

RESEARCH ARTICLE

Tree Species Composition and Diversity Indices in Woodland of Seminary Hills, Nagpur

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Manuscript details:	ABSTRACT
<p>Available online on http://www.ijlsci.in</p> <p>ISSN: 2320-964X (Online) ISSN: 2320-7817 (Print)</p> <p>Editor: Dr. Chavhan Arvind</p> <p>Cite this article as: Surpam Dewanand C, Kamble Rahul B and Chaturvedi Alka (2016) Tree Species Composition and Diversity Indices in Woodland of Seminary Hills, Nagpur, <i>Int. J. of Life Sciences</i>, A6: 149-152.</p> <p>Copyright: © Author, This is an open access article under the terms of the Creative Commons Attribution-Non-Commercial - No Derives License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.</p>	<p>The vegetation diversity of the country not only provide an endless opportunity to study the plant systematic but it also opens several new vistas of plant sciences like ethnobotany, biotechnology, endemism, phytogeography of biodiversity and its conservational strategies etc. This study carried out in the forest of Seminary Hills which are characterized by a uniform distribution of individuals with mixed species composition and various selected five sites are represented by different combinations of the dominants and co- dominants woodland species. The density and size distribution of trees contribute to the structural pattern characteristics of the forest. Present study revealed that, 33 tree species of 29 genera belonging to 20 families were observed. The area is blessed with rich vegetation. It showed the most prominent woody elements like <i>Hardwickia binata</i>, <i>Anogeissus latifolia</i>, <i>Boswellia serrata</i>, <i>Gardenia resinifera</i>, <i>Dalbergia sissoo</i>, <i>Chloroxylon sweitenia</i>, <i>Sterculia urens</i>, <i>Tectona grandis</i> etc. RD, RF and RBA were calculated to evaluate its Important Value Indices (IVI) to characterize the species dominance which indicates larger tree diversity in smaller area. Shannon-Wiener Diversity index observed ranges from 12.94 to 30.97 while Simpson's index with 0.1223 to 0. 1389 in selected sites.</p> <p>Keywords: Tree diversity, Population Study, Diversity Indices, Seminary Hills, Nagpur</p> <p>INTRODUCTION</p> <p>India considered as one of the mega-diverse countries of the world. The floral and the vegetation diversity of this country not only provide an endless opportunity to study the plant systematics but it also opens several new vistas of plant sciences like ethnobotany, biotechnology, endemism, phytogeography and biodiversity and its conservational strategies etc. However, all these present subjects had initiated their journey as the branches of Botanical Sciences. Natural resource survey like floristic study plays an important role in the economic development of developing country like India. Vegetation is the most precious gift, nature has provided to us as meeting all kinds of fodder, fuel, medicine, timber, resins and oil etc. Plant communities play a pivotal role in sustainable management by maintaining biodiversity and conserving the environment. Floristic study and diversity</p>

assessment are necessary to understand the present diversity status and conservation of biodiversity. Floristic study is necessary prerequisite for much fundamental research in tropical community ecology, such as modeling patterns of species diversity or understanding species distribution (Ganorkar and Kshirsagar, 2014). Besides the detailed assessment of floristic diversity of area of conservation; endemic, endangered and medicinally important plant species and cause of forest destruction are equally important in assigning conservation values. Based on this, Kamble (2013) worked on the assessment of some ecological aspects of some threatened medicinal plants from same region of Nagpur District, Maharashtra. Across the world, 25 hotspots have been identified on the basis of species endemism and degree of threat through habitat loss. Out of these two are confined to Indian sub continents i.e. Western Ghats and Eastern Himalaya (Rathod, 2013).

MATERIAL AND METHODES

Selected Area: Seminary Hills:

The selected study area Seminary Hills is located with latitude 21°9'57"North and Longitude 79°3'47" East. Total area of Seminary Hills Reserved forest Seminary Hills is 174.97 Acres, in Disforestation area is 8.40 Acres. (67.41 Ha) (Government Notification No.372-1502 XI of 43.Date 30/3/1944). The study site divided into five major regions with their longitudes and latitudes are SFS Arboretum (N 21° 9' 56.9287" E 79° 4' 7.7838"), Deer Park (N 21° 10' 2.4755" E 79° 3' 38.4683"), Lurd Mata Temple (N 21° 9' 50.4093" E 79° 3' 48.1629"), Telangkhedi Village(N 21° 10' 11.2998" E 79° 3' 43.2963") and Children Park (N 21° 10' 6.6535" E 79° 3' 53.7247").

Quantitative Analysis: The important quantitative analysis such as density, frequency, and abundance, Important Value Index, Relative Basal Area, Shannon and Simpson Index of tree species were determined as per Curtis and McIntosh (1951) and Misra (1968).

Stand Variables and ecological indices: Relative density, Relative frequency, and Relative basal area were calculated by the formulas given below. The importance value index was calculated from these three parameters to characterize the species dominance of the reserve.

