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RESEARCH ARTICLE

PHYTOSOCIOLOGICAL ATTRIBUTES – TOOLS FOR DETERMINING THE CURRENT STATUS OF PASTURE LAND IN JAKKANARI BEAT, SIRUMUGAI RANGE, WESTERN GHATS, COIMBATORE DISTRICT

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ABSTRACT

The aim of this investigation was to study the species composition structure and phytosociological characters like frequency, density, dominance, abundance and their relative values and important values index (IVI) of Jakkanari beat located in Sirumugai Range, Coimbatore district. Phytosociological analyses were performed for 5 plots, each 150 m^2. Subanalysis was performed for 5sq km. of the 141 species found in the study area the maximum ecological importance was attributed to the herb. The present floristic composition of the community types, which showed a high density of unpalatable species, suggests that intensive grazing has become a widespread problem across the entire study area. The result adds a new and important contest of understanding on the effect of plant diversity on ecosystem services and functioning in terrestrial ecosystem.

Keywords: Phytosociological, frequency, density, dominance, abundance, important values index.

1. INTRODUCTION

The Indian subcontinent is remarkable for its exceptional level of biological diversity at broad habitat level and within these habitats at species level. About 75 million hectares of the land area in India is forest of various types from dry deciduous to evergreen forest and from alpine to tropical forests (1). It harbours about 45000 species of plants and 65000 species of animals. Owing to this fact of rich diversity of biotic resources, India is ranked one of the 17-megadiversity countries in the world (2). A large portion of this diversity is also found to be endemic to India.

The Western Ghats, an unbroken relief along the western coast in peninsular India, is one of the richest centres of biodiversity (3,4). Almost one third of all the flowering plant species in India are found in this region and among them, 40% are endemic also. Across the world, 25hot spots have identified on the basis of species endemism and degree of threats through habitat loss (4). Out of these, two are confined to India sub-continent that is, Western Ghats/Sri Lanka and Indo-Burma (5). The present study site falls within the Western Ghats, In the following account a case study of Jakkanari beat located in Sirumugai Range, Coimbatore district was taken. The study include species composition structure and phytosociological characters like frequency, density, dominance, abundance and their relative values and important values index (IVI).

2. MATERIALS AND METHODS

2.1. Site description

The present study area Jakkanari beat, Sirumugai Range are located about 55km North – East of Mettupalayam taluk of Coimbatore district.It occupy an area about 1358 hectors. The latitude and longitude of the study area was 11°,18 N and 76°59 E. The average rainfalls of the study are 800mm per annum.These forests are highly prone to fire. The grass and many herbs dry up by April and May and leaf fall starts. The forest floor is thickly covered with dry twigs and leaves. The north east portion of this Jakkanari beat of Sirumugai Range has a small patch of this type of forests covering about an area of 5 sq.km around foot hills of Kottagiri. The pasture land is dominated by grass *Cynodon dactylon*. The climate of study area is tropical and monsoon. The floristic composition include more than 145 species belongs to grasses, sedges, forbs and trees.

2.2. Vegetation analysis

The herbaceous vegetation of the study area has been analysed over period of 6 months from September, 2012 to February, 2013. The sampling was done at the first week of every month for phytosociological studies.

2.3. Phytosociological studies

The minimum quadrate size of 1 x 1 m was fixed by the species-area curve method for phytosociological observations. Each time, 5 quadrates were laid by the randomised method. The

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minimum number of quadrates required (ie 5) was determined as described by Greig-Smith (6). For this mean number of individuals of the first two, four, six, eight and ten etc .Quadrates were calculated and plotted against the number of observations. It will be seen that the mean at first fluctuates, steadying as the required number of quadrates was reached.

The number and type of each species occurring in each quadrat were recorded. For grasses, each tiller counted as an individual because it is impossible to decide from aerial shoot whether it is separated or connect in the subterranean region, especially in perennial grasses. Different workers have used arbitrary units to represent an individual. Armstrong (7) and Stapleden (8) have counted the entire individuals as far as possible in the case of erect plants, but in creeping grasses each rooting unit has taken as an individual. Stove and Fryer (9) have considered an independent root system, as nearly as this could be determined without actually lifting the plant, to be a unit for counting. In the case of creeping plants, any portion of the plant, upto 5 cm in length and having functional root was counted as one plant. Only the plant beyond the seedling stage (ie., more than 2 cm height in case of monocots and beyond first leaf stage in dicots) were counted. The basal area at the point of emergence for the constituent species was measured. From the observation the quantitative characters such as frequency, density, abundance, relative frequency, relative density, relative dominance and importance value index were calculated.

