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Diversity of Butterflies in Guindy National Park-Butterfly Garden in Guindy Children's Park

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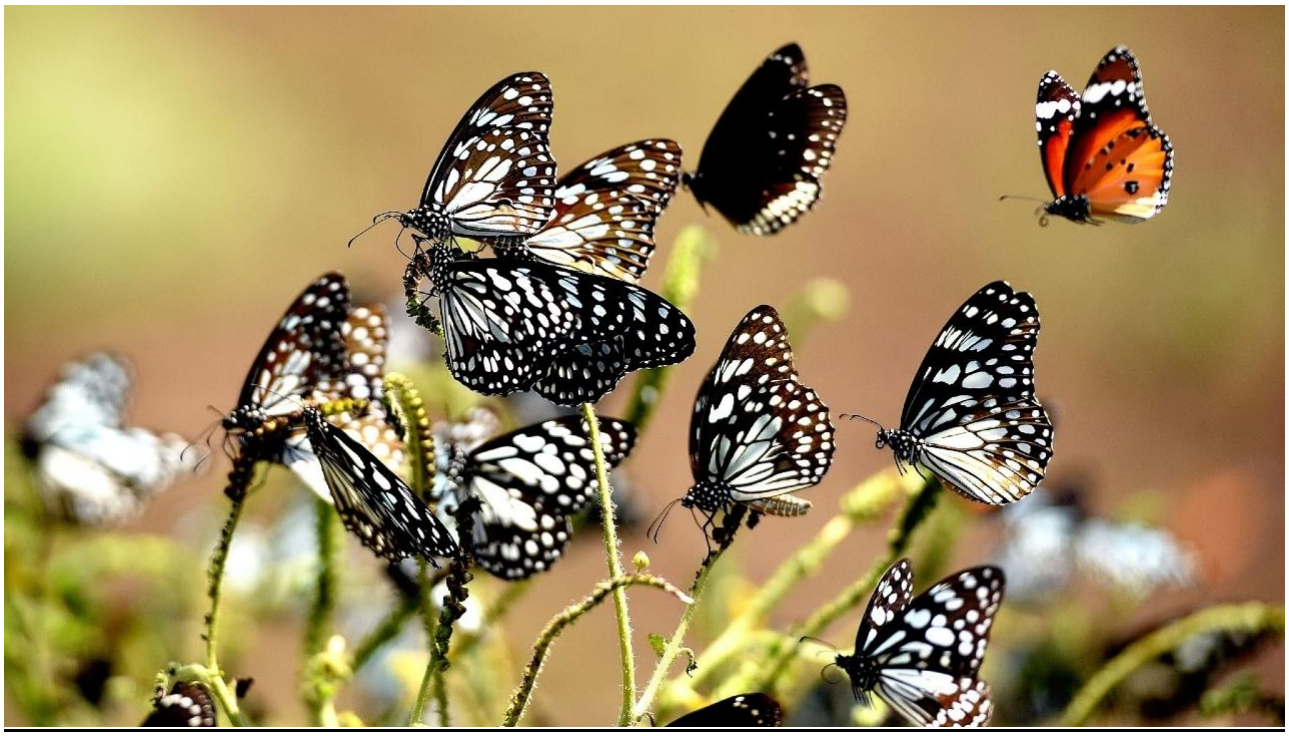

Introduction:

Guindy National Park is the only protected forest oasis holding good tropical dry evergreen forest vegetation sheltering many wild Fauna, and flora amidst the city. The literature survey provides a limited information analysis earlier before, on various aspects of Ecology & Conservation Management, Habitat analysis & assessment, distribution of Vegetation, diversity of fauna like Black buck, spotted deer, Birds, Jackal including lower vertebrates & Butterflies.

Butterflies are the sensitive insects which react quickly to any kind of disturbances like changes in the habitat quality and environmental variation. Apart from pollinators they play a major key role in food chain, being prey for birds, reptiles, spiders and predatory insects. Many species of butterflies are strictly seasonal in their occurrence and prefer a particular set of habitats and host plants for their survival. Notably these biological indicators are slowly disappearing due to changes in land pattern and habitat as they are closely dependent on plants.

