

FLORISTIC DIVERSITY OF DICOTS IN KANJIRAKUNNU HILLS, MALAPPURAM DISTRICT, KERALA

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Abstract

Studies on diversity of dicotyledons and the community structure was conducted at Kanjirakunnu hills, Malappuram District. The floristic survey revealed the occurrence of 55 species belonging to 23 families. The study was conducted during September to March which covered mostly the winter and summer seasons. Maximum number of species (7 species) was obtained from the family Scrophulariaceae. Family Rubiaceae was represented by 5 species, Families Asteraceae, Convolvulaceae and Lamiaceae were represented by 4 species each. Families Fabaceae, Apocynaceae and Euphorbiaceae were represented by 3 species each. Sapindaceae and Gentianaceae were represented by 2 members each. In this study, the maximum density was recorded by the species *Polygala elongata*. The second most density was recorded for *Justicia procumbence*. The frequency was highest for *Justicia procumbence*, *Spermacoce articularis*, *Osbeckia muralis*, *Polygala elongata*. *Spermacoce articularis* was the most abundant species in the study area. Second most abundance was for *Justicia procumbence*. The dominance of species is calculated based on Species Importance Value Index (IVI) Considering the IVI values, the dominant species in the study area was *Spermacoce articularis*

Key words: Dicotyledons, Community structure, Value Index

Introduction

Biodiversity represents the variety and abundance of life expressed at the genetic, population, species and ecosystem levels. India is known for its rich biological diversity. The Western Ghats is one of the biodiversity hotspot in India and exists as major component contributing the biodiversity for Kerala state (Anto and Jasy, 2015). Floristic diversity can be defined as the diversity of indigenous plants present in a specific area during a particular time period. The floral diversity is also important to influencing social, economic and ecological niche of the country (Sharma and Sharma, 2012). Floristic diversity refers to the number of taxa in a given region or group (Raghavendra Rao, 2017). Floristic catalogues are the source of botanical details for a particular field and it serves as a useful point for numerous detailed learning (Keith, 1988). The listing of species provides important public outreach and fundamental informations to use in addressing the biodiversity crisis (Funk *et al.*, 2007). The study deals with the assessment of Floristic diversity of dicot plants of Kanjirakunnu hills situated in peringavu, near Ramanaattukara, Malappuram district, which is a rocky area with very less human interference and with rich diversity of flora belonging to different groups.

The name Kanjirakunnu derived from the tree Kanjiram (*Strychnos nux vomica*), which is widely distributed in this region. The area has heterogeneous vegetation along elevation gradient. The ground vegetation is dense in soil filled areas and a grassland appearance in peaks. The base of the mountain are clothed with scrub vegetation, while with increasing elevation occur dry deciduous, mixed deciduous and evergreen forest. It contains many medicinal plants, endangered and threatened species of plants. The rocks surface found bryophytes, pteridophytes, lichens and fungi and various habits are including this area such as trees, shrubs, herbs,

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and climbers. Many Parasitic and epiphytic plant species are also found there. There is an average annual temperature of 33°C. Climate is tropical in nature. The peaks get immersed in fog during monsoon and winter season. It is hot and sunny during the other seasons.

Materials and Methods

Study Area

The study area, Kanjirakkunnu hills is located in Cherukavu panjayath in Kondotti thaluk, Malappuram district. It is a village situated around 4.5 km from Ramanaattukara, Kozhikkode district. The region falls within the biogeographic zone of the Western Ghats. The area lies at the latitude of 11.192830° N and a longitude of 75.899287°E.

Floristic Survey

Collection trips were conducted to this area during September 2020-March 2021, covering winter and summer seasons. Dicotyledonous plants were collected and photographs were taken. Most of the specimens were collected in generative stage like flowering and fruiting stages or both. But where generative stages could not be observed during this period of study, vegetative specimens were also collected as far as possible. Field observations like collection number, collection date, altitude, local name, family, habit and brief descriptions were noted in the field note. The specimens were collected, pressed and labelled for herbarium preparation.

The specimens identified with the help of various Floras like Flora of the Presidency of Madras, other relevant literature, and online access were also referred. For preparation of keys to the family, genus and species was based on Bentham and Hooker System of Classification. Artificial keys were provided for families, genera and species. Keys were strictly dichotomous, indented.

