Available online at www.ijpab.com

ISSN: 2320 – 7051
Int. J. Pure App. Biosci. **3 (2):** 356-361 (2015)

INTERNATIONAL JOURNAL OF PURE & APPLIED BIOSCIENCE

Research Article

OPEN ACCESS

Study of Species Diversity of Trees and Shrubs in Bhandaria Forest Area, District–Bhavnagar, Gujarat

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ABSTRACT

In the present study attempt is made to the enumeration of shrub and tree plants of Bhandaria forest area.The present of Bhandaria forest area is selected for the studies because it has been given little attention for its rich floristic vegetation. The present study compacts with total 128 species of trees and shrubs belonging to 44 families which are listed along with their scientific names, vernacular names, families and types. Out of those 42 families are dicotyledons and 02 families are monocotyledons. The most dominant families were Mimosaceae(14 species),Caesalpiniaceae (12 species) and Euphorbiaceae (08species). Shrubs and trees are important for various sectors such as ornamental, horticulture, medicine, agriculture as well as food.

Keywords*: shrubs, trees, Bhandaria forest*

INTRODUCTION

Plants are the most important approach to study natural resources management of indigenous people. The biodiversity is being tragically impoverished due to human action in the last few eras. Understanding the indigenous knowledge of mountain people in relation to biodiversity resources management is one of the key issues for sustainable development[13]. The vegetation of the District Bhavnagar; Bhandaria forest area is under high biotic pressure such as ruthless collection of native plants had threatened their existence and more plants are becoming vulnerable due to the destruction of their habitat.Flora is the most precious gift, nature has provided to us all kinds of essential requirements of the humans in the form of food, fodder, fuel, medicine, timber and oil, etc[4]. Species diversity is a key feature of biological communities and different methods are used to measure it[6]. Biodiversity of plant forms like trees and shrubs constitute the important component[11]. Plant studies have acquired increasing importance in recent years in response to the need of developing and under developing countries to assess their plant wealth.The main aim of present study was to enumeration of tree and shrub diversity of Bhandaria forest area. Trees and shrubs play an essential role in maintaining an ecological equilibrium and improving the livelihood of people in the dry regions. If this role is to be developed and expanded, the function and place of shrubs and trees in the rural landscape must be analyzed and understood.

Trees and shrubs have always been associated with wisdom and immorality in the world. Some trees are also play a role in many of the world's mythologies. Woody vegetation also acts as a soil stabilizer and prevents water and soil erosion. A number of multi-purpose trees and shrubs are ideal for protecting and improving the soil. Woody vegetation can be an important source of forage for livestock and wildlife; fuel wood, poles and food for humans; and non-wood products such as medicine, dyes and fibers. Over 50 percent of the wood from the world's forests is used as fuel. Scarcity of this resource can have damaging effects on the well-being of some populations.

Trees play a very important role in the environment by sequestering carbon, releasing oxygen and losing a large amount of water vapor, trees profoundly influence the environment[9].

MATERIAL AND METHODS

The Bhandaria forest area is situated 28 kilometers away from Bhavnagar city having a unique hilly thorny dry deciduous forest area. The Bhandaria forest area is located at geographical co-ordinates of 21º 35' 056' N longitudes and 072º 06'150º E latitude. It is a semi-arid region with very hot summer and semi cold winter, average rain fall is 25 inch in this region. The hot, dry climate supports thorny and xerophytic vegetation and ecological distribution of plant species. The mentioned investigation was carried out during year 2012-2014. The Bhandaria forest area was frequently visited, to collect the information about the shrubs and trees plant species. The collected plants were brought to the botany laboratory, identified and classified to their respective species level as per floras of Cook, T.[2], Shah, G.L.[14], Patel, R.I.[12]. During the explorations we have taken photographs of the certain species. For suitability, according to Bentham & Hooker all the selected plants species are arranged and scientific names, local names, families are given in the present research paper.

