

Taxonomic Diversity and Distribution of Trees and their Regeneration Status in Sringeri Forest Range, Western Ghats, Karnataka

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Abstract

The present study reveals about the diversity and distribution of tree species in Sringeri Range. About 97 species belong to 73 genera and 42 families. Major number of species show medicinal values and economically important.

Keywords: Western Ghats, Karnataka, Sringeri Range, Tree Species

Introduction

Plants are the indicators of prosperity. Plant diversity indicates fertility of the land. Plants reflect the rich tradition, culture and history of the land. The diversity of the land, the life form and the complexities have generated lot of interest among people since ages. In India, there is a great need for a thorough inventory of our plant resources is undisrupted, particularly when we see all around extensive disruption of natural forests due to large scale mining operations, constructions of dams, roads and various other developmental projects. The destruction of forests has resulted in a pronounced imbalance in the effectiveness of precipitation, maintenance of water table and percentage of humidity and transpiration (Simhanet al., 1981).

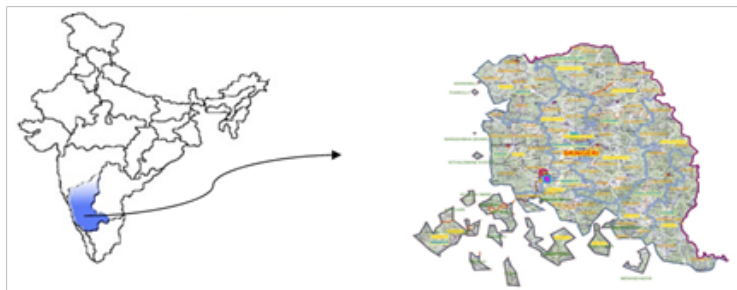
Trees are the most important constituent of forests. It plays a major role in elucidating the patterns of distribution of biodiversity. These distributions are governed by biotic and abiotic factors (Ghateet al., 1998; Upadhyay&Upadhyay, 2012). According to forester's and ecologist's a tree is defined as a woody plant that reaches diameter of 10cm (30cm girth) or more at the breast height (130cm above ground) (Chuyonget al., 2011). Trees provide basic requirements of human beings in the form of air, food, timber, plywood, paper, fuel wood, medicine and also give aesthetic value. The trees populations

are disappearing at alarming rate due to deforestation, urbanization (Kishor et al., 2011) and other various human needs (Ihenyen et al., 2009) (Kambharet al., 2014)

Hence the present study is undertaken to get the current status of diversity of trees in forest areas of Sringeri range with the information of exact distribution and frequency along with the statistical analysis.

Materials and Methods

Study Area: Sringeri Range belong to Chikmagalur a malnad district of Karnataka State with a geographical area of 7201 sq.km is situated in mid – south – western part of state. The district covers about 30% of vegetation. The place with hills and plains traversed by the river Tunga and its tributaries has bestowed rich diversity of plant wealth. The study area is situated between 13°30'50" to 13° 11' 34" N and 75° 04' 35" to 75° 19' 53" E. Sringeri has well defined physiographic regions. It has surrounded by many hills, the elevation ranges about 600-900m. Lateritic and red loams are found in Sringeri. Sringeri and its part receive rainfall from south West Monsoon and North East monsoons. The average rainfall is around 3000 mm. The maximum temperature reaches 36°C during summer and minimum around 12°C during winter. Considering topography, bioclimate and soil the vegetation of the region is broadly categorized under Evergreen, moist deciduous, dry deciduous and Shola and grasslands. Tropical evergreens occupy the western region and higher altitudes with gradual change in species composition towards the eastern side leading to disturbed evergreen with moist deciduous elements and dry deciduous species in the open and disturbed hills (Balakrishnagowda 2004).



Methodology

Field work: A frequent field visits were under taken in different vegetation in the forest range to document the diversity of trees. Before going to the field survey, a basic data about type of forests, total area of available vegetation are collected from the concern range forest office.

A belt transect of size 5m x 100m were laid in each selected vegetation in all blocks of the forest range. Number of transect is based on the area of forest cover and about 50 transects were laid to minimize the statistical error.

In each transect, all the trees, climbers and liana species are documented. Trees having ≥ 30 cm GBH (Girth at Breast Height) are considered as adult trees and their GBH is measured to calculate basal area and relative dominance. At both ends of each transects, quadrates of 5m x 5m were laid to document regenerated tree species.

