International Journal of Botany Studies
ISSN: 2455-541X, Impact Factor: RJIF 5.12
www.botanyjournals.com
Volume 2; Issue 4; July 2017; Page No. 38-42

A taxonomic and vegetative analysis of Palamalai Hill, Coimbatore

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Abstract
The present study is focused on the taxonomic and vegetative analysis of Angiospermic plants in Palamalai area. There are 72 species identified and belongs to 59 genera and 34 families. The vegetative analysis of Palamalai resulted that the following plants, *Indigofera colutea* (0.2 – 1.6 %), *Sarcostemma viminale* subsp. *Brunonianum* (0.4 – 2.4 %), *Acalypha fruticosa* (5 – 7.2 %), *Pleiospermium alatum (*0.4 – 1.6%) and *Gyrocarpus americanus* (0.4 – 1.6 %) has high species density. It also resulted that the following plants, *Blepharis maderaspatensis* (20 – 30 %), *Dioscorea oppositifolia* (34 – 38 %), *Acalypha fruticosa* (60 – 65 %) and *Gyrocarpus americanus* (40 – 43 %) has high species frequency. Based on this study the taxonomic and vegetative wealth of Palamalai hill was recognized and reported.

Keywords: vegetative analysis, quadrat method, floristic study, species density, species frequency, irula tribes

1. Introduction
Taxonomy is the study to gather acquaintance of various kinds of plants in earth and it's systematic groupings. The flora of earth is very large so that is not possible to bring together knowledge without arranging them systematically [7]. The plant taxonomist to point out the identification, nomenclature and classification of plants in order to study and scientific manner [5]. The taxonomic knowledge high significance to the branches of life science like Molecular Biology, Morphology, Geography, Embryology, Ecology, Genetics, Evolution, Palynology, Microscopic Morphology, History, Anatomy, Chemistry, Physiology, Cytology, Phylogeny and Paleobotany etc. [4].

In Palamalai hill, a very few reports are noted, Umapriya *et al,* (2011) was reported an ethnobotanical study in Palamalai hill resulted that the 50 plant species belonging to 47 genera and 31 families used by *Irula* tribe for the treatment of many common diseases [10]. Subbaiyan *et al,* (2015) reported that the one rare species, *Ceropegia juncea* Roxb. From Palamalai hill [9]. As per our knowledge there is no further studies reported in the study area. The present study includes the following objectives, to study the floral diversity with the species density and frequency in Palamalai.

2. Materials and Methods
2.1 Study area
Palamalai hill is a small hill associate with Southern Western Ghats which is selected for the present study. It comes under Periyanaicken palayam forest range of Coimbatore forest division. The study area is an offshoot of the Eastern Ghats geographically spreading by contact with the Billigrirangaa hills range as they reach out to merge with the Western Ghats at Nilgiris [10]. It lies between 11º 9' 19.944" & 11º 9.332402' N latitude and 76º 52' 27.6311" & 76º 52.460518" E longitude with 818.423 m sea level altitude. The temperature was approximately 22 to 39 ºC during the study period. The dry tropical and dry deciduous forests are commonly present in Palamalai hill. The sandy loam with Rocky substratum soil was covered in the place of the study area. *Irula* tribes are utilizing the forest area for their daily needs like food, medicine and fodder. There are 8 small villages namely Kunjurpathi, Manguzhi, Pasumani, Pasumani pudur, Perumpathi, Perukkaipathi, Perukkaipathi pudur (located in the upper place of Palamalai hill) and Ranganathapuram village (located in the foot hill of Palamalai hill).

2.2 Taxonomic analysis
The present study was performed by 18 field surveys during the period of June, 2016 to May, 2017. The plant materials with flower/ fruits were photographed using a Sony DSC – H300, 20.1 mega pixels camera and collected for further study. Normally the plants are pressed with the help of a wooden press. After drying, the plant specimens are mounted on herbarium sheet with help of normal glue and stitched with herbarium sheet. The specimens are treated with 2 % mercuric chloride solution to avoid molds and insects [6]. The collected plant specimens are taxonomically identified with the help of following floras, *The Flora of The Presidency of Madras, Flora of Coimbatore* and *An Excursion Flora of Central Tamilnadu, India* [2, 1, 3]. Unknown species are identified by using the data present in Botanical Survey of India, Southern Regional Centre, Coimbatore, Tamilnadu. The plant specimens are deposited in the herbarium of PG and Research Department of Botany, PSG College of Arts and Science (Autonomous), Coimbatore, Tamilnadu.

