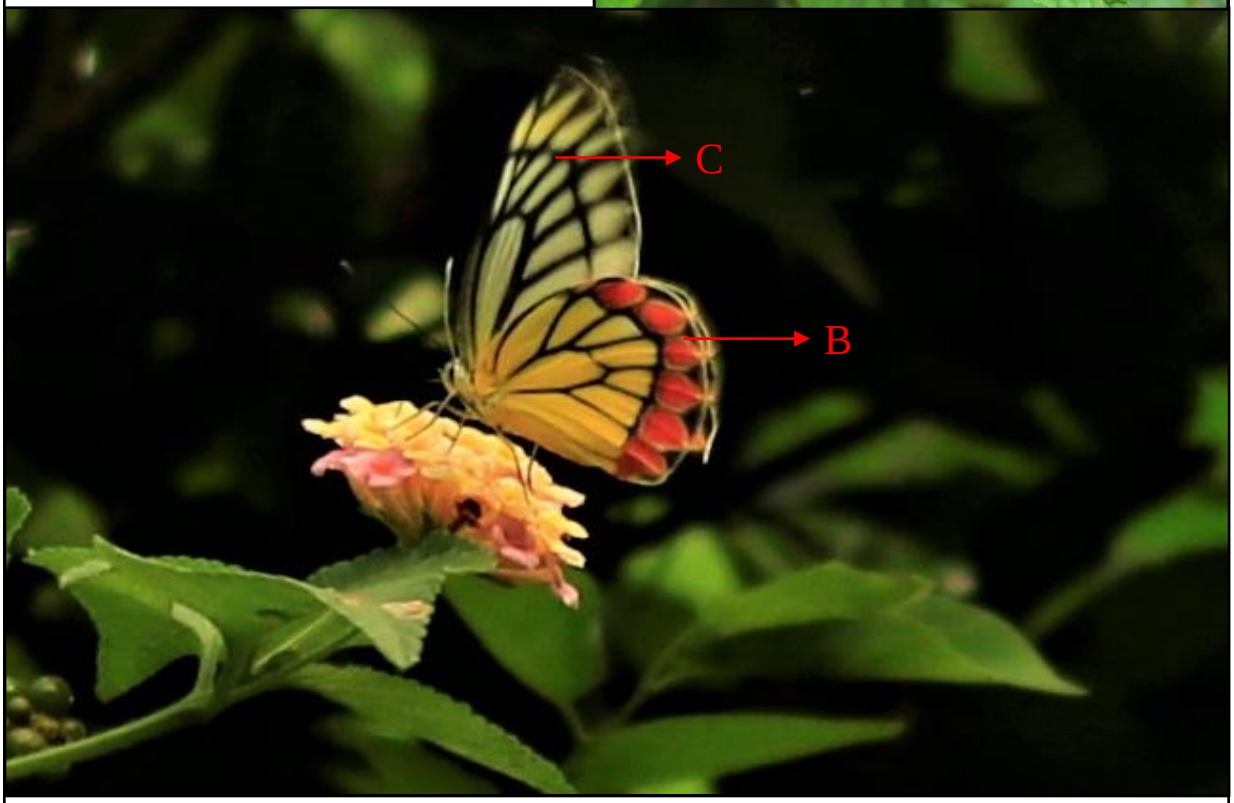
1) Upperside of wings

C. Males, yellow, with apex and termen on upper –forewing and terminal border of upper-hindwing being broadly black. Female: Black borders wider. Underside of forewing has two black spots in cell. Wet season form has brighter colour. Dry season form has narrower black markings on upperside and rusty markings on hindwing.

2) Underside of wings

D. Yellow with variable dark brown markings and fine black dusting on underside.

Scientific Name: *Delias eucharis* Drury, 1773	**Figure: 49**
Common Name: Common Jezebel	**Status at study site:** Common
Distribution in Gujarat: Throughout Gujarat except Saurashtra	
Nectar Host Plant: *Lantana camara* (A)	
Flight pattern: Slow and restless fliers	
Wingspan: 66-83mm	



Identification marks:

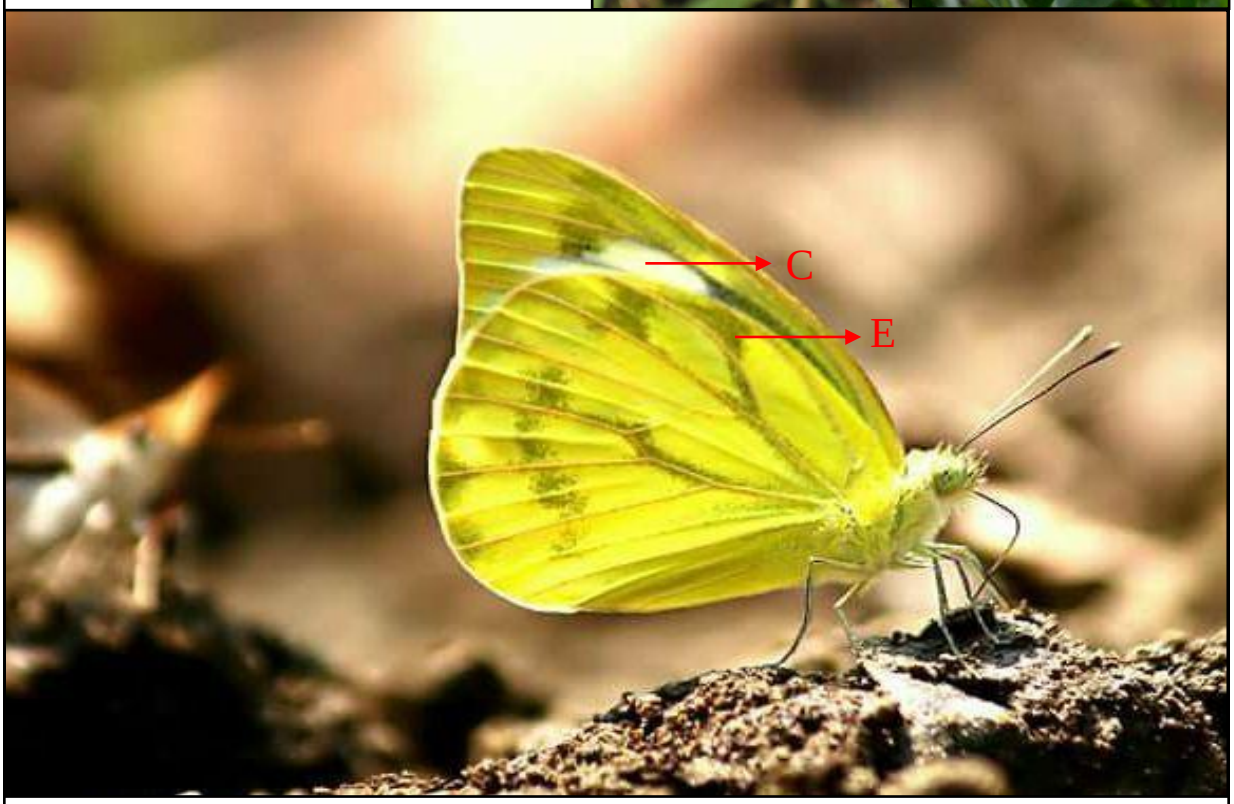
1) Upperside of wings (Not Shown)

2) Underside of wings

B. Underside of hindwing yellow with black veins and a row of marginal triangular red spots pointing towards termen.

C. Underside of forewing white with black veins and yellow apical margins.. Found at all areas. Common in all elevations.

Scientific Name: *Cepora nerissa* Fabricius, 1775	**Figure: 50**
Common Name: Common Gull	**Status at study site:** Common
Distribution in Gujarat: Entire Gujarat except Bhal and coastal area	
Nectar Host Plant: *Tridax procumbens* (A), *Cadaba fruticosa* (B)	
Flight pattern: Fast and strong flight	
Wingspan: 40-65mm	



Identification marks:

1)Upperside of wings (Not Shown)

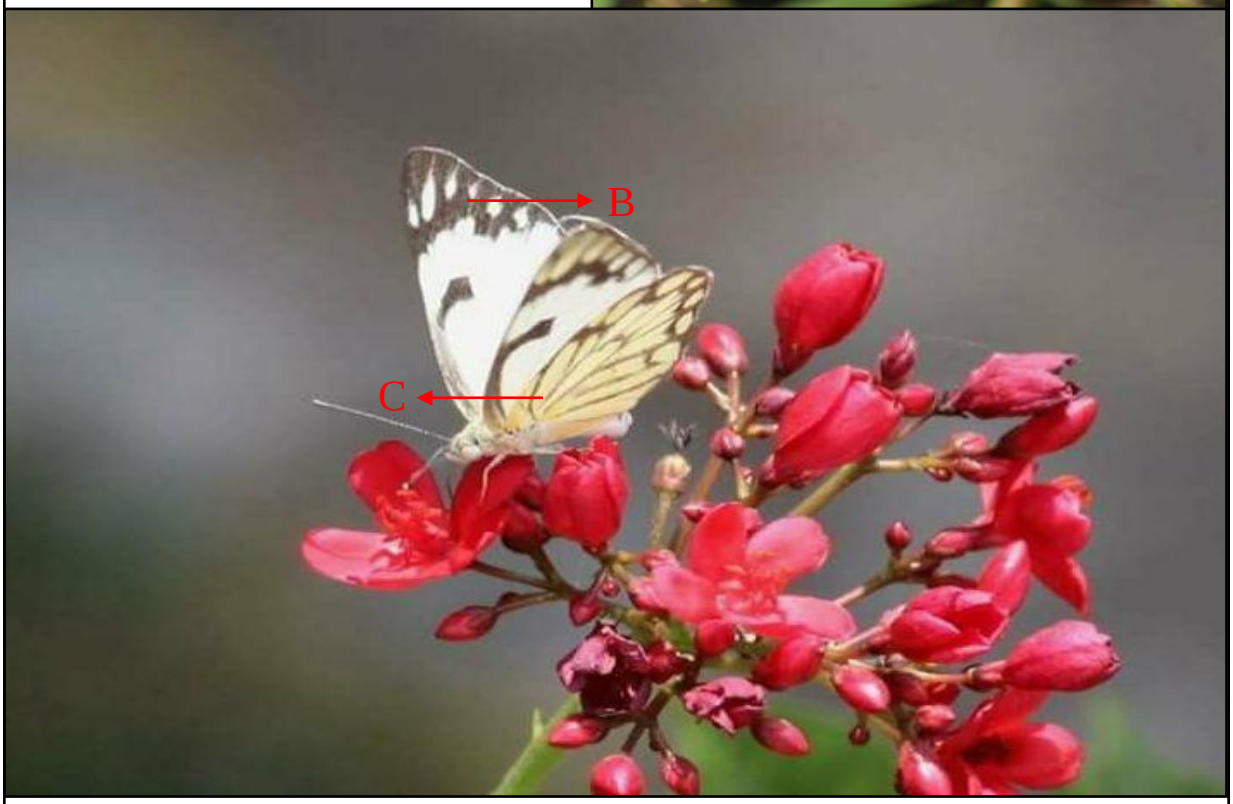
C. Upperside white with forewing having broad black border bearing white spots.

D. Upper side of hindwing white with terminal black spots.

2) Underside of wings

E. A black spot in space 3 and few blackened veins. Found in all the areas. Common in lower and middle elevations.

Scientific Name: *Belenois aurota* Fabricius, 1793	**Figure: 51**
Common Name: Pioneer	**Status at study site:** Common
Distribution in Gujarat: South Gujarat, Central Gujarat, Saurashtra	
Nectar Host Plant*:* *Tridax procumbens* (A)	
Flight pattern: Fast and active fliers	
Wingspan: 40-55mm	



Identification marks:

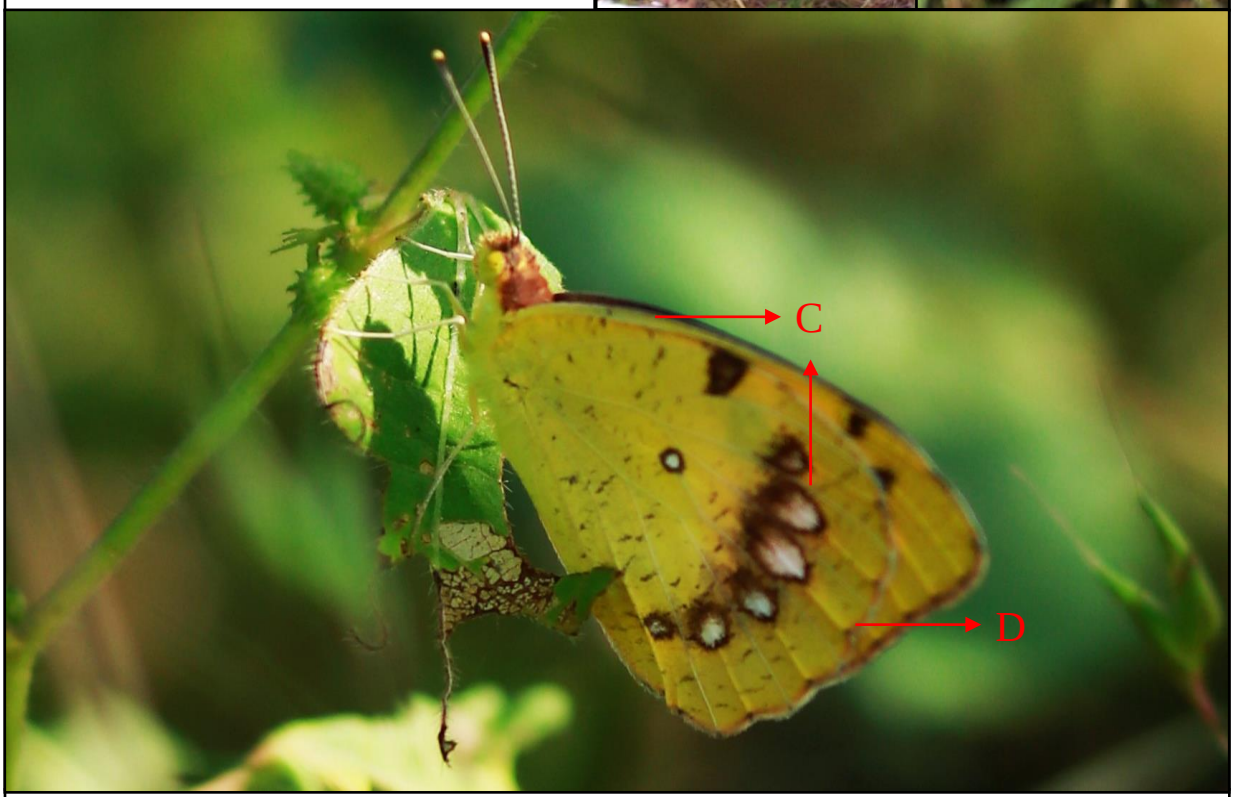
1)Upperside of wings

C. Upperside white with dark border bearing white spots. In dry season form more spots are observed than wet season form.. Found in plains as well as forest areas. Common in lower elevations and rarely seen in higher altitudes.

