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Original Research Article

An investigation of plant communities in Basudha beat of Durgapur forest range, West Bengal, India

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A B S T R A C T

The present investigation reports the vegetation structure, species composition and relative dominance of plant species of tropical dry deciduous forest of Basudha beat of Durgapur Forest Range, Burdwan, West Bengal, India. The investigation comprises of phytosociological and pedological attributes of Basudha beat. The results reflect dominancy of dicotyledons over monocotyledons in the concerned study site. Basudha (86 species) represents higher level of species diversity and richness. Maximum IVI value were recorded by Vetiveria zizanioides(8.02) followed by Andrographis paniculata (6.61), Carissa caranda (6.89), Combretum roxburghii (6.23), Meyna spinosa (6.51) , Flacourtia indica (6.51), Costus speciosus (6.08), Asparagus racemosus (6.26) and Saccharum munja (6.53). The study represents higher species richness over the entire region. The soil characteristics of the study sites revealed acidic nature of soil (Mean pH 4.64 ± 1.53) in the studied beat. CCA explain 97.73% of the variance of the family-soil environmental data. Poaceae, Fabaceae, Asteraceae, Verbenaceae, Acanthaceae, Rubiaceae, Convolvulaceae, Asclepiadaceae, are arranged from acidic soil environment with lower organic carbon and conductivity values.

Keywords

Forest, Community structure, CCA

Introduction

Since Rio de Janerio summit (Convention on biological diversity) in 1992, the issues dealt with under the convention have received wide recognition (Wamelink *et al*., 2003; Ricotta, 2003). As an important renewable natural resource, biodiversity resemblance essential values concerning scientific, agricultural, medical, pharmaceutical, educational, cultural and ecological arena. According to Hegazy (1999) significant and often irreversible loss of biodiversity has been driven by habitat destruction, overexploitation, environmental degradation (physical and chemical) and pollution. Biodiversity is defined as the kinds and numbers of organisms and their patterns of distribution (Barnes *et al*., 1998). Generally, biodiversity measurement typically focuses on the species level and species diversity is one of the most important indices which are used for the evaluation of ecosystems at different scales (Ardakani, 2004).

Vegetation ecology includes the investigation of species composition and sociological interaction of species in communities (Mueller-Dombois and Ellenberg, 1974). The structural property of a community is the quantitative relationship in between the species growing around. The quantitative study of vegetation is called phytosociology and its principal aim is to describe the vegetation, explain or predict its pattern and classify it in a meaningful way. (llorkar and Khatri, 2003).

Forest ecosystem plays a key vital role by supplying fresh water and oxygen as well as repositories of terrestrial biological diversities (Kala, 2004). This is one of the most significant, precious and essential renewable natural resource. Indian subcontinent is one of the 12 mega diversity centers in the world ranked in 10^{th} position in the world and 4^{th} in Asia in plant diversity (Singh *et al.*, 2003), harbouring over 49000 species of flowering and non-flowering plants and representing about 12% of the worlds recorded flora.

Soil is an essential component that has sustained life on this planet, favoring the growth of plants that have survived human competition. The soil resource is limited in space and the soil evolution is a slow process. The chemical and physical properties of soils are controlled largely by clay and humus as they act as the center of activity around which reactions and nutrient exchange occurs (Buckman and Brady, 1967). Soil is a medium of all plant productivity. The vegetation in turn influences the physical and chemical properties of soil to a great extent. It improves the soil structure, infiltration rate and water holding capacity.

This paper deals with the assessment of plant species structure and composition across various strata within natural forests within the Basudha beat of Durgapur Forest Division. The main objective of this present investigation includes assessment of density, distribution pattern of vegetation and associated phytosociological attributes in Basudha beat. We also investigate relationships between plant families' assemblage and their soil environment condition in the Basudha beat of Durgapur Forest Division. Distribution of selected indicator taxa and their abundance have been compared.

Materials and Methods

Study area

Durgapur is located with an average elevation of 65 meters (msl) in the Burdwan District (from 22°56' to 23°53' North latitudes and from 86°48' to 88°25' East longitudes) of West Bengal. The soil is lateritic in nature and the temperature ranges from 37.8^0C to 46.1^0C during summer and from 20.4^0C to 32.2^0C during winter. Annual rainfall is more or less 1500mm. Durgapur Forest Range is situated close to the bank of the river Ajay which sets the natural boundary between Burdwan and Birbhum districts. The topography is undulating.