2.3 Vegetative analysis [8]
The quadrat method of community analysis used to determine calculate the species frequency and density. The 4.121 km of study area is divided into 100 quadrats for the analysis of plant communities. Each quadrat is 203 X 203 m in size. Each individuals of a species are marked with a separate symbol in the map. The formulas used to determine the density and frequency of a species

$$\text{Density \%} = \frac{\text{Total number of individuals of a species}}{\text{Total number of individuals of all species}} \times 100$$

$$\text{Frequency \%} = \frac{\text{Total number of quadrats in which the species occur}}{\text{Total number of quadrats studied}} \times 100$$

3. Result and Discussion

Table 1: Total plant species with *Irulas* name, density and frequency in the study area

S. No.	Binomial Name of plants	Family	*Irulas* Name	Density %	Frequency %
1	*Blepharis maderaspatensis* (L.) B. Heyne ex Roth.	Acanthaceae	-	0.4 – 0.8	20 – 30
2	*Dicliptera paniculata* (Forssk.) I.Darbysh.	Acanthaceae	-	0.2 – 0.4	1 – 2
3	*Justicia glabra* (Oerst.) Lindau.	Acanthaceae	-	0.2 – 0.4	1 – 2
4	*Glinus oppositifolius* (L.) Aug. DC.	Aizoaceae	-	0.2 – 0.4	1 – 2
5	*Mollugo nudicaulis* Lam.	Aizoaceae	-	0.2 – 0.4	20 – 22
6	*Alphonsea sclerocarpa* Thwaites	Anonaceae	-	0.2 – 0.4	1 – 2
7	*Carissa carandas* L.	Apocynaceae	Kalla	0.2 – 0.8	4 – 8
8	*Caralluma umbellata* Haw.	Asclepiadaceae	Matekka	0.2 – 2	10 – 12
9	*Cryptolepis grandiflora* Wight	Asclepiadaceae	Paalkodi	0.2 – 0.4	1 – 3
10	*Sarcostemma viminale* subsp. Brunonianum (Wight & Arn) P.I.F	Asclepiadaceae	uthambi	0.4 – 2.4	30 – 33
11	*Secamone emetica* (Retz.) R.Br. ex Schult.	Asclepiadaceae	Korukki	0.4 – 0.8	22 – 24
12	*Ehretia microphylla* Lam.	Boraginaceae	Narasai	0.2 – 0.4	3 – 4
13	*Trichodesma indicum* (L.) Lehm.	Boraginaceae	-	0.4 – 1.6	1 – 3
14	*Capparis sepiaria* L.	Capparidaceae	-	0.2 – 0.4	1 – 2
15	*Capparis zeylanica* L.	Capparidaceae	Kodanthi	0.2 – 0.6	3 – 4
16	*Cleome monophylla* L.	Capparidaceae	Velai dagu	0.4 – 0.6	4 – 5
17	Basella alba L.	Chenopodiaceae	Vasalai	0.2 – 0.6	3 – 4
18	*Kleinia grandiflora* (Wallich ex DC.) N. Rani	Compositae	Appepokku	0.2 – 0.4	3 – 4
19	*Cuscuta reflexa* Roxb.	Convolvulaceae	-	0.4 – 6	1 – 3
20	*Ipomoea obscura* (L.) Ker Gawl.	Convolvulaceae	-	0.2 – 0.4	6 – 7
21	*Corallocarpus epigaeus* (Rottler) C.B.Clarke	Cucurbitaceae	Thonda dagu	0.2 – 0.4	1 – 2
22	*Dioscorea oppositifolia* L.	Dioscoriaceae	Riyankizhangu	0.2 – 1.6	34 – 38
23	*Dioscorea pentaphylla* L.	Dioscoriaceae	Nooraikizhangu	0.2 – 2	14 – 15
24	*Diospyros melanoxylon* Roxb.	Ebenaceae	Thumbo	0.2 – 0.6	1 – 2
25	*Diospyrous montana* Roxb.	Ebenaceae	-	0.2 – 0.4	1 – 3
26	*Diospyros vera* (Loor.) A. Chev.	Ebenaceae	Pasukka	0.2 – 0.6	6 – 8
27	Acalypha fruticosa Forssk.	Euphorbiaceae	Sinnachedi	5 – 7.2	60 – 65
28	Breynia retusa (Dennst.) Alston	Euphorbiaceae	-	0.2 – 0.4	2 – 3
29	*Euphorbia heterophylla* L.	Euphorbiaceae	-	0.2 – 0.4	1 – 2
30	*Phyllanthus polyphyllus* Willd.	Euphorbiaceae	-	0.2 – 0.4	1 – 2
31	*Phyllanthus reticulatus* Poir.	Euphorbiaceae	-	0.2 – 0.4	2 – 3
32	*Gyrocarpus americanus* Jacq.	Hernandiaceae	-	0.4 – 1.6	40 – 43
33	*Endostemon viscosus* (Roth) M.R. Ashby	Labiatae	Vettumparalai	0.6 – 2.4	18 – 20
34	*Leonotis nepetifolia* (L.) R.Br.	Labiatae	-	0.4 – 2.4	20 – 22
35	*Ocimum filamentosum* Forssk.	Labiatae	Periyathulasi	0.4 – 0.6	4 – 5
36	*Indigofera colutea* (Burm.f.) Merr.	Leguminaceae	-	0.2 – 1.6	4 – 5
37	*Indigofera linnaei* Ali.	Leguminaceae	Kondalai	0.6 – 1.6	18 – 19
38	*Stylosanthes hamata* (L.) Taub.	Leguminaceae	Yelipukka dagu	0.2 – 0.4	3 – 4
39	*Erythroxylum monogynum* Roxb.	Linaceae	-	0.2 – 0.4	1 – 2
40	*Dendrophthoe falcata* (L.f.) Ettingsh.	Loranthaceae	Chakka	0.2 – 0.6	5 – 6
41	*Dendrophthoe glabrescens* (Blakeley) Barlow.	Loranthaceae	-	0.2 – 1.6	14 – 15
42	*Viscum album*	Loranthaceae	Maraththottu	0.2 – 0.6	4 – 6
43	*Hibiscus lobatus* (Murray) Kuntze	Malvaceae	-	0.2 – 0.4	1 – 2
44	*Hibiscus micranthus* L.f.	Malvaceae	-	1.6 – 4	48 – 50
45	*Hibiscus vitifolius* L.	Malvaceae	-	0.2 – 0.6	1 – 3
46	*Pachygone ovata* (Poir.) Diels.	Menispermaceae	-	0.2 – 0.4	1 – 2
47	*Ficus microcarpa* L.f.	Moraceae	Ichchi	0.2 – 0.4	1 – 2
48	*Ficus virens* Aiton.	Moraceae	-	0.2 – 0.4	1 – 2
49	*Jasminum auriculatum* Vahl.	Oleaceae	Kaatumulle	0.2 – 0.6	5 – 8
50	*Opilia amentacea* Roxb.	Opiliaceae	-	0.2 – 0.4	3 – 4