2) Underside of wings

E. Underside of Hindwing yellow (Wet Season Form) to white (Dry Season Form) with black veins, narrow dark margin bearing ground coloured spots.

Scientific Name: *Ixias marianne* Cramer, 1779	**Figure: 52**
Common Name: White Orange-tip	**Status at study site:** Uncommon
Distribution in Gujarat: Entire Gujarat except coastal area	 
Nectar Host Plant*:* *Lantana camara* (A), *Tridax procumbens* (B)	
Flight pattern: . Fast and restless fliers	
Wingspan: 50-55mm	



Identification marks:

1) Upperside of wings

C. Upperside white with variable black border. Underside of Hindwing yellow with prominent row of post-discal spots (white or dark) and an end-cell spot

2) Underside of wings

D. Underside of forewing white with yellow apex. Apical orange patch showing through Underside of Forewing.

Scientific Name: *Ixias pyrene* Linnaeus, 1764	**Figure: 53**
Common Name: Yellow Orange-tip	**Status at study site:** Uncommon
Distribution in Gujarat: Entire Gujarat except Bhal and Coastal area	 
Nectar Host Plant*:* *Sida acuta* (A), *Tridax procumbens* (B)	
Flight pattern: . Fast and restless fliers	
Wingspan: 50-70mm	

Identification marks:

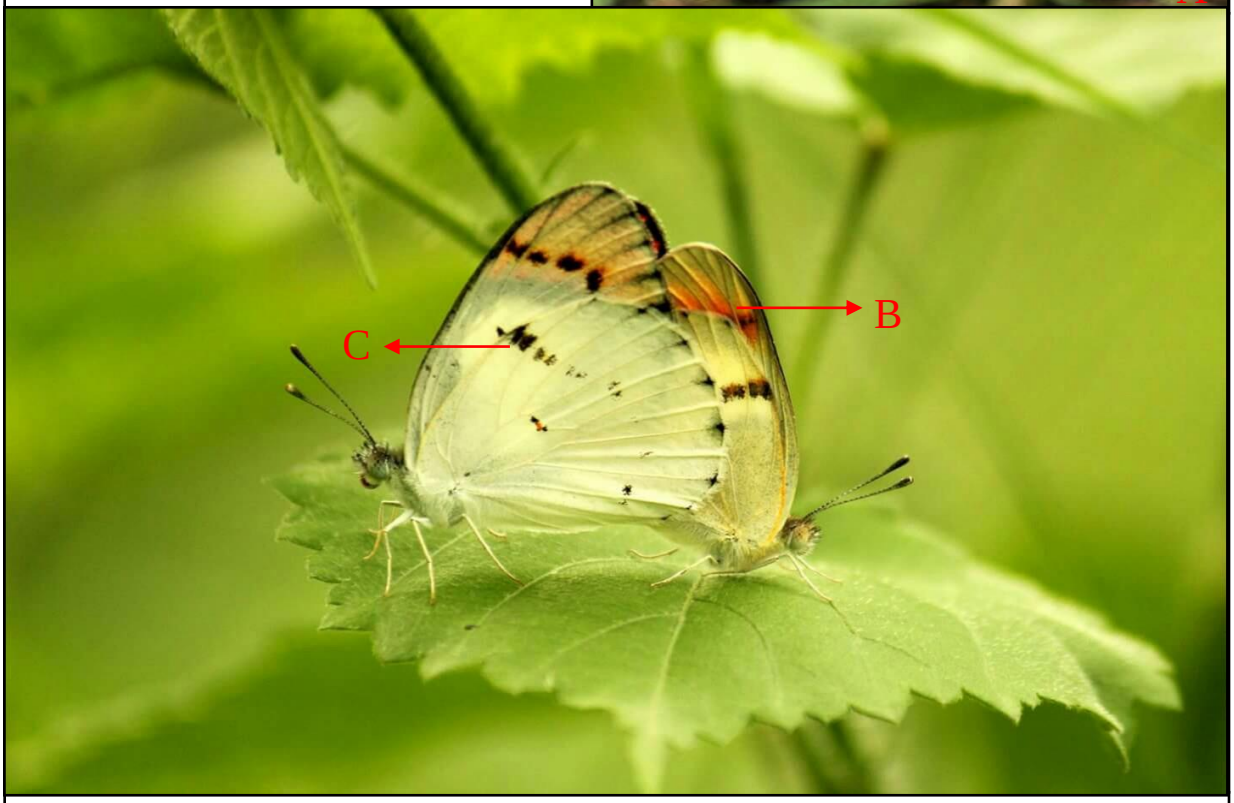
1) Upperside of wings (Not Shown)

C. In Males upperside yellow with upperside forewing apical half black, bearing a large orange patch crossed by black veins. Upperside of females either white or yellow.

2) Underside of wings

D. Underside yellow with markings variable from unmarked to heavily marked with prominent post-discal spots, end-cell spot and dark mottling

Scientific Name: *Colotis danae* Fabricius, 1775	**Figure: 54**
Common Name: Crimson tip	**Status at study site:** Uncommon
Distribution in Gujarat: Entire Gujarat	
Nectar Host Plant*:* *Tridax procumbens* (A)	
Flight pattern: . Weak and fluttering flight	
Wingspan: 40-50mm	



Identification marks:

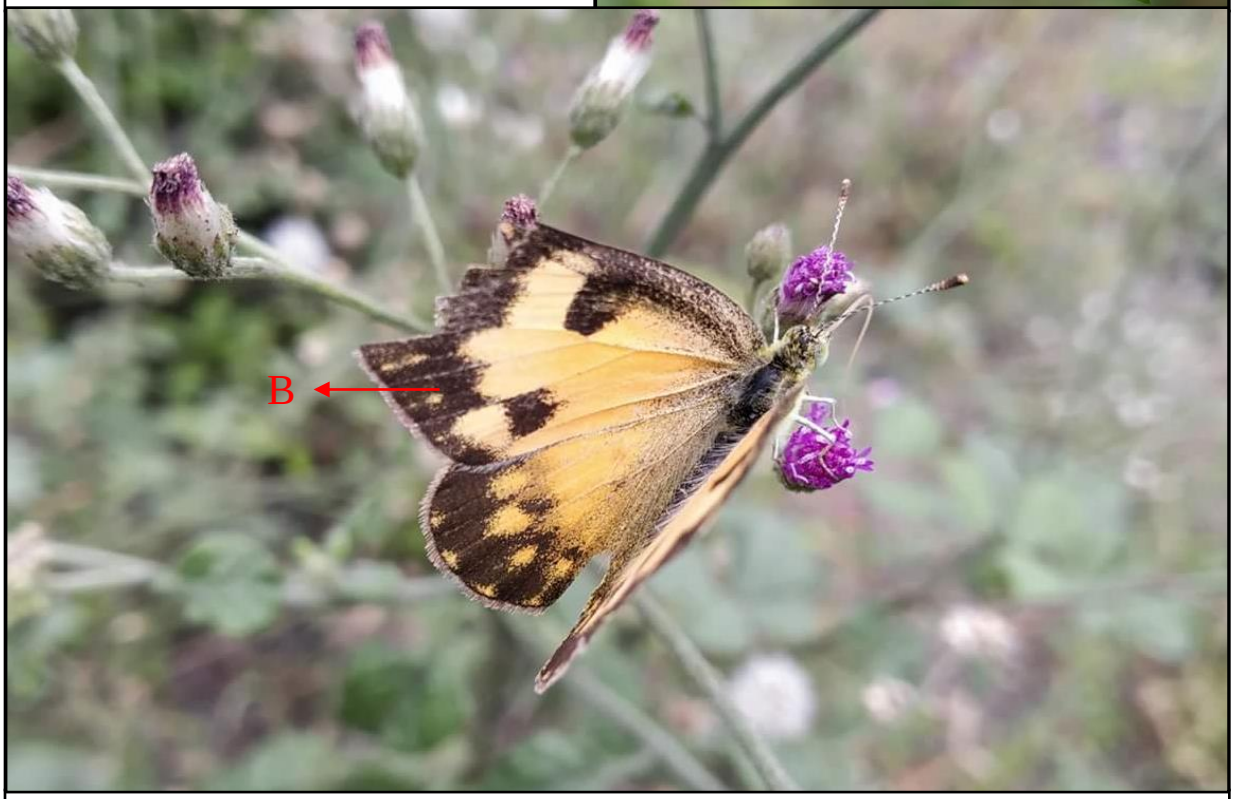
1) Upperside of wings (Not Shown)

B. Male: Upperside of Forewing white with broad crimson coloured apical patch having broad black inner edge. Underside whiter. Female: upperside white with suffused dark basal dusting. Upperside of forewing crimson or orange apex bearing a row of black spots or band.

2) Underside of wings

C. Underside both wings with end cell dot and a prominent row of discal black spots with variable orange dusting

Scientific Name: *Colotis amata* Fabricius, 1775	**Figure: 55**
Common Name: Small Salmon Arab	**Status at study site:** Uncommon
Distribution in Gujarat: Throughout Gujarat except Saurashtra, Kutch and Coastal areas	
Nectar Host Plant*:* *Chromolaena odorata* (A)	
Flight pattern: . Weak and fluttering flight	
Wingspan: 35-50mm	



Identification marks:

1)Upperside of wings

B. Male: Upper side salmon pink with broad black border bearing 2 rows of pale spots. Upper side of Forewing with dark costal border joined to spot end-cell. Female: upper side paler and markings duller than male and with broader black margin.

2) Underside of wings (Not Shown)

C. Underside heavily dusted with dark scales.

Scientific Name: *Pareronia hippia* Fabricius, 1787	**Figure: 56**
Common Name: Common Wanderer	**Status at study site:** Uncommon
Distribution in Gujarat: South and Central Gujarat	
Nectar Host Plant*:* *Chromolaena odorata* (A)	
Flight pattern: Fast and active fliers, especially males.	
Wingspan: 65-85mm	

Identification marks:

1) Upperside of wings

B. Upper side pale blue with prominent black veins and black border.

C. Upper forewing has a row of marginal pale spots increasing in size towards apex. Found in open land as well as forest areas. Common in lower elevations and foothill.

2) Underside of wings (Not Shown)

Scientific Name: *Leptosia nina* Fabricius, 1793	**Figure: 57**
Common Name: Psyche	**Status at study site:** Uncommon
Distribution in Gujarat: South and Central Gujarat	
Nectar Host Plant*:* *Tridax procumbens* (A)	
Flight pattern: Fast and active fliers, especially males.	
Wingspan: 35-50mm	

Identification marks:

1) Upperside of wings (Not Shown)

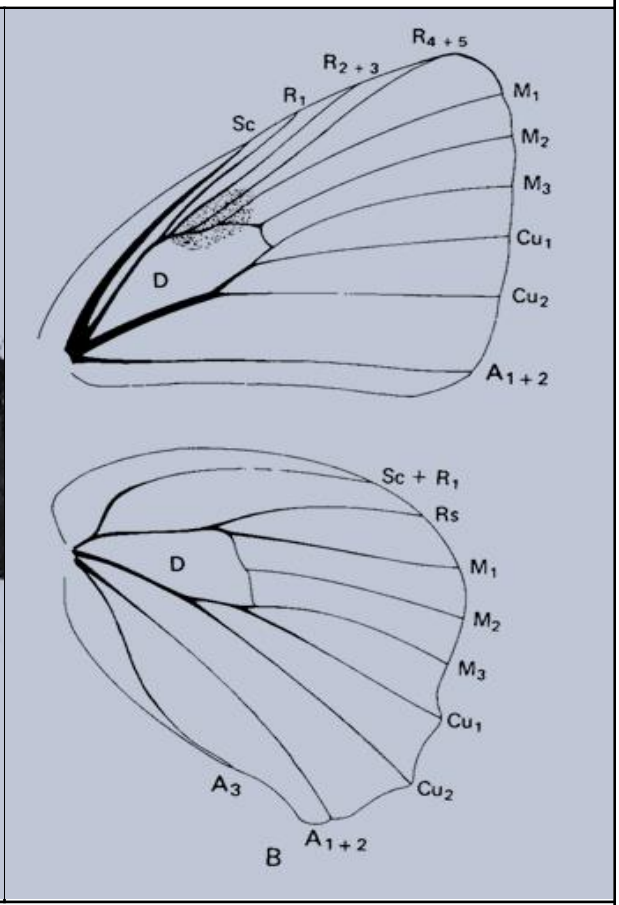
B. Wings are rounded. Upperside is white. Found in forest areas. Common in lower to middle elevations.

2) Underside of wings

C**.** Underside of hindwing is white with fine greenish or brown striations. Fine black marginal dots at the end of veins.

Family

Lycaenidae



Identification marks:

1. Most butterflies are small and medium sized.
2. Underside is usually brown or white.
3. Upper side is colourful mainly brilliant blue, orange or violet.
4. The hind wings have tails or tail like appendages.
5. Often bear a dark spot at the base.
6. Fore legs are perfect and suitable to walk.
7. Antennae are set close together on top of the head with bases touching the eye.

Scientific Name: *Catochrysops strabo* Fabricius, 1793	**Figure: 58**
Common Name: Forget-Me-Not	**Status at study site:** Uncommon
Distribution in Gujarat: Throughout Gujarat except coastal areas	
Nectar Host Plant*:* *Borreria hispida* (A)	
Flight pattern: Fast and strong flyers	
Wingspan: 25-35mm	

Identification marks:

1) Upperside of wings

B. Hindwing tailed. Found in open areas and forest areas. Common in lower and middle elevations.

2) Underside of wings (Not shown)

C. Underside pale grey with white boarder chain like narrow bands. Underside of forewing a black costal spot often midway between cell-end-bar and uppermost spot in discal band

Scientific Name: *Castalius rosimon* Fabricius, 1775	**Figure: 59**
Common Name: Common Pierrot	**Status at study site:** Common
Distribution in Gujarat: Entire Gujarat except Bhal and Coastal area	
Nectar Host Plant*:* *Emilia sonchifolia* (A)	
Flight pattern: Weak flyers	
Wingspan: 24-34mm	

Identification marks:

1) Upperside of wings (Not shown)

B. Hindwing tailed.

C. Male: Upperside white with black border. Several black spots on white area basal metallic blue scales. Female: Upperside similar to male but darker and with thicker black markings.

2) Underside of wings

C. Underside white with many irregularly arranged black spots and a basal strak both wings.

Scientific Name: *Chilades lajus* Stoll, 1780	**Figure: 60**
Common Name: Lime Blue	**Status at study site:** Very Common
Distribution in Gujarat: Entire Gujarat	
Nectar Host Plant*:* *Tephrosia purpurea* (A)	
Flight pattern: Weak flyers	
Wingspan: 26-30mm	

Identification marks:

1) Upperside of wings

B. Tailless

C. Upperside pale grey to brown with discal row of dark spots, All spots are white edged. Prefer open land and dense forest areas, common in lower to middle elevations.