The Indian sub-continent has about 1439 species of butterflies, out of which 100 species are endemic to it and 26 taxa are today globally threatened as per the IUCN 1990 Red List of threatened animals and insects. In the past few decades, the Chennai city has developed in an unstoppable manner and many green cover areas were converted into buildings. As a Result, the native forest cover is disappearing gradually. The record of research in the city national park did not have a continuation. in this contrary, it has become imperative to evolve the conservation and management of local extinction. The objective of the present study was to investigate the distribution and diversity of butterflies through different habitats, specifically, dry evergreen scrub, thorn forest, grasslands with tropical dissymmetric climate.

Guindy Children's Park is well known place with congenial environment to attract large number of live forms. The wooded environs are playing a major role to regulate the heat wave comparatively less than other area in the city. The mini zoo is upgraded as medium zoo during the year 2019. This park has many attractions to its credit viz., Vedanthangal aviary, Antelope, Antlers, Serpentarium and Ratite family collections. In Addition that wildlife awareness centre, Terrarium and medicinal garden are acting as public attractive points. The ex-situ and in-situ conservation centre has record of 114 species of butterflies in around the area the renovated butterfly park has a diversity of 30 species in the unique environment. The existing 40 species of vegetation has a number of host and nectar plant species in the collection, which act as a preferable abode for such winged friends. (D Evangeline and Santhi-2017)

The biological indicators are the most fascinating creatures in the universe, which have realized the naturalists for centuries. There are approximately 20000 species of butterflies distributed throughout the world. Indian subcontinent has diversified eco-systems which has rich diversity of butterfly about 1500 species, the diversity is more in the Western Ghats.

Tamil Nadu is concern so far 319 species of butterflies are recorded which include rare and endemic species. The sensitive species being highly diversified in their habits which require specific congenial atmosphere conditions for their survival. The literature reveals that it is presumed they came into existence some 130 million years ago during the Cretaceous period along with flowering plants. Butterflies belong to the order Lepidoptera and class Insect. The order Lepidoptera is further divided into Rhopalocera (butterflies) and Heterocera (moths).

The modern zoos are taken great interest to include the butterfly parks in the master plan to create awareness among the public. The major zoos in India are inspired and serve for the conservation of the nature. The butterflies are important pollinators of several wild and agricultural plants and depletion of their population could adversely affect the regeneration of the plants. Considering role of butterflies in maintaining nature's ecological balance, a butterfly park has been allotted in Guindy Children's Park, Chennai.

