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## Enumeration of Tree species of Bhavnagar City, Gujarat state, India

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### Abstract

The present study deals with Enumeration of Tree species belongs to Angiosperms which are *grow in the area* of Bhavnagar city, Gujarat state, India. Tree species play an important role in Urban ecosystem. Urban area and developing city need proper plantation in large number of Tree species. In this research work Tree species have been listed systematically including indigenous, cultivated and naturalized plants. The study area shows a Tree diversity comprise of 109 genera and 139 species belong to 45 angiospermic families. The Floristic analysis details given in the present paper.

**Keywords:** Enumeration, Trees, Bhavnagar.

### 1. Introduction

Trees are largest and the most useful group in plant kingdom. It is an important source of wood and non-wood products and environmental services. Such trees include, Roadside plantings, scattered trees in the landscape, Trees in fields, House compounds and orchards. Trees may also play a role in Carbon sequestration, Biodiversity conservation, Hydrological functions and Erosion control. Urban ecosystems are the cities, towns, and urban strips constructed by humans. Thus, we need to consider the wildlife, plant life, humans, and non-living natural components of inner cities in our thinking about ecosystems [5]. Urban Ecosystems are natural ecosystems that have been altered, modified, or changed by humans in a variety of ways and in varying degrees. Cities and towns in more recent times have wisely planned and left natural open space and greenbelt areas with trees and plant life among the developed areas. These natural areas and parks have provided places for wildlife to survive, preserved some beneficial ecological processes, and enhanced the quality of life for people living and working in these communities. Botanist have been study about floristic, taxonomy and phytosociology [12]. Santapau H. (1962) [1] published Flora of Saurashtra, Part-I, Bole, P.V. and Pathak, J.M. (1988) [2] published Flora of Saurashtra, Part-II-III, Mitaliya, K.D. (1998) [3] done Ethnobotanical study of Angiosperms of Bhavnagar.

### 2. Study Area

Bhavnagar city is located in the west of gulf of khambhat and It is fifth largest city of Gujarat state located between 21°28' N 72°05' E to 21°46'N 72°09'E. Bhavnagar has a semi-arid climate, with hot, dry summers from March to mid-June, the wet monsoon season from mid-June to October where the city receives around 550 mm of rain on average. The semi-arid classification is due to the city's high transpiration. The months from November to February are mild, the average temperature being around 20 °C, with low humidity. Due to proximity to the sea, the climate remains a bit humid throughout the year.

### 3. Material and Methods

The study on angiosperms Trees of Bhavnagar city of Gujarat, India is based on the results obtained from both extensive and intensive studies of the area. Field survey was carried out for observation and collection of plants. Identification of plant species during field work was done by compiling different floras [6, 7, 8, 13, 15] available and authenticated by experts from University department and research institutes. The photographs of all the plant species were taken

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field trip. This piece of work is survey based. Surveys were made for a five years during research work from 2011 to 2015. The collected plants were categorized according to their systematic positions on the levels of family and order<sup>[4, 14]</sup>, following Bentham & Hookers classification system. The list of Tree plant species Family, Analytical data represent in description<sup>[9, 10, 11]</sup>.

#### 4. Result

The total Angiosperm Trees of Bhavnagar city including indigenous cultivated and naturalized plants. The study area shows a Tree diversity comprise of 109 genera and 139 species belong to 45 Angiosperm families.