RESULTS AND DISCUSSION

The investigation was carried out in order to explore the existing tree and shrub species diversity in Bhandaria forest area, District-Bhavnagar during 2012-2014. The vegetation was dry deciduous, thorny scrub type. The study revealed the presence of some important shrubs and trees in the area. Total 128 plant species belonging to 44 families were recorded from the study site (Table 1). Out of those, 42 families were dicotyledons and 02 families were monocotyledons. The most dominant families were Mimosaceae (14 sp.), Caesalpiniaceae (12 sp.), Euphorbiaceae (08 sp.), Malvaceae (07 sp.), Apocynaceae (06 sp.) and Capparaceae (06 sp.) etc.Out of 128 plants, genera like *Acacia, Cassia, Euphorbia, Capparis, Zizyphus* were dominant. Table 1 shows enumeration list, the families have been arranged according to Bentham and Hooker's classification system (1862-1883). The tree flora of Nashik city comprises 150 angiospermic species belonging to 122 genera and 48 families recorded by K. N. Gaikwad and M.V. Mali[5].

Out of those 128 species, 57 species of shrubs and 68 species of trees were belonging to dicotyledons and 01 species of shrub and 02 species of trees were belonging to monocotyledons. Enumeration of tree and shrubs by Patel Y. B. *et al*,[11] and Dharmesh *et al*.[3] were recorded 78 species (Trees and Shrubs) in Attarsumba Range, Gandhinagar Forest Division. Laxmi Rawat *et al*,[7] noticed that the most dominant life form was trees (65 species) and shrubs (40 species) at Kandi Region of Hoshiyarpur, Punjab. Total 312 plant species, where 85 Trees species and 62 Shrubs species were recorded by Patel, Y.B. *et al*.[11] at Kalol taluka. The tree cover in Nashik city is fairly good, representing 150 angiospermic species and 3 species of Gymnosperms[5]. N.R. Modi and S.N. Dudani[10] were recorded 95 species of tree and 72 species of shrubs in the Gujarat university campus and its surrounding areas. M.S. Jangid and S. S. Sharma[8] recorded total 131 tree species of 94 genera and 38 families in Modasa taluka, district Sabarkantha.

Some of the rare trees and shrubs species in the area observed during survey. Such as *Cratevanurvala* Buch-Ham., *Thespeciapopulnea* (L.) Sol. Ex. corr., *Adansonia digitata* L., *Helicteres isora* L., *Commiphora wightii* (Arn.) Bhandari., *Dalbergia sissoo* Roxb., *Prosopis cineraria* (L.) Druce., *Ficus racemosa* L., *Acacia catechu* Willd., *Boswellia serrata* Roxb., *Wrightia tinctoria* R. Br., *Calotropis gigantea* (L.) R. Br.etc.

Table-1 Enumeration of trees and shrubs species of Bhandaria forest area

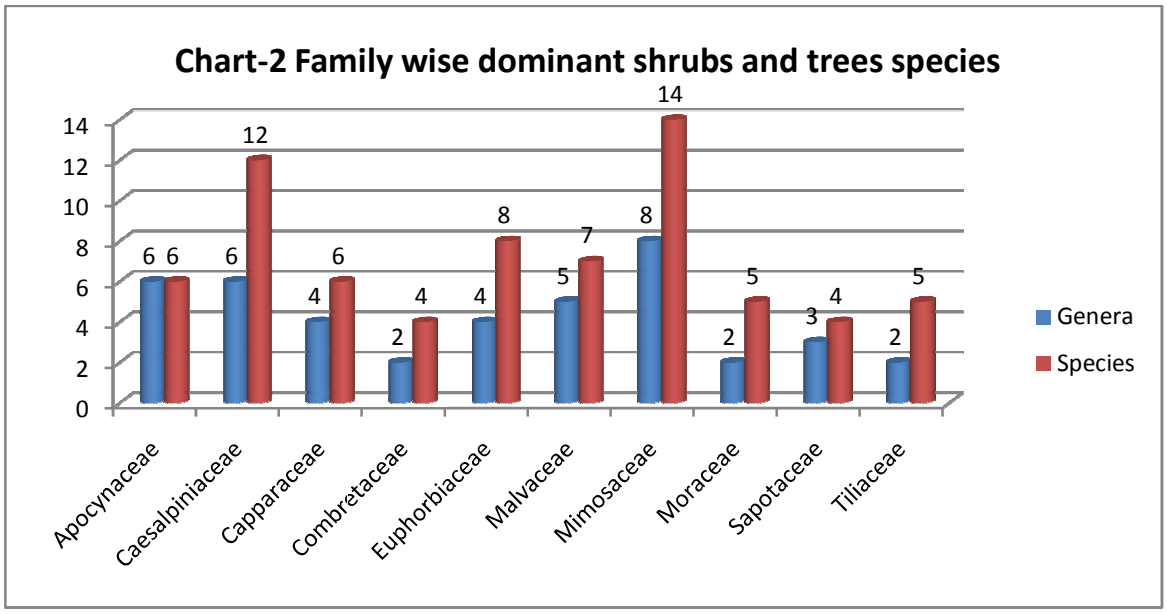
S. No.	Scientific name	Vernacular Name	Family	Habit	Type
1	*Annona Squamosa* L.	Sitafal	Annonaceae	T	C
2	*Polyalthia longifolia* (Sonn.) Thw.	Asopalav	Annonaceae	T	C
3	*Cadaba fruticosa* (L.) Druce.	Telio hemkand	Capparaceae	S	W
4	*Capparis deciduas* (Forsk.)Edgew.	Kerdo	Capparaceae	S	W
5	*Capparis grandis* L. f.	Kerdo	Capparaceae	S	W