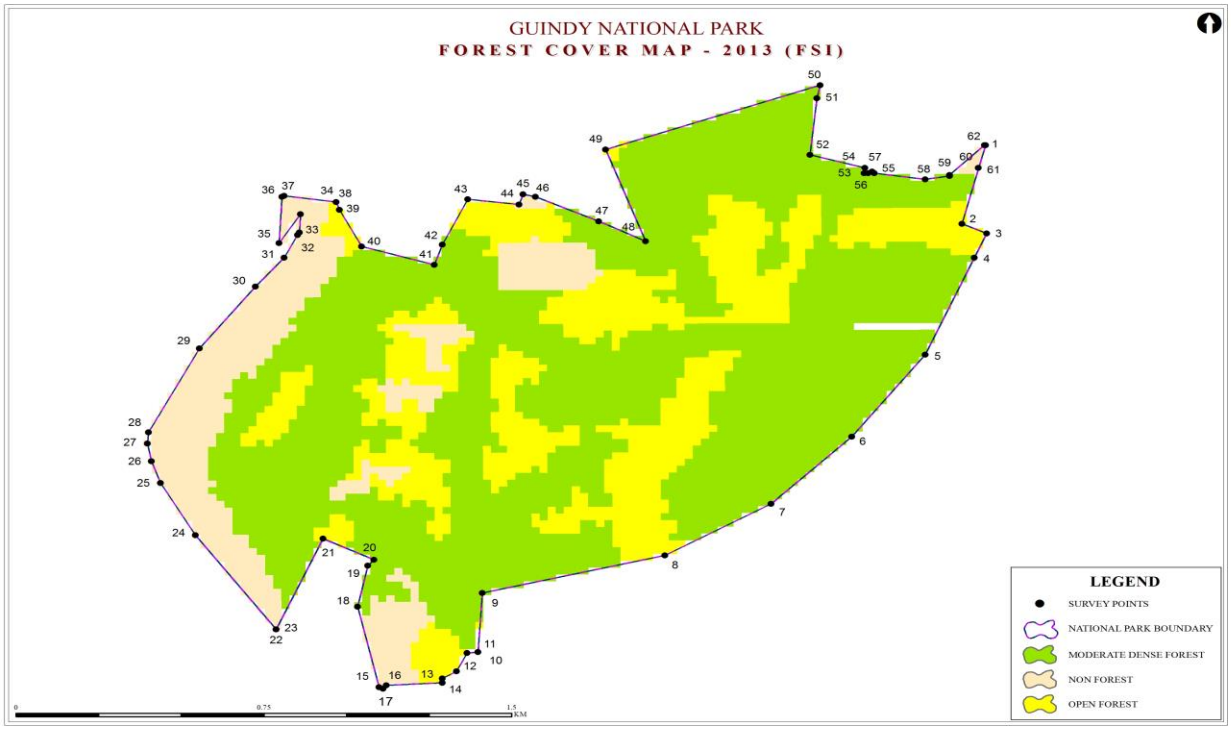

Figure 1 ; Raster image of Total Forest Cover in Guindy National Park

Guindy National Park with its unique habitat has revealed that the occurrence of 90 species of butterflies belonging to 5 families and 16 sub families, wherein 21 species of Polyommatinae, species of Pierinae, species of Papilioninae, species of Nymphalinae, 8 species of Danainae, species of Hesperiinae, species of Coliadinae and Theclinae , species of Coeliadinae and Satyrinae, species of each Biblidinae, Heliconiinae , Limenitinae and Pyrginae, and species of Curetinae Sunbeam and Miletinae.