The regenerated tree species are categorized as three classes.

Class 1: Seedlings – Regenerating tree species below one feet height

Class 2: Saplings – Regenerating tree species with 1-3 feet height

Class 3: Poles – Regenerating tree species with >3feet height and < 30 cm GBH.

Statistical analysis: The recorded trees within the belt transects in the forest range are statistically analysed. Frequency, Re-frequency, Density, Re-density, Abundance, IVI (Importance Value Index) of each plants, Shannon diversity value and Simpson's species richness values of trees in the forest range are calculated by using respective formulae (Cottam and Curtis, 1956; Shannon and Wiener, 1963; Simpson, 1949).

Result and Discussion

Table 1: Diversity of Trees

Sl. No.	Species Name	Family	A	D	F	IVI
1	<i>Acronychia pedunculata</i> (L.) Miq.	Rutaceae	1.00	0.06	0.06	0.74
2	<i>Actinodaphne hookeri</i> Meisn.	Lauraceae	1.45	0.32	0.22	3.28
3	<i>Aglaia roxburghiana</i> (Wight & Arn.) Miq.	Meliaceae	1.50	0.12	0.08	1.25
4	<i>Ailanthus altissima</i> (Mill.) Swingle	Simaroubaceae	1.29	0.18	0.14	1.93
5	<i>Albizia lebbek</i> (L.) Benth. ^{T,M}	Leguminosae	1.00	0.02	0.02	0.25
6	<i>Alstonia scholaris</i> (L.) R. Br. ^M	Apocynaceae	1.00	0.02	0.02	0.24
7	<i>Aporosa cardiosperma</i> (Gaertn.) Merr. ^M	Euphorbiaceae	3.94	2.68	0.68	29.41
8	<i>Artocarpus dadah</i> Miq. ^{M,E}	Moraceae	1.00	0.08	0.08	1.07
9	<i>Artocarpus heterophyllus</i> Lam. ^{T,M,E}	Moraceae	1.80	0.18	0.1	1.80
10	<i>Artocarpus hirsutus</i> Lam. ^{T,M}	Moraceae	1.73	0.52	0.3	7.11
11	<i>Baliospermum solanifolium</i> (Burm.) Suresh ^M	Euphorbiaceae	1.00	0.02	0.02	0.24
12	<i>Bombax ceiba</i> L. ^{M,E}	Malvaceae	1.00	0.02	0.02	0.27
13	<i>Buchanania cochinchinensis</i> (Lour.) ^M	Anacardiaceae	1.00	0.06	0.06	0.75
14	<i>Butea monosperma</i> (Lam.) Taub. ^{M,E}	Leguminosae	2.00	0.04	0.02	0.33
15	<i>Callicarpa tomentosa</i> (L.) ^{L,M}	Lamiaceae	1.00	0.02	0.02	0.25
16	<i>Calophyllum apetalum</i> Willd. ^{T,M}	Clusiaceae	1.00	0.02	0.02	0.25
17	<i>Canarium strictum</i> Roxb. ^{T,M,E}	Burseraceae	1.00	0.18	0.18	2.89
18	<i>Carallia brachiata</i> (Lour.) Merr. ^{T,M}	Rhizophoraceae	1.25	0.1	0.08	1.14
19	<i>Caryota urens</i> L. ^M	Arecaeae	1.00	0.12	0.12	1.50
20	<i>Celtis timorensis</i> Span.	Cannabaceae	1.00	0.04	0.04	0.50
21	<i>Cinnamomum malabratrum</i> (Burm.f.) J. Presl ^{M,E}	Lauraceae	1.71	0.48	0.28	4.66
22	<i>Cinnamomum sulphuratum</i> Nees ^{M,E}	Lauraceae	1.00	0.02	0.02	0.25
23	<i>Clausena dentata</i> (Willd.) M. Roem.	Rutaceae	1.50	0.06	0.04	0.57
24	<i>Cryptocarya wightiana</i> Thwaites	Lauraceae	1.00	0.02	0.02	0.24
25	<i>Dalbergia latifolia</i> Roxb. ^{T,M}	Leguminosae	1.75	0.28	0.16	2.86
26	<i>Dillenia pentagyna</i> Roxb. ^M	Dillaneaeceae	1.00	0.06	0.06	0.76