The identification and authentication of various tree species has been done with the standard literatures; different floras, research papers and reports viz., Flora of Nagpur District (Ugemuge 1986), (Singh and Karthikeyan 2000), (Singh et al. 2001)

RESULT AND DISCUSSION

50 quadrates were plotted to evaluate tree species composition in the area. Quadrates of 10×10 meter radius were carved out for the study of trees which are more than ten centimeter in DBH Floristic survey was done to compare biodiversity of the different compartment. To determine the population of plant species or a community, the quantitative analysis is to be determined firstly. From this study, Important Value Index, Shanon, and Simpsons index of all sites were evaluated. In Site I, SFS Arboratum, maximum IVI was observed as 0.838 in *Tectona grandis* while minimum IVI was observed 0.033 in *Lagerstroemia parviflora* and Shanon, Simpsons index is 0.528, 0.0717 respectively. In Site II, Deer Park, maximum IVI was observed as 0.104 in *Albizia lebbeck* while minimum IVI was observed 0.018 in *Boswellia serrata* and Shannon, Simpson index is 1.3257, 0.0012 respectively. In Site III, Lurd Mata Temple, maximum IVI was observed as 0.552 in *Tectona grandis* while minimum IVI was observed 0.026 in *Neolamarckia kadamba* and Shannon, Simpson index is 0.7564, 0.0464 respectively. In Site IV, Telankhedi Village, maximum IVI was observed as 0.691 in *Tectona grandis* while minimum IVI was observed 0.059 in *Zizyphus xylopyra* and Shannon, Simpson index is 0.623, 0.0569 respectively. In Site V, Children Park, maximum IVI was observed as 0.784 in *Azadirachta indica* while minimum IVI was observed 0.022 in *Cleistanthus collinus* and Shannon, Simpson index is 0.6534, 0.0439 respectively (Table 1).

Besides Nagpur city the floristic study were done in the Gorewada International Biopark (Proposed) forest area, Nagpur. Kamble et al. (2012) enumerated total of 449 species under 286 genera belonging to 80 families. Out of these enumerated species 79 are trees forms, 30 were shrubs 46 climbers and 294 were herbs. Among the 79 trees the most common species are *Dalbergia sisso*, *Dalbergia paniculata*, *Acacia leucophloea*, *Terminalia alata*, *Butea monosperma*, *Anogeissus latifolia*, *Hardwickia binata*, *Tectona grandis*, *Boswellia serrata*, and *Mitragyna parviflora* etc. in 1885 ha while,

Table 1: Tree Species Composition and Diversity Indices in Woodland of Seminary Hills, Nagpur