The coal-bearing area of the Raniganj coalfields lies just beyond Durgapur, although some parts intrude in to the area. The area was deeply forested till recent times, and some streaks of the original forests are still there, standing to witness its rich-natural past. In the Blocks (administrative units) of Kanksa and Aushgram large tracts of land are still covered with Sal trees (*Shorea robusta*). The Ajay River flows past unhindered forming the border in the north The Durgapur forests are continued in the Birbhum district beyond the Ajay while the forest area in the Asansol subdivision forms a part of the forest area of Dumka District of Jharkhand. Two rivulets, Kunur and Tumuni flow through the area and join the Ajay River. In case of Burdwan district, the State Forest report of FSI (2011) shows that the district has only 225 sq km i.e. 3.2% of forest coverage of the total geographic area which includes very dense, moderately dense and open forest cover.

Durgapur Forest Range consists of total 5 beat namely Shibpur, Gopalpur, Molandighi, Basudha and Arrah. These 5 beat have an area of protected forest in hectar are 1792.404(Shibpur), 1319.55 (Gopalpur), 1209.634 (Molandighi), 1672.51 (Basudha) and 546.59 (Arrah). The present work is primarily based on thorough field survey in the Basudha Beat of Durgapur Forest Range of Burdwan district of West Bengal.

Vegetation analysis

A total of 5 sampling sites distributed over Basudha beat representing various categories of natural forests and plantations were selected for vegetation sampling. At each site ten quadrates (20 ft x 20ft) were laid to quantify various layers. Individuals of shrubs, climbers and tree seedlings were enumerated within each quadrate.

Voucher specimens of plant species were collected and processed for herbarium preservation. Some of the specimens were worked out taxonomically for identification. During the field survey utmost care was taken to avoid disturbance to the flora and fauna. The structure and composition of vegetation across vegetation types have been compared in terms of frequency, density and abundance of major species. Importance Value Index (IVI = relative frequency + relative density + relative dominance).

Soil analysis

Composite soil samples (0-30 cn depth) were collected using soil auger from from the five selected sites. The collected samples were homogenized by hand-mixing and sieved through a 2 mm mesh to remove large fresh plant material (roots and shoots) and pebbles. Finally, the samples were air dried for further analysis (Jackson, 1967). The samples were analyzed for determination of Soil organic carbon content (Walkey and Black's rapid titration method: Walkey and Black, 1934) and Soil conductivity (Conductivity meter TCM 15+). pH was assessed by a digital pH meter (model Eutech) after 1: 2.5 soil: water ratio was prepared.

Data analysis

The vegetation data recorded was quantitavely analysed for density, frequency and abundance following Curtis and McIntosh (1950). The phytosociological data were treated with XLSTAT (Adinsoft, 2010) and PAST 3.01 Software (Hammer *et al.*, 2001) for statistical analysis. In order to judge the observed pattern of phytosociological characteristics of the study site, a cluster analysis (CA) based on Ward's method was carried out. It allowed interpreting the levels of similarity of the species in terms of their phytosociological attributes.

Results and Discussion

Phytosociological association

A summary of phytosociological data of Basudha beat is summarized in Table 1. The plant community represents 86 species belonging to 42 families. *Vetiveria zizanioides* (8.02) was found to be the most frequent, dominant and important species among the plant community of the concerned study site. Composition of IVI grades have been depicted in Fig 1. The decreasing trend of IVI value was in the order of *Carissa caranda* (6.89), *Andrographis paniculata* (6.61), *Saccharum munja* (6.53), *Meyna spinosa* (6.51), *Flacourtia indica* (6.51), *Asparagus racemosus* (6.26) and *Costus speciosus* (6.08).

The highest IVI score of *Vetiveria zizanioide* deserves special mention for its frequent occurrence in the study area. The lowest IVI scores were in the following order Acacia *sinuate* (0.47), *Capparis sepiaria*(0.47), *Ichnocarpus frutescens*(1.66), *Crotalaria epunctata* (1.09), *Dioscorea pentaphylla*(1.46). The relative dominance value of plants species (n=86) represented in Table1 reveals highest value for *Vetiveria zizanioide* followed by *Carissacaranda*

Table.1 Phytosociological charecteristics of tree species in Basudha beat of Durgapur Forest Range, West Bengal, India