Frequency, density and abundance were calculated using the following formulae

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

$$\text{Density} = \frac{\text{Total number of individuals of the species in all quadrats}}{\text{Total number of quadrats studied}}$$

$$\text{Abundance} = \frac{\text{Total number of individuals of the species in all quadrats}}{\text{Number of quadrats of occurrence of the species}}$$

Basal area $= \pi r^2$

Where,

π =3.14 and 'r' is the radius of the stem the point of emergence.

Relative frequency, relative density and relative dominance were calculated from the following formula:

$$\text{Relative Frequency} = \frac{\text{Number of occurence of the species}}{\text{Number of occurence of all species}} \times 100$$

$$\text{Relative density} = \frac{\text{Number of individuals of the species}}{\text{Number of individuals of all species}} \times 100$$

$$\text{Relative dominance} = \frac{\text{Total basal area of the species}}{\text{Total basal area of all species}} \times 100$$

Important Value Index (I.V.I) is the sum of quantities of relative frequency, relative density and relative dominance expressed per 300.

Dominance index was determined by the following formula as given by Simpson (10): $C=\sum (ni/N)^2$

Where,

C = dominance index.

ni= number of individuals of a species over unit area.

N= corresponding total number of individuals of all species over the same unit area.

$\sum$= Summation.

The Shannon – Wiener's index of species diversity was worked out by the following formula as given by Margalef (1968):

$H = -\sum \overline{Pi \ln Pi}$

Where,

H= Shannon – Wiener's index of species diversity.

Pi= S/N

S = Number of individuals of one species.

N= Total number of all individuals in this sample.

ln= the logarithm to the base ' e'.

The evenness index has been calculated by using the following formula:

$$EI = \frac{-H}{\text{Log } S}$$

Where,

H = Species diversity index.

S = Number of species

3. RESULTS

The present investigation was carried out in the pasture land of semi-deciduous forest, Sirumugai in Mettupalayam range of Coimbatore districts. The climatic data for the study period of the study area is given in Table 1. The maximum temperature was recorded ranged from 29.5°C September to 32.7°CMarch. The minimum temperature was varied between 23.2°C (October) and 21.8°C (August). The total rainfall recorded for the study period was 805 mm with the maximum of 356.6 mm during October and the minimum 3.7 mm during February. The rainy days were distributed in the early month of the study period (August). While the later months considerably decreasing rainy days. The relative humidity was generally above 68% and the February, experienced with lower humidity.

Table 1. The Frequency,abundance,density,relativefrequency,relativedensity,relative dominance and IVI of constituent species in the community of study area

S. No.	Name of the species	Frequency (%)	Abundance (individuals/m^2)	Density (individuals/m^2)	Basal Cover (Sq.mm/5 quadrats)	Relative Frequency (%)	Relative Density (individuals/m^2)	Relative dominance (%)	IVI
	GRASS								
1	*Chloris barbata*L.Swartz	80	3.25	2.6	7.8	1.37	0.78	0.35	2.49
2	*Cymbopogannardus* (L.)Rendle	100	5.6	5.6	56	1.71	1.67	2.51	5.88
3	*Cynodondactylon* (L.)Pers.	100	56	56	42	1.71	16.70	1.88	20.28
4	*Dactylocteniumaegyptium* (L.) Willd.	100	12	12	33	1.71	3.58	1.48	6.76
5	*Eragrostiellabifaria* (Vahl) Bor	100	15	15	22.5	1.71	4.47	1.01	7.19
6	*Eragrostistenella* (L.)Roem.&Schult.	100	2	2	3.5	1.71	0.60	0.16	2.46
7	*Heteropogoncontortus* (L.) P.Beauv.	100	4	4	16	1.71	1.19	0.72	3.62
8	*Pennisetumciliare* (L.)Link	100	17.2	17.2	43	1.71	5.13	1.93	8.76
9	*Setariaviridis* (L.) Beauv	100	4	4	9	1.71	1.19	0.40	3.30
10	*Digitariaciliaris* (Retz.) Koeler	100	2	2	1	1.71	0.60	0.04	2.35
11	*Eragrostisamabilis* (L.) W.&A.	100	4	4	3	1.71	1.19	0.13	3.03
	SEDGES								
1	*Cyperusrotundus* L	100	50	50	25	1.71	14.91	1.12	17.73
2	*Cyperusdistans* L.f.	100	13	13	9.75	1.71	3.88	0.44	6.02
	FORBS								
1	*Achyranthusaspera* L.	100	20	20	100	1.71	5.96	4.48	6.02
2	*Abrusprecatorius* L.	100	2	2	15	1.71	0.60	0.67	1.71
3	*Acalyphaindica*L.	100	4	4	20	1.71	1.19	0.90	12.15
4	*Aervalanata* (Linn.) Juss.	80	2.5	2	10	1.71	0.60	0.45	2.75
5	*Aloe vera* (Linn.) Burm.f.	0	0	0	0	0.00	0.00	0.00	0.00
6	*Andrographispaniculata* Nees.	100	3	3	2.4	1.71	0.89	0.11	2.71
7	*Boerhaaviadiffusa* L.	100	2	2	10	1.71	0.60	0.45	2.75
8	*Cortalariaretusa* L.	40	5	2	20	0.68	0.60	0.90	2.17
9	*Datura metal* L.	60	1.6	1	10	1.02	0.30	0.45	1.77
10	*Dendrocalamusstrictus* Nees.	20	2	0.4	20	0.34	0.12	0.90	1.36
11	*Enicostemmaaxillare* (Lam.) Raynal.	0	0	0	0	0.00	0.00	0.00	0.00
12	*Evolvulusalisinodes* L.	80	4.5	3.6	18	1.37	1.07	0.81	3.24