Community Analysis

Community analysis was done by quadrant method with minimum quadrant size of 1×1 meter by species area curved method. Twenty

quadrants were randomly taken for analysis. The numerical value were used to find out frequency, density, relative frequency, relative density, relative basal area, value index by using standard formula (Curtis and McIntosh, 1950). Abundance, frequency and density and were calculated using the following formula:

a. Abundance: It is the study of the number of individuals of different species in the community per unit area.

By quadrant method, samplings are made at random at several places and the number of individuals of each species was summed up for all the quadrants divided by the total number of quadrants in which the species occurred. It is represented by the equation:

Abundance = Total no of individuals of the species in all quadrates'/no of quadrates' of occurrence of the species.

b. Frequency: This term refers to the degree of dispersion of individual species in an area and usually expressed in terms of percentage of occurrence. It was studied by sampling the study areas at several places at random and recorded the name of the species that occurred in each sampling units. It is calculated by the equation:

Frequency = (No of quadrats in which the species occurred/ total no of quadrats studied) x 100

c. Density: Density is an expression of the numerical strength of a species where the total number of individuals of each species in all the quadrats is divided by the total number of quadrats studied. Density is given by the equation:

Density = Total no of individuals of the species in all the quadrats/ total no of quadrats studied
Relative frequency, relative density and relative dominance were calculated using the following formulae:

Relative Frequency (RF) = (Number of occurrence of the species /Number of occurrence of all species) x 100

Relative density (RD) = (Number of individuals of the species / Number of individuals of all species) x 100

Relative dominance (RDo) = (Total basal area of the species / Total basal area of all species) x 100

IVI = RD + RF + RDo, RIVI = IVI/3

Result and Discussion

Floristic survey

A total of 55 species belonging to 23 families were collected and identified (Table 1)

The floristic survey gave information on approximate floral wealth of study area. Maximum number of species (7 species) were obtained from the family Scrophulariaceae. Family Rubiaceae was represented by 5 species, Families Asteraceae, Convolvulaceae and Lamiaceae were represented by 4 species each. Families Fabaceae, Apocynaceae and Euphorbiaceae were represented by 3 species each. Sapindaceae and Gentianaceae were represented by 2 members each.

Table 1. List of specimens collected

Sl no	Species name	Family
1	<i>Uvaria narum</i> , Wall.	Annonaceae
2	<i>Ionidium suffruticosum</i> , Ging F. & Thoms.	Menispermaceae
3	<i>Ionidium suffruticosum</i> , Ging.	Violaceae
4	<i>Polygala elongata</i> , Klein	Polygalaceae
5	<i>Polycarpha corymbosa</i> , Lam	Caryophyllaceae
6	<i>Sida acuta</i> , Burrn.	Malvaceae
7	<i>Naregamia alata</i> , W. & A.	Meliaceae
8	<i>Cardiospermum halicacabum</i> , Liim;	Sapindaceae
9	<i>Allophylus serratus</i> , Radlk. A. Cobbe	Sapindaceae
10	<i>Indigofera trifoliata</i> , Linn	Fabaceae
11	<i>Cassia mimosoides</i> , Linn	Fabaceae
12	<i>Abrus precatorius</i> , Linn	Fabaceae
13	<i>Mimosa pudica</i> , Linn	Fabaceae
14	<i>Melastoma malabathricum</i> , Linn.	Melastomataceae
15	<i>Oldenlandia auriculata</i> (L) K.Schum.	Rubiaceae
16	<i>Oldenlandia herbacea</i> , Roxb. O. Heynii, Hook. f.	Rubiaceae
17	<i>Borreria hispida</i> , K. Sch.	Rubiaceae
18	<i>Ixora coccinea</i> Linn.	Rubiaceae
19	<i>Chasalia curviflora</i> , Thw.	Rubiaceae
20	<i>Vernonia cinera</i> , Less.	Asteraceae
21	<i>Elephantopus scaber</i> , Linn.	Asteraceae
22	<i>Synedrella nodiflora</i> , Gaertn.	Asteraceae
23	<i>Tridax procumbens</i> , Linn.	Asteraceae
24	<i>Holabrilena antidysenterica</i> , Wall.	Apocynaceae
25	<i>Ichnocarpus frutescens</i> , R. Br.	Apocynaceae
26	<i>Hemidesmus indicus</i> , R. Br.	Apocynaceae
27	<i>Strychnos nux vomica</i> , Linn	Loganiaceae
28	<i>Exacum bicolor</i> , Roxb	Gentianaceae
29	<i>Canscora diffusa</i> , R. Br.	Gentianaceae
30	<i>Ipomoea obscura</i> , Ker-Gawl.	Convolvulaceae
31	<i>Evolvulus alsinoides</i> , Linn.	Convolvulaceae