51	*Eulophia graminea* Lindl.	Orchidaceae	-	0.2 – 0.4	2 – 4
52	*Vanda testacea (Lindley) Reichb. F.*	Orchidaceae	-	0.2 – 0.4	1 - 2
53	Scutia myrtina (Burm. F.) Kurz	Rhamnaceae	-	0.2 – 0.4	1 – 2
54	*Ziziphus oenopolia* (L.) Mill.	Rhamnaceae	-	0.2 – 0.4	1 – 2
55	*Ziziphus xylopyrus* (Retz.) Willd.	Rhamnaceae	-	0.2 – 0.4	1 – 2
56	*Catunaregam spinosa* (Thumb.) Tirveng.	Rubiaceae	Kara	0.2 – 0.4	1 – 2
57	*Tarenna asiatica* (L.) Kuntze ex K. Schum.	Rubiaceae	dharani	1.6 – 2	13 – 14
58	*Clausena anisata* (Willd.) Hook.f. ex Benth	Rutaceae	Karumbe	0.4 – 1.6	5 – 6
59	*Murraya paniculata* (L.) Jack.	Rutaceae	-	0.2 – 0.6	1 – 2
60	*Pleiospermium alatum* (Wight & Arm.) Swingle	Rutaceae	Kuruntha	0.4 – 1.6	14 – 15
61	*Toddalia asiatica* (L.) Lam.	Rutaceae	Yerikonthai	0.4 – 0.6	4 – 5
62	*Cardiospermum corundum* L.	Sapindaceae	-	1.6 – 2	18 – 19
63	*Dodonaea viscosa* subsp. Angustifolia (L.f.) J.G.West	Sapindaceae	Virali	0.4 – 0.6	1 – 2
64	*Datura stramonium* L.	Solanaceae	-	0.2 – 0.6	1 – 3
65	*Grewia bracteata* Roth.	Tiliaceae	Kalle	0.2 – 1.6	15 – 16
66	*Grewia flavescens* Juss.	Tiliaceae	Sagarakallu	0.2 – 0.6	8 – 10
67	*Grewia villosa* Willd.	Tiliaceae	-	0.2 – 0.4	4 – 5
68	*Holoptelea integrifolia* Planch.	Ulmaceae	Aya	0.4 – 0.8	13 – 15
69	*Gmelina arborea* Roxb.	Verbenaceae	Koozhi	0.2 – 0.4	1 – 2
70	*Lantana veronicifolia* Hayek.	Verbenaceae	-	0.2 – 0.4	1 – 4
71	*Priva cordifolia* (L.f.) Druce	Verbenaceae	Otte	0.2 – 0.4	1 – 2
72	*Ampelocissus tomentosa* (B. Heyne & Roth) Planch.	Vitaceae	Thugai	0.2 – 0.4	2 – 3