13	*Gymnemasylvestre* R.Br.	100	5	5	50	1.88	1.49	2.24	5.61
14	*Ipomoea obscura* (L.) Ker-Gawl.	60	3.3	2	15	1.02	0.60	0.67	2.29
15	*Leucasaspera* (Willd.) Link.	100	1	1	1.45	1.71	0.30	0.06	2.07
16	*Mimosa pudica* L.	60	1.3	0.8	8	1.02	0.24	0.36	1.62
17	*Mukiamadraspatana* (Linn.) M.Roemer.	100	2	2	20	1.71	0.60	0.90	3.20
18	*Occimumbasilicum* L.	100	2	2	20	1.71	0.60	0.90	3.20
19	*Ocimumcanum* Sims.	100	1	1	10	1.71	0.30	0.45	2.45
20	*Ocimumgratissimum* Linn.	0	0	0	0	0.00	0.00	0.00	0.00
21	*Ocimum sanctum* Linn.	60	1.6	1	5	1.02	0.30	0.22	1.55
22	*Phyllanthusamarus* Schum. & Thonn.	0	0	0	0	0.00	0.00	0.00	0.00
23	*Solanum trilobatum* L.	80	1	0.8	8	1.37	0.24	0.36	1.96
24	*Solanum virginianum* L.	0	0	0	0	0.00	0.00	0.00	0.00
25	*Spermacoceocymoides* (Brum.F.) DC.	100	10	10	100	1.71	2.98	4.48	9.17
26	*Tribulus terrestis* (L.)	100	1	1	10	1.71	0.30	0.45	2.45
27	*Tridax Procumbens*L.	100	16	16	240	1.71	4.77	10.75	17.23
28	*Abutilon hirtum*Sweet	100	2	2	20	1.71	0.60	0.90	3.20
29	*Abutilon indicum* (L.)Sweet	0	0	0	0	0.00	0.00	0.00	0.00
30	*Azimatetracantha*Lam.	40	1	0.4	6	0.68	0.12	0.27	1.07
31	*Barleria prionitis*L.	20	1	0.2	2	0.34	0.06	0.09	0.49
32	*Calotropis gigantea* (L.)W.T.Aiton	20	5	1	15	0.34	0.30	0.67	1.31
33	*Canthium coromandelicum* (Burm.f.) Alston	60	1.3	0.8	8	1.02	0.24	0.36	1.62
34	*Capparisroxburghii DC.*	100	3	3	45	1.71	0.89	2.02	4.62
35	*Capparissepiaria*Linn.	80	1	0.8	8	1.37	0.24	0.36	1.96
36	*Carissa carandas*Linn.	40	1.5	0.6	9	0.68	0.18	0.40	1.26
37	*Carissa Spinarum*L.	20	1	0.2	3	0.34	0.06	0.13	0.54
38	*Carmona retusa* (Vahl) Masam.	20	1	0.2	2	0.34	0.06	0.09	0.49
39	*Cipadessa baccifera* (Roth) Miq.	40	1	0.4	2	0.68	0.12	0.09	0.89
40	*Cissus quadrangularis*Linn.	100	1	1	20	1.71	0.30	0.90	2.90
41	*Cissus vitiginea* L.	100	1	1	15	1.71	0.30	0.67	2.68
42	*Coleus aromaticus* Benth.	100	1	1	15	1.71	0.30	0.67	2.68
43	*Croton sparsiflorus*Morong,Ann.	20	1	0.2	1	0.34	0.06	0.04	0.45
44	*Euphorbia antiquorum*L.	40	1	0.4	4	0.68	0.12	0.18	0.98
45	*Flacourtiaindica* (Brum.f.) Merr.	0	0	0	0	0.00	0.00	0.00	0.00
46	*Flueggealeucopyrus* Willd.	0	0	0	0	0.00	0.00	0.00	0.00

