

Study of floristic diversity, life-forms and biological spectrum of the forest situated at the Sansarpur of Koraon range, Allahabad, Uttar Pradesh, India

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Abstract

Floral diversity is affected by the external factors like fire, grazing, pest, invasive species and especially by the man made activities. This study was conducted at the forest of Sansarpur, Koraon, Allahabad, Uttar Pradesh, India. For identification of floristic composition, quadrates were laid down and samples of all species of trees, shrubs, herbs, climbers and epiphytes were collected and identified with the help of Flora of Allahabad, Flora of Uttar Pradesh, Herbarium of the Botany Department of Allahabad University and various floras and monographs. Classification of the plants has been done on the basis of perennating buds on the plants and the degree of their protection during adverse conditions and the biological spectrum is prepared on the basis of the percentage of each life-form following Raunkiaer (1934). A total of 138 species belonging to 112 genera and 48 families of angiosperm were recorded in the course of the sampling of vegetation. Out of 48 families 45 families belong to dicotyledons and remaining 3 belongs to monocotyledons. The dicotyledons comprise 45 families 96 genera and 120 species and monocotyledons comprise 03 families 16 genera and 18 species. Out of the total 138 species dicotyledons represents 86.95% and monocotyledons 13.04%. Dicotyledons comprise a main proportion of the area. Out of total 48 families Fabaceae was the more dominant family followed by Poaceae, Asteraceae, Malvaceae, Euphorbiaceae, Acanthaceae, Combretaceae, Mimosaceae, Caesalpinaceae and Rubiaceae at the study area. In this study phanerophytes are more than therophytes. Phanerophytes constituted themain proportion of the vegetation which is 48%, followed by therophytes (34%), chamaephytes (8%), geophytes (6%), hemicryptophytes (3%), and epiphytes(1%).

Keywords – Floral diversity, biological spectrum, life-forms, koraon.

Introduction

Forest is the largest productive biota of the earth and play a significant role in economic progress and conserving natural ecosystem. Forests provide renewable raw material and energy for use of human beings, diminish climate change, maintain biodiversity, protect land and water resources and decrease pollution level. Forests are affected by the external factors like fire, grazing, pest, invasive species and especially by the man-made activities. All life – forms depend on the forests and biodiversity. Biodiversity or Biological diversity is the part of nature which refers to the differences between and among living community and their

environmental conditions (Nath, 2015). Biodiversity is important for the survival of human beings as well as for economy and for the function and stability of the ecosystem (Singh, 2002). Plants and animals are the two main factors of the biodiversity which included the variation among species (Joshi and Shringi, 2014). Floral diversity is the variation in the plant species which occur naturally in the specific area. Diversity in the plants is a natural resource found on the earth and it is commercially important and it is a strong economy of a country. The floristic diversity determined the structure and function of forest ecosystem more than any other living component (Richards, 1996). Floristic diversity of an area is a tool which provides the design and functioning of the natural communities and also adds to complete information about the pattern and process of their organization.

Life – forms is the total adaptations of plants to the climate (Raunkiaer, 1934). Raunkiaer (1934) classified plants into five major groups on the basis of perennating buds on the plants and the degree of their protection during adverse conditions - phanerophytes, chamaephytes, hemicryptophytes, cryptophytes and therophytes. Life – forms are an important thing to know the biological spectrum of the plant community because the biological spectrum is the percentage of life – forms classes in any plant community (Milne and Milne, 1971). Biological spectrum is designed to know that which type of environment is dominant at any specific region and it also indicates climatic conditions of any specific region.

In the recent years developing and under developing countries are showing more awareness in the study of floristic diversity for the assessment of plant wealth of their country (Vediya and Kharadi, 2011). Floristic variety and structural analysis studies are important for providing information on species abundance of the forests, the structure of the forest, functions of ecosystem, beneficial in identifying naturally and economically important plants and their varieties and also in conserving threatened and naturally important plant species. (Giriraj et al., 2008; Pappoe et al., 2010, Addo-Fordjour et al., 2009).

C.S. Jha and J.S. Singh (1990), Adhikari et al. (1995), Singh and Rawat (2000), C.V. Chittibabu and N. Parthasarathy (2000), S. K. Pandey and R. P. Shukla (2003), D. C. Saini (2005), S. Mani and Parthasarathy N. (2005), Shukla and Mishra (2006), Y. L. Krishnamurthy et al. (2010), S. D. Maliya (2012), S. Baithalu et al. (2013) and A. S. Thakur (2015) they have been worked on floristic composition and biological spectrum of the plant community in India.