3.1 Taxonomical study

As per this study, 16 herbs, 29 shrubs, 14 climbers and 13 trees species are recorded in the study area. The collected plants are belongs 34 families, 59 genera and 72 species (Table.1).

Dominant families are Euphorbiaceae (5 spp.), Asclepidaceae (4 spp.), Rutaceae (4 spp.), Acanthaceae (3 spp.), Capparidaceae (3 spp.), Ebenaceae (3 spp.), Labiatae (3 spp.), Leguminosae (3 spp.), Loranthaceae (3 spp.), Malvaceae (3 spp.), Rhamnaceae (3 spp.), Tiliaceae (3 spp.) and Verbanaceae (3 spp.).

Azioaceae (2 spp.), Boraginaceae (2 spp.), Convolvulaceae (2 spp.), Dioscoriaceae (2 spp.), Moraceae (2 spp.), Orchidaceae (2 spp.), Rubiaceae (2 spp.) and Sapindaceae (2 spp.) are moderately present in Palamalai hill.

The following families are present in low numbers of species namely Anonaceae (1 spp.), Apocynaceae (1 spp.), Chenopodiaceae (1 spp.), Compositae (1 spp.), Cucurbitaceae (1 spp.), Hernandiaceae (1 spp.), Linaceae (1 spp.), Menispermaceae (1 spp.), Oleaceae (1 spp.), Opiliaceae (1 spp.), Solanaceae (1 spp.), Ulmaceae (1 spp.) and Vitaceae (1 spp.).

3.2 Vegetative analysis

In the study area, *Indigofera colutea* and *Blepharis maderaspatensis* are herbaceous plants have high density (0.2 – 1.6 %) and frequency (20 – 30 %) respectively. Among the climbers, *Sarcostemma viminale* subsp. *Brunonianum* and *Dioscorea oppositifolia* are have high density (0.4 – 2.4 %) and frequency (34 – 38 %) respectively. *Acalypha fruticosa* is a shrub present with high density (5 – 7.2 %) and frequency (60 – 65 %). The following tree species, *Pleiospermium alatum* and *Gyrocarpus americanus* are have high density (0.4 – 1.6 %). *Gyrocarpus americanus* also has high species frequency (40 – 43 %) among the tree species (Fig. 1).