	Name of the Plant	Family	RF (%)	RD (%)	RA (%)	IVI
SP1	*Saccharum spontaneum*	Poaceae	1.46	1.27	1.09	3.82
SP2	*Cassytha filiformis*	Lauraceae	1.75	2.02	1.43	5.2
SP3	*Aristida adscensionis*	Poaceae	1.46	1.5	1.28	4.24
SP4	*Heteropogon contortus*	Poaceae	1.75	1.62	1.14	4.51
SP5	*Andrographis paniculata*	Acanthaceae	2.05	2.83	1.73	6.61
SP6	*Perotis latifolia*	Poaceae	0.87	0.92	1.31	3.1
SP7	*Chloris barbata*	Poaceae	1.17	1.39	1.48	4.04
SP8	*Desmodium dichotomum*	Fabaceae	1.17	0.81	0.86	2.84
SP9	*Carissa caranda*	Apocynaceae	1.75	3.01	2.13	6.89
SP10	*Spermacoce hispida*	Rubiaceae	1.17	0.52	0.55	2.24
SP11	*Macrotyloma uniflorum*	Fabaceae	1.46	0.69	0.59	2.74
SP12	*Zizyphus oenoplia*	Rhamnaceae	1.46	1.73	1.48	4.67
SP13	*Combretum roxburghii*	Combretaceae	2.05	2.6	1.58	6.23
SP14	*Hemidesmus indicus*	Asclepiadaceae	1.75	0.69	0.49	2.93
SP15	*Mimosa rubicaulis*	Mimosaceae	1.17	0.86	0.92	2.95
SP16	*M. pudica*	Mimosaceae	1.17	1.04	1.11	3.32
SP17	*Phoenix acualis*	Arecaceae	1.75	2.43	1.73	5.91
SP18	*Evolvulus nummularius*	Convolvulaceae	1.46	0.57	0.49	2.52
SP19	*Meyna spinosa*	Rubiaceae	1.75	2.78	1.98	6.51
SP20	*Gardenia gummifera*	Rubiaceae	1.46	1.1	0.94	3.5
SP21	*Tylophora indica*	Asclepiadaceae	1.75	1.5	1.06	4.31
SP22	*Eragrostis tenella*	Poaceae	1.46	1.04	0.89	3.39
SP23	*Smilax zeylanica*	Smilacaceae	1.75	1.04	0.74	3.53
SP24	*Flacourtia indica*	Flacourtiaceae	2.05	2.78	1.68	6.51
SP25	*Ichnocarpus frutescens*	Convolvulaceae	0.58	0.34	0.74	1.66
SP26	*Centratherum nthelminticum*	Asteraceae	1.75	1.5	1.06	4.31
SP27	*Crotalaria epunctata*	Fabaceae	0.37	0.23	0.49	1.09
SP28	*Dioscorea pentaphylla*	Dioscoreaceae	0.75	0.34	0.37	1.46
SP29	*Mucuna pruriens*	Fabaceae	0.75	1.33	1.42	3.5
SP30	*Woodfordia fruticosa*	Lythraceae	0.37	0.28	0.61	1.26
SP31	*Desmodium triflorum*	Fabaceae	0.37	0.46	0.99	1.82
SP32	*Flacourtia jangomas*	Flacourtiaceae	0.18	0.17	0.74	1.09
SP33	*Bauhinia vahlii*	Fabaceae	0.37	0.28	0.61	1.26

