Studies on the Density of Butterflies in Railway Colony, Madurai

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Abstract: *Butterflies are one of the most beautiful and colourful organisms present on earth. Butterflies are important bioindicators which should be protected to conserve the environment. A survey of Railway Colony, Madurai from March 2018 to August 2018 was carried out. Regular monitoring of the butterflies was carried out every fortnight by making transect counts and recording their number for the entire study period. The study revealed the presence of twenty one species of butterflies belonging to four families. Shannon index, Shannon Evenness and Simpson's indices of butterflies were calculated. Twenty one species of butterflies were recorded belonging to four families. The family, Nymphalidae dominated with eight species and Pieridae was the least with three species.*

Keywords: *Butterflies, Lepidoptera, Species, Density, Madurai.*

INTRODUCTION

Butterflies are the most beautiful and attractive than most other insects and have fascinated human imagination and creativity. They are valuable pollinators when they move from plant to plant, gathering nectar and are one of the important food chain components of birds, reptiles, spiders and predatory insects. They are also good indicators of environmental quality as they are sensitive to changes in the environment. Of all the insects, butterflies and moths are most admired and popular. They are good pollinators and some of their larval forms are agricultural pests. Butterfly fauna of India is rich with 1500 species, which is close to 90 percent of the total butterflies in the world (Kunte, 2000).

In nature butterflies have been regarded as the symbol of beauty and grace (Rafi *et al.*, 2000). Butterflies are attractive with their eye catching colours and delicate charisma. Physical beauty and behavioural display are admired for butterflies (Arya *et al.*, 2014). Butterflies are widely appreciated as ecological indicators (Chakravarthy *et al.*, 1997). Diversity of butterflies is high in the tropics compared to temperate region as vegetation diversity is high in tropical region. Butterflies are the indicator species representing particular vegetation/habitat. They are sensitive to changes in habitat and climate which influence their species distribution and abundance. Some serve as useful tools in genetics (Sharmila and Thatheyus, 2014).

The Indian subcontinent bearing a diverse terrain, climate and vegetation hosts about 1,504 species of butterflies and described as a "butterfly paradise" (Venkataramani, 1986). Butterflies are well studied according to their taxonomical aspect with respect to continuous addition of new species of butterflies. As butterfly species play a vital role in pollination and mentioned as seasonal indicators in terms of anthropogenic disturbance and habitat quality, they help in the sorting and preservation of habitats under threat. Butterflies are thus sensitive to habitat degradation and climatic change and factors influencing the

butterfly species are of great importance to ecologists (Kocher and Williams, 2000). Hence the present work has been undertaken to study the density of butterflies in Railway Colony, one of the lung areas of Madurai city.

Materials and Methods

Study area

The study was conducted from March 2018 to August 2018 at Railway Colony in Madurai. Madurai located at 9.93° N 78.12° E, has an average elevation of 101 metres. The climate is tropical and the summers are much rainier than the winters in Madurai. In Madurai the average annual temperature is 28.8°C and the average rainfall is 840mm.

The Railway Colony is a residential area meant for the employees and their families of Southern Railways in Madurai, Tamil Nadu. A recreation center, living quarters for the employees, temple, church and a marriage hall are all located within the premises of the colony. The railway colony is strategically located, very near the Madurai Junction railway station. The colony also has an entry from the Karimedu market area, thus serving as a conduit for residents and non-residents alike who want to enter the Karimedu market and the surrounding areas from the Periyar bus stand. The latitude of the Railway Colony, Madurai, Tamil Nadu, India is N 9°55.2437' and the longitude is E 78°6.5902'. The Railway Colony is located with the GPS coordinates of 9.9249°N, 78.1066°E (Fig 1). The study area was divided into five different locations as office, park, church, red ground and quarters.

Survey of Butterflies

The study was carried out for six months from March 2018 to August 2018. Regular monitoring of the butterflies was carried out every fortnight by making transect counts and recording their number for the entire study period. The butterflies were observed from 9am to 11am in the morning. A chosen area was observed for six months and the target area was divided into five different locations. A visual survey was done during each sampling period. The butterflies were identified based on the wing pattern. The date of observation, number of species and individuals were recorded in the selected five locations.