6	*Capparis sepiaria* L.	Kanther	Capparaceae	S	W
7	*Crateva nurvala* Buch-Ham.	Vayvarno	Capparaceae	T	W
8	*Maerua oblongifolia* (Forsk) A. Rich	Dudhio hemkand	Capparaceae	S	W
9	*Abutilon indicum* (L.) Sw.	Khapat	Malvaceae	S	W
10	*Gossypium herbaceum* L.	Kapas	Malvaceae	S	C
11	*Hibicus ovalifolius* (Forsk.) Vahl.	Chanak bhindo	Malvaceae	S	W
12	*Hibicus caesius* Garcke	------	Malvaceae	S	W
13	*Hibiscus rosa-sinensis* L.	Jasud	Malvaceae	S	C
14	*Thespecia populnea* (L.) Sol. Ex. corr.	Paras piplo	Malvaceae	T	W
15	*Urena sinuata* L.	Vedau bhindo	Malvaceae	S	W
16	*Adansonia digitata* L.	Rukhdo	Bombaceae	T	W
17	*Helicteres isora* L.	Marada sing	Sterculiaceae	S	W
18	*Sterculia foetida* L.	Pun	Sterculiaceae	T	C
19	*Waltheria indica* L.	------	Sterculiaceae	S	W
20	*Grewia damine* Gaertn.	Sisoti	Tiliaceae	S	W
21	*Grewia tenax* (Forsk.) Fiori.	Gangeti	Tiliaceae	S	W
22	*Grewia villosa* Willd.	Lusaka	Tiliaceae	S	W
23	*Triumfetta rhomboidea* Jacq.	Zipto	Tiliaceae	S	W
24	*Aegle mamelos* (L.) Corr.	Bili	Rutaceae	T	C
25	*Citrus lamon* (L.) Burm.f.	Limbu	Rutaceae	S	C
26	*Murraya koennigii* (L.) Spreng.	Mitholimbdo	Rutaceae	T	C
27	*Alianthus excela* Roxb.	Arduso	Simaroubaceae	T	W
28	*Balanites aegyptica* (L.) Del.	Ingoriyo	Balanitacea	S	W
29	*Boswellia serrata* Roxb.	Saledi	Burseraceae	T	W
30	*Commiphora wightii* (Arn.) Bhandari.	Gugal	Burseraceae	S	W
31	*Azadiracta indica* A. Juss.	Limdo	Meliaceae	T	W
32	*Melia azadiarach* L.	Bakan Limdo	Meliaceae	T	W
33	*Maytenus emarginata* (Willd.) D. Hou.	Vicklo	Celastraceae	S	W
34	*Zizyphus mauritina* Lam.	Mota bor	Rhamnaceae	T	W
35	*Zizyphus nummularis* (Burm.f.) W & A.	Chani bor	Rhamnaceae	S	W
36	*Zizyphus xyloprus*(Retz.) Willd.	Ghat bor	Rhamnaceae	S	W
37	*Sapindus laurifolius* Vahl.	Aritha	Sapindaceae	T	C
38	*Mangifera indica* L.	Ambo	Anacardiaceae	T	C
39	*Moringa concanensis* Nimm.	Kadvo-sargavo	Moringaceae	T	W
40	*Moringa olifera* Lam.	Mitho-sargavo	Moringaceae	T	C
41	*Butea monosperma* (Lam.) Taub.	Khakhro	Fabaceae	T	C
42	*Dalbergia sissoo* Roxb.	Sisam	Fabaceae	T	W
43	*Derris indica* (Lam.) Bennet.	Karanj	Fabaceae	T	W
44	*Bauhinia purpurea* L.	Devkanchan	Caesalpiniaceae	T	W
45	*Bauhinia racemosa* Lam.	Apto	Caesalpiniaceae	T	W
46	*Caesalpnia bonchucella* (L.) Flem.	Kachka	Caesalpiniaceae	S	W
47	*Caesalpnia pulcherima* (L.) Sw. Obs.	Galtoro	Caesalpiniaceae	S	C
48	*Cassia auriculata* L.	Aval	Caesalpiniaceae	S	W
49	*Cassia fistula* L.	Garmalo	Caesalpiniaceae	T	W
50	*Cassia occidentalis* L.	Kasundro	Caesalpiniaceae	S	W
51	*Cassia siamea* Lam.	Kasid	Caesalpiniaceae	T	W
52	*Delonix elata* (L.) Gamble.	Sandhesaro	Caesalpiniaceae	T	W
53	*Delonix regia* (Boj.) Raf.	Gulmohar	Caesalpiniaceae	T	W
54	*Peltophorum pterocarpum* (DC.) Baker. ex Heyne.	Tamrashingi	Caesalpiniaceae	T	W
55	*Tamarindus indica* L.	Khati Amli	Caesalpiniaceae	T	W
56	*Acacia catechu* Willd.	Khair	Mimosaceae	T	W
57	*Acacia farnesiana* (L.)	Tal baval	Mimosaceae	T	W
58	*Acacia leucophloea* (Roxb.)Willd.	Harmobaval	Mimosaceae	T	W
59	*Acacia nilotica* (L.) Del.	Deshi bavl	Mimosaceae	T	W
60	*Acacia senegal* (L.) willd.	Gorad baval	Mimosaceae	T	W
61	*Acacia tortilis* (Forssk.) Hayne.	Israeli baval	Mimosaceae	T	W
62	*Albizia lebbeck* (L.) Benth.	Pilosirish	Mimosaceae	T	W
63	*Albizia procera* (Roxb.) Bth.	Safed sirish	Mimosaceae	T	W
64	*Dichrostachis cinerea* (L.) W & A.	Mordhundhiyu	Mimosaceae	T	W