SP34	*Canscora decussata*	Gentianaceae	0.37	0.46	0.99	1.82
SP35	*Vernonia cinerea*	Asteraceae	0.37	0.34	0.74	1.45
SP36	*Cryptolepis buchanani*	Asclepiadaceae	0.56	0.81	1.14	2.51
SP37	*Eranthemum pulchellum*	Acanthaceae	0.56	1.04	1.48	3.08
SP38	*Butea superba*	Fabaceae	1.12	2.31	1.63	5.06
SP39	*Achyranthes aspera*	Amaranthaceae	0.93	1.85	1.58	4.36
SP40	*Sida rhombifolia*	Malvaceae	0.75	0.69	0.74	2.18
SP41	*Sida cordata*	Malvaceae	0.56	0.52	0.74	1.82
SP42	*Ventilago denticulata*	Rhamnaceae	0.75	0.57	0.61	1.93
SP43	*Olax scandens*	Olacaceae	1.12	1.44	1.03	3.59
SP44	*Helicteres isora*	Sterculiaceae	0.37	0.69	1.48	2.54
SP45	*Abrus precatorius*	Fabaceae	1.12	1.91	1.36	4.39
SP46	*Triumfetta rhomboidea*	Tliaceae	0.56	0.69	0.99	2.24
SP47	*Anisomeles indica*	Labiateae	0.93	1.04	0.89	2.86
SP48	*Cocculus hirsutus*	Menispermaceae	0.37	0.57	1.23	2.17
SP49	*Daemia extensa*	Asclepiadaceae	0.37	0.23	0.49	1.09
SP50	*Rauvolfia serpentina*	Apocynaceae	0.56	0.46	0.64	1.66
SP51	*Costus speciosus*	Costaceae	0.93	2.78	2.37	6.08
SP52	*Ipomoea aquatica*	Convolvulaceae	0.75	1.15	1.23	3.13
SP53	*Eulophia nuda*	Orchidaceae	0.18	0.23	0.99	1.4
SP54	*Pentanema indicum*	Asteraceae	0.75	1.44	1.54	3.73
SP55	*Acacia sinuata*	Fabaceae	0.18	0.05	0.24	0.47
SP56	*Capparis sepiaria*	Capparidaceae	0.18	0.05	0.24	0.47
SP57	*Parkinsonia aculeata*	Fabaceae	0.18	0.23	0.99	1.4
SP58	*Asparagus racemosus*	Liliaceae	1.12	3.01	2.13	6.26
SP59	*Imperata cylindrical*	Poaceae	0.37	0.28	0.61	1.26
SP60	*Vetiveria zizanioides*	Poaceae	1.31	4.17	2.54	8.02
SP61	*Phyllanthus reticulatus*	Euphorbiaceae	0.93	1.39	1.18	3.5
SP62	*Indigofera tinctoria*	Fabaceae	0.18	0.4	1.73	2.31
SP63	*Gymnema sylvestres*	Asclepiadaceae	0.75	1.04	1.11	2.9
SP64	*Aristolochia indica*	Aristolochiaceae	0.75	0.69	0.74	2.18
SP65	*Bixa orellana*	Bixaceae	0.37	0.34	0.74	1.45
SP66	*Ochna obtusata*	Ochnaceae	0.37	1.04	2.23	3.64
SP67	*Curculigo orchioides*	Hypoxidaceae	0.75	0.69	0.74	2.18
SP68	*Lantana camara*	Verbenaceae	0.93	1.1	0.94	2.97
SP69	*Argyreia nervosa*	Convolvulaceae	0.37	0.23	0.49	1.09
SP70	*Elephantopus scaber*	Asteraceae	1.12	1.85	1.23	4.2
SP71	*Clerodendrum viscosum*	Verbenaceae	1.12	2.78	1.98	5.88
SP72	*Saccharum munja*	Poaceae	1.31	3.24	1.98	6.53
SP73	*Vitex negundo*	Verbenaceae	0.93	1.15	0.99	3.07
SP74	*Ludwigia octovalvis*	Onagraceae	0.37	0.4	0.86	1.63
SP75	*Cuscuta reflexa*	Convolvulaceae	0.56	1.04	1.48	3.08
SP76	*Stephania japonica*	Menispermaceae	0.37	0.69	1.48	2.54
SP77	*Cassia sophera*	Caesalpiniaceae	0.93	1.39	1.18	3.5
SP78	*Justicia adhatoda*	Acanthaceae	0.93	1.33	1.14	3.4
SP79	*Lippia javanica*	Verbenaceae	0.37	0.69	1.48	2.54
SP80	*Physalis minima*	Solanaceae	0.37	0.46	0.99	1.82
SP81	*Drosera burmanii*	Droseraceae	0.56	1.44	2.05	4.05
SP82	*Centella asiatica*	Apiaceae	0.75	0.57	0.61	1.93
SP83	*Plumbago zeylanica*	Plumbaginaceae	0.75	1.04	1.11	2.9
SP84	*Piper longum*	Piperaceae	0.37	0.57	1.23	2.17
SP85	*Gloriosa superba*	Liliaceae	1.12	1.85	1.31	4.28
SP86	*Spilanthes acmella*	Asteraceae	0.56	1.5	2.13	4.19

Fig.1 Composition of IVI Grade of measured plant families in Basudha beat, Durgapur Forest divisioin [IVI range A=<10, B= 5-10, C=2-5, D=0-2]