2) Underside of wings (Not shown)

C. spots on underside of hindwings brown in colour.

Scientific Name: *Curetis thetis* Drury, 1773	**Figure: 61**
Common Name: Indian Sunbeam	**Status at study site:** Uncommon
Distribution in Gujarat: Entire Gujarat except Bhal and Coastal area	
Nectar Host Plant*:* *Tridax procumbens* (A), *Lantana camara* (B)	
Flight pattern: Strong and powerful flyers	
Wingspan: 40-48mm	

Identification marks:

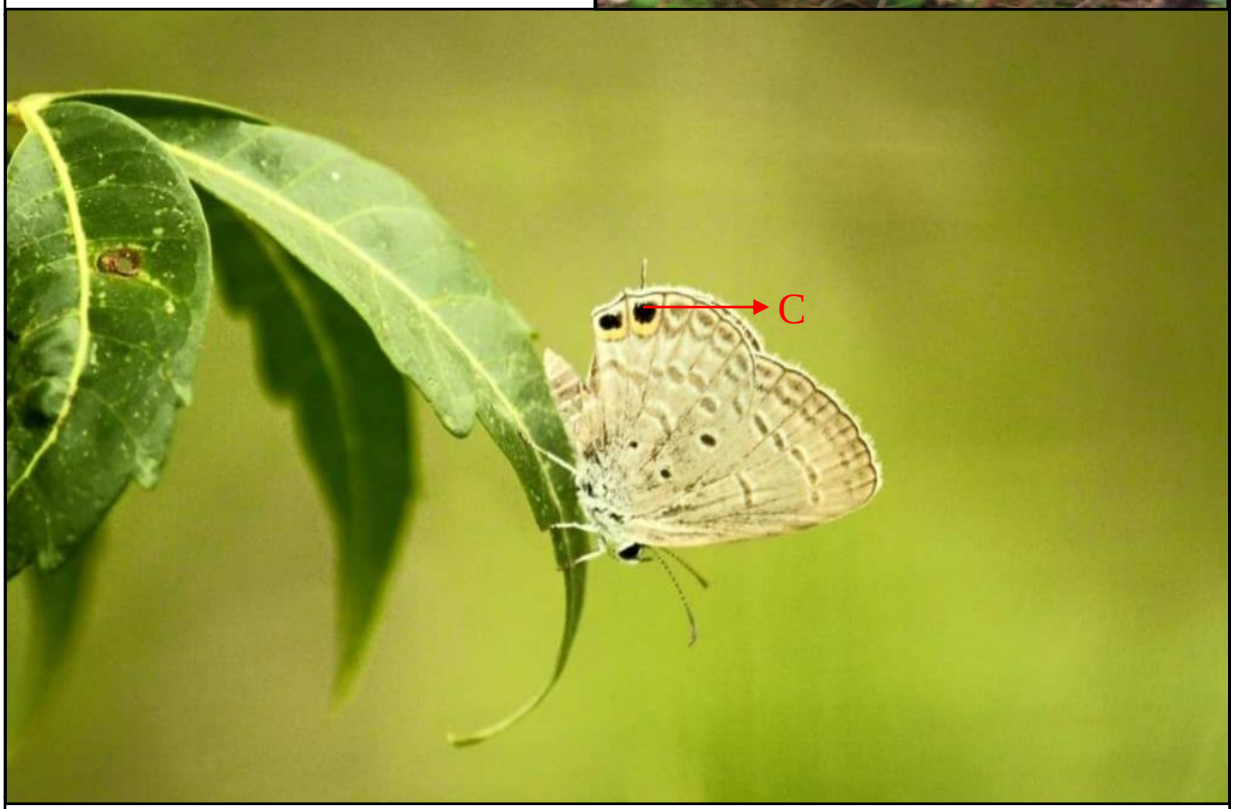
1) Upperside of wings (Not shown)

B. Upperside golden red. Upperside of forewing with black border broadening at apex and which is not continued along dorsum. Found in dense forest areas. Common in lower elevations.

2) Underside of wings

C. Hindwing tailless. Hindwing termen evenly convex. Underside glossy white with no minute black dots, only a marginal line present

Scientific Name: *Euchrysops cnejus* Fabricius, 1798	**Figure: 62**
Common Name: Gram Blue	**Status at study site:** Common
Distribution in Gujarat: Entire Gujarat except Bhal and Coastal area	
Nectar Host Plant*:* *Lantana camara* (A)	
Flight pattern: Strong and powerful flyers	
Wingspan: 25-35mm	



Identification marks:

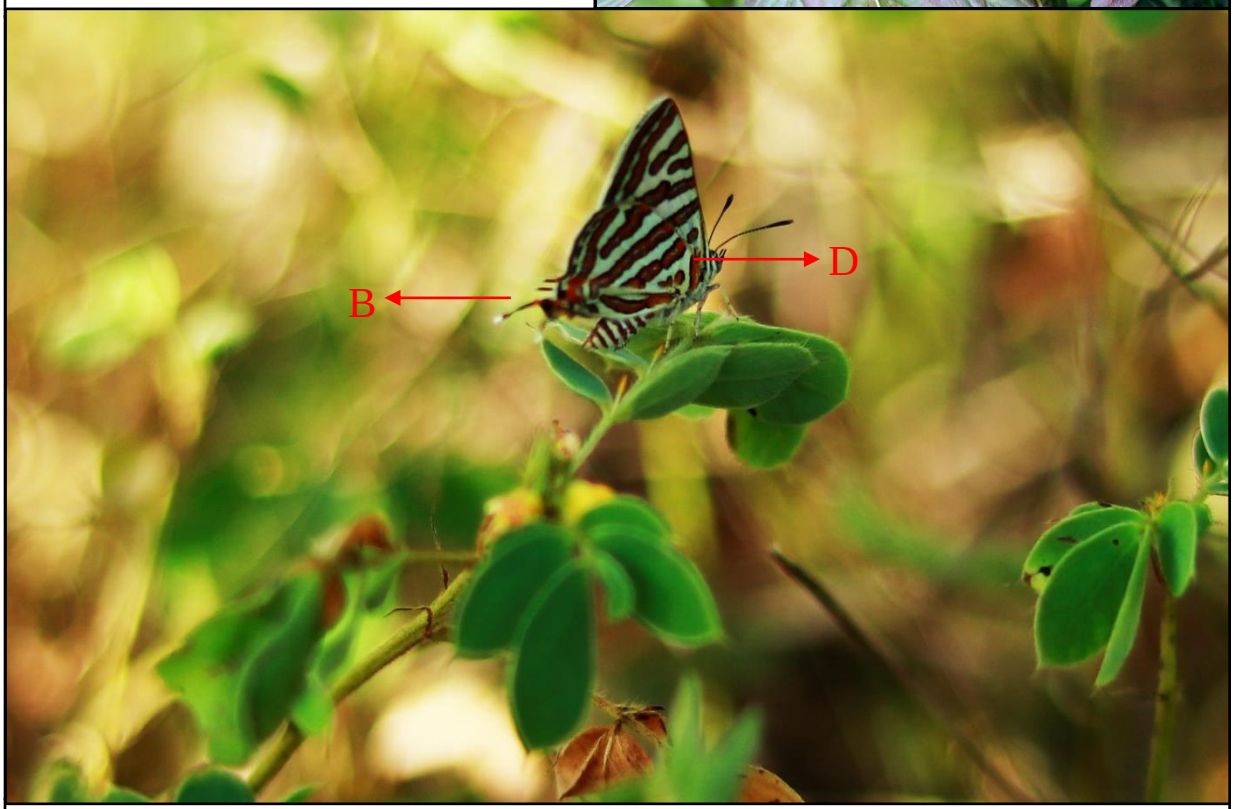
1) Upperside of wings (Not shown)

B. Pale purplish suffused with a bluish shade, apparent only in certain lights

2) Underside of wings

C. Ground colour and markings as in the male, the tornal two black spots touched outwardly with metallic bluish-green scaling

Scientific Name: *Spindasis vulcanus* Fabricius, 1775	**Figure: 63**
Common Name: Common Silverline	**Status at study site:** Common
Distribution in Gujarat: Central and South Gujarat	
Nectar Host Plant: *Celosia argentea* (A)	
Flight pattern: . Fast and fluttering flight	
Wingspan: 26-34mm	



Identification marks:

1) Upperside of wings (Not shown)

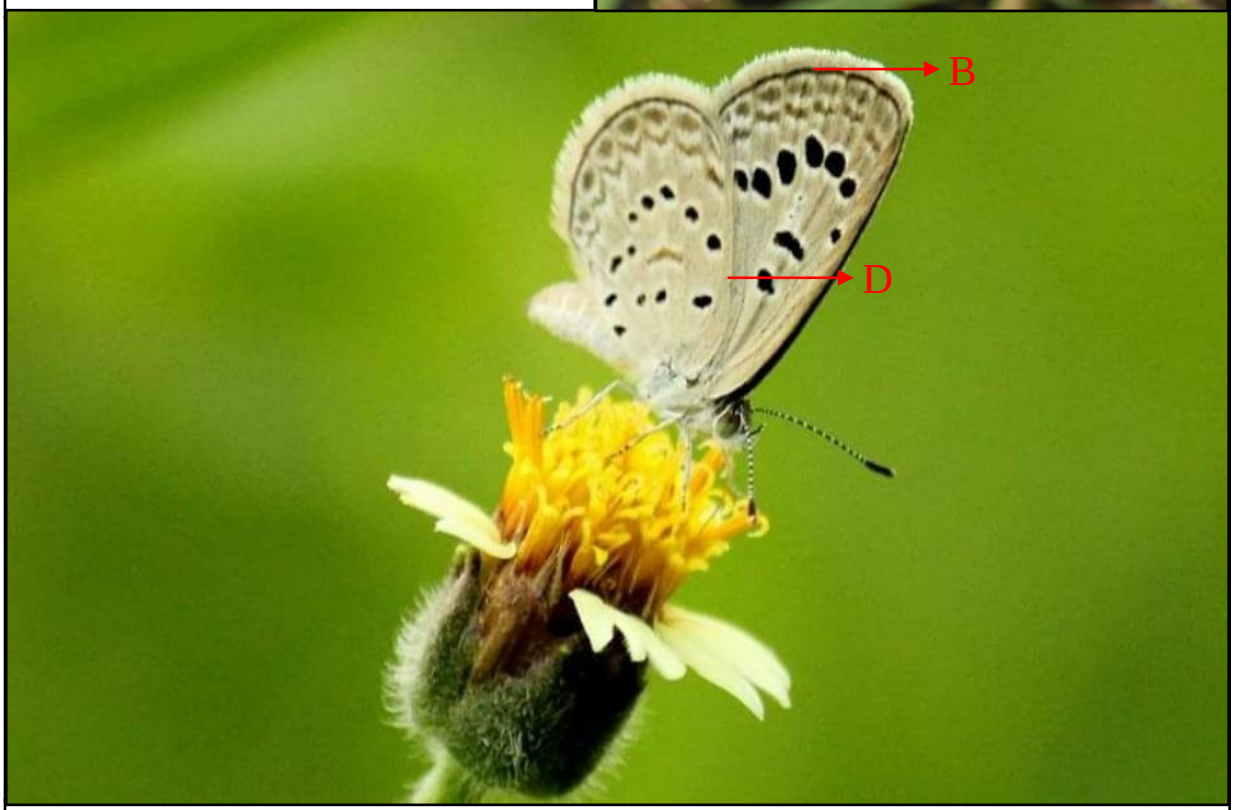
B. Hindwing has two tails and one lobe.

C. Upper forewing has dark brown to black with central large triangular dark patch bearing orange stripes.

2) Underside of wings

D. Underside white or yellowish white. Reddish bands with black margins and central silver spotted line. Underside hind wing has outer basal band continuous.

Scientific Name: *Zizeeria karsandra* Moore, 1865	**Figure: 64**
Common Name: Dark Grass Blue	**Status at study site:** Very Common
Distribution in Gujarat: Entire Gujarat except Kutch	
Nectar Host Plant*:* *Tridax procumbens* (A)	
Flight pattern: Fast flyers	
Wingspan: 18-24mm	



Identification marks:

1) Upperside of wings (Not shown)

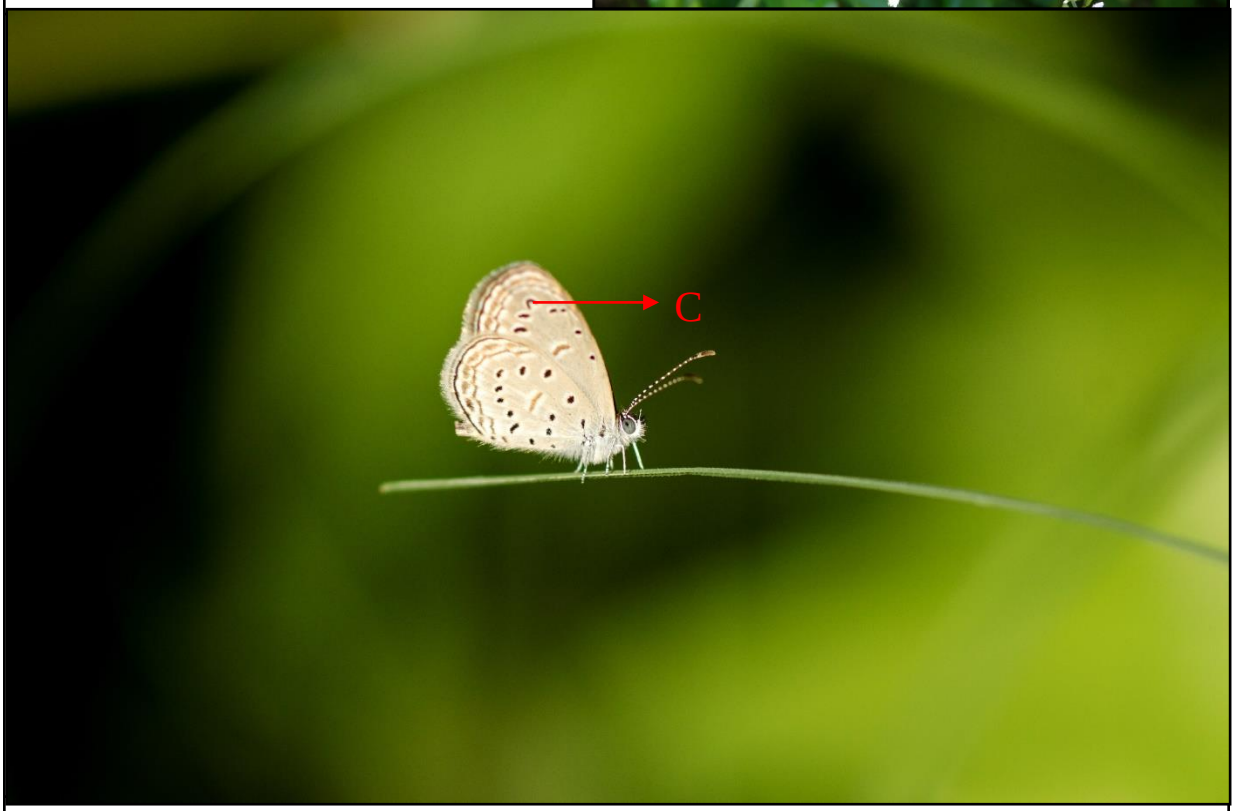
B. Tailless, Male upperside is dark blue with broad dark brown border.