**Table 1:** List of Tree Species:

Sr. No.	Botanical name	local name in Gujarati	Family
1	<i>Anona squamosa L.</i>	Sitaphal	ANONACEAE
2	<i>Anona reticulata L.</i>	Ramphal	ANONACEAE
3	<i>Polyalthia longifolia (Sonn.) Thw.</i>	Asopalav	ANONACEAE
4	<i>Polyalthia longifolia var.pandula</i>	Asopalav	ANONACEAE
5	<i>Crateva nurvala Buch.-Ham.</i>	Vayvarno	CAPPARACEAE
6	<i>Cochlospermum religiosum L.</i>	Katiro	COCHLOSPERMACEAE
7	<i>Tamarix dioica Roxb.</i>	Bhuri pras	TAMARICACEAE
8	<i>Thespesia populina L.</i>	Paraspiplo	MALVACEAE
9	<i>Elaeocarpus ganitrus Roxb.</i>	Rudraksh	ELAEOCARPACEAE
10	<i>Bombax ceiba L.</i>	Simal, Simlo	BOMBACACEAE
11	<i>Ceiba pentendra L.</i>	Simal, Simlo	BOMBACACEAE
12	<i>Adansonia digitata L.</i>	Rukhdo	BOMBACACEAE
13	<i>Sterculia urens Roxb.</i>	Kadayo	STERCULACEAE
14	<i>Sterculia foetida Roxb.</i>	pun	STERCULACEAE
15	<i>Kleinhovia hospital l.</i>	Bataria	STERCULACEAE
16	<i>Guazuma tomentosa</i>	khotu rudraksh	STERCULACEAE
17	<i>Grewia tiliaefolia Vahl.</i>	Dhaman	TILIACEAE
18	<i>Aegle marmelos (L.) Corr</i>	Bili	RUTACEAE
19	<i>Citrus limon (L.) Burm.f.</i>	Limbu	RUTACEAE
20	<i>Limonia acidissima L.</i>	Kothu, Kothi	RUTACEAE
21	<i>Murraya koenigii (L.) Spreng.</i>	Mitho limdo	RUTACEAE
22	<i>Murraya paniculata l.</i>	Kamini	RUTACEAE
23	<i>Ailanthus excelsa Roxb.</i>	Arduso	SIMARUBACEAE
24	<i>Balanites aegyptiaca (L.) Del.</i>	Ingorio	BALANITACEAE
25	<i>Commiphora wightii (Arn.)</i>	gugal	BURSERACEAE
26	<i>Guaiacum officinale Linn</i>	Lignum-vitae	ZYGOPHYLLACEAE
27	<i>Azadirachta indica A.Juss.</i>	Limdo	MELIACEAE
28	<i>Melia azedarach L.</i>	Bakan limdo	MELIACEAE
29	<i>Zizyphus mauritiana Lam.</i>	Bor, moti Bordi	RHAMNACEAE
30	<i>Maytenus emerginata (Willd.)</i>	Viklo	CELASTRACEAE
31	<i>Sapindus emarginatus Vahl.</i>	Aritha	SAPINDACEAE
32	<i>Mangifera indica L.</i>	Aambo	ANACARDIACEAE
33	<i>Moringa oleifera Lam.</i>	Mitho Saragavo	MORINGACEAE
34	<i>Butea monosperma (Lam.) Taub.</i>	Khakharo	FABACEAE
35	<i>Dalbergia sissoo Roxb.</i>	Moto sisam	FABACEAE
36	<i>Dalbergia latifolia L.</i>	Safed sisam	FABACEAE
37	<i>Erythrina variegata Linn.</i>	Panarvo	FABACEAE
38	<i>Gliricidia sepium L.</i>	Gliricidia	FABACEAE
39	<i>Pterocarpum marsupium</i>	Biyo	FABACEAE
40	<i>Derris indica (Lam.) Bennet.</i>	Kanaji, Karanj	FABACEAE
41	<i>Bauhinia racemosa Lam.</i>	Apto	CAESALPINIACEAE
42	<i>Bauhinia purpurea Lam.</i>	Kanchnar	CAESALPINIACEAE
43	<i>Caesalpinia crista L.</i>	Kachka	CAESALPINIACEAE
44	<i>Cassia absus L.</i>	Chimed, Chon	CAESALPINIACEAE
45	<i>Cassia fistula L.</i>	Garmalo	CAESALPINIACEAE
46	<i>Cassia javanica L.</i>	Java ki rani	CAESALPINIACEAE
47	<i>Cassia siamea Lam.</i>	Kasod	CAESALPINIACEAE
48	<i>Cassia renigera Wall.</i>	pinkcassia	CAESALPINIACEAE
49	<i>Caesalpinia coriarea (Jacq.)Willd</i>	Divi-Divi	CAESALPINIACEAE
50	<i>Delonix elata (L) Gamble.</i>	Sandhesaro	CAESALPINIACEAE
51	<i>Delonix regia (Boj.) Raf.</i>	Gulmohor	CAESALPINIACEAE
52	<i>Parkinsonia aculeata</i>	rambaval	CAESALPINIACEAE
53	<i>Peltophorum pterocarpum (Dc.) Backer</i>	Tamrafali	CAESALPINIACEAE
54	<i>Saraca indica L.</i>	Ashok	CAESALPINIACEAE
55	<i>Tamarindus indica L.</i>	Khati Amla	CAESALPINIACEAE
56	<i>Leucaena leucocephala (Lam.)</i>	Laso Baval	MIMOSACEAE
57	<i>Acacia chundra (Roxb.) Willd.</i>	Khair	MIMOSACEAE