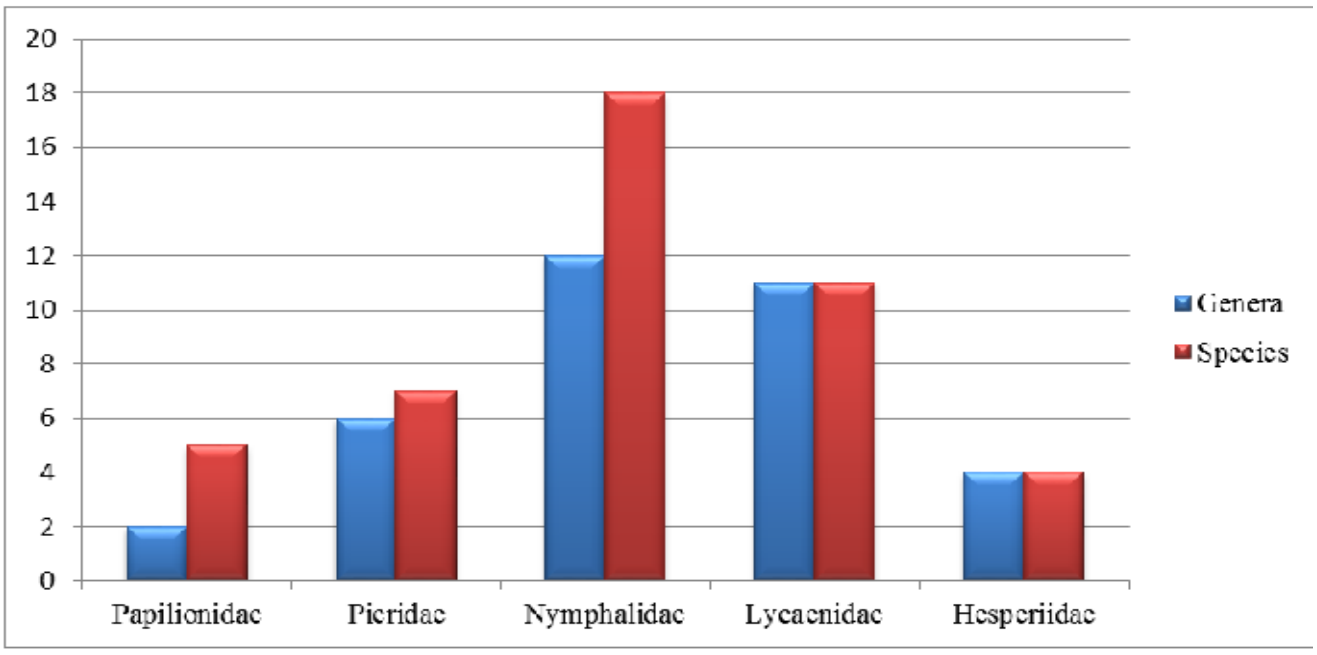

Chart - Graph Showing Family-Distribution of Butterflies from 2000-2018

BUTTERFLY GARDEn

Figure 2 . Butter Garden Cover

- Butterflies are the major pollinating insects
- Butterflies are attracted much because of its beautiful colours
- Butterflies are known as winged birds
- Butterflies require open area for basking
- Butterflies require some kind of shelter against wind and rains
- During the normal, warm sunny summer days the butterflies prefer wide open areas like lawn and will seeks soft soil i.e., sandy and like to have small puddle of water. Host plants for its larval stage

- Certain larvae are harmful so care should be taken before planting host plants. Pollinator garden is to create an environment that attracts butterflies, moths, bees and wasp. It is often aimed at inviting butterflies and moths to lay eggs as well. Butterflies feed on the nectar of flowers, and there are hundreds of such plants used to attract them, depending on the location, time of year, and other environmental factors. There is a range of specific plants that attract butterflies, are easy to care for and are attractive for the garden. It is important to include "Host Plants" to ensure that the butterfly larvae (caterpillars) have a home and "Nectar Plants" for the butterflies to feed upon.

Most of the local plants in Chennai are a source of supporting butterflies, but butterflies often depend on flowering plants with various colours butterflies need shelter from predators and wind, Hedges are ideal for them but small trees, shrubs, climbers and ground cover together can provide them a better environment. Thus, the plant species list for creating an environment for the butterflies in Guindy Children's Park is listed below; apart from this many plants in the park also provides environment for pollinators.
(Vikas Madhav Nagarajan1, M. Yuvan & Rohith Srinivasan,2021)

Figure 3 . Flowering Plants in Butterfly Garden in Guindy National Park

II. LOCATION:

The butterfly park is adjoined to the Guindy National Park. It is one of the enclosures of the approved master lay-out plan of Guindy Children's Park, Chennai.

III. CONCEPT OF BUTTERFLY CONSERVATION:

The management and conservation of flora and fauna by habitat protection is a Well accepted conservation strategy. Although butterflies have high fecundity, the potential is hardly realized under natural conditions because of the ecological parameters viz., mortality factors like drought, wind, temperature etc. The following are the salient features of successful butterfly conservation:

Environmental conditions:

Environmental requirement of adults and larvae are not similar. Tropical butterflies require day temperatures of 23 25^0 C and 80-85% relative humidity. A slight and intermittent air current stimulates flight in many butterflies thus increases the frequency of feeding, locating of mate and courtship behavior.

i) Life history and morphology:

Butterflies are 'holometabolous' insects ie. they undergo complete metamorphosis with four distinct development stages in their life cycle viz., egg, larva, pupa and adult. The eggs are laid on the leaves and the eggs hatch into tiny caterpillars within 3-7 days. The body of the caterpillar is divisible into three parts viz., the head, thorax and abdomen. Head bears a pair of powerful mandibles for chewing food and silk glands underneath the head produce silk strands.

ii) Nutrition and host plant associations:

Butterflies require continued supply of nectar plants for the adults and food plants for the larvae. The caterpillars being highly voracious require sufficient stock of host plants. Butterflies not only depend on the plants for nectar, sap, juice etc. but, they also require plants for laying their eggs, to escape from the predators as well as to protect themselves from unfavorable weather conditions. Nectar is sucked from the flower by inserting the Haustella. After mating, the female butterfly lays its eggs on leaves of specific plant on which the emerging caterpillars will directly feed.