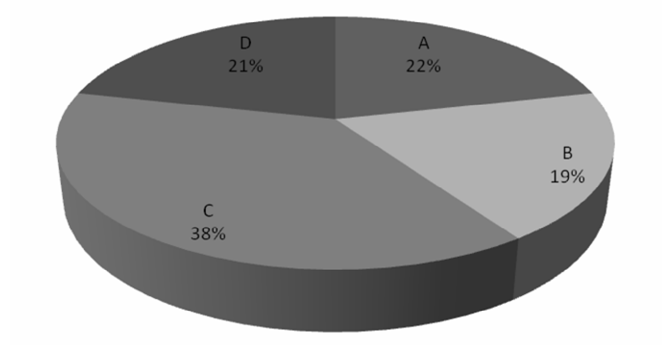
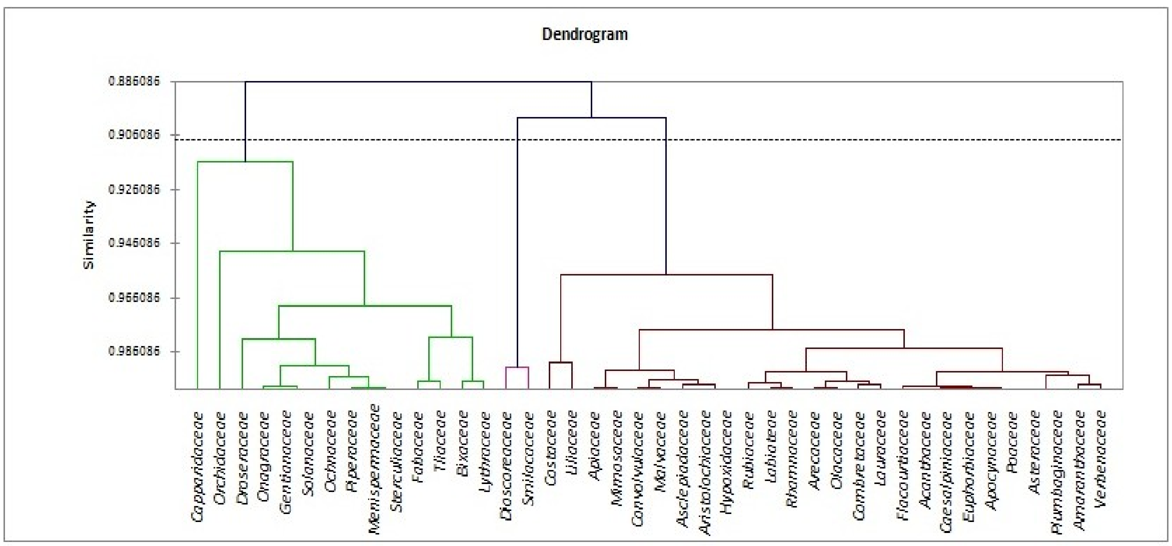


Fig.2 Dendogram showing relationship among forty-two families based on their phytosociological attributes

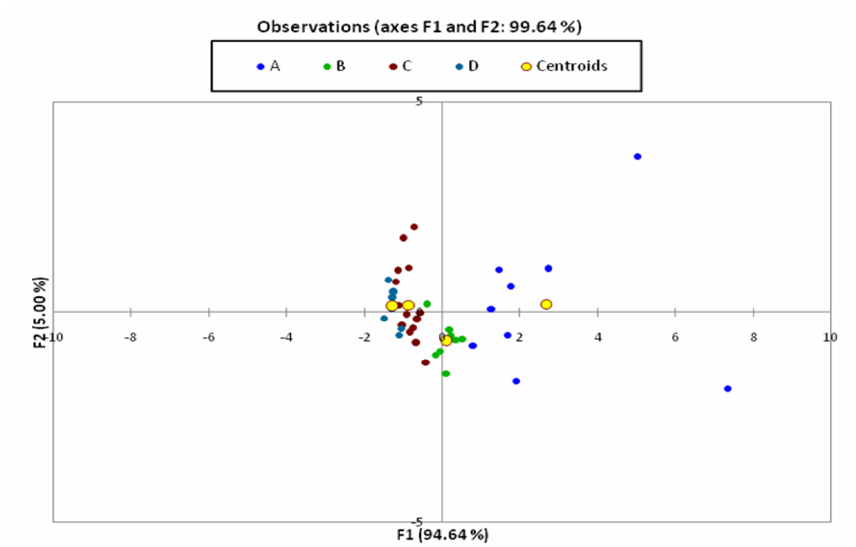


The similarity is based on Pearson correlation coefficient and the classification is based on unweighted pair-group average