Results

Density of butterflies was studied in Railway colony, Madurai from March 2018 to August 2018. Totally twenty one species of butterflies were recorded belonging to four families. Table 1 shows the species of butterflies observed in Railway colony, Madurai. Nymphalidae was represented with eight species while Papilionidae was with six species followed by Lycaenidae with four species and finally Pieridae with three species in Railway colony. Table 2 exhibits the list of butterflies observed in Railway colony from March to August 2018. It indicates the presence and absence of butterfly species and *Danaus chrysippus* was more in number during all months. In June maximum number of butterfly species was noticed. July had a minimum number of butterfly species. *Papilio demoleus, Acraea terpsicore, Moduza procris, Delias eucharis* and *Zizinz otis* were completly absent in July. Table 3 shows butterfly numbers in the selected five sites. Quaters area exhibited the highest number of butterfies in all the families. In quarters area, the highest number of individuals observed were *Danus chrysippus* followed by *Tirumala limniace, Catopsilia pomona, Eurema hecabe, Danus genuita, Jamides celeno* and *Junonia lemonias.*

The densities of butterflies of the families Nymphalidae, Papilionidae, Pieridae and Lycaenidae are exhibited in Fig. 2 to 5. *Melanitis leda, Pachliopta hector, Catopsilia pomona* and *Chilades lajus* showed the highest density. Figure 6 divulges the prevalance of butterflies. Nymphalidae exhibited the highest (38%), followed by Papillionidae (29%), Lycaenidae (19%) and Pieridae (14%).

Discussion

As a result of six months (March 2018 to August 2018) observation in the Railway colony, twenty one species of butterflies were recorded belonging to four families of Lepidoptera. Butterflies are one of the best known and charismatic groups of fauna. More number of species of butterflies was noticed in the quarters side in the Railway colony. This area also had highly diverse nectar plants. In the other four areas, butterflies were recorded but in minimum numbers. The higher species richness of butterflies is associated with gardens, which indicates availability and access to food plants. The only source of their diet is the nectar which is helpful to the butterflies during flight. Butterflies do not eat the pollen grains (Asher *et al.,* 2001).

Among the families observed, Nymphalidae was the dominant family. In case of butterflies, the plain tiger (*Danaus chrysippus*) mimics that of striped tiger (*Danaus genutia*) which is also called the monarch butterfly. Crepuscular species like *Melanitis leda* are more active in dark than the sun-loving and diurnal species (Ramesh *et al.,* 2012).

Followed by Nymphalidae, Papilionidae family with six species was recorded. Family Lycaenidae, the prettiest and smallest butterflies group included four species. The family Pieridae, the most familiar butterflies included three species. Among the sighted butterflies, *Eurema hecabe* is abundant whereas common jezebel is endemic to peninsular India and Srilanka (Ramesh *et al.,* 2012).

Most of the butterflies are seasonal and they have different requirements for different habitat types in order to meet their basic life processes like mating, breeding, and foraging. The great variety of butterflies are recorded and supported by their food and host plants. Availability of larval and adult food plants and habitat quality appeared to be one of the most important parameters to determine butterfly community. Abundance of butterfly species is due to favourable tropical climatic conditions, availability of host plants, food, and vegetation, topographic features, predators, parasitoids and prevalence of diseases (Amala *et al.,* 2011).

The above mentioned studies showed maximum number of species of butterflies recorded because of the favourable environment for butterflies. But in present study, twenty one species of butterflies we recorded due to low number of nectar plants, human habitation and noise pollution which interrupt the habitat of butterflies. The study area has a potential as a habitat for butterflies. But density has been decreasing due to human disturbances. It appears that human- induced disturbances and possibly presence of variety of foraging sites contribute to the variation of abundance, composition, richness and diversity of species. Further detailed long term studies are necessary to know about the breeding biology and habitat preference of butterflies in this area.

Conclusion

As a result of six months observation, twenty one species of butterflies were recorded belonging to four families. In butterflies, Nymphalidae dominanted with eight species and Pieridae was the least with three species.