iii) Ovipositor, care of eggs and larval rearing:

Butterflies require ambient temperatures of about 25^0C and need to bask under radiant heat sources in order to bring their body temperature for up to 32-35^0C. The management of important larval food plants is of paramount importance since the plants get quickly consumed. Since the water content of the diet is a critical factor affecting palatability and larval growth, control of relative humidity is particularly important.

iv) Conditions for mating:

The most common cause of failure of captive breeding programmers is the inability to secure pairings and fertile eggs. Most butterflies require a suitable environment for display of elaborate courtship behavior.

v) Behavioral aspects of butterflies:

a) Flight: The flight of butterflies is of two kinds viz., fluttering by wings or passive flight by gliding.

b) Basking: Butterflies being cold- blooded organisms bask in the sun with open wings to keep the thoracic muscles warm for flight.

c) Territoriality: Male butterflies maintain a clear-cut territory in search for partner, food and protection.

d) Courtship: Male butterfly looks for female using visual and olfactory stimuli. During mating one of the pair usually flies, dragging the other.

e) Mud-pudding: The male butterflies replenish their sodium reserves by licking the damp soil and pass it on to females during the courtship as their nuptial gift.

f) Migration: Butterflies migrate to tide over unfavorable conditions such as over- crowding, scarcity of food, extreme weather conditions etc.

g) Defense: All stages of butterflies are susceptible to a variety of natural enemies. Only two per cent of progeny are destined to attain full development. Warning coloration, camouflage, accumulation of toxic materials are some of the adaptations found in butterflies.

h) Variations: Sexual dimorphism or polymorphism is common among the butterflies in response to seasons.

vi) Visitors walk paths and rest sheds:

Visitors are allowed to walk all along the pathway which is surrounded the butterfly park, seating arrangements arc entre. The middle road and side road the park easily leads the visitor to the park. Both entry and exits are connected to a well laid cement road with facilities of tree lining and seating arrangements. Stainless steel barricades have been provided to prevent visitors from entering the nectar and host plant gardens. Visitors are guided with suitable directional signages throughout the butterfly park.

vii) Educative signage's, photo gallery and interpretation

Nearly ten stainless steel signage boards have been erected along the walk paths depicting the details of life history, ecological role, behavior, butterfly gardening, butterfly watching, photographing butterflies etc. Photo gallery and interpretation center containing LED images of butterflies of Tamil Nadu and display of butterfly related videos and photographs through professional digital display equipment have been arranged in the indoor butterfly conservatory.

Figure 4.

Conclusion

The present study of report gave us the data existence of 90 species of butterflies belonging to 5 families, by the report analysis from D Evangeline, s santhi , Thanga pandian MA, Ganesh P, Ramaraj C, Selvakumar, Janarthan & Associate Professor S Pauline Deborah.This indicates that the possibility of surviving butterflies in urban cities have higher chances when the habitat is undisturbed. Further, systematic research is essential to understand the status of butterflies in mega metropolitan cities. This also underlies that the biodiversity existence in cities where conservation strategies are essential.

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List of Butterflies in Guindy National Park