27	<i>Dimocarpus longan</i> Lour.	Sapindaceae	3.22	1.48	0.46	15.89
28	<i>Diospyros candolleana</i> Wight ^M	Ebenaceae	1.00	0.02	0.02	0.24
29	<i>Diospyros ebenum</i> J.Koenig ex Retz. ^M	Ebenaceae	2.38	0.38	0.16	3.27
30	<i>Diospyros paniculata</i> Dalzell ^M	Ebenaceae	1.00	0.02	0.02	0.25
31	<i>Elaeocarpus serratus</i> L. ^M	Elaeocarpaceae	1.30	0.26	0.2	3.26
32	<i>Elaeocarpus tuberculatus</i> Roxb. ^M	Elaeocarpaceae	2.00	0.04	0.02	0.41
33	<i>Eugenia roxburghii</i> DC.	Myrtaceae	2.00	0.04	0.02	0.33
34	<i>Ficus exasperata</i> Vahl ^M	Moraceae	1.00	0.06	0.06	0.78
35	<i>Ficus hispida</i> L.f. ^M	Moraceae	1.50	0.06	0.04	0.59
36	<i>Ficus racemosa</i> L. ^M	Moraceae	1.00	0.02	0.02	0.25
37	<i>Ficus species</i>	Moraceae	1.00	0.1	0.1	1.43
38	<i>Ficus tsjahela</i> Burm. f.	Moraceae	1.00	0.02	0.02	0.25
39	<i>Flacourtia indica</i> (Burm.f.) Merr. ^M	Flacourtiaceae	1.42	0.34	0.24	3.50
40	<i>Flacourtia montana</i> J. Graham	Flacourtiaceae	1.00	0.16	0.16	2.03
41	<i>Garciniagummi-gutta</i> (L.) Roxb. ^{M,E}	Clusiaceae	2.50	0.9	0.36	8.60
42	<i>Garcinia morella</i> (Gaertn.) Desr. ^{M,E}	Clusiaceae	1.58	0.38	0.24	3.88
43	<i>Glochedianz eylanicum</i> (Gaertn.) A. Juss. ^M	Phyllanthaceae	1.80	0.18	0.1	1.83
44	<i>Gmelina arborea</i> Roxb. ^T	Lamiaceae	1.00	0.02	0.02	0.24
45	<i>Gordonia obtusa</i> Wall. Ex Wight	Theaceae	1.25	0.1	0.08	1.16
46	<i>Grewia tiliifolia</i> Vahl	Malvaceae	1.00	0.02	0.02	0.24
47	<i>Holarrhena pubescens</i> Wall. Ex G.Don ^M	Apocynaceae	1.00	0.02	0.02	0.24
48	<i>Holigarna arnottiana</i> Hook.f. ^M	Anacardiaceae	1.20	0.24	0.2	2.90
49	<i>Holigarna grahamii</i> (Wight) Kurz ^M	Anacardiaceae	2.25	0.18	0.08	1.53
50	<i>Holigarna nigra</i> Bourd.	Anacardiaceae	1.36	0.3	0.22	3.24
51	<i>Hopea canarensis</i> Hole	Dipterocarpaceae	1.00	0.02	0.02	0.25
52	<i>Hopea parviflora</i> Bedd.	Dipterocarpaceae	4.22	0.76	0.18	6.94
53	<i>Hopea ponga</i> (Dennst.) Mabb.	Dipterocarpaceae	9.43	1.32	0.14	11.62
54	<i>Hydnocarpus pentandrus</i> (Buch.-Ham.) Oken ^M	Achariaceae	1.00	0.02	0.02	0.24
55	<i>Ixora brachiata</i> Roxb. ^M	Rubiaceae	1.00	0.06	0.06	0.74
56	<i>Knema attenuata</i> Warb. ^M	Myristicaceae	2.05	0.78	0.38	7.28
57	<i>Lagerstroemia microcarpa</i> Wight ^{T,M}	Lythraceae	1.00	0.14	0.14	1.92
58	<i>Litsea floribunda</i> Gamble	Lauraceae	1.25	0.2	0.16	2.21
59	<i>Litsea laevigata</i> Gamble	Lauraceae	1.00	0.02	0.02	0.25
60	<i>Lophopetalum wightianum</i> Arn. ^{T,M}	Celastraceae	3.93	1.1	0.28	16.59
61	<i>Macaranga peltata</i> (Roxb.) Mull. Arg. ^M	Euphorbiaceae	1.00	0.04	0.04	0.49