C. In females upperside is brown with blue scales at wing bases. Found in open and forest areas.

2) Underside of wings

C. underside grey-white with small spots.

Scientific Name: *Zizina otis* Fabricius, 1787	**Figure: 65**
Common Name: Lesser Grass Blue	**Status at study site:** Very Common
Distribution in Gujarat: Entire Gujarat except Bhal and Coastal area	
Nectar Host Plant*:* *Duranta lorentzii* (A)	
Flight pattern: Strong and powerful flyers	
Wingspan: 19-26mm	



Identification marks:

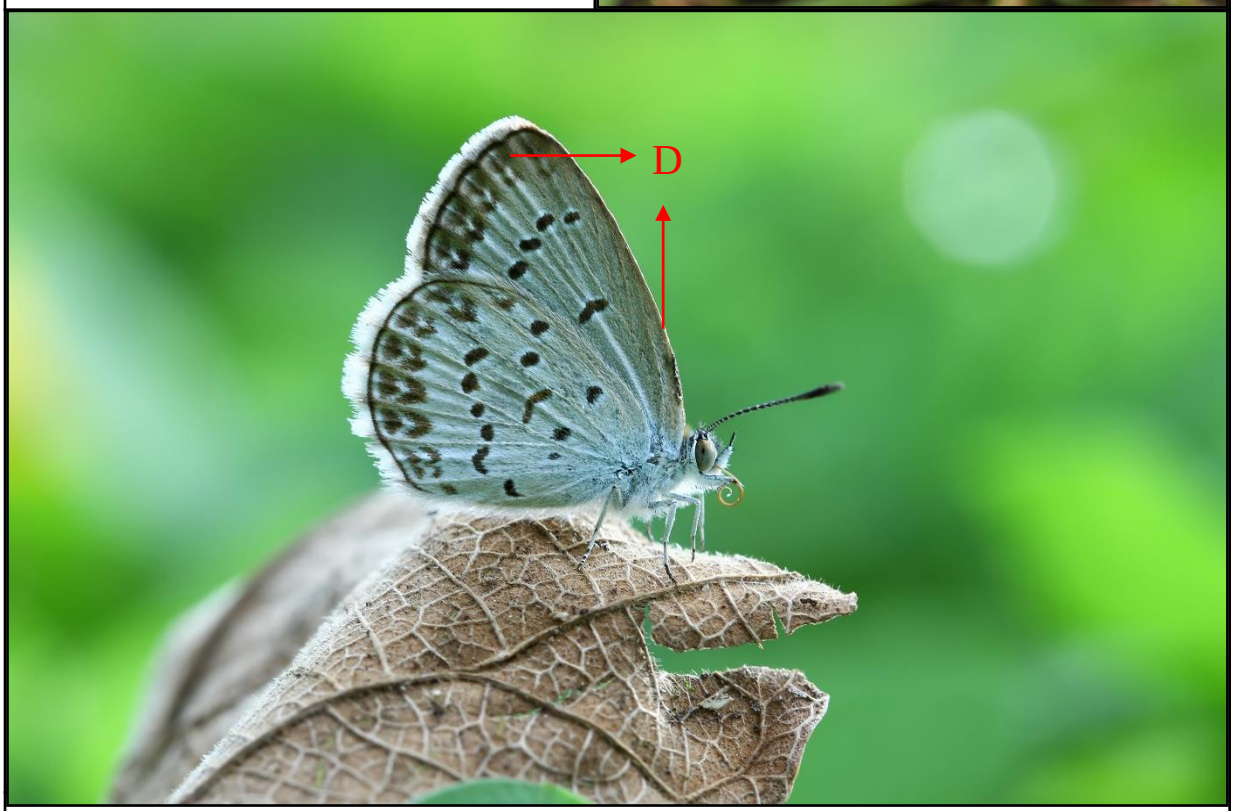
1) Upperside of wings (Not shown)

B. Tailless,. Found in open and forest areas. Weak but fast flyers Common in lower to middle elevations.

2) Underside of wings

C. Underside greyish white with black spots. On Underside of hindwing discal spot in space 6 shifted, not in line with spots in space 5,6. Underside of forewing has no costal spots or mid cell spot

Scientific Name: *Zizula hylax* Fabricius, 1775	**Figure: 66**
Common Name: Tiny Grass Blue	**Status at study site:** Very Common
Distribution in Gujarat: Throughout Gujarat except Kutch and Coastal areas	
Nectar Host Plant*:* *Tridax procumbens* (A)	
Flight pattern: Strong and powerful flyers	
Wingspan:16-24mm	



Identification marks:

1) Upperside of wings (Not shown)

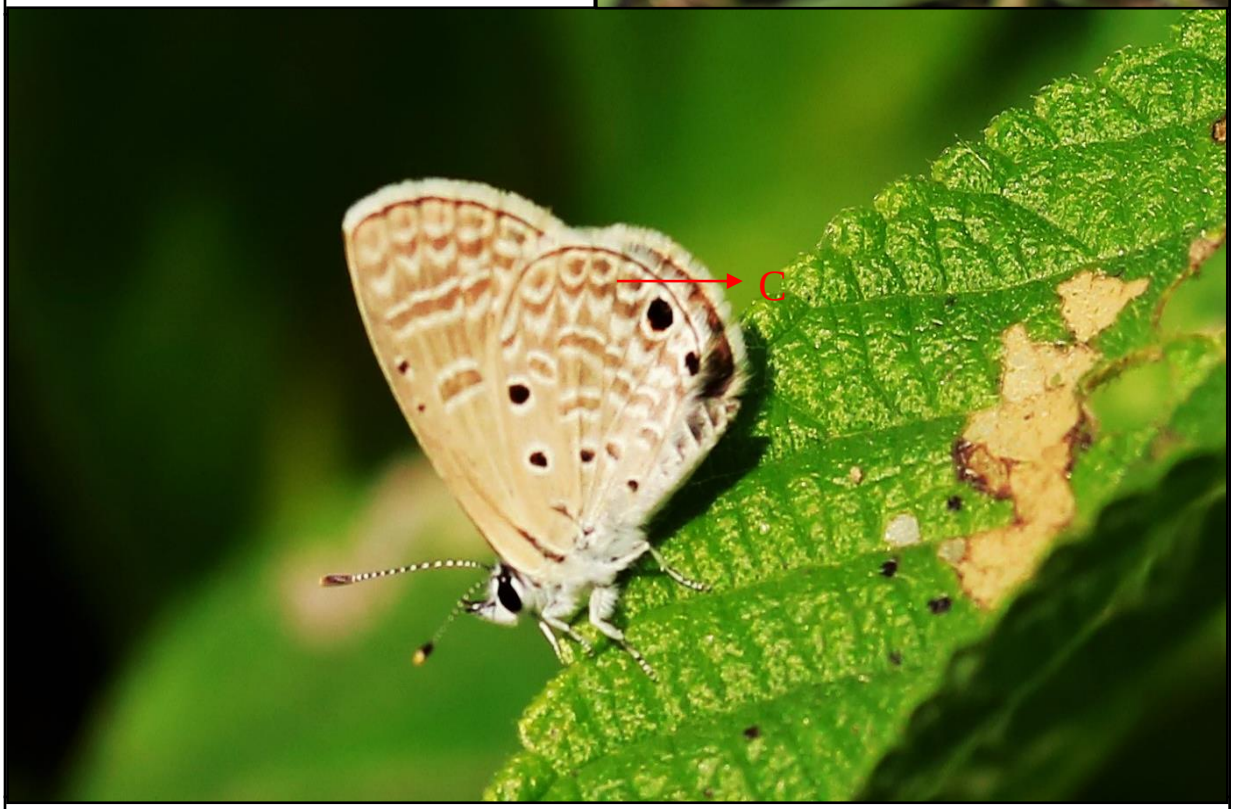
B. Tailless, smallest of the grass blues.

C. It has especially a long abdomen, extending beyond hindwing in males. Found in open and forest areas. Common in lower to middle elevations.

2) Underside of wings

D. Underside pale brown to white with small black markings encircled by white rings.

Scientific Name: *Azanus ubaldus* Stoll, 1782	**Figure: 67**
Common Name: Bright Babul Blue	**Status at study site:** Common
Distribution in Gujarat: South and Central Gujarat	
Nectar Host Plant*:* *Tridax procumbens* (A)	
Flight pattern: Fast flyers	
Wingspan: 20-25mm	



Identification marks:

1) Upperside of wings (Not shown)

B. Hindwing tailless. Prefer forest areas as well as open areas. Common in lower elevations.

2) Underside of wings

C. Underside grey to brown with chain like white edged bands. Underside of hindwing has black tornal spots in space 1 and 2 and two black costal spots.

Scientific Name: *Spindasis ictis* Hewitson, 1865	**Figure: 68**
Common Name: Common Shot Silverline	**Status at study site:** Common
Distribution in Gujarat: Central and South Gujarat	
Nectar Host Plant: *Tridax procumbens* (A)	
Flight pattern: Fly rapidly	
Wingspan: 27-35mm	

Identification marks:

1) Upperside of wings

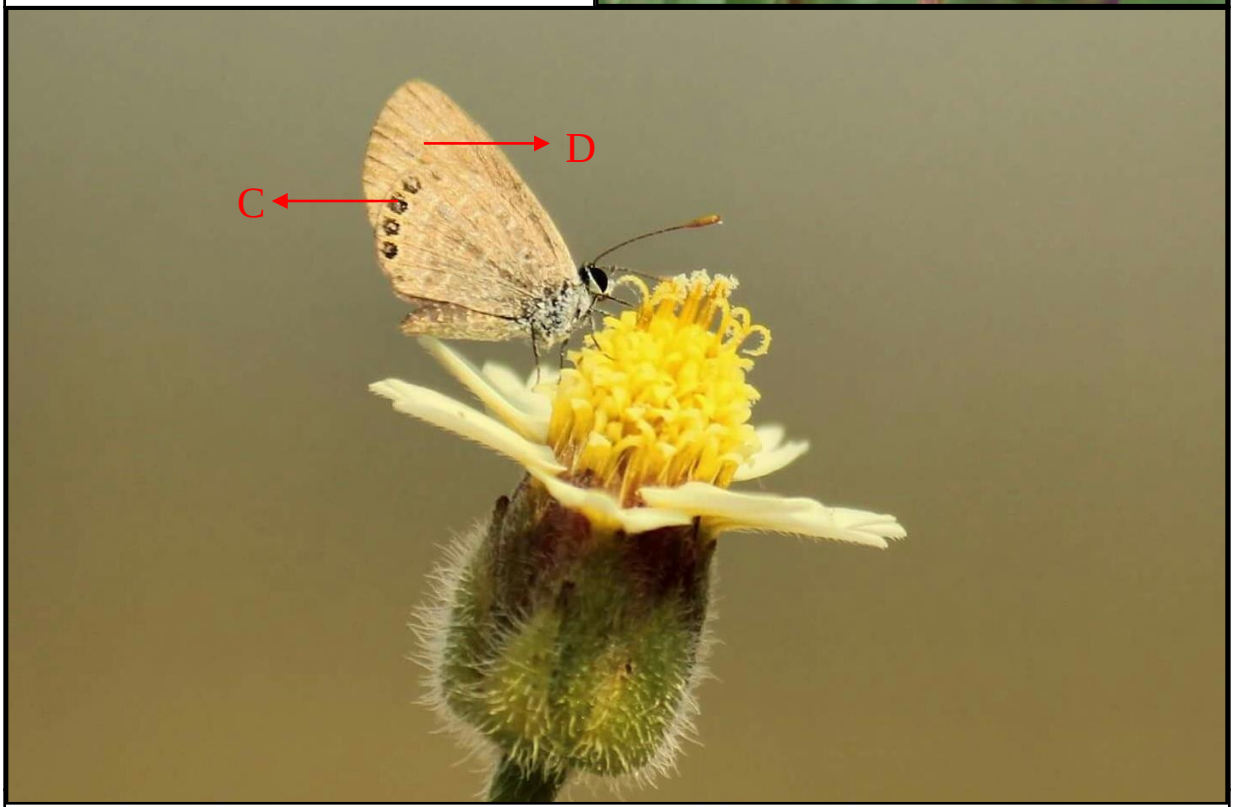
B. Hind wing has one pair of tail. Grey to brown bands with central silver spotted line.

C. In males upperside of forewing is dark brown with triangular orange patch. Upper side of female dark brown with lead grey coloured scales on both wings.