C.P. Shukla, and K.N. Mishra (2006) worked on floristic composition and biological spectrum of burnt and unburnt grazing lands of Dewghat forest.

The aim of this paper to study the floristic diversity, life - forms and the biological spectrum of the Sansarpur forest of Koraon range, Allahabad, Uttar Pradesh.

Materials and methods–

Study area

The present study was conducted in Sansarpur forest located in Koraon Tehsil in Allahabad District of Uttar Pradesh State, India. The forest is situated 19 km distance from Koraon and 82 Km distance from main District, Allahabad. Forest lies at 24°52'13.50"N latitude and 82°05'48.54" E longitude at an altitude of 92 meters above sea level. Rainy, winter and summer seasons are the three well recognized monsoonic seasons. Average annual rainfall is about 934 mm and most rainfall is seen from the month of June to September. There is a common occurrence of winter rains. There is a long and hot summer season with maximum temperature ranging from 40 °C to 45 °C and extend from March to June. Study area enjoys a wonderful cool and dry winter season and extends from December to February. There is black and coarse grey land soil has more clay than any other types of rocks or minerals.

Method

The study was conducted during different seasons of the year 2016-17. Global Positioning System (GPS) is used for the Geographical coordinates of the study area. The study area was visited on the basis of altitude, physical appearance, hill, angle, dry place, water body, road side etc. A sample of all species occurring at a site belonging to trees, shrubs, herbs, climbers and epiphytes were collected and identified. Collected plant samples were identified with the help of Flora of Allahabad, Flora of Uttar Pradesh, Herbarium of the Botany Department of Allahabad University and various floras and monographs. Classification of the plants in the life forms or growth forms were done on the basis of Raunkiaer's (1934) classification of plants. The basis of the preparation of the biological spectrum is the percentage of each life-form following Raunkiaer (1934).

Result and discussion

Classification of habit and life-forms of plants observed at Sansarpur forests.

S. No.	Name of the flora	Common name	Family	Habit	Life forms
1	<i>Abutilon indicum</i> (Linn.) Swee.	Kanghi	Malvaceae	Herb	Th
2	<i>Acacia catechu</i> (L. f.) Willd.	Khair	Mimosaceae	Tree	Ph
3	<i>Acacia farnesiana</i> (Linn.) Wight et Arn.	Vilayati Kikar	Mimosaceae	Tree	Ph
4	<i>Acacia nilotica</i> (Linn.) P.J.H. Hurter and Mab.	Babul	Mimosaceae	Tree	Ph
5	<i>Achyranthes aspera</i> Linn.	Latjeera	Amaranthaceae	Herb	Th
6	<i>Adina cordifolia</i> Hook. f.	Haldu	Rubiaceae	Tree	Ph
7	<i>Aegle marmelos</i> (Linn.) Corre.	Bel	Rutaceae	Tree	Ph

8	<i>Ageratum conyzoides</i> Linn.	Sarhand	Asteraceae	Herb	Th
9	<i>Ailanthus excelsa</i> Roxb.	Aruu	Simaroubaceae	Tree	Ph
10	<i>Alangium salvifolium</i> (L.f.) Wangerin	Ankal	Cornaceae	Tree	Ph
11	<i>Albizia lebbek</i> Benth.	Siris	Mimosaceae	Tree	Ph
12	<i>Albizia procera</i> Benth.	SafedSiris	Mimosaceae	Tree	Ph
13	<i>Alysicarpus vaginalis</i> DC.	Sauri	Fabaceae	Herb	Th
14	<i>Amaranthus viridis</i> Linn.	Jungalichaul ayi	Amaranthaceae	Herb	Th
15	<i>Anagallis arvensis</i> Linn.	Krishananeel	Primulaceae	Herb	Th
16	<i>Anogeissus latifolia</i> (Roxb. ex Dc) Wall.	Dhaura	Combretaceae	Tree	Ph
17	<i>Anogeissus acuminata</i> (Roxb. ex Candolle) Guillemain et al.	Dhaura	Combretaceae	Tree	Ph
18	<i>Argemone mexicana</i> Linn.	Satyanashi	Papaveraceae	Herb	Th
19	<i>Azadirachta indica</i> A. Juss.	Neem	Meliaceae	Tree	Ph
20	<i>Bambusa arundinaceae</i> (Retz.) Willd.	KanteelaBaa ns	Poaceae	Herb	G
21	<i>Barleria cristata</i> Linn.	Kansaraiya	Acanthaceae	Herb	Ch
22	<i>Bauhinia purpurea</i> (Linn.) Benth.	Kachhar	Caesalpinaceae	Tree	Ph
23	<i>Bauhinia racemosa</i> Lam..	katmauli	Caesalpinaceae	Tree	Ph
24	<i>Bidens biternata</i> (Lour.) Merr. and Sherff.	Chirchitta	Asteraceae	Herb	Ch
25	<i>Boerhavia diffusa</i> Linn.	Punarnawa	Nyctaginaceae	Herb	H
26	<i>Borreria stricta</i> Linn. F.	Safedphooli	Rubiaceae	Herb	Th
27	<i>Boswellia serrata</i> Roxb. exColebr.	Salai	Burseraceae	Tree	Ph
28	<i>Blumea lacera</i> (Burn.f.) DC.	Kakronda	Asteraceae	Herb	Th
29	<i>Brachiaria reptans</i> (Linn.) Gard.	Chaurila	Poaceae	Herb	Th
30	<i>Bridelia retusa</i> (Linn.) Spreng.	Kaji	Euphorbiaceae	Tree	Ph