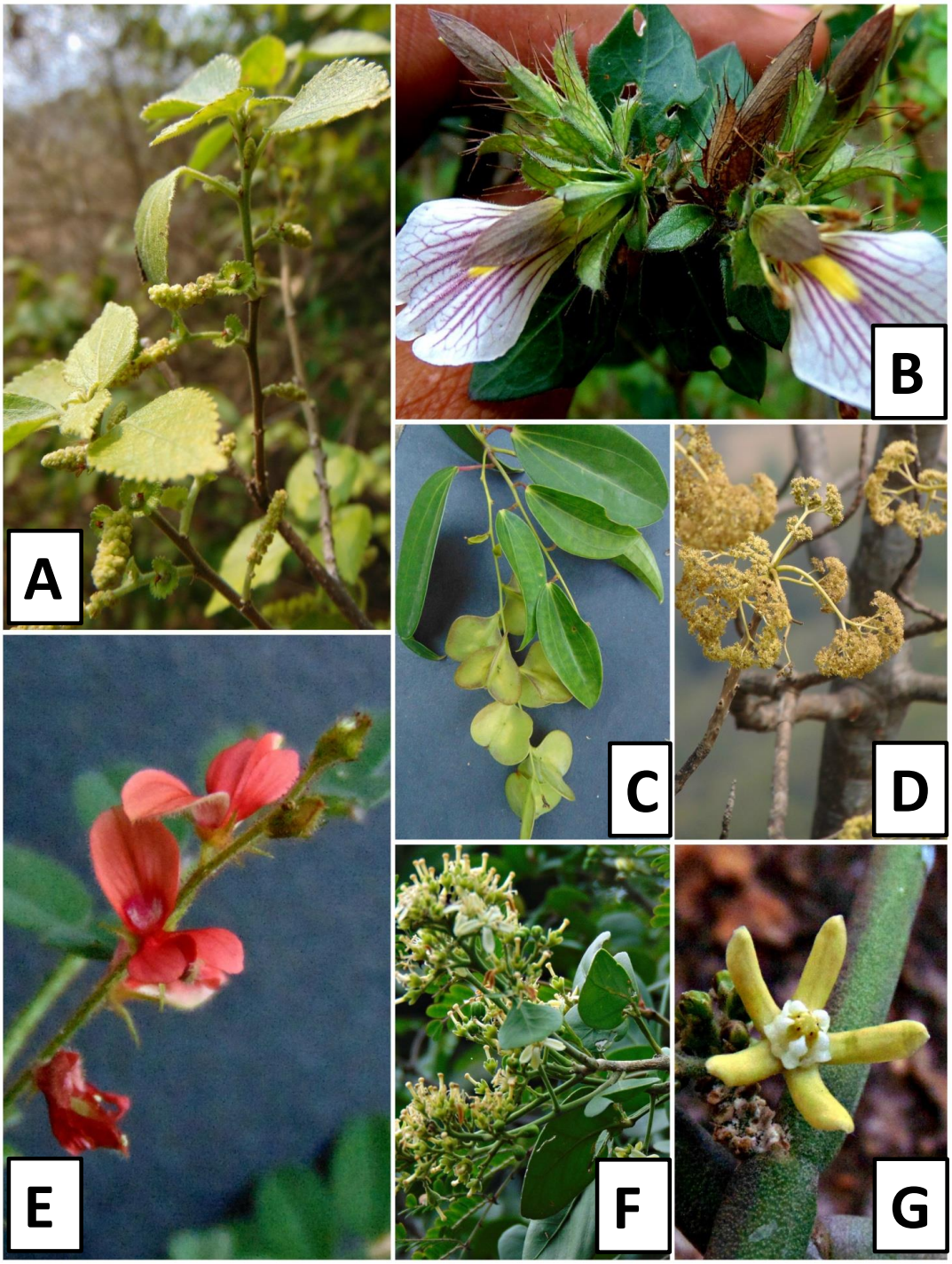

Fig 1: High species density and frequency species of Palamalai hill. **A)** *Acalypha frutocosa*, **B)** *Blepharis maderaspatensis*, **C)** *Discorea Oppositifolia*, **D)** *Gyrocarpus amerixanus*, **E)** *Indigofera colutea*, **F)** *Pleiospermium alatum*, **G)** *Sarcoarpus americanus*

4. Conclusion and Summary

In this present study, the floristic and vegetative analysis of Palamalai hill was discussed. The study resulted that Euphorbiaceae is a dominant family present in the study area. The following species, *Indigofera colutea*, *Sarcostemma viminale* subsp. *Brunonianum*, *Acalypha fruticosa*, *Pleiospermium alatum* and *Gyrocarpus americanus* are have high species density percentage. *Blepharis maderaspatensis*, *Dioscorea oppositifolia*, *Acalypha fruticosa* and *Gyrocarpus americanus* has high species frequency percentage. Due to the limitation of time, many families like Amaranthaceae, Aricaceae, Poaceae and Cyperaceae are not included in this study. In future, there is a need of further analysis which is required to complete the Flora of Palamalai.

5. Acknowledgement

I sincere thanks to Dr. M. Murugesan, Scientist 'B', Eastern Regional Centre, Botanical Survey of India, Shillong and Dr. V. Ravichandran, Post Doctorate Fellow, Southern Regional Centre, Botanical Survey of India, Coimbatore for give a motivation and clear my doubts. I also deliver my sincere thanks to R. Vasudevan, Junior Research Fellow in Institute

of Forest Genetics and Tree Breeding for helping to completing this work.

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