2) Underside of wings

D. Forewing blue and not extending above vein 2.

Scientific Name: *Freyeria trochylus* Freyer, 1845	**Figure: 69**
Common Name: Grass Jewel	**Status at study site:** Very Common
Distribution in Gujarat: Throughout Gujarat except Coastal areas	
Nectar Host Plant*:* *Tephrosia purpurea* (A)	
Flight pattern: Weak and short flight	
Wingspan: 15-22mm	



Identification marks:

1) Upperside of wings (Not shown)

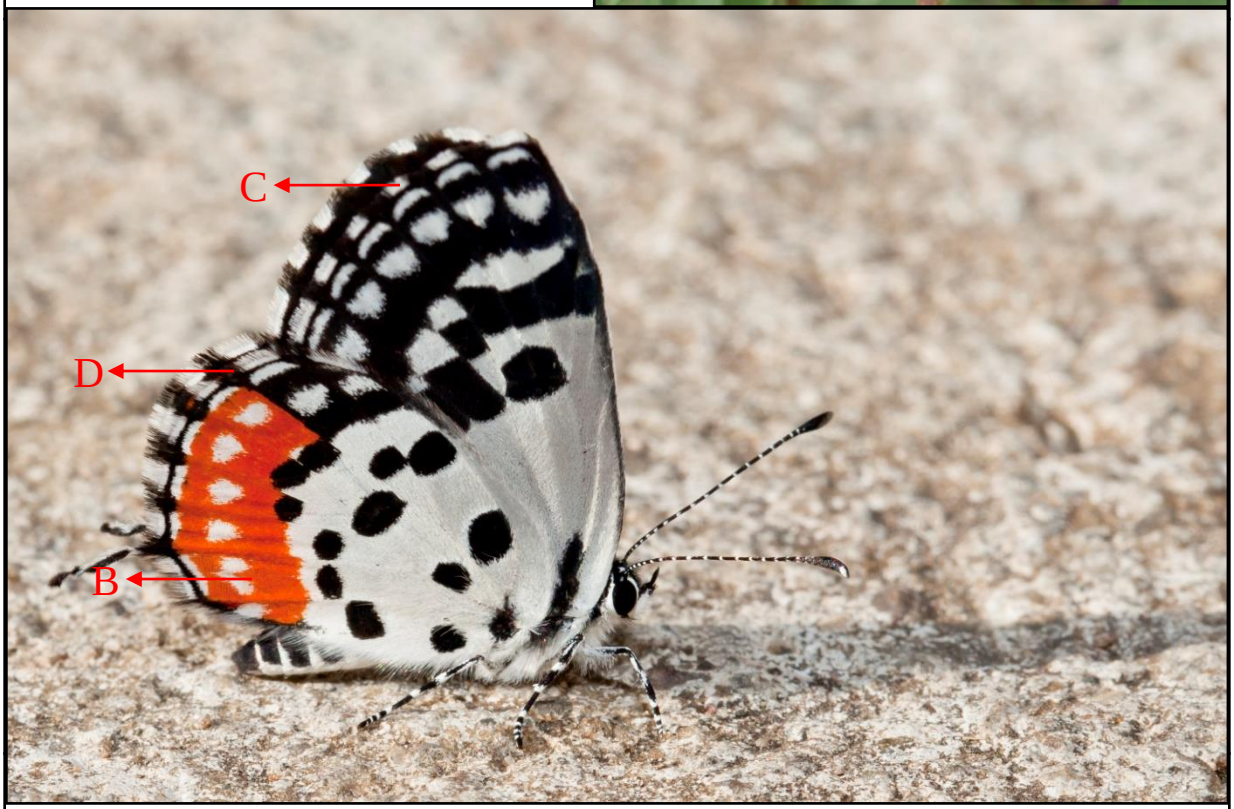
B. Tailless

2) Underside of wings

C. Underside of hindwing has a marginal row of prominently orange crowned jewelled metallic spots not above space 5.

D. Underside pale grey to brown. Common in open areas.

Scientific Name: *Talicada nyseus* Guerin-Meneville, 1843	**Figure: 70**
Common Name: Red Pierrot	**Abundance:** Rare
Distribution in Gujarat: Central Gujarat	
Nectar Host Plant*:* *Tephrrosia purpurea* (A)	
Flight pattern: Weak flyers	
Wingspan: 30-35mm	



Identification marks:

1) Upperside of wings (Not shown)

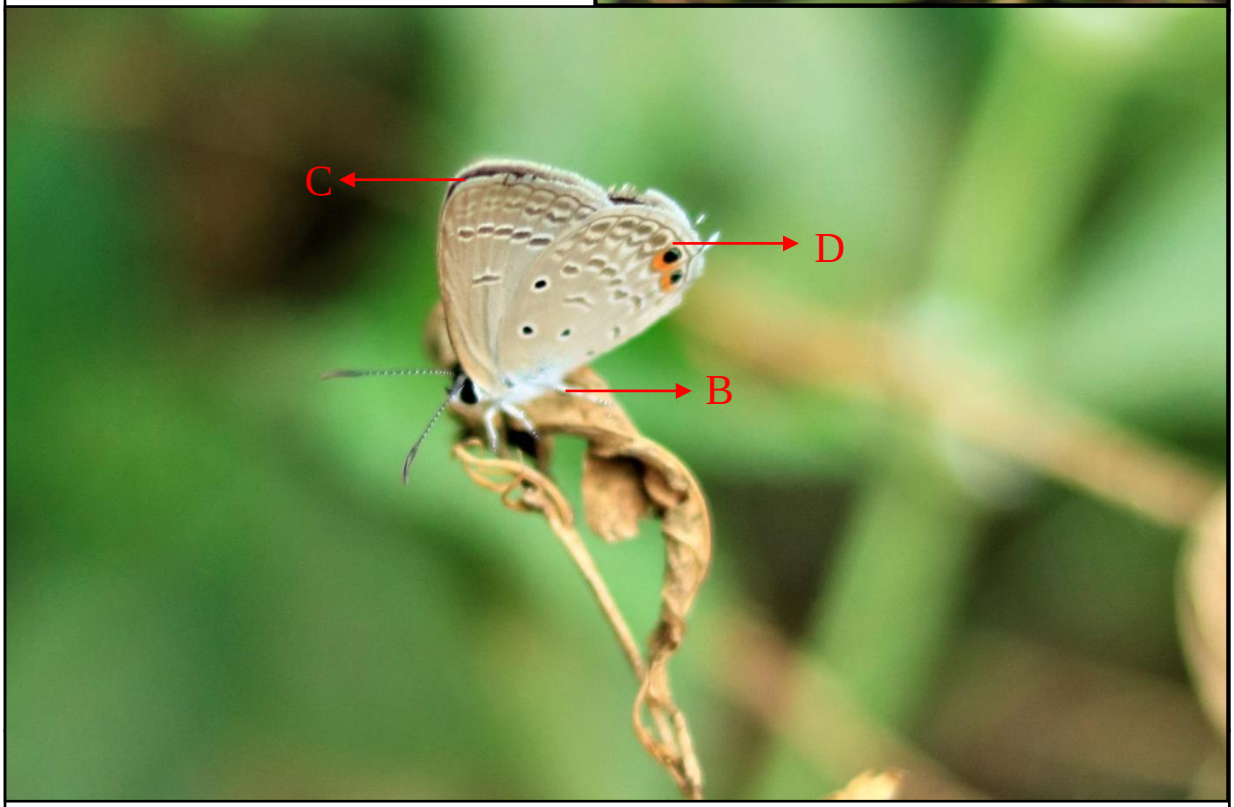
B. Tailed hindwing. Found in disturbed as well as forest areas. Common in all elevations.

2) Underside of wings

C. Underside of forewing white with large broad black band beyond disc bearing white spots.

D. Underside of hindwing white with broad orange marginal band bearing white spots. Black basal and discal spots present.

Scientific Name: *Chilades parrhasius* Fabricius, 1793	**Figure: 71**
Common Name: Small Cupid	**Abundance:** Rare
Distribution in Gujarat: Entire Gujarat	
Nectar Host Plant*:* *Tridax procumbens* (A)	
Flight pattern: Fast flyers	
Wingspan: 20-25mm	



Identification marks:

1) Upperside of wings (Not shown)

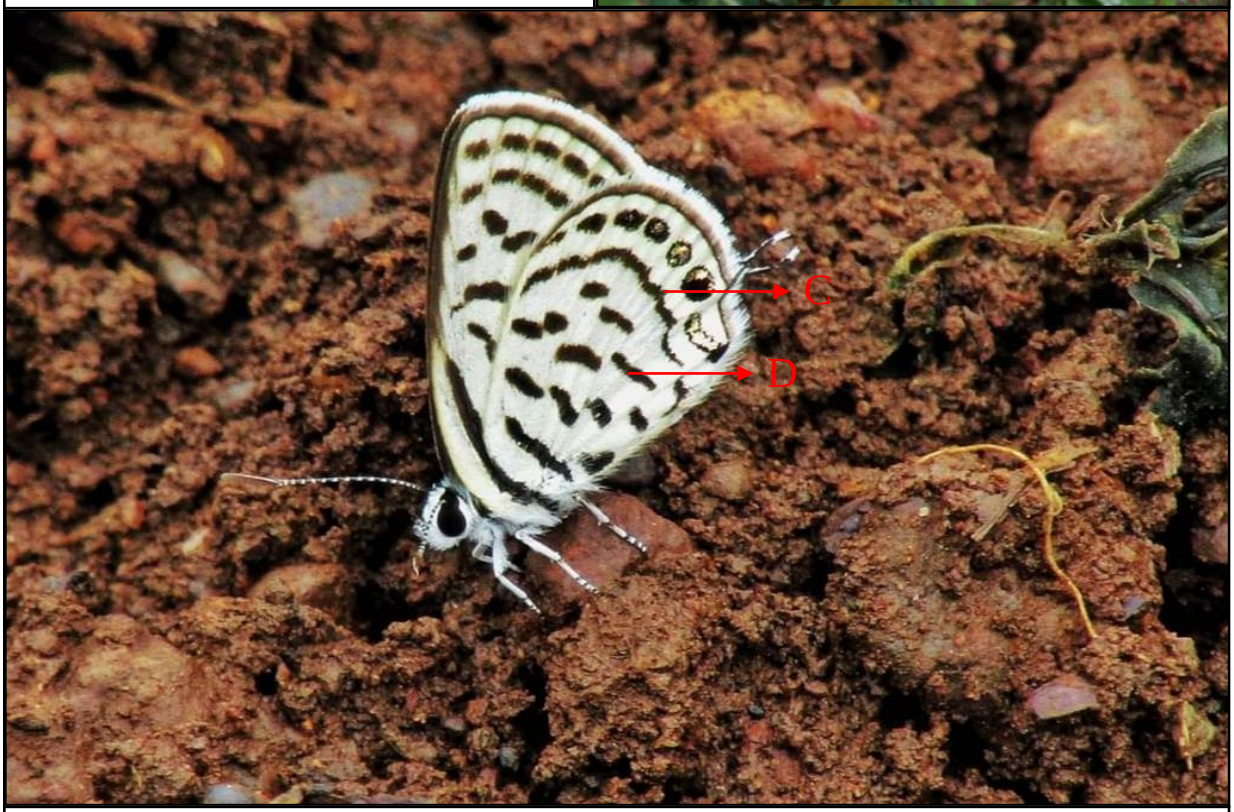
B. Hindwing tailed. In males upperside bright lavender blue with thread like dark border. In females upperside is dark grey to brown with variable basal blue scales.

2) Underside of wings

C. Underside grey to brown with a post-discal band of white lined spots.

D. Two costal black spots in space 7, one in cell.

Scientific Name: *Tarucus nara* Kollar, 1848	**Figure: 72**
Common Name: Striped Pierrot	**Abundance:** Common
Distribution in Gujarat: South Gujarat, Saurashtra, Central Gujarat	
Nectar Host Plant: *Emilia sonchifolia* (A)	
Flight pattern: Fast and short flight.	
Wingspan: 23-28mm	



Identification marks:

1) Upperside of wings (Not shown)

B. Hindwing tailed. Prefer open areas, grasslands and forest areas. Common in lower elevations.

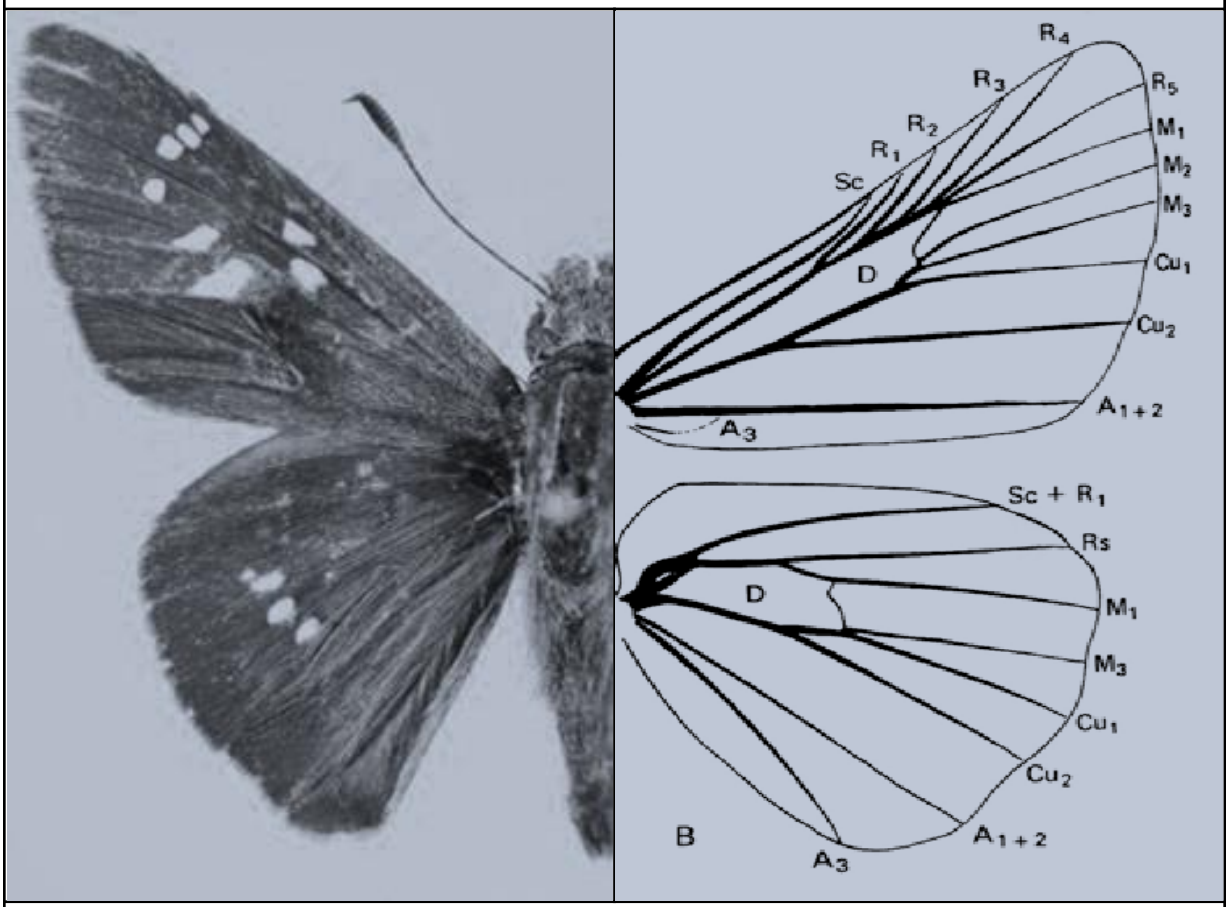
2) Underside of wings

C. Underside white with elongated black streaks.

D. Underside of hindwing has sub-marginal line of black spots with blue scales.

Family

Hesperiidae



Identification marks:

1. Antennae dilated apically to form a gradual club which often ends in a hook, bases remote.
2. Labial palps more or less roughly haired, maxillary palps are wanting.
3. Butterflies of this family show few characters of both the butterflies and moths.
4. They have large eyes, hairy body and crepuscular habits like moths but many are active daytime.
5. The antenna is usually expanded towards the tip into a bent club which end in a short hook.
6. Proboscis is exceptionally long compared to the size of the butterfly.