Acknowledgement

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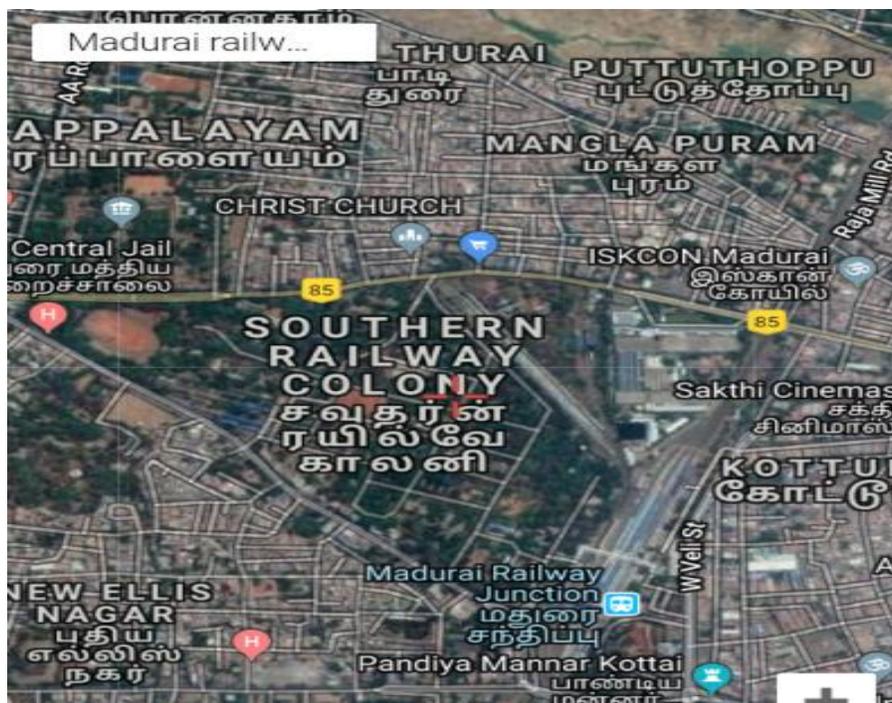
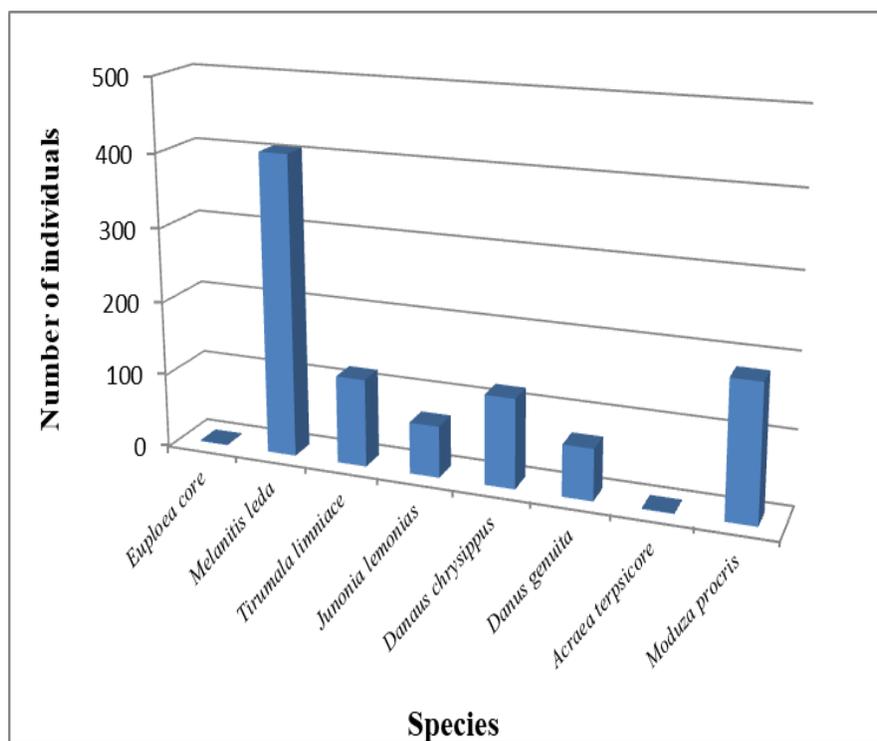**Fig.1.** Study area- Railway colony, Madurai shown in Google map
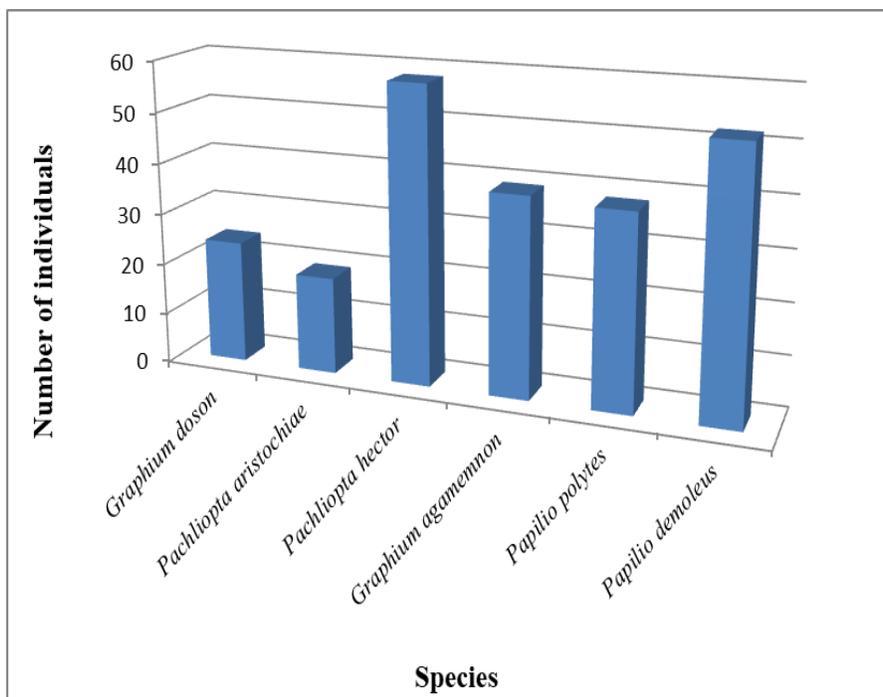