32	<i>Evolvulus nummularius</i> (L.) L.	Convolvulaceae
33	<i>Merremia tridentata</i> , Hallier f.	Convolvulaceae
34	<i>Cuscuta reflexa</i> , Roxb.	Scrophulariaceae
35	<i>Lindenbergia urticaefolia</i> , Link and Otto	Scrophulariaceae
36	<i>Torenia bicolor</i> , Dalz.	Scrophulariaceae
37	<i>Buchnera hispida</i> , Ham.	Scrophulariaceae
38	<i>Striga lutea</i> , Lour	Scrophulariaceae
39	<i>Sopubia delphinifolia</i> , G. Don	Scrophulariaceae
40	<i>Centranthera indica</i> , Gamble n. comb.	Scrophulariaceae
41	<i>Rungia parviflora</i> , Nees	Acanthaceae
42	<i>Justicia procumbens</i> , Linn.	Acanthaceae
43	<i>Lantana camara</i> , Linn.	Verbenaceae
44	<i>Clerodendron infortunatum</i> Linn.	Verbenaceae
45	<i>Clerodendron serratum</i> Spreng	Verbenaceae
46	<i>Ocimum sanctum</i> , Linn.	Lamiaceae
47	<i>Hyptis suaveolens</i> Poit.	Lamiaceae
48	<i>Dysophylla quadrifolia</i> Benth	Lamiaceae
49	<i>Leucas aspera</i> R. Br.	Lamiaceae
50	<i>Cassytha filiformis</i> Linn.	Lauraceae
51	<i>Santalum album</i> Linn	Santalaceae
52	<i>Antidesma menasu</i> Miq.	Euphorbiaceae
53	<i>Breynia patens</i> Rolfe	Euphorbiaceae
54	<i>Tragia involucrata</i> , Linn.	Euphorbiaceae
55	<i>Sebastiania chamaelea</i> Muell. Arg.	Euphorbiaceae

Systematic Treatment

Key to the Angiosperms

1. Leaves reticulately veined; flowers 4-5 merous.....Dicotyledonae
 1. Leaves parallel veined; flowers trimerous.....Monocotyledonae

Key to the Dicotyledonae

1. Flowers usually with only one whorl of Petals or none
 inner whorl of perianth is undifferentiated..... Monochlamydeae
 1. Inner whorl of perianth differentiated to sepal & petal
 2. Petals free.....Polypetalae
 2. Petals united... ..Gamopetalae

Key to the families of Polypetalae

1. Flowers with prominent disc; calyx free from ovary
 2. Leaves glandular.....Rutaceae
 2. Leaves aglandular.....Meliaceae
 1. Flowers with receptacle modified to torus or calyx adnate with ovary
 3. Flower hypogynous
 4. Unisexual, climbers.....Menispermaceae
 4. Bisexual, trees or shrub.....Malvaceae
 3. Flowers perigynous/ epigynous
 5. Petal/sepal united to form perianth.....Aizoaceae
 5. Petal/sepal differentiated from perianth
 6. Fruit legumes.....Fabaceae
 6. Fruit berry/ drupe/ pepo
 7. Leaves many lobed; climbers.....Cucurbitaceae
 7. Leaves single lobed; erect herb/shrub.....Myrtaceae