Scientific Name: *Hasora chromus* Cramer, 1780	**Figure: 73**
Common Name: Common Banded Awl	**Status at study site:** Uncommon
Distribution in Gujarat: Entire Gujarat except Kutch	
Nectar Host Plant*:* *Lantana camara* (A)	
Flight pattern: Fast and strong flyers	
Wingspan: 45-50mm	

Identification marks:

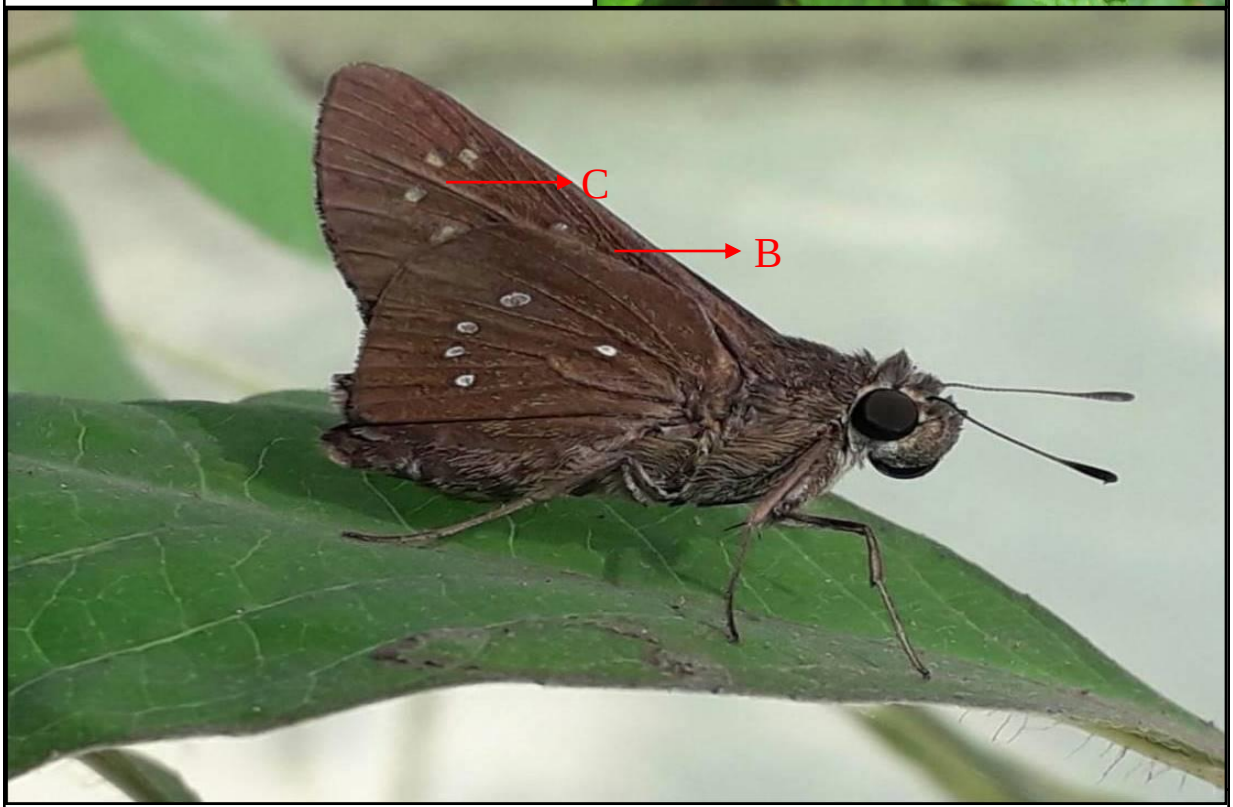
1) Upperside of wings (Not shown)

2) Underside of wings

B. Underside brown, may be little blue glossed when newly emerged. Forewing apex pointed.

C. Underside hindwing has a bluish-white discal band, which is slightly diffused at its outer edge.

Scientific Name: *Pelopidas mathias* Fabricius, 1798	**Figure: 74**
Common Name: Small Branded Swift	**Status at study site:** Uncommon
Distribution in Gujarat: Central and South Gujarat	
Nectar Host Plant*:* *Lantana camara* (A)	
Flight pattern: Fast and strong flyers	
Wingspan: 32-38mm	

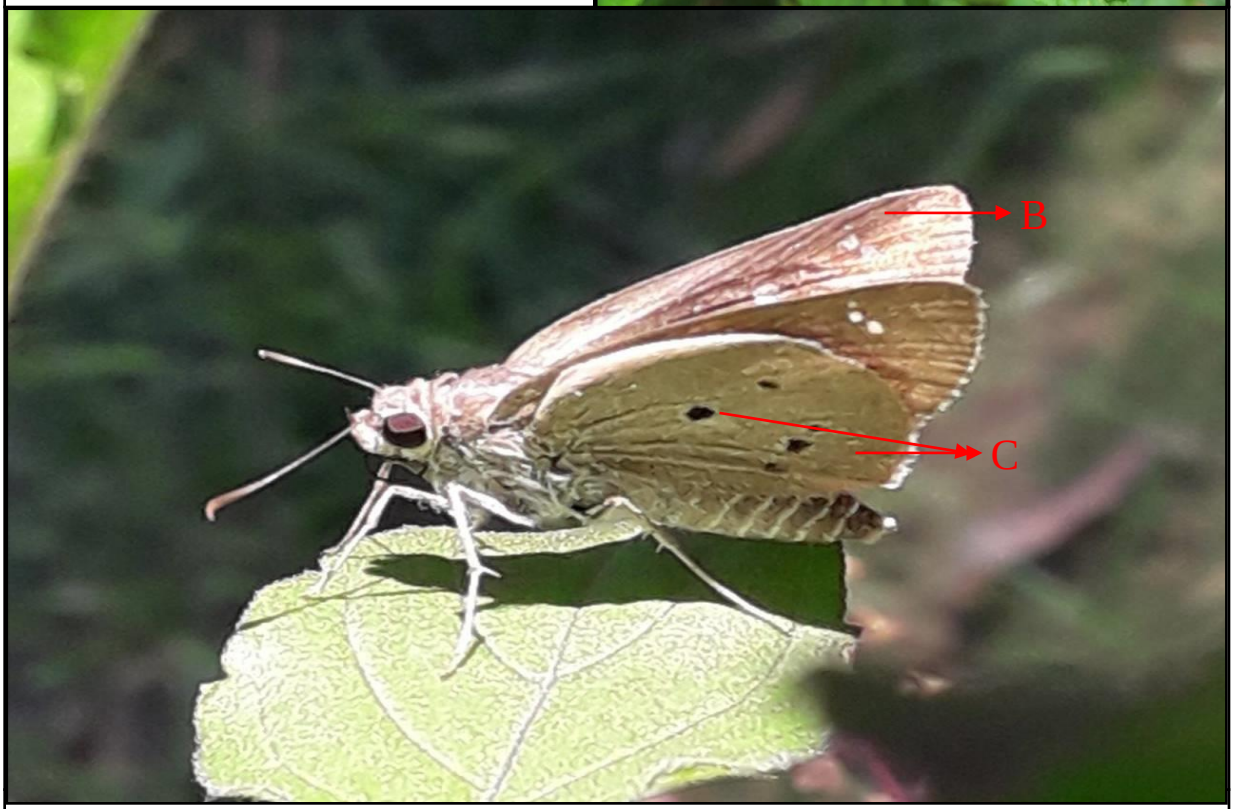


Identification marks:
1) Upperside of wings
B. Upperside is olive brown.
C. Forewing with two small yellowish semi-transparent spots.
2) Underside of wings (Not shown)

Scientific Name: *Telicota bambusae* Moore, 1878	**Figure: 75**
Common Name: Dark Palm Dart	**Status at study site:** Uncommon
Distribution in Gujarat: Central and South Gujarat	
Nectar Host Plant*:* *Lantana camara* (A)	
Flight pattern: Fast and strong flyers	
Wingspan: 32-38mm	

Identification marks:
1) Upperside of wings
B. Upperside has discal orange spots
C. Forewing with two small yellowish semi-transparent spots.
2) Underside of wings (Not shown)

Scientific Name: *Suastus gremius* Fabricius, 1798	**Figure: 76**
Common Name: Indian Palm Bob	**Status at study site:** Rare
Distribution in Gujarat: Central and South Gujarat	
Nectar Host Plant*:* *Lantana camara* (A)	
Flight pattern: Strong and fast flight.	
Wingspan: 32-45mm	



Identification marks:

1) Upperside of wings

B. Upperside is dark brown. Found in forest areas and common in foothills

2) Underside of wings

C. underside of hindwing is grey brown. Prominent black cell spots

Sr. No	Family	No. of Genus		No. of Species	
		Number	%	Number	%
1	Papilionidae	3	6.25	6	9.524
2	Nymphalidae	19	39.583	26	41.266
3	Pieridae	9	18.75	13	20.64
4	Lycaenidae	13	27.09	14	22.22
5	Hesperiidae	4	8.33	4	6.35
TOTAL		**48**	**100**	**63**	**100**

Table 4: Percentage distribution of Butterfly genus and species in Pavagadh Hill

Sr No	Common Name	Scientific Name	Abundance
Family: Papilionidae			
1	Common Jay	*Graphium doson* Felder & Felder, 1864	VC
2	Tailed Jay	*Graphium agamemnon* Linnaeus, 1758	VC
3	Common Rose	*Pachliopta aristolochiae* Fabricius, 1775	VC
4	Crimson Rose	*Pachliopta hector* Linnaeus, 1758	C
5	Common Mormon	*Papilio polytes* Linnaeus, 1758	C
6	Lime Butterfly	*Papilio demoleus* Linnaeus, 1758	C
Family: Nymphalidae			
7	Tawny Coster	*Acraea terpsicore* Linnaeus, 1758	UC
8	Common Castor	*Ariadne merione* Cramer, 1777	UC
9	Black Rajah	*Charaxes solon* Fabricius, 1793	C
10	Painted Lady	*Vanessa cardui* Linnaeus, 1758	C
11	Plain Tiger	*Danaus chrysippus* Linnaeus, 1758	VC
12	Striped Tiger	*Danaus genutia* Cramr, 1779	VC
13	Common Indian Crow	*Euploea core* Cramer, 1780	C
14	Common Baron	*Euthalia aconthea* Cramer, 1777	UC
15	Great Eggfly	*Hypolimnas bolina* Linnaeus, 1758	C
16	Danaid Eggfly	*Hypolimnas misippus* Linnaeus, 1764	VC
17	Peacock Pansy	*Junonia almana Linnaeus,1758*	UC
18	Grey Pansy	*Junonia atlites Linnaeus,1763*	R
19	Yellow Pansy	*Junonia hierta Fabricius, 1798*	R
20	Chocolate Pansy	*Junonia iphita Cramer, 1779*	UC
21	Lemon Pansy	*Junonia lemonias* Linnaeus, 1758	VC
22	Blue Pansy	*Junonia orithya* Linnaeus, 1758	UC
23	Common Evening Brown	*Melanitis leda* Linnaeus, 1758	C
24	Common Bushbrown	*Mycalesis perseus* Fabricius, 1775	UC
25	Common Sailer	*Neptis hylas* Linnaeus, 1758	UC
26	Glassy Tiger	*Parantica aglea* Stoll, 1782	UC
27	Common Leopard	*Phalanta phalantha* Drury, 1773	UC

28	Baronet	*Symphaedra nais* Forster, 1771	UC
29	Blue Tiger	*Tirumala limniace Cramer, 1775*	VC
30	Common Four Ring	*Ypthima huebneri* Kirby, 1871	UC
31	Common Five Ring	*Ypthima baldus* Fabricius, 1775	UC
Family: Pieridae			
32	Common Emigrant	*Catopsilia pomona* Fabricius, 1775	VC
33	Mottled Emigrant	*Catopsilia pyranthe* Latreille,1758	VC
34	Small Grass Yellow	*Eurema brigitta* Stoll, 1780	VC
35	Common Grass Yellow	*Eurema hecabe* Linnaeus, 1758	VC
36	Common Jezebel	*Delias eucharis* Drury, 1773	C
37	Common Gull	*Cepora nerissa* Fabricius, 1775	C
38	Pioneer	*Belenois aurota* Fabricius, 1793	C
39	White Orange Tip	*Ixias marianne* Cramer, 1779	UC
40	Yellow Orange Tip	*Ixias pyrene* Linnaeus, 1764	UC
41	Crimson Tip	*Colotis danae* Fabricius, 1775	UC
42	Small Salmon Arab	*Colotis amata* Fabricius, 1775	UC
43	Common Wanderer	*Pareronia hippia* Fabricius, 1787	UC
44	Pysche	*Leptosia nina* Fabricius, 1793	UC
Family: Lycaenidae			
45	Forget-me-not	*Catochrysops Strabo* Fabricius, 1793	UC
46	Common Pierrot	*Castalius rosimon* Fabricius, 1775	C
47	Lime Blue	*Chilades lajus* Stoll, 1780	VC
48	Indian Sunbeam	*Curetis thetis* Drury, 1773	UC
49	Gram Blue	*Euchrysops cnejus* Fabricius, 1798	C
50	Common Silverline	*Spindasis vulcanus* (Fabricius, 1775)	C
51	Dark Grass Blue	*Zizeeria karsandra* Moore, 1865	VC
52	Lesser Grass Blue	*Zizina otis* Fabricius, 1787	VC
53	Tiny Grass Blue	*Zizula hylax* Fabricius, 1775	VC
54	Bright Babul Blue	*Azanus ubaldus* Stoll, 1782	C
55	Common Shot Silverline	*Spindasis ictis* Hewitson, 1865	C
56	Grass Jewel	*Freyeria trochylus* Freyer, 1845	VC
57	Red Pierrot	*Talicada nyseus* Guerin-Meneville, 1843	R

58	Small Cupid	*Chilades parrhasius* Fabricius, 1793	R
59	Striped Pierrot	*Tarucus nara* Kollar, 1848	C
Family: Hesperiidae			
60	Common Banded Awl	*Hasora chromus* Cramer, 1780	UC
61	Small Branded Swift	*Pelopidas mathias* Fabricius, 1798	UC
62	Dark Palm Dart	*Telicota bambusae* Moore, 1878	UC
63	Indian Palm Bob	*Suastus gremius* (Fabricius, 1798)	R

Table 5: Abundance of Butterflies in the Study Area ((VC= Very Common, C= Common, UC=Uncommon, R=Rare)