Fig.2. Density of butterflies of the family Nymphalidae observed in Railway colony, Madurai from March 2018 to August 2018

Fig.3. Density of butterflies of the family Papilionidae observed in Railway colony, Madurai from March 2018 to August 2018
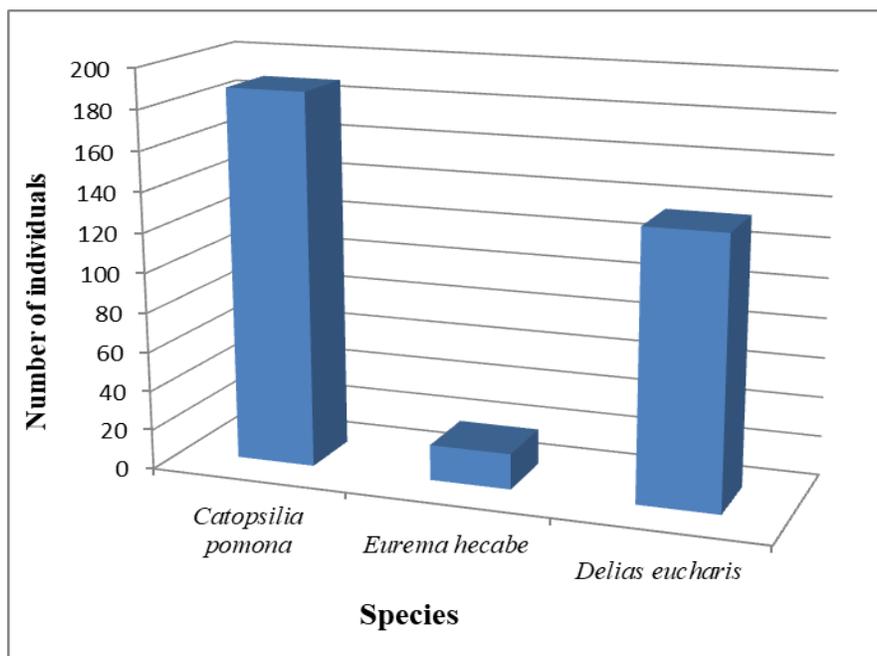