47	*Gmelinaasiaticas*L.	20	1	0.2	5	0.34	0.06	0.22	0.62
48	*Grewiaovalifolia*L.	20	1	0.2	2	0.34	0.06	0.09	0.49
49	*Jatropacurcas*L.	100	2.4	2.4	48	1.71	0.72	2.15	4.57
50	*Justiciatranquebariensis*Linn.f.	60	4.6	2.8	14	1.02	0.83	0.63	2.49
51	*Lantana camara*L.	100	4	4	40	1.71	1.19	1.79	4.69
52	*Opuntiastricta*(Haw.)Haw.	20	1	0.2	10	0.34	0.06	0.45	0.85
53	*Pachygoneovata*(Poir.)Meirs ex Hook.f.&Thomson	40	1.5	0.6	9	0.68	0.18	0.40	1.26
54	*Partheniumhysterophorus*L.	100	6	6	60	1.71	1.79	2.69	6.18
55	*Pavettaindica*Linn.	0	0	0	0	0.00	0.00	0.00	0.00
56	*Pavoniazeylanica*(L.) Car.	100	3.2	3.2	32	1.71	0.95	1.43	4.09
57	*Phyllanthus reticulates* L.	100	4.6	4.6	46	1.71	1.37	2.06	5.14
58	*Pterolobiumhexapetalum*(Roth) Sant.	60	1	0.6	9	1.02	0.18	0.40	1.61
59	*Scutiamyrtina*(Brum.f.) Kurz.	0	0	0	0	0.00	0.00	0.00	0.00
60	*Sidaaccuta,*Burm.	100	2.4	2.4	24	1.71	0.72	1.08	3.50
61	*Solanum pubescens*Willd.	100	4	4	40	1.71	1.19	1.79	4.69
62	*Tephrosiapurpurea*(L.) Pers.	100	6	6	150	1.71	1.79	6.72	10.21
63	*Toddaliaasiatica*(L.) Lam.	100	1.4	1.4	14	1.71	0.42	0.63	2.75
64	*Vernoniacinerea*(L.) Less.	100	5.6	5.6	112	1.71	1.67	5.02	8.39
65	*Zizyphusjujupa*Lam.	20	1	0.2	2	0.34	0.06	0.09	0.49
	TREE								
1	*Acacia chundra*(Roxb.) DC.	20	1	0.2	15	0.34	0.06	0.67	1.07
2	*Acacia concinna*(Willd.) DC.	0	0	0	0	0.00	0.00	0.00	0.00
3	*Acacia ferruginea*DC.	20	1	0.2	5	0.34	0.06	0.22	0.62
4	*Acacia leucophloea*(Roxb.) Willd.	20	1	0.2	8	0.34	0.06	0.36	0.76
5	*Acacia melanoxylon*R.Br.	0	0	0	0	0.00	0.00	0.00	0.00
6	*Ailanthus excels* Roxb.	0	0	0	0	0.00	0.00	0.00	0.00
7	*Ailanthus malabarica*DC.	0	0	0	0	0.00	0.00	0.00	0.00
8	*Albiziaamara*(Roxb.) Boiv.	20	1	0.2	7	0.34	0.06	0.31	0.71
9	*Albizialebbeck*Bent.	20	1	0.2	21	0.34	0.06	0.94	1.34
10	*Albiziaodoratissima (*L.f.) Benth.	20	1	0.2	6	0.34	0.06	0.27	0.67
11	*Annona squamosa*L.	20	1	0.2	11	0.34	0.06	0.49	0.89
12	*Anogeissuslatifolia*(Roxb. Ex DC.) Wall. Ex Guill. &Perr.	0	0	0	0	0.00	0.00	0.00	0.00
13	*Artocarpusheterophyllus*Lamk.	20	1	0.2	7	0.34	0.06	0.31	0.71
14	*Atalantiamonophylla*(L.) Correa	0	0	0	0	0.00	0.00	0.00	0.00