31	<i>Buchanania lanzan</i> Spreng.	Chironji	Anacardiaceae	Tree	Ph
32	<i>Butea monosperma</i> (Lam.) Taub.	Palas	Fabaceae	Tree	Ph
33	<i>Calotropis procera</i> (Ait.) R. Br.	Madar	Asclepiadaceae	Shrub	Ph
34	<i>Cannabis sativa</i> Linn.	Bhang	Cannabinaceae	Herb	Th
35	<i>Cassia absus</i> Linn.	Bankulthi	Caesalpiniaceae	Herb	Th
36	<i>Cassia fistula</i> Linn.	Amaltas	Caesalpiniaceae	Tree	Ph
37	<i>Cassia tora</i> Linn.	Chakvad	Caesalpiniaceae	Herb	Th
38	<i>Cleome gynandra</i> Linn.	SafedHurhur	Cappariaceae	Herb	Th
39	<i>Chenopodium album</i> Linn.	Bathua	Chenopodiaceae	Herb	Th
40	<i>Coccinia grandis</i> (Linn.) Voigt.	Kunuru	Cucurbitaceae	Climber	Ph
41	<i>Convolvulus pluricaulis</i> Choisy.	Shankhpuspi	Gentianaceae	Herb	H
42	<i>Corchorus tricularis</i> Lam.	Kadvapat	Tiliaceae	Herb	Th
43	<i>Cordia dichotoma</i> Forst.	Lasora	Ehreteaceae	Tree	Ph
44	<i>Crotalaria prostrata</i> Willd.	Chhunchhuni	Fabaceae	Herb	Th
45	<i>Cuscuta reflexa</i> Roxb.	Amar Bel	Cuscutaceae	Climber	Ph
46	<i>Cynodon dactylon</i> (Linn.) Pers.	Doobghaaas	Poaceae	Herb	G
47	<i>Cyperus difformis</i> Linn.	Motha	Cyperaceae	Herb	Ch
48	<i>Cyperus rotundus</i> Linn.	Bara-nagar-motha	Cyperaceae	Herb	G
49	<i>Dactyloctenium aegyptiacum</i> Linn.	Makra	Poaceae	Herb	G
50	<i>Dalbergia latifolia</i> Roxb.	Safed shisham	Fabaceae	Tree	Ph
51	<i>Dalbergia sissoo</i> Roxb.	Shisham	Fabaceae	Tree	Ph
52	<i>Datura innoxia</i> Linn.	Datura	Solanaceae	Shrub	Ph
53	<i>Dendrocalamus stictus</i> (Roxb.) Nees.	LathiBaans	Poaceae	Herb	G
54	<i>Desmodium gangeticum</i> (Desv.)DC.	Salparni	Fabaceae	Herb	Ch
55	<i>Desmodium triflorum</i> DC.	Kudaliya	Fabaceae	Herb	Ch
56	<i>Desmostachya bipinnata</i> (L.) Stapf.	Kusha	Poaceae	Herb	Ch