Key to the families of Gamopetalae

- 1. Ovary inferior
 - 2. Calyx modified into pappus.....Asteraceae
 - 2. Calyx normal with sepal.....Rubiaceae
- 2. Ovary superior
 - 3 . Milky laticiferous shoots.....Apocynaceae
 - 3 . Milky latex free from shoots
 - 4. Ovules many per carpel
 - 5. Anthers united to pairs.....Gesneriaceae
 - 5. Anthers free.....Acanthaceae
 - 4. Ovule 1-2 per carpel
 - 6.Style gynobasic; ovary 4 lobed.....Lamiaceae
 - 6. Style terminal; ovary 2/4 lobed.....Verbanaceae

Key to the families of Monochlamydeae

- 1. Unisexual or polygamous flowers
 - 2. Leaves obscure; Carpel 3.....Euphorbiaceae
 - 2. Leaves prominent; Carpel 2.....Moraceae
- 1. Bisexual flowers.....Santalaceae

Key to Monocotyledonae

- 1. Fruit caryopsis.....Poaceae
- 1. Fruit achene.....Cyperaceae

Table 2. Number individuals in of each quadrat

Sl. no	Name of species	Number of individuals in each quadrat																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	<i>C. mimosoides</i>	2	5	3	0	4	0	8	2	0	7	3	5	7	0	0	2	6	1	0	2
2	<i>J. procumbence</i>	8	12	18	7	9	6	13	17	9	4	2	5	6	8	3	14	11	8	2	2
3	<i>S. articularis</i>	12	11	15	16	11	7	8	11	9	5	8	13	12	8	5	9	16	10	11	3
4	<i>O. muralis</i>	5	7	4	5	5	7	6	8	3	2	4	4	3	4	5	4	8	5	2	4
5	<i>L. aspera</i>	0	0	2	0	3	1	1	1	0	2	4	3	0	0	0	1	5	2	1	1
6	<i>M. hirtus</i>	3	3	0	2	3	3	4	1	2	0	0	0	3	3	1	4	0	2	0	0
7	<i>N. alata</i>	3	1	0	0	2	0	0	0	4	3	2	0	3	0	0	8	5	0	3	1
8	<i>C. diffusa</i>	3	0	2	1	2	4	3	2	2	0	2	4	1	0	0	8	0	2	3	3
9	<i>H. enneaspermus</i>	0	5	2	0	0	3	0	3	0	2	2	2	1	4	5	0	0	3	0	1
10	<i>C. odorata</i>	0	0	0	0	1	0	2	0	0	0	3	1	1	0	2	0	0	0	1	0
11	<i>S. chamaelea</i>	2	1	1	3	3	3	2	0	0	5	2	3	3	3	0	3	1	3	1	0
12	<i>P. elongate</i>	8	11	8	5	5	3	6	9	9	2	0	1	7	3	0	4	9	5	5	1
13	<i>B. sensitivum</i>	0	0	0	0	3	2	2	0	1	0	1	1	3	4	0	0	2	1	0	0
14	<i>E. alsinoides</i>	5	3	9	5	5	2	2	0	1	3	3	4	6	5	5	5	5	4	4	0
15	<i>S. acuta</i>	0	0	0	2	0	0	3	0	0	1	0	0	2	0	2	2	1	1	1	0
16	<i>I. trifoliata</i>	3	5	11	5	11	7	8	4	4	6	6	0	0	5	3	2	4	5	8	8
17	<i>L. camera</i>	0	0	0	1	0	1	0	3	0	2	1	1	0	0	0	0	1	0	1	1
18	<i>C. peltata</i>	1	0	0	0	0	0	1	0	0	0	1	0	1	0	0	2	0	0	0	1
19	<i>M. pudica</i>	2	0	1	1	3	1	2	1	1	0	1	2	0	0	1	3	2	2	1	4
20	<i>I. coccinea</i>	1	0	0	0	2	1	0	0	0	3	0	0	1	0	1	0	0	0	0	1