Fig 2 depicts the dendogram showing relationship among forty two families based on their phytosociological attributes. The similarity is based on Pearson correlation coefficient and the classification is based on unweighted pair-group average. Three clusters were obtained which constitute the following associations: Cluster 1 with 26 families namely Acanthaceae, Amaranthaceae, Apiaceae, Apocynaceae, Arecaceae, Aristolochiaceae, Asclepiadaceae, Asteraceae, Caesalpiniaceae, Combretaceae, Convolvulaceae, Costaceae, Euphorbiaceae, Flacourtiaceae, Hypoxidaceae, Labiateae, Lauraceae, Liliaceae, Malvaceae, Mimosaceae, Olacaceae, Plumbaginaceae, Poaceae, Rhamnaceae, Rubiaceae, Verbenaceae; Cluster 2 comprises 14 families namely Bixaceae, Capparidaceae, Droseraceae, Fabaceae, Gentianaceae, Lythraceae, Menispermaceae, Ochnaceae, Onagraceae, Orchidaceae, Piperaceae, Solanaceae, Sterculiaceae, Tliaceae and Cluste 3 comprises only 2 species namely Dioscoreaceae and Smilacaceae. Fig: 3 depicts Symmetric graphical display in two dimensions resulting from discriminant analysis of phytosociological data of measured plant families The percentage of inertia accounted for by the two dimensions is 99.64%.[IVI range A=<10, B= 5-10, C=2-5, D=0-2]. Table 2 enumerates the factor scores of different families derived from discriminant analysis. On F1 & F2 axes, some predominant families are as fallows- Poaceae (7.333, -1.812), Fabaceae (5.019, 3.707), Asteraceae (2.727, 1.022), Verbenaceae (1.774, 0.617), Acanthaceae (1.678, -0.549), Rubiaceae (1.907, -1.639), Convolvulaceae(1.460, 1.013), Asclepiadaceae (1.279, 0.077).

Soil characteristics and Plant family –Soil environmental dependency: Table 3 enumerates the values of different soil parameters measured in the selected beat forest. Mean organic carbon was 2.11±0.46 with a minimum and maximum value of 1.51 and 2.74 respectively. Similarly minimum pH value was 2.11 and maximum 5.79 with a mean value of 4.64±1.53 during the study period. Conductivity with a minimum value of 0.03 µmhos/cm and maximum of 0.14 µmhos/cm showed a mean value of 0.07±0.04µmhos/cm in the measured soil sample. The first two axes of CCA explain 97.73% of the variance of the family-soil environmental data. Along the first axis families like Poaceae, Fabaceae, Asteraceae, Verbenaceae, Acanthaceae, Rubiaceae, Convolvulaceae, Asclepiadaceae, are arranged from soil environment with lower organic carbon content, acidic type of soil and with lower conductivity values of soil (Fig-4). On the other hand other plant families are prone to lower values of this three soil parameters except the following four families Amaranthaceae, Costaceae, Liliaceae and Droseraceae

Fig.3 Symmetric graphical display in two dimensions resulting from discriminant analysis of phytosociological data of measured plant families



The percentage of inertia accounted for by the two dimensions is 74.95%.[IVI range A=<10, B= 5-10, C=2-5, D=0-2]

Table.2 Factor scores for discriminant analysis of Phytosociological variations of plant families in the study site