Sl. No	Common name	*Scientific name*
1	Angled coaster	*Ariadne Ariadne*
2	Baronet	*Symphaedranais*
3	Black rajah	*Charaxes solon*
4	Blue Mormon	*Papiliopolyinnerstor*
5	Blue pansy	*Précis orithya*
6	Blue tiger	*Tirumalalimniaceexoticus*
7	Bright babul blue	*Azanusubaldus*
8	Brown awl	*Badamiaexcalamaionis*
9	Chocolate pansy	*Précis iphita*
10	Common albatross	*Applias albino*
11	Common banded awl	*Hasorachromas*
12	Common banded peacock	*Papiliocrino*
13	Common blue bottle	*Graphiumsarpedon*
14	Common caster	*Airadnemerione*
15	Common crow	*Epplocea core*
16	Common emigrant	*Catopsiliacrocale*
17	Common evening brown	*Melanitisleda*
18	Common grass dart	*Taractroceramaevius*
19	Common grass yellow	*Euremahecabe*
20	Common gull	*Ceporanerissas*
21	Common jay	*Graphiumdoson*
22	Common jezebel	*Delius eucharis*
23	Common leopard	*Phalanthphalantha*
24	Common Mormon	*Papiliopolytes*
25	Common nawab	*Polyuraathamas*
26	Common pier rot	*Castaliusrosimon*
27	Common rose	*Pachlioptaaristolochiae*
28	Common silverline	*Spindasisvulcanus*
29	Common wanderer	*Paeroniavaleria*
30	Crimson tip	*Colitis danae*
31	Dark blue tiger	*Tirumalaseptentrionis*
32	Glassy blue tiger	*Paranticaaglea*
33	Gram blue	*Euchuyrysopsenejus*
34	Grass jewel	*Freyeriatrochilus*
35	Great orange tip	*Hebomoiaglaucippe*
36	Great eglfly	*Hypolimnasbolina*
37	Grey pansy	*Précis atlites*
38	Indian skipper	*Spialiagalba*
39	Indian sunbeam	*Curetisthetis*
40	Jocker	*Bybliailithiya*
41	Large salmon arab	*Calotisfausta*
42	Lemon emigrant	*CatopsiliaPomona*

43	Lemon pansy	*Précis lemonias*
44	Lime blue	*ChiladesLaius*
45	Lime butterfly	*Papiliodemoleus*
46	Mottled emigrant	*Catopsiciapyranthe*
47	Pale grass blue	*Zizeeriamaha*
48	Pea blue	*Lampidesboeticus*
49	Peacock pansy	*Précis almanac*
50	Pioneer	*Anaphacisaurota*
51	Plain orange tip	*Calotis eucharis*
52	Plain tiger	*Danauschrysippus*
53	Plains cupis	*Chilaespandava*
54	Psyche	*Leptosianina*
55	Red pierrot	*Talicadanyseus*
56	Small banded swift	*Palopidasmathias*
57	Small grass yellow	*Euremabrigitta*
58	Spot swordtail	*Pathuysanomius*
59	Striped tiger	*Danausgenutica*
60	Suffused flat	*Tagiadusgana*
61	Tailed jay	*Graphiumagamemnon*
62	Tamil yeoman	*Cicochroathais*
63	Tawny coster	*Acraeaviolae*
64	The zebra blue	*Syntarcusplinius*
65	Tricolor paid flat	*Pseudocoladeniaindran*
66	White Orange tip	*Ixias Marianne*
67	Yellow Orange tip	*Ixiapyrenesesia*
68	Yellow pansy	*Précis heirta*
69	Chest-streaked sailor	*Neptisjumbah*
70	Common Sailor	*Neptishylas*
71	Sun bean	*Creuslula rays*
72	Monkey Puzzle (congregation)	*Araucaria Araucana*

73	***Euploea Sylvester***	**Double branded crow**	
74	***Hypolimnasbolina***	**Great eggfly**	
75	***Hypolimnasmissippus***	**Dannaideggfly**	
76	***Junoniaatlites***	**Grey Pansy**	
77	***Junonialemonias***	**Lemon pansy**	
78	***Junoniaalmanac***	**Peacock pansy**	
79	***Junoniahierta***	**Yellow pansy**	
80	***Junoniaiphita***	**Chocolate pansy**	
81	***Junoniaorithiya***	**Blue pansy**	

82	***Melanitisleda***	**Common evening brown**	
83	***Mycalesisperseus***	**Common bush brown**	
84	***Mycalesissubdita***	**Tamil bush brown**	
85	***Neptishylas***	**Common sailer**	
86	***Neptisjumbah***	**Chestnut streaked sailer**	
87	***Phalantaphalantha***	**Common leopard**	
88	***Tirumalalimniace***	**Blue tiger**	
89	***Tirumalaseptentrionis***	**Dark blue tiger**	
90	***Vanessa cardui***	**Painted Lady**	