Sr. No	Common Name	Scientific Name	S	M	PM	W
Family: Papilionidae						
1	Common Jay	*Graphium doson* Felder & Felder, 1864	+	+	+	+
2	Tailed Jay	*Graphium agamemnon* Linnaeus, 1758	+	+	+	+
3	Common Rose	*Pachliopta aristolochiae* Fabricius, 1775	-	+	+	+
4	Crimson Rose	*Pachliopta hector* Linnaeus, 1758	-	+	+	+
5	Common Mormon	*Papilio polytes* Linnaeus, 1758	-	+	+	+
6	Lime Swallowtail	*Papilio demoleus* Linnaeus, 1758	-	+	+	-
Family: Nymphalidae						
7	Tawny Coster	*Acraea terpsicore* Linnaeus, 1758	-	+	+	-
8	Common Castor	*Ariadne merione* Cramer, 1777	-	+	+	+
9	Black Rajah	*Charaxes solon* Fabricius, 1793	-	+	+	-
10	Painted Lady	*Vanessa cardui* Linnaeus, 1758	-	+	+	-
11	Plain Tiger	*Danaus chrysippus* Linnaeus, 1758	+	+	+	+
12	Striped Tiger	*Danaus genutia* Cramr, 1779	-	+	+	-
13	Common Indian Crow	*Euploea core* Cramer, 1780	-	+	+	-
14	Common Baron	*Euthalia aconthea* Cramer, 1777	-	+	+	-
15	Great Eggfly	*Hypolimnas bolina* Linnaeus, 1758	+	+	+	+
16	Danaid Eggfly	*Hypolimnas misippus* Linnaeus, 1764	+	+	+	+
17	Peacock Pansy	*Junonia almana Linnaeus,1758*	-	-	+	-
18	Grey Pansy	*Junonia atlites Linnaeus,1763*	-	+	+	-
19	Yellow Pansy	*Junonia hierta Fabricius, 1798*	-	+	+	-
20	Chocolate Pansy	*Junonia iphita Cramer, 1779*	+	+	+	-
21	Lemon Pansy	*Junonia lemonias* Linnaeus, 1758	+	+	+	+
22	Blue Pansy	*Junonia orithya* Linnaeus, 1758	-	+	+	
23	Common Evening Brown	*Melanitis leda* Linnaeus, 1758	-	+	+	-

24	Common Bushbrown	*Mycalesis perseus* Fabricius, 1775	-	+	+	-
25	Common Sailer	*Neptis hylas* Linnaeus, 1758	-	-	+	+
26	Glassy Tiger	*Parantica aglea* Stoll, 1782	-	+	+	-
27	Common Leopard	*Phalanta phalantha* Drury, 1773	-	-	+	-
28	Baronet	*Symphaedra nais* Forster, 1771	-	-	+	-
29	Blue Tiger	*Tirumala limniace Cramer, 1775*	-	-	+	+
30	Common Four Ring	*Ypthima huebneri* Kirby, 1871	-	-	+	+
31	Common Five Ring	*Ypthima baldus* Fabricius, 1775	-	-	+	-
Family: Pieridae						
32	Common Emigrant	*Catopsilia pomona* Fabricius, 1775	+	+	+	+
33	Mottled Emigrant	*Catopsilia pyranthe* Latreille,1758	+	+	+	+
34	Small Grass Yellow	*Eurema brigitta* Stoll, 1780	+	+	+	+
35	Common Grass Yellow	*Eurema hecabe* Linnaeus, 1758	+	+	+	+
36	Common Jezebel	*Delias eucharis* Drury, 1773	+	-	+	+
37	Common Gull	*Cepora nerissa* Fabricius, 1775	-	-	+	+
38	Pioneer	*Belenois aurota* Fabricius, 1793	-	+	+	+
39	White-Orange Tip	*Ixias marianne* Cramer, 1779	-	+	+	-
40	Yellow-Orange Tip	*Ixias pyrene* Linnaeus, 1764	-	+	+	-
41	Crimson Tip	*Colotis danae* Fabricius, 1775	-	+	+	-
42	Small Samon Arab	*Colotis amata* Fabricius, 1775	-	+	+	-
43	Common Wanderer	*Pareronia hippia* Fabricius, 1787	-	+	+	-
44	Pysche	*Leptosia nina* Fabricius, 1793	-	+	+	-
Family: Lycaenidae						
45	Forget-me-not	*Catochrysops strabo* Fabricius, 1793	-	+	+	-
46	Common Pierrot	*Castalius rosimon* Fabricius, 1775	-	-	+	-
47	Lime Blue	*Chilades lajus* Stoll, 1780	-	+	+	-
48	Indian Sunbeam	*Curetis thetis* Drury, 1773	-	-	+	-
49	Gram Blue	*Euchrysops cnejus* Fabricius, 1798	-	+	+	+
50	Common Silverline	*Spindasis vulcanus* (Fabricius, 1775)	-	-	+	-
51	Dark Grass Blue	*Zizeeria karsandra* Moore, 1865	-	+	+	-

52	Lesser Grass Blue	*Zizina otis* Fabricius, 1787	-	+	+	+
53	Tiny Grass Blue	*Zizula hylax* Fabricius, 1775	-	-	+	-
54	Bright Babul Blue	*Azanus ubaldus* Stoll, 1782	-	-	+	+
55	Common Shot Silverline	*Spindasis ictis* Hewitson, 1865	-	-	+	-
56	Grass Jewel	*Freyeria trochylus* Freyer, 1845	-	+	+	-
57	Red Pierrot	*Talicada nyseus* Guerin-Meneville, 1843	-	-	+	-
58	Small Cupid	*Chilades parrhasius* Fabricius, 1793	-	-	+	-
59	Striped Pierrot	*Tarucus nara* Kollar,1848	-	-	+	-
Family: Hesperiidae						
60	Common Banded Awl	*Hasora chromus* Cramer, 1780	-	-	+	-
61	Small Branded Swift	*Pelopidas mathias* Fabricius, 1798	-	+	+	-
62	Dark Palm Dart	*Telicota bambusae* Moore, 1878	-	+	+	-
63	Indian Palm Bob	*Suastus gremius* Fabricius, 1798	-	-	+	-

Table 6: Seasonal Distribution of Butterflies in the Pavagadh Hill (S=Summer, M=Monsoon, PM=Post-Monsoon, W=Winter)

Sr No.	Species Name	Garden Area	Forest Area	Open Scrubland
Family: Papilionidae				
1	*Graphium doson* Felder & Felder, 1864	+	+	+
2	*Graphium agamemnon* Linnaeus, 1758	+	+	+
3	*Pachliopta aristolochiae* Fabricius, 1775	+	+	+
4	*Pachliopta hector* Linnaeus, 1758	+	+	+
5	*Papilio polytes* Linnaeus, 1758	+	+	+
6	*Papilio demoleus* Linnaeus, 1758	+	+	+
Family: Nymphalidae				
7	*Acraea terpsicore* Linnaeus, 1758	+	+	+
8	*Ariadne merione* Cramer, 1777	+	+	+
9	*Charaxes solon* Fabricius, 1793	-	+	+
10	*Vanessa cardui* Linnaeus, 1758	-	+	+
11	*Danaus chrysippus* Linnaeus, 1758	+	+	+
12	*Danaus genutia* Cramr, 1779	-	+	+
13	*Euploea core* Cramer, 1780	+	+	+
14	*Euthalia aconthea* Cramer, 1777	+	+	+
15	*Hypolimnas bolina* Linnaeus, 1758	+	+	+
16	*Hypolimnas misippus* Linnaeus, 1764	+	+	+
17	*Junonia almana Linnaeus,1758*	-	+	-
18	*Junonia atlites Linnaeus,1763*	-	+	+
19	*Junonia hierta Fabricius, 1798*	-	+	-
20	*Junonia iphita Cramer, 1779*	+	+	+
21	*Junonia lemonias* Linnaeus, 1758	+	+	+
22	*Junonia orithya* Linnaeus, 1758	-	+	-
23	*Melanitis leda* Linnaeus, 1758	-	+	+
24	*Mycalesis perseus* Fabricius, 1775	-	+	+
25	*Neptis hylas* Linnaeus, 1758	-	+	+
26	*Parantica aglea* Stoll, 1782	+	+	-
27	*Phalanta phalantha* Drury, 1773	-	+	-
28	*Symphaedra nais* Forster, 1771	+	+	+

29	*Tirumala limniace Cramer, 1775*	+	+	+
30	*Ypthima huebneri* Kirby, 1871	-	+	-
31	*Ypthima baldus* Fabricius, 1775	-	+	-
Family: Pieridae				
32	*Catopsilia pomona* Fabricius, 1775	+	+	+
33	*Catopsilia pyranthe* Latreille,1758	+	+	+
34	*Eurema brigitta* Stoll, 1780	+	+	+
35	*Eurema hecabe* Linnaeus, 1758	+	+	+
36	*Delias eucharis* Drury, 1773	+	+	+
37	*Cepora nerissa* Fabricius, 1775	+	+	+
38	*Belenois aurota* Fabricius, 1793	+	+	+
39	*Ixias marianne* Cramer, 1779	+	+	+
40	*Ixias pyrene* Linnaeus, 1764	+	+	+
41	*Colotis danae* Fabricius, 1775	+	+	+
42	*Colotis amata* Fabricius, 1775	+	+	+
43	*Pareronia hippia* Fabricius, 1787	+	+	+
44	*Leptosia nina* Fabricius, 1793	-	+	+
Family: Lycaenidae				
45	*Catochrysops strabo* Fabricius, 1793	-	+	+
46	*Castalius rosimon* Fabricius, 1775	-	+	-
47	*Chilades lajus* Stoll, 1780	+	+	+
48	*Curetis thetis* Drury, 1773	+	+	+
49	*Euchrysops cnejus* Fabricius, 1798	+	+	+
50	*Spindasis vulcanus* (Fabricius, 1775)	-	+	+
51	*Zizeeria karsandra* Moore, 1865	+	+	+
52	*Zizina otis* Fabricius, 1787	+	+	+
53	*Zizula hylax* Fabricius, 1775	+	+	+
54	*Azanus ubaldus* Stoll, 1782	-	+	+
55	*Spindasis ictis* Hewitson, 1865	-	+	-
56	*Freyeria trochylus* Freyer, 1845	-	+	-
57	*Talicada nyseus* Guerin-Meneville, 1843	-	+	-
58	*Chilades parrhasius* Fabricius, 1793	-	+	-

59	*Tarucus nara* Kollar, 1848	-	+	+
Family: Hesperiidae				
60	*Hasora chromus* Cramer, 1780	-	+	-
61	*Pelopidas mathias* Fabricius, 1798	-	+	+
62	*Telicota bambusae* Moore, 1878	-	+	+
63	*Suastus gremius* Fabricius, 1798	-	+	-

Table 7: Distribution of butterflies in different habitats of Pavagadh Hill (+ stands for presence of species, - stands for absence of species)

Diversity Index	Summer	Monsoon	Post Monsoon	Winter
Shannon-Weiner Index (H)	2.523	3.318	3.871	3.271
Simpsons's Index of Diversity (1-D)	0.9156	0.9616	0.9776	0.9587

Table 8: Diversity indices of seasons

Diversity Index	Garden	Forest	Scrubland
Shannon-Weiner Index (H)	3.352	3.871	3.637
Simpsons's Index of Diversity (1-D)	0.963	0.9776	0.9721

Table 9: Diversity indices of habitats

Sr. No.	Scientific Name	Proboscis Length (mm)	Body Length (mm)	Wingspan (mm)
Papilionidae				
1.	*Graphium doson* C. & R. Felder, 1864	22.58 ± 0.601	27.2	79.9
2.	*Graphium agamemnon* Linnaeus, 1758	25.96 ± 0.114	28.28	85.6
3.	*Pachliopta aristolochiae* Fabricius, 1775	18.94 ± 0.906	21.9	85.0
4.	*Papilio polytes* Linnaeus, 1758	18.0 ± 0.158	22.8	95.1
5.	*Papilio demoleus* Linnaeus, 1758	23.4 ± 0.589	25.7	84.8
Nymphalidae				
6.	*Danaus chrysippus* Linnaeus, 1758	12.94 ± 0.449	29.2	76.4
7.	*Hypolimnas misippus* Linnaeus, 1764	13.96 ± 0.114	22.4	83.5
8.	*Junonia lemonias* Linnaeus, 1758	12.04 ± 0.230	23.4	57.3
9.	*Danaus genutia* Cramer, 1779	12.14 ± 0.151	25.5	77.6
10.	*Tirumala limniace* Cramer, 1775	12.24 ± 0.270	28.2	95.6
Pieridae				
11.	*Catopsilia pomona* Fabricius, 1775	15.92 ± 0.164	19.1	63.5
12.	*Catopsilia pyranthe* Linnaeus,1758	15.06 ± 0.089	20.4	60.1
13.	*Eurema brigitta* Stoll, 1780	13.02 ± 0.083	17.8	44.5
14.	*Eurema hecabe* Linnaeus, 1758	9.04 ± 0.114	16.2	45.46
15.	*Delias eucharis* Drury, 1773	15.98 ± 0.109	22.2	73.7
Lycaenidae				

16.	*Chilades lajus* Stoll, 1780	5.58 ± 0.238	8.7	28.1
17.	*Zizina otis* Fabricius, 1787	5.12 ± 0.192	6.7	19.1
18.	*Zizula hylax* Fabricius, 1775	6.6 ± 0.336	7.2	18.2
19.	*Freyeria trochylus* Freyer, 1845	4.72 ± 0.164	6.8	9.9
20.	*Zizeeria karsandra* Moore, 1865	5.3 ± 0.158	8.7	22.02

Table 10: Butterfly Species examined with their Morphological Measurements

Sr. No.	Name of the Nectar Host Plant	Family	Flowering Season	Flower Color	Corolla Shape	Type of Plant
1.	*Lantana camara*	Verbenaceae	throughout year	Yellow, Orange, Red & Pink	Tubular	Shrub
2.	*Nerium oleander*	Apocynaceae	throughout year	Pink	Tubular	Shrub
3.	*Jatropha pandurifolia*	Euphorbiaceae	Throughout Year	Red with yellow centre	Tubular	Shrub
4.	*Caesalpinia pulcherrima*	Fabaceae	throughout year	Red	Non-Tubular	Shrub
5.	*Tamarindus indica*	Caesalpiniaceae	May to Aug	Pale Yellow	Non-Tubular	Tree
6.	*Bougainvillea spectabilis*	Nyctaginaceae	throughout year	Pink	Tubular	Shrub
7.	*Murraya koenigii*	Rutaceae	Apr-May	White	Non-Tubular	Tree
8.	*Chromolaena odorata*	Asteraceae	Sept-Dec	White	Tubular	Shrub
9.	*Tridax procumbens*	Asteraceae	Throughout Year	Yellowish White	Tubular	Herb
10.	*Tectona grandis*	Verbenaceae	June-Sept	White	Non-Tubular	Tree
11.	*Tephrosia purpurea*	Fabaceae	Sept-Oct	Purple	Non-Tubular	Shrub
12.	*Allamanda cathartica*	Apocynaceae	Throughout year	Yellow	Tubular	Shrub
13.	*Cassia occidentalis*	Fabaceae	July-Dec	Yellow	Tubular	Shrub
14.	*Sida acuta*	Malvaceae	Aug-Dec	Yellow	Tubular	Herb

15.	*Catharanthus roseus*	Apocynaceae	Throughout year	Pink	Tubular	Shrub
16.	*Calotropis procera*	Apocynaceae	Aug-Dec	White with purple crown	Non-Tubular	Shrub
17.	*Tabernaemontana gamblei*	Apocynaceae	Throughout year	White	Tubular	Shrub
18	*Wedelia trilobata*	Asteraceae	Almost throughout the year	Yellow	Non-Tubular	Herb
19	*Emilia sonchifolia*	Asteraceae	Aug-Dec	Purple	Tubular	Herb
20	*Ixora coccinea*	Rubiaceae	Throughout year	Pink	Tubular	Shrub
21	*Sida rhombifolia*	Malvaceae	Aug-Dec	Yellow	Tubular	Herb
22	*Sida cordifolia*	Malvaceae	Aug-Dec	Yellow	Tubular	Herb