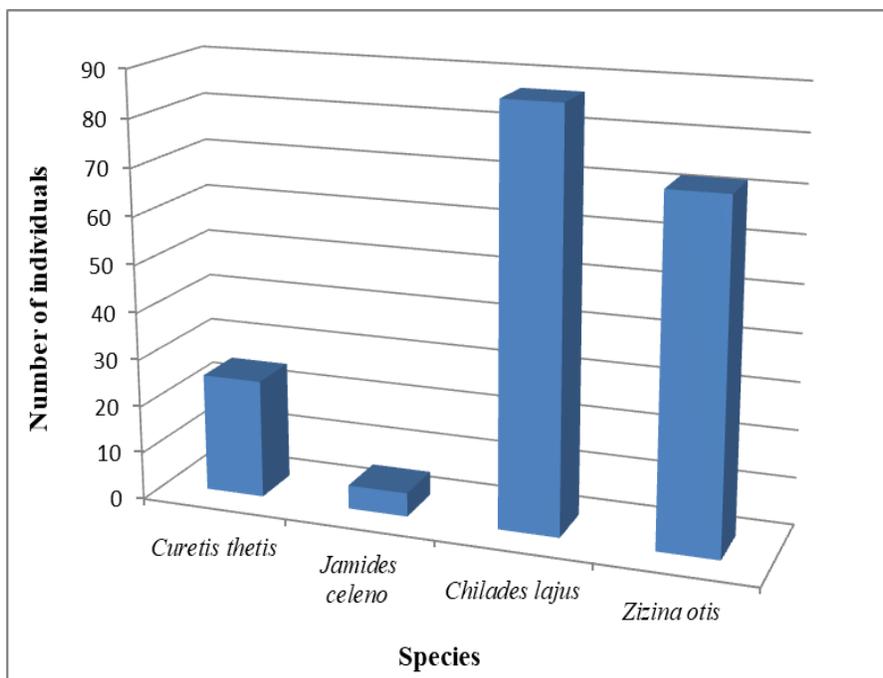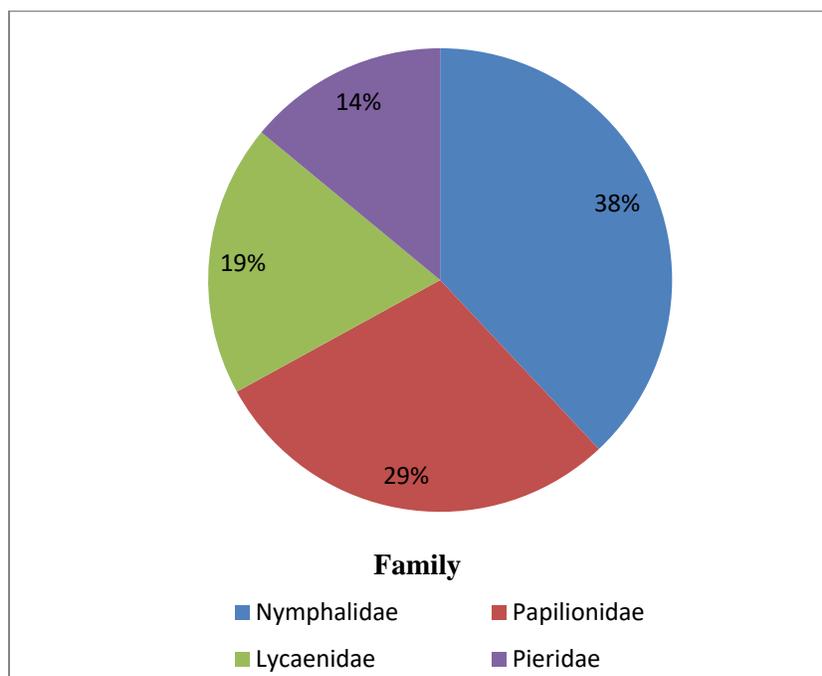**Fig.4.** Density of butterflies of the family Pieridae observed in Railway colony, Madurai from March 2018 to August 2018

Fig.5. Density of butterflies of the family Lycaenidae observed in Railway colony, Madurai from March 2018 to August 2018

Fig.6. Pie diagram showing prevalence of butterfly families in Railway colony, Madurai from March 2018 to August 2018

Table 1. Species of butterflies observed in Railway colony, Madurai from March 2018 to August 2018

S.NO	SCIENTIFIC NAME	COMMON NAME	FAMILY
1.	*Euploea core*	Common Crow	
2.	*Melanitis leda*	Common Evening Brown	
3.	*Tirumala limniace*	Blue Tiger	
4.	*Junonia lemonias*	Lemon Pansy	Nymphalidae
5.	*Danaus chrysippus*	Plain Tiger	
6.	*Danus genuita*	Striped Tiger	
7.	*Acraea terpsicore*	Tawny Coster	
8.	*Moduza procris*	Commander	
9.	*Graphium doson*	Common Jay	
10.	*Pachliopta aristochiae*	Common Rose	
11.	*Pachliopta hector*	Crimson Rose	Papilionidae
12.	*Graphium agamemnon*	Tailed Jay	
13.	*Papilio polytes*	Common Marmon	
14.	*Papilio demoleus*	Lime Butterfly	
15.	*Catopsilia pomona*	Common Emigrant	
16.	*Eurema hecabe*	Common Grass Yellow	Pieridae
17.	*Delias eucharis*	Common Jezebel	
18.	*Curetis thetis*	Indian Sunbeam	
19.	*Jamides celeno*	Common Cerulean	
20.	*Chilades lajus*	Lime Blue	Lycaenidae
21.	*Zizina otis*	Lesser Grass Blue	