65	*Leucaena leucocephala* (Lam.) de Wit.	Laso baval, Subaval	Mimosaceae	T	W
66	*Mimosa hamata* Willd.	Kasi baval	Mimosaceae	S	W
67	*Pithecellobium dulce* (Roxb.) Bth.	Goras amli	Mimosaceae	T	W
68	*Prosopis chilensis* (Molina) Stuntz.	Gando baval	Mimosaceae	T	W
69	*Prosopis cineraria* (L.) Druce.	Khijado	Mimosaceae	T	W
70	*Anogeissus latifolia* (Roxb.) Wall. ex Bedd.	Dhavdo	Combretaceae	T	W
71	*Terminalia arjuna* (Roxb.) Wight & Arn.	Arjun	Combretaceae	T	W
72	*Terminalia bellirica* (Gaertn.) Roxb.	Baheda	Combretaceae	T	W
73	*Terminalia catappa* L.	Deshi badam	Combretaceae	T	C
74	*Eucalyptus globules* Labill.	Nilgiri	Myrtaceae	T	C
75	*Psidium guajava* L.	Jamphal	Myrtaceae	T	C
76	*Syzygium cumini* (L.) Skeels.	Jambu	Myrtaceae	T	C
77	*Lawsonia inermis* L.	Mendi	Lythraceae	S	W
78	*Punica granatum* L.	Dadam	Punicaceae	S	C
79	*Carica papaya* L.	Popayo	Caricaceae	S	C
80	*Opuntia elatior* Mill.	Phaphdathor	Cactaceae	S	W
81	*Xeromphis spinosa* (Thumb.) Keay.	Mindhal	Rubiaceae	T	W
82	*Plumbago zeylanica* L.	Safed chitrak	Plumbaginaceae	S	W
83	*Madhuka indica* J.F. Gmel.	Mahudo	Sapotaceae	T	C
84	*Manilkara achras* (Mill.) Fosberg.	Chiku	Sapotaceae	T	C
85	*Manilkara hexandra* (Roxb.) Dub.	Rayan	Sapotaceae	T	C
86	*Mimusops elengi* L.	Borsali	Sapotaceae	T	W
87	*Nyctanthes arbor-tristis* L.	Parijatak	Oleaceae	S	C
88	*Salvadora oleoides* Decne.	Moti Piludi	Salvadoraceae	T	W
89	*Salvadora persica* L. Sp. Pl.	Nani Piludi	Salvadoraceae	S	W
90	*Alstonia scholaris* R. Br.	Saptparni	Apocynaceae	S	W
91	*Holarrena antidysenterica* L.	Indrajav	Apocynaceae	S	W
92	*Nerium indicum.* Mill.	Lal karen	Apocynaceae	S	C
93	*Plumeria rubra* L.	Khad Champo	Apocynaceae	T	C
94	*Thevetia peruviana* (Pers.) Merrill.	Pili-karen	Apocynaceae	T	C