15	*Azadirachtaindica*A.Juss.	20	1	0.2	15	0.34	0.06	0.67	1.07
16	*Bassialatifolia*Roxb.	0	0	0	0	0.00	0.00	0.00	0.00
17	*Bauhinia racemosa*Lam.	20	1	0.2	3	0.34	0.06	0.13	0.54
18	*Bischofiajavanica*Blume	20	1	0.2	20	0.34	0.06	0.90	1.30
19	*Canthiumdiccoccum*(Gaertn.) Merr.	0	0	0	0	0.00	0.00	0.00	0.00
20	*Cappariszeylanica*L.	20	1	0.2	8	0.34	0.06	0.36	0.76
21	*Cassia auriculata*L.	20	1	0.2	9	0.34	0.06	0.40	0.80
22	*Cassia fistula* L.	20	1	0.2	11	0.34	0.06	0.49	0.89
23	*Cassineglauca*Rottb.Kuntze.	0	0	0	0	0.00	0.00	0.00	0.00
24	*Chloroxylonswietenia*DC.	0	0	0	0	0.00	0.00	0.00	0.00
25	*Cochlospermumreligiosum*(L.) Alston	20	1	0.2	10	0.34	0.06	0.45	0.85
26	*Cordia obliqua*Willd.	0	0	0	0	0.00	0.00	0.00	0.00
27	*Dalbergiapaniculata*Roxb.	0	0	0	0	0.00	0.00	0.00	0.00
28	*Diospyrosmontana*Roxb.	20	1	0.2	3	0.34	0.06	0.13	0.54
29	*Diospyrosmelanoxylon*Roxb.	0	0	0	0	0.00	0.00	0.00	0.00
30	*Eucalyptus tereticornis*Sm.	0	0	0	0	0.00	0.00	0.00	0.00
31	*Feronia elephantum*L.	0	0	0	0	0.00	0.00	0.00	0.00
32	*Ficusbenghalensis*L.	0	0	0	0	0.00	0.00	0.00	0.00
33	*Ficusglomerata*Roxb.	0	0	0	0	0.00	0.00	0.00	0.00
34	*Ficusmicrocarpa*L.f.	0	0	0	0	0.00	0.00	0.00	0.00
35	*Ficustravancorica*King	20	1	0.2	6	0.34	0.06	0.27	0.67
36	*Ficusvirens*L.	0	0	0	0	0.00	0.00	0.00	0.00
37	*Grewiatiliifolia*Vahl.	0	0	0	0	0.00	0.00	0.00	0.00
38	*Haldiniacardifolia*(Roxb.) Riddsdale	20	1	0.2	7	0.34	0.06	0.31	0.71
39	*Hardwickiabinata*Roxb.	0	0	0	0	0.00	0.00	0.00	0.00
40	*Ixorapavetta*Andrews	20	1	0.2	9	0.34	0.06	0.40	0.80
41	*Lagerstroemia lanceolata*Wall.	0	0	0	0	0.00	0.00	0.00	0.00
42	*Machilusmacrantha*Nees.	0	0	0	0	0.00	0.00	0.00	0.00
43	*Mangiferaindica*L.	20	1	2	40	0.34	0.60	1.79	2.73
44	*Melia azedarach* L.	20	1	0.2	20	0.34	0.06	0.90	1.30
45	*Melia dubia*Cav.	0	0	0	0	0.00	0.00	0.00	0.00
46	*Morindacoreiai*Bunch.	20	1	0.2	6	0.34	0.06	0.27	0.67
47	*Morindatinctoria*Roxb.	20	1	0.2	25	0.34	0.06	1.12	1.52
48	*Palaquiumellipticum*(Dalz.)Baill.	0	0	0	0	0.00	0.00	0.00	0.00
49	*Phyllanthusemblica*L.	20	1	0.2	20	0.34	0.06	0.90	1.30
50	*Pterocarpussantalinus*L.f.	20	1	0.2	15	0.37	0.06	0.67	1.10

51	*Pongamiapinnata*(L.) Pierre	20	1	0.2	30	0.34	0.06	1.34	1.74
52	*Pterocarpus marsupium* Roxburgh	0	0	0	0	0.00	0.00	0.00	0.00
53	*Santalum album* L.	20	1	0.2	40	0.34	0.06	1.79	2.19
54	*Schleicheraoleosa*(Lour.)Merr.	0	0	0	0	0.00	0.00	0.00	0.00
55	*Strychnosnux-vomica* L.	0	0	0	0	0.00	0.00	0.00	0.00
56	*Strychnospotatorum*L.	0	0	0	0	0.00	0.00	0.00	0.00
57	*Swieteniamahagoni*(L.)Jacq	0	0	0	0	0.00	0.00	0.00	0.00
58	*Tamarindusindica*L.	20	1	0.2	30	0.34	0.06	1.34	1.74
59	*Tectonagrandis*L.f.	20	1	0.2	20	0.34	0.06	0.90	1.30
60	*Termanaliachebula*Retz.	0	0	0	0	0.00	0.00	0.00	0.00
61	*Termanaliatomentosa*(Roxb.)Wight &Arn.	0	0	0	0	0.00	0.00	0.00	0.00
62	*Wrightiatinctoria*(Roxb.) R.Br.	20	1	0.2	32	0.34	0.06	1.43	1.83
63	*Ziziphusmauritiana*Lam.	20	1	0.2	12	0.34	0.06	0.54	0.94
		∑f 5880	∑ab385.35	∑ d 335.6	∑ bc 2247.4				