62	<i>Madhuca indica</i> J. F. Gmel. ^M	Sapotaceae	1.00	0.1	0.1	1.30
63	<i>Mallotus philippensis</i> (Lam.) Mull. Arg. ^{M,E}	Euphorbiaceae	1.00	0.02	0.02	0.24
64	<i>Mangifera indica</i> L. ^{T,M,E}	Anacardiaceae	1.13	0.18	0.16	2.31
65	<i>Memecylon talboltianum</i> D.Brandis ^M	Melastomataceae	1.56	0.28	0.18	2.68
66	<i>Memecylon umballatum</i> Burm. F.	Melastomataceae	2.33	0.14	0.06	1.10
67	<i>Mesua ferrea</i> L. ^M	Calophyllaceae	6.00	0.12	0.02	0.70
68	<i>Meyna laxiflora</i> Robyns	Rubiaceae	1.00	0.02	0.02	0.24
69	<i>Mimusops elengi</i> L.	Sapotaceae	2.33	0.98	0.42	12.60
70	<i>Mitragyna parvifolia</i> (Roxb.) Korth.	Rubiaceae	1.00	0.02	0.02	0.25
71	<i>Murraya paniculata</i> (L.) Jack	Rutaceae	1.20	0.12	0.1	1.39
72	<i>Myristica dactyloides</i> Gaertn. ^M	Myristicaceae	1.00	0.04	0.04	0.49
73	<i>Nothopegia beddomei</i> Gamble	Anacardiaceae	1.22	0.22	0.18	2.41
74	<i>Nothopegiaracemosa</i> (Dalzell) Ramamoorthy	Anacardiaceae	1.33	0.24	0.18	2.53
75	<i>Olea dioica</i> Roxb. ^M	Oleaceae	2.62	1.1	0.42	12.18
76	<i>Pajanelia longifolia</i> (Willd.) K.Schum.	Bignoniaceae	1.00	0.02	0.02	0.24
77	<i>Persea macrantha</i> (Nees) Kosterm. ^{T,M}	Lauraceae	2.44	0.78	0.32	9.93
78	<i>Pittosporum tenuifolium</i> Banks & Sol. Ex Gaertn. ^M	Pittosporaceae	1.50	0.06	0.04	0.57
79	<i>Psydrax dicoccos</i> (Gaertn.) ^M	Rubiaceae	1.00	0.08	0.08	0.99
80	<i>Pterocarpus marsupium</i> Roxb. ^{T,M}	Leguminosae	1.00	0.04	0.04	0.53
81	<i>Rapanea wightiana</i> (Wall. Ex A.DC.) Mez	Primulaceae	1.33	0.08	0.06	0.82
82	<i>Scleropyrum pentandrum</i> (Dennst.) Mabb.	Santalaceae	1.00	0.02	0.02	0.24
83	<i>Strychnos nux-vomica</i> L. ^M	Loganiaceae	1.00	0.04	0.04	0.50
84	<i>Symplocas cochinchinensis</i> (Lour.) S.Moore	Symplocaceae	1.60	0.48	0.3	5.62
85	<i>Syzygium caryophyllatum</i> (L.) Alston ^{M,E}	Myrtaceae	2.22	0.4	0.18	3.41
86	<i>Syzygium cumini</i> (L.) Skeels ^{T,M,E}	Myrtaceae	3.50	2.38	0.68	45.13
87	<i>Syzygium gardneri</i> Thwaites	Myrtaceae	1.00	0.04	0.04	0.52
88	<i>Syzygium laetum</i> (Buch.-Ham.) Gandhi	Myrtaceae	1.00	0.08	0.08	0.99
89	<i>Syzygium zeylanicum</i> (L.) DC. ^{T,M,E}	Myrtaceae	1.00	0.02	0.02	0.24
90	<i>Tabernaemontana heyneana</i> Wall. ^M	Apocynaceae	2.29	0.32	0.14	2.61
91	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	1.38	0.22	0.16	2.74

92	<i>Terminalia paniculata</i> Roth ^{T,M}	Combretaceae	1.61	0.58	0.36	7.74
93	<i>Terminalia tomentosa</i> Wight & Arn. ^{T,M}	Combretaceae	2.09	0.46	0.22	4.85
94	<i>Toona ciliata</i> M.Roem.	Meliaceae	1.00	0.04	0.04	0.50
95	<i>Vepris bilocularis</i> Engl.	Rutaceae	1.00	0.1	0.1	1.25
96	<i>Vitex altissima</i> L.f.	Lamiaceae	1.00	0.04	0.04	0.50
97	<i>Ziziphus rugosa</i> Lam. ^{M,E}	Rhamnaceae	1.00	0.02	0.02	0.24