List of plant species proposed for the Pollinator Garden

Sl. No.	Species Name	Vernacular name	Type / Description
1	*Albizialebbek*	Vaagai	Tree (Nectar/ Food Source)
2	*Asclepiascurassavica*		Groundcover (Food Source, Resting spot)
3	*Buteamonosperma*	Purasu	Tree (Nectar/ Food Source)
4	*Caesalpiniacorearia*	Diwi-divi	Tree (Food Source)
5	*Clerodendruminerme*	Pee naari	Shrub (Food Source)
6	*Combretumalbidum*	Odaikodi	Climber (Food Source)
7	*Canavaliavirosa*	Esakottai	Climber (Food Source)
8	*Canthiumcoromandelicum*	Kaaramullu	Shrub (Nectar/ Food Source)
9	*Cappariszeylanica*	Adondai	Climber (Food Source)
10	*Capparissepiaria*	Karindu	Climber (Food Source)
11	*Cassia alata*	Semaiagathi	Shrub (Nectar/Food Source, Egg laying)
12	*Cassia tora*		Shrub (Nectar/ Food Source)
13	*Calliandrahaematocephala*		Shrub (Food Source)
14	*Courouptiaguianensis*	Nagalingam	Tree (Food Source, Resting spot, Shelter)
15	*Crotalaria verrucosa*	Salangaisedi	Sub-shrub (Food Source, Resting spot)
16	*Delonixregia*	Mayilkoonai	Tree (Food Source)
17	*Derris ovalifolia*	Yannaikodi	Climber (Food Source)
18	*Derris scandens*	Nanchupattai	Climber (Food Source)
19	*Glycosmismauritiana*	Konji	Shrub (Nectar/Food Source)
20	*Hibiscus rosa-sinensis*	Semburathi	Shrub (Food Source)
21	*Helicteresisora*	Vadampir	Tree (Food Source)
22	*Ixoraarborea*	Koran	Shrub (Nectar/Food Source, Egg laying)
23	*Justiciaadhatoda*	Adathodai	Shrub (Food Source)

Sl. No.	Species Name	Vernacular name	Type / Description
24	*Lanatacamara*	Unnichedi	Tree (Food Source, Shelter)
25	*Lecasaspera*	Thumbai	Herb (Food Source)
26	*Maeuraoblongifolia*	Mochukodi	Sub-shrub (Food Source, Resting spot)
27	*Murrayapaniculata*	Alari	Shrub (Nectar/ Food Source)
28	*Nerium oleander*	Kattu	Shrub (Nectar/ Food Source)
29	*Ocimumbasilicum*	Thulasi	Shrub (Food Source)
30	*Pavettaindica*	Pavettai	Tree (Nectar/Food Source)
31	*Pertocarpusmarsupium*	Vengai	Tree (Food Source)
32	*Pertocarpussantalinus*	Santhanavengai	Tree (Food Source)
33	*Plumbagozeylanica*	Chittramoolam	Herb (Nectar/ Food Source)
34	*Pongamiapinnata*	Pungan	Tree (Nectar/ Food Source)
35	*Polyalthialongifolia*	Nettilingam	Tree (Food Source)
36	*Premnaserratifolia*	Nalapinnai	Shrub (Food Source, Egg laying)
37	*Suregadaangustifolia*	Padabattai	Tree (Food Source, Shelter)
38	*Sennaauriculata*	Aavaram	Shrub (Nectar/Food Source)
39	*Ravolfiatetraphylla*	Pambukala	Shrub (Food Source)
40	*Tecomasmithii*	Sonnapatti	Shrub (Food Source)
41	*Toddaliaasiatica*	Milagaranai	Shrub (Nectar/ Food Source)
42	*Thunbergiagrandiflora*		Climber (Food Source)
43	*Woodfordiafruticosa*	Velakkai	Shrub (Food Source)
44	*Wrightiatinctoria*	Paalai	Shrub (Food Source)
45	*Ziziphusmauritiana*	Ilandhai	Tree (Nectar/ Food Source)