Sr. No.	Name of Species	Site - I SFS Arboretum			Site -II Deer Park			Site -III Lurd Mata Temple			Site -IV Telangkhedi Village			Site - V Children Park		
		IVI	H	D	IVI	H	D	IVI	H	D	IVI	H	D	IVI	H	D
1	<i>Hardwickia binata</i>	0.316	0.919	0.0102	0.55	0.6682	0.0338	0.383	0.9365	0.0223	0.424	0.122	0.0214	0.404	0.9307	0.0116
2	<i>Dalbergia sisso</i>	0.068	1.534	0.0005	0.11	1.3036	0.0013	0.156	1.3791	0.0037	-	-	-	0.046	1.8395	0.0001
3	<i>Tectona grandis</i>	0.838	0.528	0.0717	0.83	0.5058	0.0771	0.552	0.7564	0.0464	0.691	0.623	0.0569	0.765	0.6637	0.04186
4	<i>Chloroxylon swietenia</i>	0.134	1.262	0.0018	0.28	0.9347	0.0087	0.203	1.2493	0.0062	0.188	1.188	0.0042	0.332	1.0128	0.0078
5	<i>Sterculia urens</i>	0.11	1.341	0.0012	-	-	-	0.095	1.6235	0.0013	-	-	-	0.021	2.1675	4.1201
6	<i>Anogeissus latifolia</i>	0.333	0.897	0.0113	0.31	0.8946	0.0107	0.121	1.5043	0.0022	0.109	1.425	0.0014	0.15	1.3451	0.0016
7	<i>Lagerstroemia parviflora</i>	0.033	1.824	0.0001	0.16	1.1557	0.0028	-	-	-	0.197	1.168	0.0046	0.138	1.38	0.0013
8	<i>Albizia odoratissium</i>	0.047	1.682	0.0002	-	-	-	-	-	-	-	-	-	-	-	-
9	<i>Casia fistula</i>	0.182	1.14	0.0034	-	-	-	-	-	-	-	-	-	0.094	1.5406	0.0006
10	<i>Terminalia alata</i>	0.134	1.262	0.0018	-	-	-	-	-	-	-	-	-	0.169	1.2952	0.0020
11	<i>Gardenia resinifera</i>	0.411	0.813	0.0172	0.044	1.6653	0.0002	-	-	-	-	-	-	0.266	1.1055	0.0050
12	<i>Tamarindus indica</i>	0.281	0.966	0.0081	-	-	-	0.049	1.9497	0.0003	-	-	-	-	-	-
13	<i>Cassia siamea</i>	-	-	-	0.064	1.5174	0.0004	-	-	-	-	-	-	-	-	-
14	<i>Bauhinia racemosa</i>	-	-	-	0.064	1.5174	0.0004	-	-	-	-	-	-	-	-	-
15	<i>Pterocarpus marsupium</i>	-	-	-	-	-	-	-	-	-	0.157	1.266	0.0029	-	-	-
16	<i>Albizia lebbeck</i>	-	-	-	0.104	1.3257	0.0012	-	-	-	-	-	-	-	-	-
17	<i>Albizia procera</i>	-	-	-	-	-	-	0.06	1.8499	0.0005	-	-	-	-	-	-
18	<i>Acacia catechu</i>	-	-	-	0.084	1.4100	0.0007	0.034	2.1298	0.0001	-	-	-	-	-	-
19	<i>Acacia leaucophloea</i>	-	-	-	-	-	-	0.033	2.1445	0.0001	0.151	0.779	0.0027	0.266	1.1055	0.0052
20	<i>Mitragyna parviflora</i>	-	-	-	0.099	1.3452	0.0010	-	-	-	-	-	-	-	-	-
21	<i>Neolamarckia kadamba</i>	-	-	-	-	-	-	0.026	2.2620	0.0001	-	-	-	-	-	-
22	<i>Cleistanthus collinus</i>	-	-	-	-	-	-	-	-	-	-	-	-	0.022	2.148	0.004
23	<i>Azadirachta indica</i>	-	-	-	-	-	-	-	-	-	-	-	-	0.784	0.6534	0.0439
24	<i>Lannea coromandelica</i>	-	-	-	-	-	-	0.21	1.2326	0.0067	0.133	1.338	0.0021	0.018	2.2319	2.3175
25	<i>Bombex cieba</i>	-	-	-	-	-	-	0.029	2.2082	0.0001	-	-	-	0.085	1.5827	0.0005
26	<i>Madhuca indica</i>	-	-	-	-	-	-	-	-	-	-	-	-	0.017	2.2559	2.0672
27	<i>Boswelvia serrata</i>	-	-	-	0.018	2.0182	0.00003	0.186	1.2924	0.0052	-	-	-	-	-	-
28	<i>Ziziphus oenoplea</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	<i>Soymida febrifuga</i>	-	-	-	-	-	-	0.034	2.1298	0.0001	0.159	1.261	0.003	-	-	-
30	<i>Zizyphus xylopyra</i>	-	-	-	-	-	-	-	-	-	0.059	1.691	0.0004	-	-	-
31	<i>Grewia tilifolia</i>	-	-	-	-	-	-	0.289	1.075	0.0127	-	-	-	-	-	-
32	<i>Cochlospermum religiosum</i>	-	-	-	-	-	-	0.034	2.1298	0.0001	-	-	-	-	-	-
33	<i>Leucaena leucocephala</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

in our study area i.e. Seminary Hills Forest area of 67.41 ha area; observed 33 tree species including the most prominent species like *Hardwickia binata*, *Tectona grandis*, *Anogeissus latifolia*, *Boswellia serrata*, *Gardenia resinifera*, *Dalbergia sissoo*, *Chloroxylon sweitenia*, *Sterculia urens*. This indicates larger tree diversity in smaller area. There were 33 tree species belonging to 20 families. The species found in the canopy, sub canopy and under storey for each 10×10 meter plot. The number of species (33) recorded in the present study was found to be higher than the number of species reported by several workers in the different tropical forests Khera *et al.* 2001 (92 species) of 690 ha. area in Central Himalaya; Mulchand *et al.*, (432 species) of 1855.5 ha. area in Patnadevi forest area Maharashtra, India; Bharali *et al.*, 2011 (72 species) of 7813 sq.km in West Siang District Arunachal Pradesh, India. Kershaw, 1973 observed the forest of 81.8 percent of the total species show contagious pattern of distribution which is the characteristic features of natural vegetation, while according to our observation about 50% of total species shown such type of distribution pattern. From early years, the Seminary Hills area were planted by some trees like *Tectona grandis*, but nowadays, scenario completely changed with the natural vegetation comprising many sapling with future generation.

CONCLUSION

Present study revealed that, 33 tree species belonging to more than 20 families were studied and the study reveals that the Seminary Hills forest represents the unique vegetation of tropical dry deciduous forest. The area is blessed with rich vegetation and holds Numbers of botanically interesting, economically important, endangered, threatened, endemic and exotic elements. It also shows that Seminary Hills forest have good potential of medicinal plants. The forest is not only rich in floristic diversity but also harbours many wildlife species birds, reptiles, amphibians, mammals.

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