Note: A-Abundance, D-Density, F-Frequency, T-Timber yielding, M-Medicinally valuable, E-Economically valuable

The study yielded a total 97 species of trees belong to 73 genera and 42 families. *Aporosacardiosperma* (Gaertn.) Merr. of Euphorbiaceae showed highest density (2.68) and Frequency (0.68) *Hopea pona* (Dennst.) Mabb. of Dipterocarpaceae showed highest abundance (9.43) *Syzygium cumini* (L.) Skeels of Myrtaceae showed highest importance value index (45.13) Shannon's diversity index value is 3.71 and Simpson's importance index value is 0.97.

Table 2: Diversity of Seedlings

Sl. No	Species Name	A	D	F	SIV
1	<i>Actinodaphne hookeri</i>	2.00	0.08	0.04	1.80
2	<i>Aporosa cardiosperma</i>	3.76	0.94	0.25	15.01
3	<i>Bamboosa arundinaceae</i>	1.00	0.01	0.01	0.36
4	<i>Caryota urens</i>	2.48	0.99	0.40	19.61
5	<i>Cinnamomum malabattrum</i>	3.91	0.90	0.23	14.11
6	<i>Clausena dentata</i>	1.00	0.02	0.02	0.73
7	<i>Croton roxburghii</i>	1.67	0.05	0.03	1.26
8	<i>Cryptocarya wightiana</i>	1.00	0.01	0.01	0.36
9	<i>Dalbergia latifolia</i>	3.82	0.42	0.11	6.66
10	<i>Dimocarpus longan</i>	6.00	1.26	0.21	16.65
11	<i>Diospyros montana</i>	1.58	0.19	0.12	4.96
12	<i>Elaeocarpus serratus</i>	3.64	0.40	0.11	6.49
13	<i>Flacourtia montana</i>	2.25	0.18	0.08	3.77
14	<i>Garcinia morella</i>	1.00	0.01	0.01	0.36
15	<i>Holigarna arnottiana</i>	2.25	0.09	0.04	1.88
16	<i>Hopea parviflora</i>	2.00	0.04	0.02	0.90
17	<i>Hopea pona</i>	6.00	0.18	0.03	2.38
18	<i>Knema attenuata</i>	1.25	0.05	0.04	1.54
19	<i>Litsea floribunda</i>	2.83	0.65	0.23	11.97
20	<i>Litsea laevigata</i>	2.33	0.14	0.06	2.87
21	<i>Lophopetalum wightianum</i>	1.00	0.01	0.01	0.36
22	<i>Macaranga peltata</i>	2.00	0.02	0.01	0.45
23	<i>Madhuca indica</i>	1.50	0.03	0.02	0.81

Table 3: Diversity of Saplings

Sl. No.	Species Name	A	D	F	SIV
1	<i>Actinodaphne hookeri</i>	2.50	0.05	0.02	1.73
2	<i>Ailanthus altissima</i>	1.00	0.01	0.01	0.59
3	<i>Aporosacardiosperma</i>	2.92	0.73	0.25	23.56
4	<i>Calophyllum apetalum</i>	1.50	0.03	0.02	1.37
5	<i>Caryota urens</i>	1.83	0.11	0.06	4.47
6	<i>Cinnamomum malabattrum</i>	2.85	0.37	0.13	12.07
7	<i>Clausena dentata</i>	2.00	0.02	0.01	0.78
8	<i>Croton roxberghii</i>	1.00	0.01	0.01	0.59
9	<i>Dalbergia latifolia</i>	4.19	0.67	0.16	18.75
10	<i>Dimocarpus longan</i>	2.25	0.27	0.12	9.85
11	<i>Diospyros montana</i>	2.00	0.1	0.05	3.88
112	<i>Elaeocarpus serratus</i>	1.50	0.09	0.06	4.11
13	<i>Flacourtia montana</i>	2.50	0.05	0.02	1.73
14	<i>Garcinia gummi-gutta</i>	2.00	0.02	0.01	0.78
15	<i>Garcinia morella</i>	3.00	0.03	0.01	0.96
16	<i>Garcinia xanthochymus</i>	1.00	0.01	0.01	0.59
17	<i>Holigarna arnottiana</i>	1.50	0.03	0.02	1.37
18	<i>Hopea parviflora</i>	5.00	0.1	0.02	2.64
19	<i>Hopea ponga</i>	6.33	0.19	0.03	4.68
20	<i>Ixora brachiata</i>	1.00	0.01	0.01	0.59
21	<i>Knema attenuata</i>	1.43	0.1	0.07	4.70
22	<i>Lagerstroemia microcarpa</i>	1.00	0.01	0.01	0.59
23	<i>Litsea floribunda</i>	1.43	0.2	0.14	9.41
24	<i>Litsea laevigata</i>	1.75	0.07	0.04	2.92
25	<i>Lophopetalum wightianum</i>	1.00	0.01	0.01	0.59
26	<i>Mallotus philippensis</i>	1.00	0.01	0.01	0.59