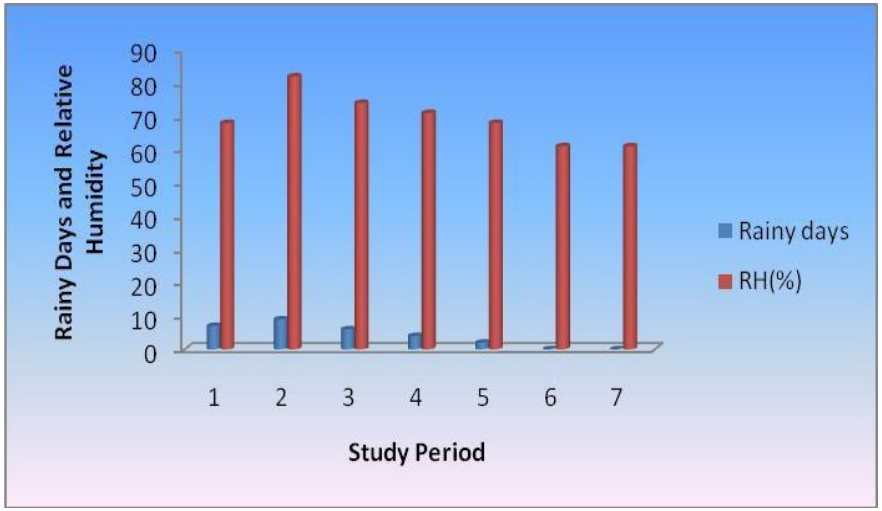

Fig. 1. Climatic data of the study area.

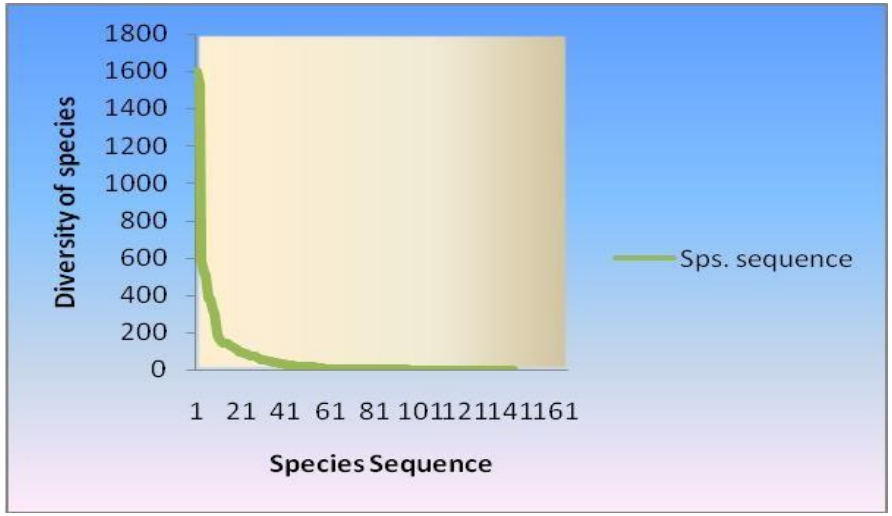

Fig. 2. Diversity – dominance curve for the study area.

3.1. Species diversity

During the study period September 2016 to March 2017 about 141 species of flowering plants belonging to 126 genera under 46 families were recorded from the study area. Regarding the habit of the plants, out of the 141 species, 63 were tree species, 65 belonged to forbs and shrub, 11 grasses and 2 sedges .

3.2. Family composition

Among the families, Poaceae is the largest one which constitutes 16species, followed by Fabaceae (15 species), Rubiaceae and Euphorbiaceae (9 species respectively), Lamiaceae (7 Species), Moraceae and Malvaceae(6 species respectively).