95	*Wrightia tinctoria* R. Br.	Mitho indrajav	Apocynaceae	T	W
96	*Calotropis gigantea*(L.) R. Br.	Moto ankado	Asclepiadaceae	S	W
97	*Calptropis procera* (Ait.) R. Br.	Nano ankado	Asclepidaceae	S	W
98	*Cordia dichotoma* Forst.	Gundo	Ehretiaceae	T	W
99	*Cordia gharaf* (Forsk.) Ehrenb & Asch.	Gundi nani	Ehretiaceae	T	W
100	*Ehretia laevis* Roxb.	Vadhravdi	Ehretiaceae	T	W
101	*Ipomoea fistulosa* Mart. ex Choisy.	Nafftvel	Convolvulaceae	S	W
102	*Tecomella undulata* (Smith.) Seem.	Ragat rohido	Bignoniaceae	T	C
103	*Tacoma stans* (L.) H.B. & K.	Vasnati	Bignoniaceae	S	C
104	*Adhtoda vasica* (L.) Nees.	Ardusi	Acanthaceae	S	W
105	*Clerodendrum inerme* (L.) Gaerth. Fruct.	Kadvi mehndi	Verbenaceae	S	C
106	*Clerodendrum multiflorum* (Burm.f.) O. Ktze.	Arani	Verbenaceae	S	W
107	*Lantana camara* L.	Gandhari	Verbenaceae	S	W
108	*Vitex negundo* L.	Nagod	Verbenaceae	S	C
109	*Tectona grandis* L.f.	Sag	Verbenaceae	T	C
110	*Anisomeles indica* (L.) O.ktze.	Chodharo	Lamiaceae	S	W
111	*Euphorbia antiquorum* L.	Tridharo thor	Euphorbiaceae	S	C
112	*Euphorbia neriifolia* L.	Vad thor	Euphorbiaceae	S	W
113	*Euphorbia nivulia* Buch. Ham.	Vad thor	Euphorbiaceae	S	W
114	*Euphorbia tirucalli* L.	Kharsani thor	Euphorbiaceae	S	W
115	*Jatropha curcas* L.	Ratan jyot	Euphorbiaceae	S	W
116	*Jatropha gossypifolia* L.	Vilayti nepalo	Euphorbiaceae	S	W
117	*Kiranganelia reticulata* (Poir.) Baill.	Kamboi	Euphorbiaceae	S	W
118	*Securinega virosa* Roxb. ex. Willd.	Shinvi	Euphorbiaceae	S	W
119	*Ficus bengalensis* L.	Vadlo	Moraceae	T	W
120	*Ficus racemosa*L.	Umaro	Moraceae	T	W
121	*Ficus religiosa* L.	Piplo	Moraceae	T	W
122	*Ficus tsiela* Roxb.	Pipar	Moraceae	T	W
123	*Morus alba* L.	Shetur	Moraceae	S	C
124	*Holoptelea integrifolia* (Roxb.) Planch.	Kanjo	Ulmaceae	T	W