Table 4: Diversity of Poles

Sl. No	Species Name	A	D	F	SIV
1	<i>Ailanthus altissima</i>	1.00	0.01	0.01	0.77
2	<i>Ailanthus malabarica</i>	2.00	0.02	0.01	0.99
3	<i>Aporosa cardiosperma</i>	2.90	0.58	0.2	23.96
4	<i>Bamboosa arundinaceae</i>	1.00	0.01	0.01	0.77
5	<i>Calophyllum apetalum</i>	1.00	0.01	0.01	0.77
6	<i>Canarium strictum</i>	1.00	0.01	0.01	0.77
7	<i>Caryota urens</i>	1.90	0.19	0.1	9.71
8	<i>Celtis timorensis</i>	1.00	0.01	0.01	0.77

9	<i>Chroton roxbergi</i>	1.00	0.01	0.01	0.77
10	<i>Cinnamomum malabattrum</i>	2.33	0.21	0.09	9.63
11	<i>Clausena dentata</i>	1.00	0.01	0.01	0.77
12	<i>Dalbergia latifolia</i>	3.43	0.48	0.14	18.45
13	<i>Dimocarpus longan</i>	3.57	0.82	0.23	31.03
14	<i>Diospyros montana</i>	1.33	0.04	0.03	2.53
15	<i>Elaeocarpus serratus</i>	2.00	0.02	0.01	0.99
16	<i>Enterolobium saman</i>	1.00	0.01	0.01	0.77
17	<i>Garcinia gummi-gutta</i>	1.17	0.07	0.06	4.83
18	<i>Holigarna arnottiana</i>	2.00	0.02	0.01	0.99
19	<i>Hopea ponga</i>	2.00	0.08	0.04	3.98
20	<i>Knema attenuata</i>	4.57	0.32	0.07	11.04
21	<i>Litsea floribunda</i>	2.00	0.02	0.01	0.99
22	<i>Litsea laevigata</i>	1.33	0.04	0.03	2.53
23	<i>Macaranga peltata</i>	1.00	0.01	0.01	0.77
24	<i>Memecylon talboltianum</i>	1.80	0.09	0.05	4.74
25	<i>Mesua ferrea</i>	1.00	0.01	0.01	0.77
26	<i>Murraya paniculata</i>	2.56	0.41	0.16	17.95
27	<i>Nothopegia beddomei</i>	1.67	0.2	0.12	11.02

During the present study, the 23 species of seedlings, 26 species of saplings and 27 species of poles are recorded. The most important sapling species is *Caryotaurens*, seedling species is *Aporosacardiosperma* and pole species is *Dimocarpus longan* with highest Species importance value index. Dominance of established seedlings, saplings under the adult trees also affects the future composition of the community. Regeneration through seeds depends on production, dispersal and germination of seeds, and establishment and growth of seedlings.

Conclusion

The importance of forests cannot be underestimated. We depend on forests for our survival, from the air we breathe to the wood we use. The ground vegetation forms only a small proportion of the total biomass in the forest ecosystem.

The pressure originating due to the differences in micro climate and inter-specific competition influences the regeneration of different species and also opens the door for the invasion acclimatization of new species in a forest ecosystem. The regeneration behavior of different tree species is characterized by their population structure, which in turn depends upon the presence of adequate number of seedlings, saplings and poles in different girth classes.

Stringeri Range shows a good level of distribution of tree diversity. This is supported by the Shannon's and Simpson's diversity indices. This Range falls under Western Ghats region which is one of the hotspot of Biodiversity. This luxuriant diversity is to be conserved and more concern should be given on protecting the forest areas from human encroachment.

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