Table 3. Abundance, frequency and density of individuals

Sl.no	Name of species	A	B	C	D	E	F	G	H	IVI	RIVI
1	<i>C. mimosoides</i>	14	57	4.07	70	2.85	5.13	5.14	5.13	15.40	5.13
2	<i>J. Procumbence</i>	20	164	8.2	100	8.2	14.76	7.35	14.76	36.87	12.29
3	<i>S. articularis</i>	20	200	10	100	10	18.00	7.35	18.00	43.35	14.45
4	<i>O. muralis</i>	20	95	4.75	100	4.75	8.55	7.35	8.55	24.45	8.15
5	<i>L. aspera</i>	13	27	2.07	65	1.35	2.43	4.77	2.43	9.63	3.21
6	<i>M. hirtus</i>	13	34	2.61	65	1.7	3.06	4.77	3.06	10.90	3.63
7	<i>N. alata</i>	11	35	3.18	55	1.75	3.15	4.04	3.15	10.34	3.44
8	<i>C. diffusa</i>	15	42	2.8	75	2.1	3.78	5.51	3.78	13.07	4.35
9	<i>H. enneaspermus</i>	12	33	2.75	60	1.65	2.97	4.41	2.97	10.35	3.45
10	<i>C. odorata</i>	7	11	1.57	35	0.55	0.99	2.57	0.99	4.55	1.517
11	<i>S. chamaelea</i>	16	39	2.43	80	1.95	3.51	5.88	3.51	12.90	4.30
12	<i>P. elongate</i>	18	101	5.61	90	5.05	9.09	6.61	9.09	24.79	8.26
13	<i>B. sensitivum</i>	10	20	2	50	1	1.80	3.67	1.80	7.27	2.42
14	<i>E. alsinoides</i>	18	76	4.22	90	3.8	6.84	6.61	6.84	20.29	6.76
15	<i>S. acuta</i>	9	15	1.66	45	0.75	1.35	3.30	1.35	6.00	2.00
16	<i>I. trifoliata</i>	18	105	5.83	90	5.25	9.45	6.61	9.45	25.51	8.50
17	<i>L. camera</i>	9	12	1.33	45	0.6	1.08	3.30	1.08	5.46	1.82
18	<i>C. peltata</i>	6	7	1.16	30	0.35	0.63	2.20	0.63	3.46	1.15
19	<i>M. pudica</i>	16	28	1.75	80	1.4	2.52	5.88	2.52	10.92	3.64
20	<i>I. coccinea</i>	7	10	1.42	35	0.5	0.90	2.57	0.90	4.37	1.45

A: Occurrence, B: Number of Individuals, C: Abundance, D: Frequency, E: Density, F; Relative abundance, G: Relative Frequency, H: Relative density

Community Analysis

The data from the analysis consist of list of species in the study area (10). Second most species in an area for the study and their abundance which gave information about which species are present in a certain area.

Density

In this study, the maximum density was recorded by the species *Polygala elongata*. The second most density was recorded for *Justicia procumbence*. (Tables 2-3)

Frequency

The frequency was highest for *Justicia procumbence*, *Spermacoce articularis*, *Osbeckia muralis*, *Polygala elongata*. (Tables 2-3).

Abundance

Spermacoce articularis was the most abundant species in the study area (10). Second most abundance was for *Justicia procumbence* (8.2). This was followed by *Indigofera trifoliata* (5.83), *Polygala elongata* (5.51) and *Evolvulus alsinoides* (4.22) and *Osbeckia muralis* (4.75) (Tables 2-3).

Importance Value Index (IVI)

The dominance of species is calculated based on Species Importance Value Index (IVI) Considering the IVI values, the dominant species in the study area was *Spermacoce articularis* (43.35). This was followed by *Justicia procumbence* (36.87), *Polygala elongata* (24.79), *Osbeckia muralis* (24.45) and *Evolvulus alsinoides* (20.39).

Conclusion

Knjirankunnu is mostly an undisturbed laterite hill with abundant dicot plant diversity. The predominant species in the area are grassland flora with a few trees. Not only grasslands have a local importance for the maintenance of biodiversity and food production, but they also affect ecological processes at landscape like pollination, water regulation and climate regulation. Grasslands are recognized globally for their high biodiversity and their social and cultural values. Kanjirakunnu is a typical grassland with rich dicot floral diversity, which plays a crucial role in maintain the microclimate of the local area. Biodiversity of this special ecosystem has to be con served from humaninterference.

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