

Tree diversity in Bhupdeopur forest of Chhattisgarh, India

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Abstract

The present investigation was done in the Bhupdeopur reserve forest, located in Raigarh district of Chhattisgarh, India. The study was conducted in year 2010. The study resulted in documentation of 63 tree species belonging to 29 families and 52 genera. The maximum relative frequency (5.69) was determined for *Diospyros melanoxylon*, while minimum (0.35) for *Artocarpus heterophyllus* and *Anthocephalus cadamba*. The highest value of relative density (10.98) was calculated for species *Shorea robusta*, while lowest value (0.18) was determined for 4 of the tree species viz. *Artocarpus heterophyllus*, *Ficus heterophylla*, *Ficus religiosa* and *Anthocephalus cadamba*. The peak value of relative abundance (10.00) was determined for *Tectona grandis* and lower value of (0.42) was observed for *Litsea glutinosa*. The maximum value of IVI (20.19) was obtained for *Shorea robusta* while, minimum value (1.42) was noted for *Ficus heterophylla*, all other species had recorded intermediate value. The results of present study serve as baseline information for floristic composition, distribution and dominance of tree species in Bhupdeopur forest of Chhattisgarh, India.

Keywords: Phytosociological Floristic composition, Baseline information.

INTRODUCTION

The forest ecosystems are vital in terms of tree species growing. Tropical forests are highly diverse due to species interaction and niche variation, which is a result of favorable climatic (Ojo and Oja-Adams, 1995) and edaphic conditions. In recent time, the world over destruction of vegetation has been continuing at an alarming pace due to a variety of causes (Prance *et al.* 2000, Pimm *et al.* 1995). It is estimated that about 8% of the scientifically known plant species on earth are presently on the brink of extinction. The structure of plant as well as animal communities in many natural ecosystems is largely influenced by the disturbances frequently occurring in the system naturally or due to anthropogenic activities (Kwit and Patt, 2003). In many of these systems, disturbances change overall community structure. The importance of disturbance for maintaining community composition and determining population dynamics has been well recognized in the tropical system (Sahoo *et al.* 2008). Disturbances also have profound effect on the regeneration of non pioneer under storey trees. Therefore, the study of vegetation wealth and the component floristic elements found within a region has assumed great relevance in biodiversity studies. Beside that understanding of vegetation composition, diversity of species and their habitats and composition with similar other habitats may become a tool to estimate the level of adaptation to the environment and their ecological significance. Information on floristic composition, diversity are absolutely essential in understanding the forest ecosystem dynamics (Gentry 1990, Hartshorn, 1990) but in tropical and subtropical countries the data on structure and functional dynamics of these forests are scarce (Parthasarthy and Sethi, 1997).

In view of such a scenario, the study of vegetation and the component floristic elements of a region like Chhattisgarh, which is consisting 44% forest and poorly explored have great importance. Hence, the present study was undertaken to determine the floristic composition with reference to tree diversity in the forest of Bhupdeopur.

MATERIALS AND METHODS

The present study was conducted at Bhupdeopur forest of Raigarh, Chhattisgarh. The study site was found to be spread over about 25 km of North West of Raigarh city. Phytosociological data was collected in the forest of Bhupdeopur by stratified random sampling method, during 2010. The size and number of quadrats needed for sampling was determined using the species area curve method (Mishra, 1968). The tree species were identified by following the Flora of Presidency of Madras (Gamble and Fischer, 1915-1935) and Flora of Orissa Saxena and Brahman, (1990). The quantitative analysis for Relative frequency, Relative density and Relative abundance was done by following Phillips (1959), while, IVI (Important value index) was calculated by adopting the method of Cottan and Curtis (1956).

RESULTS

In present study total of 63 tree species belonging to 29 families and 51 genera were recorded. All the families were of class Dicotyledonae. 44 families were belonging to sub class Polypetalae, 15 of Gamopetalae and 4 of Monochlamydae. Moraceae and Rubiaceae were found to be the dominant family. The maximum number of tree species (6) was noted for two of the families Moraceae and Rubiaceae, (5) for family Mimosaceae, Combretaceae, (4) for family Fabaceae, (3) each for Caesalpiniceae, Anacardiaceae, Euphorbiaceae and (2) each for Meliaceae, Dilliniaceae, Apocynaceae, Ebenaceae and Verbanaceae, while minimum number of species (1) was recorded for (15) families like Lythraceae, Bombaceae, Sapindaceae, Dipterocarpaceae, Sterculiaceae, Myrtaceae, Rhamnaceae, Simaroubaceae, Burseraceae, Annonaceae, Flacourtiaceae, Sapotaceae, Eignoniaceae, Lecythidaceae and Lauraceae.