125	*Casuarina equisetifolia* Forst.	Saru	Casuarinaceae	T	C
126	*Musa paradisiacal* L.	Kela	Musaceae	S	C
127	*Cocos nucifera* L.	Nariel	Arecaceae	T	C
128	*Phoenix syivestris* (L.) Roxb.	Khajuri	Arecaceae	T	C

Chart - 1: Total number of trees and shrubs species of dicots and monocots



CONCLUSION

Many rare and medicinal important ground floral species were found growing luxuriantly. Out of the total 93 genera and 128 species, 58 species of shrubs were found from which monocotyledonous was 01 and dicotyledonous were 57. Total 70 species of trees were found from which monocotyledonous were 02 and dicotyledonous were 68. Mimosaceae and Caesalpiniaceae were the highest dominating families with relevant genera and species. The least genera were found form Combretaceae, Moraceae and Tiliaceae. However Combretaceae was having comparatively least genera and species both and majority of these were found to be of wild type. Study highlights a rich status of trees and shrubs diversity of Bhandaria forest area. There is a need for better management and conservation of the biodiversity in the area.

REFERENCES

1. Barnes, B.V. Zak, D. R. Denton, S.R. Spurr, S.H., *Forest ecology*, (4th ed.), John Wiley and Sons, Inc, 773 p. (1998)

2. Cook, T. *The flora of the presidency of the Bombay*. Vol. I and II, Bishan Singh Mahindra Pal Singh, Dehradun. (1908)
3. Dharmesh, G. Vishant, R. Yogesh B. and Himanshu, A., Carbon stock estimation major tree species in Attarsumba range, Gandhinagar forest division, India, *Annals of Biological Research*, **5(9)**: 46-49 (2014)
4. Gaur, R.D., Flora of the district Garhwal northwest Himalaya (with ethanobotanical notes). Transmedia Publication, Srinagar (Garhwal) India. (1999)
5. Gaikwad, K.N. and Mali, M.V., Tree Flora of Nashik City (Maharashtra) Life Science Botany, **2(2)**: L-94-101 (2012)
6. Krebs, J.C., *Ecological methodological*, Adition Wesley Longman, 650 p. (1988)
7. Laxmi Rawat, R. K. Manhas, Deepak Kholiya, S. K. Kamboj. Floristic Diversity of Kandi Region of Hoshiarpur, Punjab, *India Applied Ecology and Environmental Sciences,* **1(4)**: 49-54 (2013)
8. Jangid, M. S. and Sharma, S.S., Study of tree species diversity of Modasa Taluka, District Sabarkantha (Gujarat) India, Life sciences Leaflets **4**: 119 – 126 (2010)
9. Mulia, N.R. Modi, N.R. & Dudani, S.N., A record of tree wealth of M.G Science Institute Ahmedabad, Life science leaflets, **5**: 143-147 (2010)
10. Modi, N.R. and Dudani, S.N., *International Journal of Conservation Science,* **4(2)**: 189-196 (2013)
11. Patel, Y. Patel, R. and Pandya, H., Study for Tree Enumeration of Attarsumba Range, Gandhinagar Forest Division, India, *International Journal of Innovative Research in Science Engineering and Technology*, **3(4)**: 11185-11190.(2014a)
12. Patel, R.I., *Forest Flora of Gujarat State*, Published by Gujarat State Forest Department, Gujarat state, Baroda. (1984)
13. Pei, I., Conservation of Biological diversity in Templeyard and Holly hills by the Daui Ethnic Monorities of China. Ethno biology, **3**: 27-35 (1991)
14. Shah, G.L., *Flora of Gujarat State*. Part I and II, Sardar Patel University, Vallabh-Vidhyanagar. (1978)
15. Yogesh, B. Patel, Dipak, N. Prajapati, Nimisha D. Patel and Himanshu A. Pandya. Floristic Diversity Study of KalolTaluka, Panchmahal, Gujarat, India. *International Journal of Recent Scientific Research* **5(11)**: pp. 2089-2094 (2014)