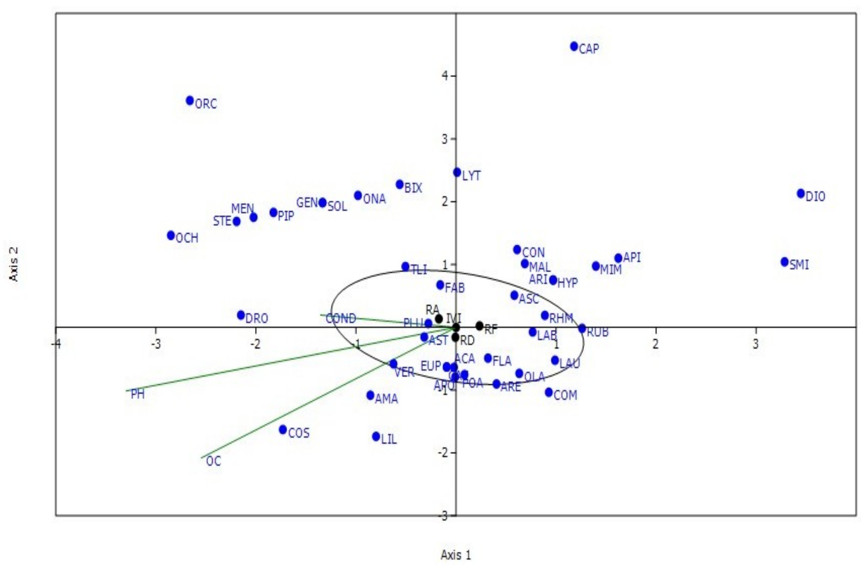
		F1	F2	F3
F1	POA	7.333	-1.812	-1.334
F2	FAB	5.019	3.707	1.503
F3	AST	2.727	1.022	-0.659
F4	VER	1.774	0.617	-1.609
F5	ACA	1.678	-0.549	-0.610
F6	RUB	1.907	-1.639	1.904
F7	CON	1.460	1.013	2.151
F8	ASC	1.279	0.077	1.303
F9	LIL	0.812	-0.798	-2.475
F10	APO	0.538	-0.641	-0.546
F11	FLA	0.367	-0.661	-0.014
F12	RHM	0.208	-0.581	0.795
F13	MIM	0.204	-0.411	1.546
F14	COM	0.119	-1.464	0.113
F15	COS	-0.380	0.177	-2.087
F16	ARE	-0.059	-0.931	-0.192
F17	LAU	-0.162	-1.019	0.339
F18	MEN	-0.713	2.039	-0.432
F19	AMA	-0.625	-0.178	-0.885
F20	DRO	-0.849	1.053	-0.995
F21	MAL	-0.538	-0.014	0.621
F22	OCH	-1.004	1.755	-0.805
F23	OLA	-0.650	-0.736	-0.022
F24	SMI	-0.405	-1.190	1.608
F25	CAE	-0.747	-0.367	-0.290
F26	EUP	-0.747	-0.367	-0.290
F27	PLU	-0.913	-0.070	-0.152
F28	LAB	-0.838	-0.491	0.163
F29	STE	-1.144	0.975	-0.360
F30	TLI	-1.091	0.162	-0.032
F31	ARI	-1.013	-0.308	0.300
F32	HYP	-1.013	-0.308	0.300
F33	PIP	-1.191	0.717	-0.207
F34	API	-1.048	-0.394	0.455
F35	GEN	-1.235	0.466	-0.067
F36	SOL	-1.235	0.466	-0.067
F37	ONA	-1.259	0.330	0.010
F38	DIO	-1.113	-0.545	0.751
F39	BIX	-1.282	0.208	0.086
F40	ORC	-1.379	0.769	-0.102
F41	LYT	-1.306	0.072	0.163
F42	CAP	-1.489	-0.153	0.122

Code used - POA-Poaceae, FAB-Fabaceae, AST-Asteraceae, VER-Verbenaceae, ACA-Acanthaceae,RUB-Rubiaceae, CON-Convolvulaceae, ASC-Asclepiadaceae, LIL-Liliaceae, APO-Apocynaceae, FLA-Flacourtiaceaek, RHM-Rhamnaceae, MIM-Mimosaceae, COM-Combretaceae, COS-Costaceae, ARE-Arecaceae, LAU-Lauraceae, MEN-Menispermaceae-AMA-Amaranthaceae, DRO-Droseraceae, MAL-Malvaceae, OCH-Ochnaceae, OLA-Olacaceae, SMI-Smilacaceae, CAE-Caesalpiniaceae, EUP-Euphorbiaceae, PLU-Plumbaginaceae, LAB-Labiateae, STE-Sterculiaceae, TLI-Tliaceae, ARI-Aristolochiaceae, HYP-Hypoxidaceae, PIP-Piperaceae,API-Apiaceae, GEN-Gentianaceae, SOL-Solanaceae, ONA-Onagraceae, DIO-Dioscoreaceae, BIX-Bixaceae, ORC-Orchidaceae, LYT-Lythraceae, CAP-Capparidaceae

Table.3 Summary of soil parameters measured in Basudha beat, DFR during the study period

	Minimum	Maximum	Mean
Organic Carbon (%)	1.51	2.74	2.11±0.46
pH	2.11	5.79	4.64±1.53
Conductivity (µmhos/cm)	0.03	0.14	0.07±0.04

Fig.4 Canonical correspondence analysis, family composition and significant soil environmental variables



The predominant forest types of Basudha beat of Durgapur Forest Division are tropical dry deciduous type. The number of species in a particular forest type varies markedly along the altitudinal range of its growth, which depends on the complex suit of factors that characterize the habitat of individual species. Ecological function of the species involves all kinds of processes, which are inevitably associated with some changes over space, composition and structure are affected at species level. The fundamental capability of ecosystems to evolve, change and recognize themselves is a prerequisite for the sustainability of viable system (Ashby 1974). The species in a community grow together in a particular environment because they have a similar requirement for existence in terms of environmental factors (Ter Baak, 1987).