The maximum relative frequency (5.69) was determined for *Diospyros melanoxylon*, while minimum (0.35) for *Artocarpus heterophyllus* and *Anthocephalus cadamba*. Out of 63 species, 26

species have recorded relative frequency <1, while 13 species have >2, 5 species >3, 3 species >4 and only one species recorded >5 (Table-1).

The highest value of relative density (10.98) was calculated for *Shorea robusta*, while lowest value (0.18) was determined for *Artocarpus heterophyllus*, *Ficus heterophylla*, *Ficus religiosa* and *Anthocephalus cadamba*. 25 species have recorded <1 relative density, while 11 species recorded >2, 8 species >3, 3 species >4 and 2 species >9 (Table-1).

The peak value of relative abundance (10.00) was determined for *Tectona grandis*, while lower value (0.42) was observed for *Litsea glutinosa*. <1 relative abundance was noted for 16 tree species, while >2 for 10 species, >3 for 3 species and >9 for 1 species (Table-1).

Important value index (IVI) was determined for all the 63 tree species. The maximum value (20.19) was obtained for *Shorea robusta* while, minimum value (1.42) was noted for *Ficus heterophylla*. IVI value >2 was determined for 7 species, >5 for 15 species and >10 for 4 species (Table-1).

Table 1. Diversity of tree species in Bhupdeopur forest of Chhatisgarh.

TREE SPECIES	FAMILY	RELATIVE FREQUENCY	RELATIVE DENSITY	RELATIVE ABUNDANCE	IVI
<i>Sterculia urens</i> ROXB	Sterculiaceae	0.94	0.56	1.15	2.65
<i>Salmaia malabarica</i> DC (Lour)	Bombacaceae	1.54	0.72	0.90	3.16
<i>Shorea robusta</i> ROXB	Diptero carpaceae	4.62	10.98	4.59	20.19
<i>Allettus excelsa</i> ROXB	Simaroubaceae	0.47	0.30	1.23	2.00
<i>Azadirachta indica</i>	Meliaceae	0.83	0.68	1.59	3.1*
<i>Soymdia febrifuga</i> (ROXB) A. Juss	Meliaceae	2.13	1.82	1.64	5.59
<i>Aegle marmelos</i> comen	Rutaceae	0.83	0.83	1.94	3.6
<i>Citrus india</i> Linn	Rutaceae	0.94	0.91	1.85	3.7
<i>Chloroxylon swietenia</i> DC	Rutaceae	4.03	3.95	1.89	9.87
<i>Boswellia serrata</i> Triana & Planch	Burseraceae	1.89	1.21	1.23	4.33
<i>Mangifera indica</i> L	Anacardiaceae	1.66	0.98	1.14	3.78
<i>Semecarpus anacardium</i> (L.F.)	Anacardiaceae	1.89	2.05	2.08	6.02
<i>Buchnanania lanzan</i> spreng	Anacardiaceae	2.49	3.41	2.65	8.55
<i>Schleichera oleosa</i> Oken	Sapindaceae	2.13	1.32	1.20	4.65
<i>Artocarpus heterophyllus</i> Lam	Moraceae	0.35	0.18	1.02	1.55
<i>Ficus heterophylla</i>	Moraceae	0.47	0.18	0.77	1.42
<i>Ficus religiosa</i> Linn	Moraceae	0.47	0.18	0.77	1.42
<i>Ficus glomerata</i> ROXB	Moraceae	0.59	0.22	0.74	1.55
<i>Ficus benghalensis</i> L	Moraceae	0.59	0.26	0.86	1.71
<i>Ficus globosa</i>	Moraceae	0.71	0.26	0.71	1.68
<i>Acacia auriculiformis</i> A. Cunn ex. Benth.	Mimosaceae	0.47	0.34	1.36	2.17
<i>Albizia lebbek</i> Benth.	Mimosaceae	0.59	0.30	0.99	1.88
<i>Acacia catechu</i> Willd	Mimosaceae	0.59	0.75	2.47	3.81
<i>Acacia leucophloea</i> ROXB Willd	Mimosaceae	0.83	0.52	1.23	2.58
<i>Albizia odoratissima</i> Benth.	Mimosaceae	1.18	0.56	0.92	2.66
<i>Tanarindus indica</i> L	Caesalpiniaceae	0.94	0.45	0.92	2.31
<i>Bauhinia variegata</i> L.	Caesalpiniaceae	1.43	0.75	1.02	3.2
<i>Cassia fistula</i> Linn	Caesalpiniaceae	1.66	1.13	1.32	4.11
<i>Dalbergia paniculata</i> ROXB	Fabaceae	1.30	0.68	1.01	2.99
<i>Pongamia pinnata</i> L. Pierre Linn	Fabaceae	1.54	0.83	1.04	3.41
<i>Butea monosperma</i> (Lam) Taxb	Fabaceae	1.66	1.06	1.23	3.95
<i>Pterocarpus marsupium</i>	Fabaceae	2.72	2.35	1.66	6.73
<i>Ziziphus xylophylla</i> Willd	Rhamnaceae	1.66	0.83	0.97	3.46
<i>Terminalia bellinca</i> ROXB	Combretaceae	1.77	0.96	1.07	3.82
<i>Terminalia chebula</i> Retz	Combretaceae	1.89	0.94	0.96	3.79
<i>Terminalia arjuna</i>	Combretaceae	2.13	1.93	1.75	5.81
<i>Anogeissus latifolia</i> Roxb Ex. D.C.	Combretaceae	2.96	3.22	2.10	8.28
<i>Terminalia tomentosa</i> Willd	Combretaceae	5.21	7.78	2.88	15.87
<i>Syzium cumini</i> (L.) skeeds	Myrtaceae	2.49	1.89	1.47	5.65
<i>Lagerstroemia parviflora</i> ROXB	Lythraceae	3.55	3.41	1.85	8.81
<i>Dillenia pentagyna</i> ROXB	Dilleniaceae	1.06	0.91	1.64	3.61
<i>Dillenia indica</i> L	Dilleniaceae	2.01	1.93	1.85	5.79
<i>Millettia tomentosa</i> ROXB J. sinchais	Annonaceae	1.30	0.87	1.29	3.45
<i>Flacourtia ramonchi</i> Comm. L.	Flacourtiaceae	1.30	0.68	1.01	2.99
<i>Anthocephalus cadamba</i> ROXB	Rubiaceae	0.35	0.18	1.02	1.55
<i>Gardenia turgida</i> ROXB	Rubiaceae	0.71	0.39	0.77	1.63
<i>Ixora parviflora</i>	Rubiaceae	0.94	0.41	0.64	2.19
<i>Randia dumetorum</i> (Retz.) Lam	Rubiaceae	0.71	0.43	1.33	2.53
<i>Adina cordifolia</i> Benth & Hook F.	Rubiaceae	1.18	0.68	1.11	2.97
<i>Mitragyna parviflora</i>	Rubiaceae	2.01	1.70	1.63	5.34
<i>Madhuca indica</i> J.F. Gmel	Sapotaceae	2.96	2.46	1.61	7.03
<i>Diospyros peregrina</i> (Gaerth)	Ebenaceae	0.47	3.41	1.93	5.27
<i>Diospyros melanoxylon</i> ROXB	Ebenaceae	5.69	9.49	3.22	18.4
<i>Alistonia Scholarias</i> (L) R.B.R.	Apocynaceae	0.59	0.34	1.11	2.04