57	<i>Digitaria ciliaris</i> (Retz.) Koele.	Takri	Poaceae	Herb(Grass)	G
58	<i>Diospyros melanoxylon</i> Roxb.	Tendu	Ebenaceae	Tree	Ph
59	<i>Echinochloa colonum</i> (Linn.) Link.	Jharwa	Poaceae	Herb	G
60	<i>Eclipta prostrata</i> Hassak.	Bhringaraj	Asteraceae	Herb	Th
61	<i>Elytraria acaulis</i> (L.f.) Lindau.	Patharchatta	Acanthaceae	Herb	H
62	<i>Emblica officinalis</i> Gaertn.	Amla	Euphorbiaceae	Tree	Ph
63	<i>Eragrostis tenella</i> (Linn.) Roem. and Schult.	Bharbhusi	Poaceae	Herb(Grass)	Th
64	<i>Eucalyptus robusta</i> Sm..	Safeda	Myrtaceae	Tree	Ph
65	<i>Euphorbia hirta</i> Linn.	Duddhi	Euphorbiaceae	Herb	Th
66	<i>Evolvulus alsinoides</i> Linn.	NeeliShankh pusphi	Convolvulaceae	Herb	H
67	<i>Evolvulus nummularis</i> Linn.	Musakarni	Convolvulaceae	Herb	H
68	<i>Feronia limonia</i> Linn.	Kaith	Rutaceae	Tree	Ph
69	<i>Ficus benghalensis</i> Linn.	Bargad tree	Moraceae	Tree	Ph
70	<i>Ficus racemosa</i> Linn.	Gular tree	Moraceae	Tree	Ph
71	<i>Ficus religiosa</i> Linn.	Peepal tree	Moraceae	Tree	Ph
72	<i>Ficus rumphaii</i> Linn.	Pakar	Moraceae	Tree	Ph
73	<i>Gardenia latifolia</i> Ait.	Papra	Rubiaceae	Tree	Ph
74	<i>Gloriosa superb</i> Linn.	Kalihari	Colchicaceae	Herb	G
75	<i>Gomphrena celosioides</i> Mart.	Gul-e- makhmal	Amaranthaceae	Herb	Th
76	<i>Gymnema sylvestre</i> R.Br.	Gudmar	Asclepiadaceae	Herb	Th
77	<i>Hemidesmus indicus</i> (Linn.) Schult.	Anantamul	Asclepiadaceae	Climber	Ph
78	<i>Holoptelia integrifolia</i> (Roxb.) Planch.	Chilbil	Ulmaceae	Tree	Ph
79	<i>Ipomoea fistulosa</i> Mart DC.	Behaya	Convolvulaceae	Shrub	Ph
80	<i>Iseilema anthephoroides</i> Hack.	Ghaas	Poaceae	Herb	Ch
81	<i>Jatropha gossypifolia</i> Linn.	Ratanjoti	Euphorbiaceae	Shrub	Ph
82	<i>Justicia adhatoda</i> Nees.	Adusa	Acanthaceae	Shrub	Ph

83	<i>Justicia paniculata</i> (Burm.f.) Wall. ex Nees.	Chiraita	Acanthaceae	Herb	Th
84	<i>Justicia procumbens</i> Linn.	Kalmashi	Acanthaceae	Herb	Th
85	<i>Lantana camara</i> Linn.	Raimuniya	Verbenaceae	Shrub	Ph
86	<i>Leucaena leucocephal</i> (Lam.) De Wit.	Subabul	Fabaceae	Tree	Ph
87	<i>Leucas aspera</i> (Willd.) Link.	Gumma	Lamiaceae	Herb	Th
88	<i>Lindernia ciliata</i> (Colsm.) Pen.	Oonmudia	Linderniaceae	Herb	Th
89	<i>Loranthus longiflorus</i> Desr.	Banda	Proteaceae	Epiphyte	E
90	<i>Madhuca indica</i> Gme.	Mahua	Sapotaceae	Tree	Ph
91	<i>Malvastrum coromandelianum</i> (Linn.) Garc.	Kharenti	Malvaceae	Herb	Th
92	<i>Mangifera indica</i> Linn.	Aam	Anacardiaceae	Tree	Ph
93	<i>Medicago denticulata</i> Willd.	Alfalfa	Fabaceae	Herb	Th
94	<i>Melilotus indica</i> (Linn.) All.	Ban methi	Fabaceae	Herb	Th
95	<i>Miliusa tomentosa</i> (Roxb.) J.	Hoom	Annonaceae	Tree	Ph
96	<i>Mimusop shexandra</i> Roxb.	Khirni	Sapotaceae	Tree	Ph
97	<i>Mitragyna parvifolia</i> (Roxb.) Korth.	Kaim	Rubiaceae	Tree	Ph
98	<i>Murraya koenigii</i> (Linn.) Spreng.	Curry patta	Rutaceae	Tree	Ph
99	<i>Oldenlandia herbaceae</i> (Linn.) Roxb.	Paper-bhed	Rubiaceae	Herb	Th
100	<i>Oplismenus burmannii</i> (Retz.) P.Beauv.	Kudak	Poaceae	Herb	Th
101	<i>Oxalis corniculata</i> Linn.	Khatibuti	Oxalidaceae	Herb	Ch
102	<i>Panicum repens</i> Linn.	Bansi	Poaceae	Herb	Th
103	<i>Parthenium hysterophorus</i> Linn.	GajarGhans	Asteraceae	Herb	Th
104	<i>Peristrophe paniculata</i> (Forssk.) Brummi.	Atrilal	Acanthaceae	Herb	Th
105	<i>Phyllanthus debilis</i> Ham.	Jarmala	Euphorbiaceae	Herb	Th