Table 2. Number of butterflies observed in Railway colony, Madurai from March to August 2018

S.NO	NAME	MARCH		APRIL		MAY		JUNE		JULY		AUGUST		TOTAL
		I	II	I	II	I	II	I	II	I	II	I	II	
1.	*Acraea terpsicore*	-	-	-	-	-	-	1	-	-	-	-	-	1
2.	*Catopsilia pomona*	7	18	10	13	7	16	26	35	9	16	14	17	188
3.	*Chilades lajus*	-	-	-	-	-	7	4	1	-	-	5	8	25
4.	*Curetis thetis*	-	-	-	-	-	-	-	-	1		2	3	6
5.	*Danaus chrysippus*	49	14	46	42	44	22	37	57	13	25	27	30	406
6.	*Danus genuita*	19	11	6	6	8	7	9	24	2	12	6	8	118
7.	*Delias eucharis*	2	3	3	3	2	1	1	3	-	-	-	-	18
8.	*Euploea core*	3	1	6	6	5	11	5	13	3	7	3	7	70
9.	*Eurema hecabe*	19	8	19	18	11	11	14	23	3	-	3	6	135
10.	*Graphium agamemnon*	1	-	4	4	1	-	9	-	-	4	-	1	24
11.	*Graphium doson*	-	-	-	-	-	-	14	5	-	-	-	-	19
12.	*Jamides celeno*	4	10	7	3	3	-	24	5	2	8	12	10	88
13.	*Junonia lemonias*	3	4	4	5	5	-	8	3	3	-	42	43	120
14.	*Melanitis leda*	2	1	8	8	4	2	8	9	7	-	9	11	69
15.	*Moduza procris*	-	-	-	-	-	1	-	-	-	-	-	-	1
16.	*Pachliopta aristochiae*	2	2	7	6	6	3	7	7	-	9	3	5	57

17.	*Pachliopta hector*	-	1	-	-	1	-	4	8	3	6	7	9	39
18.	*Papilio demoleus*	-	-	-	-	-	2	6	30	-	-	-	-	38
19.	*Papilio polytes*	-	-	-	-	-	3	5	23	6	17	15	19	89
20.	*Tirumala limniace*	20	6	25	20	13	5	17	37	10	-	14	15	182
21.	*Zizina otis*	2	4	4	5	3	-	39	9	-	-	2	4	72
	Total	133	83	149	139	113	91	238	292	62	104	164	196	1765

Table 3. Number of butterflies observed in five sites in Railway colony, Madurai from March to August 2018

S.NO	SPECIES	OFFICE	PARK	CHURCH	RED GROUND	QUARTERS
1.	*Acraea terpsicore*	-	-	-	-	1
2.	*Catopsilia pomona*	56	10	21	27	74
3.	*Chilades lajus*	5	2	7	4	7
4.	*Curetis thetis*	-	4	-	-	1
5.	*Danaus chrysippus*	29	32	23	128	194
6.	*Danus genuita*	2	4	8	40	64
7.	*Delias eucharis*	-	5	12	1	-
8.	*Euploea core*	3	12	9	19	26
9.	*Eurema hecabe*	5	5	14	38	73
10.	*Graphium agamemnon*	2	4	6	1	11
11.	*Graphium doson*	-	-	3	5	11
12.	*Jamides celeno*	3	4	3	24	53
13.	*Junonia lemonias*	5	12	19	36	48
14.	*Melanitis leda*	7	7	20	17	18
15.	*Moduza procris*	-	-	-	-	1
16.	*Pachliopta aristochiae*	8	7	12	7	24
17.	*Pachliopta hector*	5	7	6	7	14
18.	*Papilio demoleus*	2	2	-	1	33
19.	*Papilio polytes*	5	14	19	23	25
20.	*Tirumala limniace*	20	16	12	49	85
21.	*Zizina otis*	3	5	5	21	38