<i>Holarrhena antidysenterica</i>	Apocynaceae	3.08	3.79	2.38	9.25
<i>Stereospermum suaveolens</i> DC.	Bigoniaceae	0.83	0.34	0.79	1.95
<i>Gmelina arborea</i> ROXB	Verbenaceae	0.47	0.37	1.54	2.38
<i>Tectona grandis</i> L.F.	Verbenaceae	0.87	4.29	10.00	15.12
<i>Careja arborescens</i> ROXB	Lecythidaceae	1.43	0.72	0.97	3.12
<i>Bridelia squamosa</i> Linn	Euphorbiaceae	0.94	0.68	1.39	3.01
<i>Emblica officinalis</i> L.	Euphorbiaceae	1.06	0.68	1.23	2.97
<i>Cleistanthus collinus</i> ROXB	Euphorbiaceae	2.13	2.84	2.85	7.82
<i>Litsea glutinosa</i> (Lour.) C.B. Robinson	Lauraceae	1.54	0.34	0.42	2.3

DISCUSSION

Bhupdeopur forest is a part of Tropical dry deciduous forest. The presence of 63 tree species in 200 sampling units indicated a high variability in terms of tree species. The higher species richness and diversity for tree species observed in present investigation confirmed the fact that Bhupdeopur forest is an undisturbed stand. The life in this region is still in its natural state and the Nature is still not much disturbed to an extent of extinction. However, in present study the number of tree species recorded was quite less and Moraceae and Rubiaceae were found to be the dominant family while, higher tree species number with Rubiaceae and Euphorbiaceae as a dominant family was noted by Reddy *et al.* (2007) for the forest of Similipal Biosphere reserve in Orissa. The total number of species recorded in present investigation had conformity with the findings of Lalakawma *et al.* (2009) for tropical semi evergreen forest of North east India, while, comparatively greater richness of tree species was recorded by Tripathi *et al.* (2010) for subtropical humid forest of North east India. The lower number of tree species was recorded by the Shukla (2009) in Terai landscape in north eastern Uttar Pradesh.

The results of present study reveals that Bhupdeopur forest is rich in terms of tree species despite the disturbances like fire, grazing extraction of medicinal plant and invasion of exotic species, it has greatly status similar to other tropical forests of the country. The present study serves as baseline information for floristic composition, distribution and dominance of tree species in Bhupdeopur forest of Chhattisgarh, India.

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