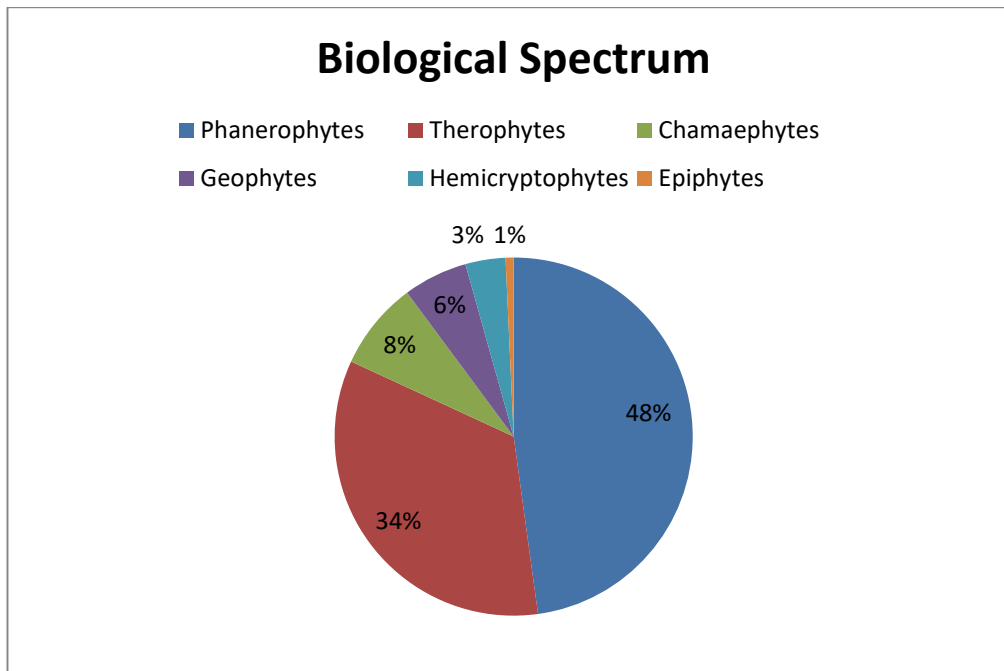
106	<i>Plumbago zeylanica</i> Linn.	Cheetrak	Plumbaginaceae	Herb	Th
107	<i>Pongamia pinnata</i> Linn.	Karanj	Fabaceae	Tree	Ph
108	<i>Prosopis cineraria</i> (Linn.) Dru.	Shami	Fabaceae	Tree	Ph
109	<i>Prosopis julifera</i> (Sw.) DC.	Vilayati babul	Fabaceae	Tree	Ph
110	<i>Pterocarpusmarsupium</i> Roxb.	Bijasal	Fabaceae	Tree	Ph
111	<i>Ricinus communis</i> Linn.	Rendi	Euphorbiaceae	Tree	Ph
112	<i>Saccharum spontaneum</i> Linn.	Kans	Poaceae	Herb	Ch
113	<i>Saccharum munja</i> Roxb.	Munj	Poaceae	Herb	Ch
114	<i>Salmalia malabarica</i> Linn.	Semal	Malvaceae	Tree	Ph
115	<i>Setaria pumila</i> (Poir) Roem. and Schult.	Bandra	Poaceae	Herb	Ch
116	<i>Sida cordata</i> (Burm. f.) Borss. Waal.	Bhuinii	Malvaceae	Herb	Th
117	<i>Sida cordifolia</i> Linn.	Khareti	Malvaceae	Herb	Th
118	<i>Sida spinosa</i> Linn.	Gulsakari	Malvaceae	Herb	Th
119	<i>Solanum nigrum</i> Linn.	Makoi	Solanaceae	Herb	Th
120	<i>Solanum xanthocarpum</i> Schrad. and H. Wendl.	Bhatakataiya	Solanaceae	Herb	Th
121	<i>Syzygium cumini</i> Linn.	Jamun	Myrtaceae	Tree	Ph
122	<i>Tamarindus indica</i> Linn.	Imli	Fabaceae	Tree	Ph
123	<i>Tectona grandis</i> Linn.	Sagon	Lamiaceae	Tree	Ph
124	<i>Tephrosia purpurea</i> Linn.	Sarphonk	Fabaceae	Herb	Th
125	<i>Terminalia arjuna</i> Wight and Arn.	Arjun	Combretaceae	Tree	Ph
126	<i>Terminalia bellirica</i> Roxb.	Behera	Combretaceae	Tree	Ph
127	<i>Terminalia chebula</i> Retz.	Harad	Combretaceae	Tree	Ph
128	<i>Terminalia tomentosa</i> (Roxb.) Wight and Arn.	Asan	Combretaceae	Tree	Ph