3.3. Status of grass, sedges, forbs and trees

During the study period 5quadrates are randomly laid down on the study area. Out of 141 individuals, the grasses belonging to 11 species were recorded from 5 quadrates covering 1358 hectors of Jakkanaribeat, Sirumugai. Based on Frequency values *Cymbopogan nardus* (100), *Cynodon dactylon* (100), *Dactyloctenium aegyptium* (100), *Pennisetumciliare* (100), *Eragrostisbifaria* (100), *Digitariaciliaris* (100), *Eragrostisamabilis* (100) etc., were dominant among the Grasses. Whereas *Cypeus rotundus* (100), *Cyperusdistans* (100) were the dominant components of Sedges. *Achyranthus aspera* (100), *Acalypha indica* (100), *Andrographispaniculata* (100), *Gymnema sylvestre* (100), *Spermacoce ocymoides* (100), *Tridax procumbens* (100), *Abutilon hirtum* (100), *Capparis roxburghii* (100) were the dominant components in Forbs layer. Based on Abundance values *Cynodon dactylon* (56), *Cyperus rotundus* (50), *Achyranthus aspera* (20), *Tridax procumbens* (16) etc., were the dominant components in the community. Based on the density values *Cynodon dactylon* (56), *Cyperus rotundus* (50), *Achyranthus aspera* (20), *Tridax procumbens* (14) etc., were the dominant component of the grasses and forbs layer. Based on the Basal cover values *Tridax procumbens* (240), *Tephrosia purpurea* (150), *Achyranthus aspera* (100), etc., were dominant components of shrubacious layers. *Mangifera indica* (40), *Santalum album* (40), *Albizia leebeck* (21), *Tectona gradis* (20), etc., were dominant among the tree species. Based on the IVI values *Cynodon dactylon* (20.28), *Cyperus rotundus* (17.73), *Tridax procumbens* (17.23), *Acalypha indica* (12.15), *Eragros tiellabifaria* (7.19), *Dactyloctenium aegyptium* (6.76), *Achyranthus aspera* (6.02) etc., were the dominant components of shrubacious layer (Table 1). The species composition, the number of individuals in each species and the number of sampling units in which each species were present are given in table. The total number of individuals and hence the density altogether in the studied period were positively related to the density of the species varied between 165.4 and 335.6 individuals/m^2. Numerically the grass *Cynodon dactylon* contributed higher individuals than that of the other studied group. Apart from the grass, the sedge species, *Cyperus rotundus* shared maximum number of individuals. Among the grasses the species, *Pennise tumciliare*, *Eragros teillabifaria,* and *Dactyloctenium aegyptium* and sedges like *Cyperus distans* and forbs like *Achyranthus aspera,* and Tress like *Acacia chundra, Mangifera indica* and *Pterocarpus santalinus* showed their appearance at all times of sampling. The other species observed during the study period appeared only in limited time.

Frequency is usually expressed in terms of percentage occurrence of individual's species in an area. On global level, based on analysis on several thousands of quadrates. Raunkiaer (11) propounded the law of frequency. The frequency class 'A' include those species where the frequency values ranged between 1 and 20 percent, frequency class 'B' between 21 and 40 percent, frequency class 'C' between 41 and 60 percent, frequency class 'D' 61 and 80 percent and frequency class 'E' between 81 and 100 percent. Based on the relative proportion of different classes, Raunkiaer gave a law of frequency as

<
A > B > C= D < E
>

Relative frequency refers to relative dispersion of a species in respect to that of rest of the species. Density represents the number of individuals of a species in unit ground area in a community. Abundance however, refers, to the number of individuals per unit area on the basis of the number of quadrates of occurrence only. It is not like the density where the numbers of all the quadrates studied in the community are taken into account. Relative density is an expression for numerical strength of a species in relation to the total number of individuals of all the species of an area. The basal area is regarded as an index of dominance of a species and the term signifies the are occupied by the aboveground part of the plant at the region of emergence Relative dominance is a coverage value of species with respect to the coverage of the rest of the species. The Importance Value Index (IVI) of a species derived from the percentage values of the relative frequency, relative density and relative dominance is used to assess its ecological importance in the community. All the

sociological characters viz. frequency, density, basal area and their relative values abundance and importance values index of the study area the presented in table1. The study area was characterized by an even distribution of grasses in general. All other species have restricted distribution. The shrub, *Spermacoce ocymoides* was important in the study area in terms of its numerical strength. On the basis of increasing or decreasing values of basal cover and importance value index, species have classified as 'increasers' and 'decreasers' (12,13). Irena Simova (14) has regarded the frequency to be more artificial character than density and basal cover. The latter two are more reliable as they remain unaltered by varying quadrate size. It is known from the study are that the shrub *Spermacoceo cymoides* Occupied maximum basal cover area. In order to express the ecological success of any species with single values, the concept of importance value index has been developed. The quantitative values of relative dominance are added to get the IVI. Gupta and Das (15) used relative biomass in place of relative basal cover (relative dominance) to attain the IVI.

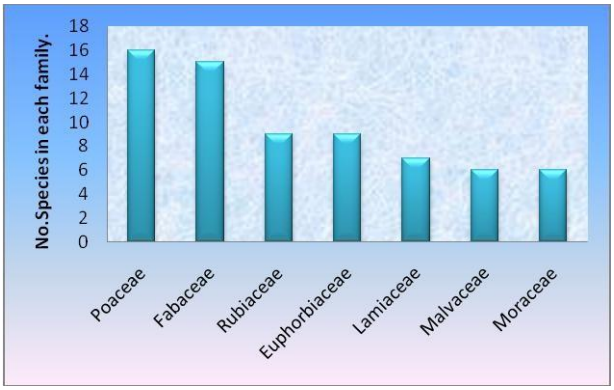

Fig. 3. Dominant families of the study area.