In order to assess ecological knowledge of the native flora in Basudha beat of Durgapur Forest Division in particular, a quantitative phytosociological study in different was carried out. Importance value index (I.V.I.) for each plant species was determined to quantify the importance of each species. The vegetation of the studied site is composed of evergreen vegetation. The disturbance is mainly due to the extensive cutting of tress for fuel and for fodder, overgrazing, removal of economically important trees, defective forest management and some other biotic interference. These activities are responsible in converting natural vegetation to semi natural vegetation. An important component of any ecosystem is the species it contains. Species also serves as good indicators of the ecological condition of a system (Morgenthal, *et al.*, 2001). A list of all species collected during the study was compiled. The floristic composition of different area was also compared. The species composition of the concerned study site was considerably different. Vegetation analysis gives the information necessary to determine the name of community and provide data that can be used to compare it with other communities. Four to five plant communities: *Carissa caranda* (6.89), *Andrographis paniculata* (6.61), *Saccharum munja* (6.53), *Meyna spinosa* (6.51), *Flacourtia indica* (6.51), *Asparagus racemosus* (6.26) and *Costus speciosus* (6.08) were observed as a leading dominant. The communities with strong single species dominance have been attributed to grazing, species competition, seed predation, disease, stability and niche diversification (Whittaker and Levin, 1977; Harper, 1977). The rarer plant species with poor representation in our samples need proper attention from plant biologists to determine their conservation status and key functions. The communities in the study area were heterogeneous.

The concept of species diversity relates simply to "richness" of a community or geographical area in species. At the simplest level of examination, species diversity corresponds to the number of species present. Species diversity is considered to be an important attribute of community organization and allowed comparison of the structural characteristics of the communities. It is often related to community dynamics stability, productivity, integration, evolution, structure and competition. The idea of displacement of one species through competition with other is net prime importance. The ecology of different plant communities from Basudha beat of Durgapur Forest Division showed variation in nature, structure, composition of vegetation and soil characteristics. Most of the species were dry-deciduous in nature. The majority of individuals of plant population were seen in danger. Various types of activities have modified the plant cover over wide areas. There is a need to develop plant-protected areas. Scientific information relating to the composition of vegetation can be helpful for proper rehabilitation of the affected area because this forms the basic element for the conservation of important and endangered flora and fauna of any region. Protection of the natural flora from overgrazing is necessary, especially during the time when the desirable plants set their seeds. Protection is essential to maintain the desirable forage plant species in a good proportion, to avoid invader plant species and to rehabilitate the destroyed natural flora. We must carry out our efforts to make a list of the plant species, which can be lost from the natural environment, otherwise it will leads to desertification. Desertification associated with human activities has been recognized over the past two decades as one of the important facets of ongoing global environmental change (Verstraete and Schwartz, 1991; UNEP, 1997; Huenneke *et al.*, 2002) and Species loss can alter the goods and services provided by ecosystems (Hooper *et al.*, 2005).

The variable rate of relative frequency

distribution at Basudha beat of Durgapur Forest Division may be explained by a common biological explanation pattern which implies most dominant species appeared to colonize a new area appropriates a fraction of the available resources and by competitive interaction, preempts that fraction. The second species then preempts a similar fraction of the remaining resource and so on with further colonists. From the results of the present investigation it can be concluded that Basudha beats of Durgapur forest division needs prior conservation to sustain its diverse flora.

Soil pH gives some measure of general level of fertility (Wilde, 1954). Grubb (1963) noted low pH (4.2) with poor exchangeable potassium in Montane Forest soil. Acidic nature of different pedons of Basudha forest may be attributed towards the acidifying effect of intense decomposition products of organic residues accumulated on the forest floor since remote past. Lower level of conductivity of different pedons of basudha beat maybe attributed towards lower decomposition rate of leaf litter along with lower mineralization rate of the pedons of respective study site. Higher level of soil organic-C in Basudha beat than remaining sites, and it may result due to higher litter fall rate of the plant species of the habitat and the contact between the plant residues and microbes in erosional soil is reduced and may result in lower decomposition. Thus, inputs of organic matter decreases and output of soil organic matter increases in erosional soils.

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