Table 11: Prominent Nectar Plant Species found in the Study Area

Sr. No.	Name of the Nectar Host Plant	Corolla Length Mean±SD (mm)	Visited Butterflies
1.	*Lantana camara*	9.96 ± 0.114	Common Jay
			Tailed Jay,
			Common Rose,
			Common Mormon
			Lime Swallowtail
			Common Emigrant
			Mottled Emigrant
			Common Jezebel
			Plain Tiger
			Danaid Eggfly
			Striped Tiger
			Blue Tiger
			Lemon Pansy
2.	*Chromolaena odorata*	10.06 ± 1.277	Common Emigrant
			Mottled Emigrant,
			Common Grass Yellow
			Plain Tiger
			Danaid Eggfly
3.	*Tridax procumbens*	5.5 ± 0.070	Common Emigrant
			Mottled Emigrant
			Common Grass Yellow
			Small Grass Yellow,
			Lime Blue
			Tiny Grass Blue
4.	*Tephrosia purpurea*	3.06 ± 0.396	Grass Jewel
			Lesser Grass Blue
			Tiny Grass Blue
			Lime Blue
			Dark Grass Blue
	Catharanthus roseus	23.0 ± 1.083	Common Jay

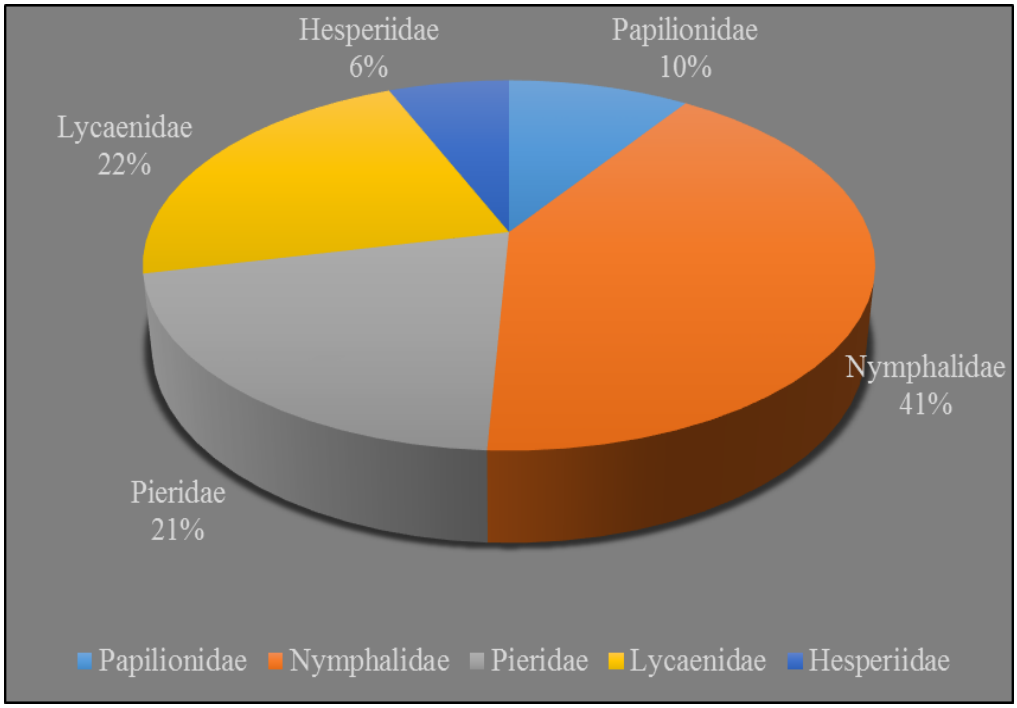
5.			Lime Swallowtail
			Tailed Jay
			Common Rose
			Common Mormon
6.	*Sida acuta*	3.75 ± 0.250	Lemon Pansy
			Lime Blue
			Lesser Grass Blue
			Tiny Grass Blue
			Grass Jewel
			Dark Grass Blue
7.	*Wedelia trilobata*	2.5 ±0.207	Lemon Pansy
			Plain Tiger
			Danaid Eggfly
8.	*Emilia sonchifolia*	2.2 ±0.148	Lime Blue
			Lesser Grass Blue
			Tiny Grass Blue
			Grass Jewel
			Dark Grass Blue
9.	*Ixora coccinea*	25.5 ±1.204	Common Jay
			Tailed Jay
			Common Mormon
			Lime Swallowtail
			Common Rose
10.	*Sida rhombifolia*	5.28 ± 0.258	Lime Blue
			Lesser Grass Blue
			Tiny Grass Blue
			Grass Jewel
			Dark Grass Blue

Table 12: Corolla length of preferred nectar plants and their visited butterflies

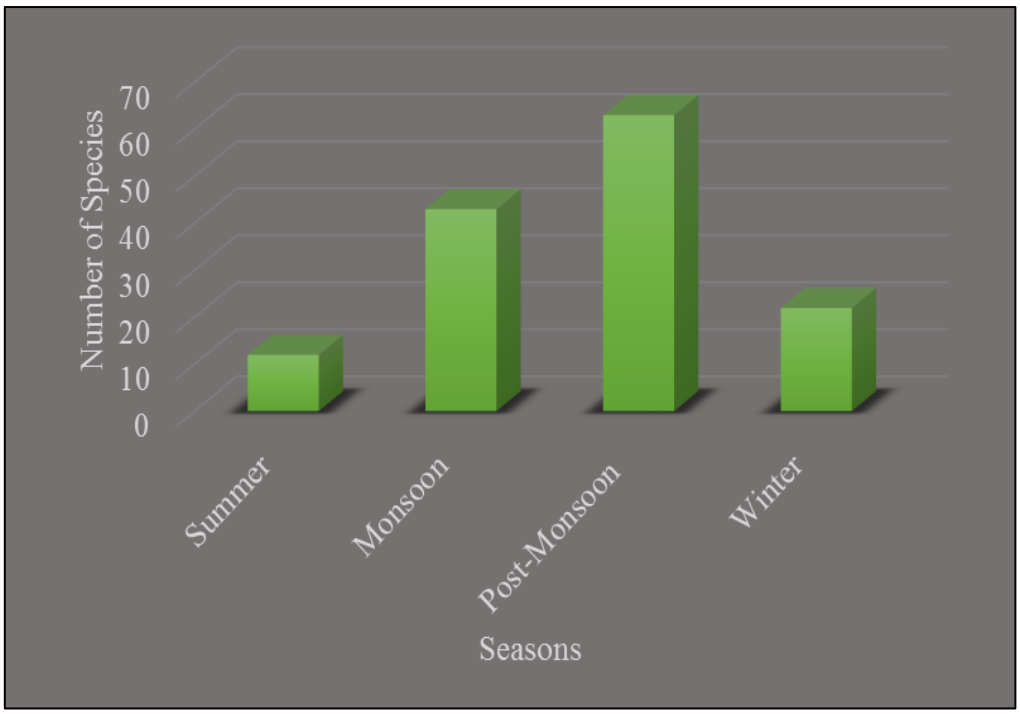
Sr. No.	Name of the Nectar Host Plant	Corolla Length Mean±SD (mm)	Visited Butterflies	Frequency of Visits/Hour
1.	*Lantana camara*	9.96 ± 0.114	Common Jay	4
			Tailed Jay,	12
			Common Rose,	6
			Common Mormon	14
			Lime Swallowtail	6
			Common Emigrant	10
			Mottled Emigrant	10
			Common Jezebel	10
			Plain Tiger	16
			Danaid Eggfly	14
			Striped Tiger	14
			Blue Tiger	14
			Lemon Pansy	12
2.	*Chromolaena odorata*	10.06 ± 1.277	Common Emigrant	12
			Mottled Emigrant,	12
			Common Grass Yellow	2
			Plain Tiger	14
			Danaid Eggfly	12
3.	*Tridax procumbens*	5.5 ± 0.070	Common Emigrant	6
			Mottled Emigrant	6
			Common Grass Yellow	12
			Small Grass Yellow,	10
			Lime Blue	16
			Tiny Grass Blue	16
4.	*Tephrosia purpurea*	03.06 ± 0.396	Grass Jewel	16
			Lesser Grass Blue	12
			Tiny Grass Blue	10
			Lime Blue	10
			Dark Grass Blue	10
	Catharanthus roseus	23.0 ± 1.083	Common Jay	6

5.			Lime Swallowtail	16
			Tailed Jay	8
			Common Rose	10
			Common Mormon	6
6.	*Sida acuta*	3.75 ± 0.250	Lemon Pansy	8
			Lime Blue	14
			Lesser Grass Blue	12
			Tiny Grass Blue	10
			Grass Jewel	16
			Dark Grass Blue	12
7.	*Wedelia trilobata*	2.5 ±0.207	Lemon Pansy	8
			Plain Tiger	6
			Danaid Eggfly	4
8.	*Emilia sonchifolia*	2.2 ±0.148	Lime Blue	12
			Lesser Grass Blue	12
			Tiny Grass Blue	12
			Grass Jewel	16
			Dark Grass Blue	14
9.	*Ixora coccinea*	25.5 ±1.204	Common Jay	16
			Tailed Jay	2
			Common Mormon	2
			Lime Swallowtail	12
			Common Rose	15
10.	*Sida rhombifolia*	5.28 ± 0.258	Lime Blue	18
			Lesser Grass Blue	16
			Tiny Grass Blue	14
			Grass Jewel	4
			Dark Grass Blue	12

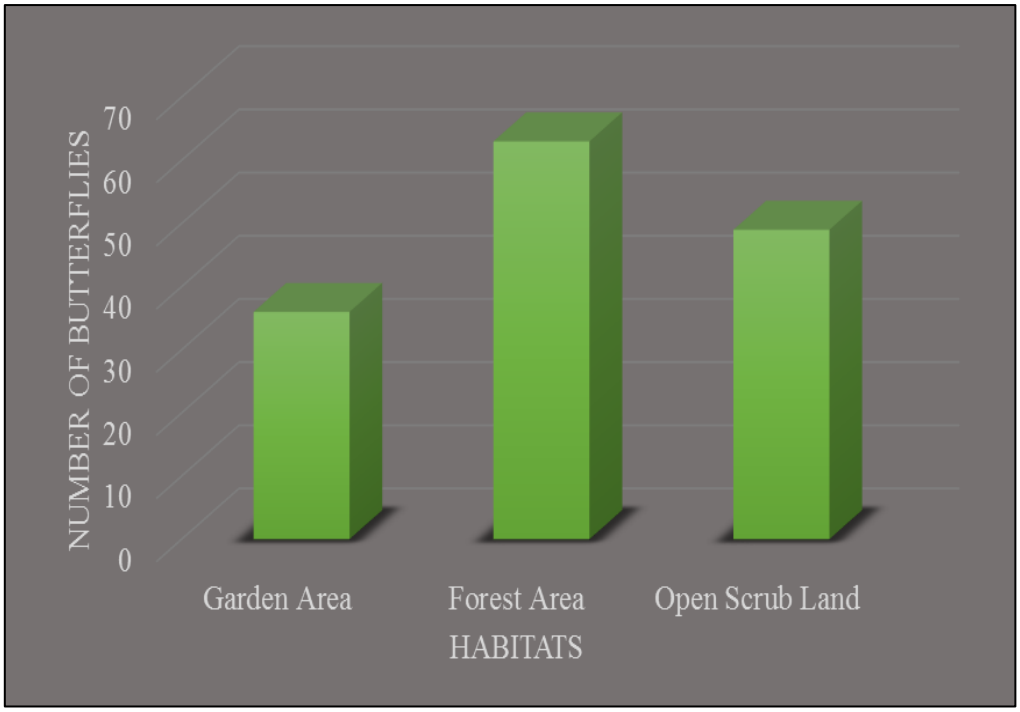
Table 13: Frequency of flowers visited by butterflies during the study period at Pavagadh Hill



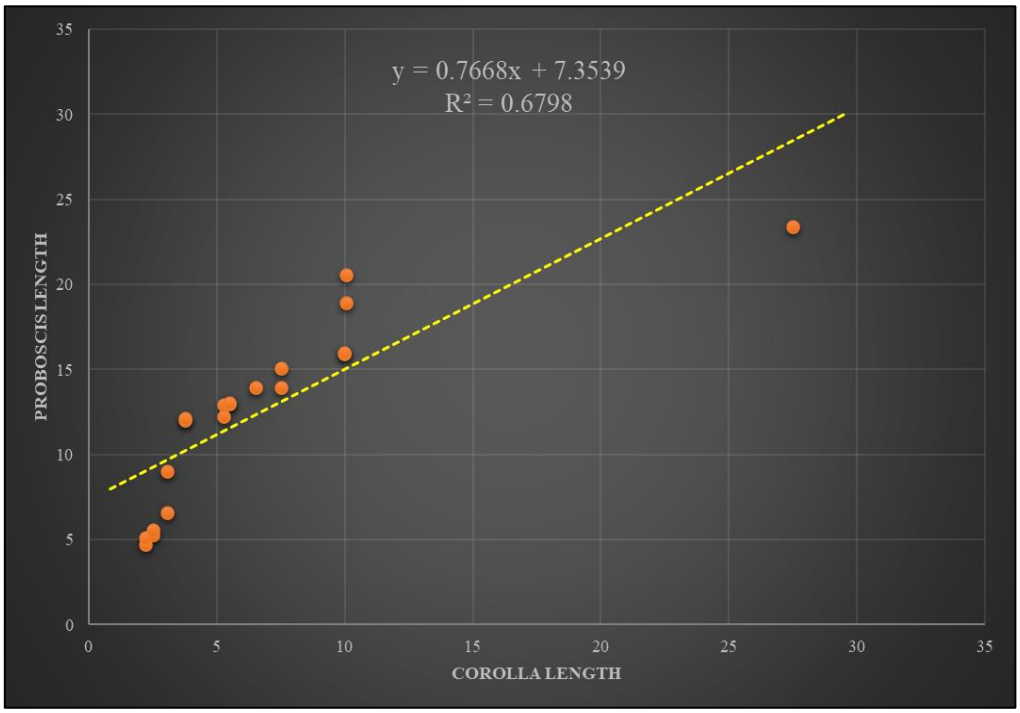
Graph 1: Composition of Different Butterfly Families in Pavagadh Hill



Graph 2: Seasonal Variation of Butterflies in Pavagadh Hill



Graph 3: Distribution of Butterflies in Different Habitats of Pavagadh Hill



Graph 4: Co-evolutionary relationship among Butterflies and Plants. The values are in mm (Mean±SD).