Of the 141 species found in the study area the maximum ecological importance was attributed to the herb, *Spermacoceocymoides* and followed by *Achyranthusaspera,Tridaxprocumbens,*and *Tephrosiapurpurea* the all remaining 137 species altogether contributed very less ecological importance. Dominance - diversity curve for the study area have been drawn to interpret the community organizations in terms of resources sharing and niche space . It is confirmed that in the study area the single species *Spermacoceocymoides* the maximum share of the available community resources. The dominance index during the study period was varied from 0.067 to 0.081 and it was more pronounced during dry months. The diversity index was ranged from 1.31 to 1.36. It is observed that the species diversity and evenness were inversely proportional to dominance of the community. The result adds a new and important contest of understanding on the effect of plant diversity on ecosystem services and functioning in terrestrial ecosystem.

4. DISCUSSION

An analysis of the temperature data during the study period indicated that there is a well marked season in the study area, since the differences between seasonal temperatures ranged widely. The study conducted by Simon and Mohankumar (16) also reported that altitude and rain fall in Kerala are not correlated. On the other hand the study on rain fall in Palakkad Gap in Western Ghats by Raj and Azeez (17) show annual rain fall varying with altitude. The total annual rain fall of the Palakkad plains is lower than the total annual rain fall for the whole state Kerala (18,19). The ombrothermic graph shows that it is a humid region due to the wide spread moderate rainfall and higher humidity. Due to its specific geographical location, the climate of the Palakkad plain is highly influenced by the humid climate of Kerala as well as the more arid climate condition on the western side of the Western Ghats (17).

Forest degradation is usually accompanied by species extinction, reduction in biodiversity and decrease in primary productivity. Consequently, there is a growing interest in quantifying habitat characteristics like foret structure, floristic composition and species richness in Indian forest (20 - 24). Phytosociological analysis of plant community is the first and foremost basis of the study of any species of vegetation as it is a pre-requisite for the understanding of community structure and organization. Species composition is one of the major characters of plant community. The dominance distribution pattern at the levels of species and family justifies mature, stable and complex nature of vegetation (25-27). It is evident from the data (Table 3) that the study area comprised a considerable number of individuals contributed by the shrubs were considerably higher that the grasses. This may be attributed to the presence of wide ecological amplitude in shrubs (27,28). There exists little authentic quantitative ecological information pertaining to vegetation aspects in relation to the soil nutrient status in this region.

Of the 141 species present in the community generally the shrubs showed even distribution. According to Misra (27) this may be due to their high reproductive capacity, quick dispersal of seeds and wind pollination to produce viable seeds. The herb, *Hyptissuaveolens*registered higher density and basal cover. Mc Naughton (29) opined that the presence of

tolerance to poor conditions, adaptability and suitability to varies ecological niches for certain shrub species could be the possible reasons for the successful establishment in the grazing grasslands and the herbage yield as the dominant and important shrub. The relative frequency, relative density and relative dominance of the herb, *Hyptissuaveolens*was generally higher that the other species at all times of sampling. The quality and diversity of the species combination around individuals-so called neighbourhood diversity-is important from functional aspect as well (30-32)

The dominance-diversity curves prepared for the study are (Fig. 3) also confirmed the single species dominance in the community in terms of resource sharing. In addition, these curve fit for the geometric series confirming the niche pre-emption hypothesis of Whittaker (33) which stated that the single species (*Hyptissuaveolens*) occupied the maximum share of the available community resources. High species content and more even distributions of I.V.I among the species in dry deciduous forest depict high degree of stability and complexity of community (27).It has been argue that the ecosystem with high species diversity is more stable and resilient to environmental disturbance than those have low species diversity.

It is well known from the data that the species diversity of the study area was fluctuating according to seasons. Higher diversity was found in rainy seasons. During rainy months many species tend to grew equally. However in adversed conditions the species diversity decreased and farrowing only few drought tolerant species. The dominance index found to be decreased during rainy season in the study area. This is attributed to the favourable condition (26, 27).

5. Conclusion

The phytosociological analysis for a pasture land community was carried out in the Jakkanari beat, Sirumugai Range of Coimbatore district, over a period of seven months from September, 2016 to March 2017. The habitat is humid and the climatic factors were determined to be favourable for the growth of the vegetation. Altogether it is estimated that 141 species were found in the study area. Among them, the herb, *Cyanodon dactylon* is found to be dominant as it received maximum impact of the environment. The distribution, numerical strength, basal cover, and their relative values and importance value index were higher for this species. The dominance-diversity curve obtained also indicates that this species shared the maximum resources of the habitat. However on basis of numerical strength no species are dominating in the study area. As the diversity index is above 2 at most of the sampling times, it is known that the species diversity in the study area is well and adequate. It is desired that the community was a consociational unit due to the prevalence of single species dominance. There for it is expected to have still more productivity herbage which can be highly beneficial for many wild herbivores and hence the maintenance of ecological balance.

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