129	<i>Tinosporacordifolia</i> (Willd.) Miers.	Giloy	Menispermaceae	Climber	Th
130	<i>Tribulus terrestris</i> Linn.	Gokhru	Zygophyllaceae	Herb	Th
131	<i>Trichosanthes cucumerina</i> Linn.	Junglichichinda	Cucurbitaceae	Climber	Ph
132	<i>Tridax procumbens</i> Linn.	Musbhari	Asteraceae	Herb	Th
133	<i>Vernonia cinerea</i> Less.	Sahdevi	Asteraceae	Herb	Th
134	<i>Xanthium strumarium</i> Linn.	Chotadhatura	Asteraceae	Herb	Th
135	<i>Xyliaxylo carpa</i> (Roxb.) Taub.	Jambu	Fabaceae	Tree	Ph
136	<i>Ziziphus mauritiana</i> Lam.	Ber	Rhamnaceae	Tree	Ph
137	<i>Ziziphus nummularia</i> (Burn.f.) Wight. and Arn.	Jharber	Rhamnaceae	Shrub	Ph
138	<i>Zizyphus oenoplia</i> (Linn.) Mill.	Makkay	Rhamnaceae	Shrub	Ph

A total of 138 species belonging to 112 genera and 48 families of angiosperm were recorded throughout the sampling of vegetation (Table 1). Out of 48 families 45 families belongs to dicotyledons and remaining 3 belongs to monocotyledons. Out of these 138 species and 112 genera total 54 tree species belongs to 36 genera; 08 shrubs species to 07 genera and 70 herbs species to 61 genera. Five climbers and one of epiphyte species also recorded. The number of herb species is more than other plant species. The dicotyledons comprise 45 families 96 genera and 120 species and monocotyledons comprise 03 family 16 genera and 18 species. Out of the total 138 species dicotyledons represents 86.95% and monocotyledons 13.04%. Dicotyledons comprise main proportion of the area. Fabaceae(17 species) was the more dominant family followed by Poaceae(15 species), Asteraceae(08 species), Malvaceae(06 species), Euphorbiaceae(06 species), Acanthaceae(06 species), Combretaceae(06 species), Mimosaceae(05 species), Caesalpiniaceae(05 species) and Rubiaceae(04 species) at the study area.

Category	Dicotyledons		Monocotyledons	
	Number	Percentage	Number	Percentage
Family	45	93.75%	3	6.25%
Genera	96	85.71%	16	14.28%

Species	120	86.95%	18	13.04%
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In this study phanerophytes are more than therophytes. The main cause in the decline of therophytes is grazing by animals. Grazing is the common phenomenon in the forest (Yadav and Singh 1977). There is the highest percentage of phanerophytes which is 48%, followed by therophytes (34%), chamaephytes (8%), geophytes (6%), hemicryptophytes (3%), and epiphytes (1%). The large proportion of the life-forms constituted by phanerophytes and therophytes. Bioclimatic conditions of an area strongly affect the life-forms (Meher-Homji, 1964). The phanerophytic bioclimatic condition is dominant in the moist area and therophytic bioclimatic condition in the dry area.

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