58	<i>Acacia jacquemontii</i> Bth.	Rato Baval	MIMOSACEAE
59	<i>Acacia leucophloea</i> (Roxb.) Willd.	Hermo Baval	MIMOSACEAE
60	<i>Acacia nilotica</i> (L.) Del.	Desi Baval	MIMOSACEAE
61	<i>Acacia senegal</i> (L.) Willd.	Gorad Baval	MIMOSACEAE
62	<i>Albizia lebbek</i> (L.) Bth.	Kalo Siris	MIMOSACEAE
63	<i>Pithecellobium dulce</i> (Roxb.) Bth.	Goras Amli	MIMOSACEAE
64	<i>Adenanthera pavonia</i>	<i>Adenanthera</i>	MIMOSACEAE
65	<i>Prosopis cineraria</i> (L.) Druces	Khijdo	MIMOSACEAE
66	<i>Anogeissus latifolia</i> (Roxb.) Wall.	Dhavdo	COMBRETACEAE
67	<i>Anogeissus pendula</i> Edgew.	Dhankra	COMBRETACEAE
68	<i>Terminalia arjuna</i> (Roxb.) W. & A	Arjun sadad	COMBRETACEAE
69	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Behda,	COMBRETACEAE
70	<i>Terminalia catappa</i> L.	Deshi badam	COMBRETACEAE
71	<i>Terminalia crenulata</i> Roth.	Sadad	COMBRETACEAE
72	<i>Couroupita guianensis</i> L.	Shivlingi	LECYTHIDACEAE
73	<i>Barringtonia racemosa</i>	Samudrafal	BARRINGTONIACEAE
74	<i>Eucalyptus globulus</i> Labill.	Nilgiri	MYRTACEAE
75	<i>Psidium guajava</i> L.	Jamphal	MYRTACEAE
76	<i>Syzygium cumini</i> (L.) Skells.	Jambu	MYRTACEAE
77	<i>Callistemon lanceolata</i> DC.	Botalbrush	MYRTACEAE
78	<i>Punica granatum</i> L.	Dadam	PUNICACEAE
79	<i>Carica papaya</i> L.	Papaya	CARICACEAE
80	<i>Alangium salvifolium</i> (L.f.) Wang.	Ankol, Ankoli	ALANGIACEAE
81	<i>Adina cordifolia</i> (Roxb.) Bth. & Hk.f.	Haldu, Haldarvo	RUBIACEAE
82	<i>Gardenia turgida</i> Roxb.	Gangdi	RUBIACEAE
83	<i>Hymenodictyon excelsum</i> (Roxb.) Wall.	Bhamarchhal	RUBIACEAE
84	<i>Anthocephalus indicus</i>	Kadamb	RUBIACEAE
85	<i>Morinda tomentosa</i> Heyne A.Rich	Aal, Ali	RUBIACEAE
86	<i>Xeromphis spinosa</i> (Thumb.) Keay	Mindhal	RUBIACEAE
87	<i>Achras zapota</i> Linn.	Chiku tree	SAPOTACEAE
88	<i>Madhuca indica</i> J.F.Gmel.	Mahudo	SAPOTACEAE
89	<i>Manilkara hexandra</i> (Roxb.) Dub.	Rayan	SAPOTACEAE
90	<i>Mimusops elengi</i> L.	Bakul	SAPOTACEAE
91	<i>Diospyros cordifolia</i> Roxb.	<i>Dheki, Makardu</i>	EBNACEAE
92	<i>Diospyros melanoxylon</i> Roxb.	Timaru	EBNACEAE
93	<i>Salvadora oleoides</i> Deene.	Piludi	SALVADORACEAE
94	<i>Salvadora persica</i> L.	Piludi	SALVADORACEAE
95	<i>Alstonia scholaris</i> R.Br	saptarni	APOCYNACEAE
96	<i>Carissa congesta</i> Wt.	Karamdi	APOCYNACEAE
97	<i>Plumeria rubra</i> L.	Champo	APOCYNACEAE
98	<i>Thevetia peruviana</i> (Pers.) Merrill	Pili Karen	APOCYNACEAE
99	<i>Wrightia tinctoria</i> R.Br.	Dudhalo	APOCYNACEAE
100	<i>Strychnos nux vomica</i> L.	Zercochlu	LOGANIACEAE
101	<i>Cordia dichotoma</i> Forsk.f.	Moto gundo	EHRETIACEAE
102	<i>Cordia gharaf</i> (Forsk.) Ehrenb. & A.Liar	Gundi	EHRETIACEAE
103	<i>Cordia sebestana</i> L.	cordia	EHRETIACEAE
104	<i>Ehretia laevis</i> Roxb.	Vadhvardi	EHRETIACEAE
105	<i>Oroxylum indicum</i> L.	tetu	BIGNONIACEAE
106	<i>Crescentia alata</i> H.B. & K.	Topgola, tumbdu	BIGNONIACEAE
107	<i>Jacaranda mimosifolia</i> D. Don	jacaranda	BIGNONIACEAE
108	<i>Dolichandrone falcata</i> var. <i>lawii</i> (seem) Haines	Medsing	BIGNONIACEAE
109	<i>Kigella pinnata</i> (Jacq.)	Undhafulo	BIGNONIACEAE
110	<i>Tecomella undulata</i> (Sm.)	Ragatrohido	BIGNONIACEAE
111	<i>Tabebuia rosea</i> Hemsl.	<i>Tabebuia</i>	BIGNONIACEAE
112	<i>Millingtonia hortensis</i> L.	Desi buch	BIGNONIACEAE
113	<i>Spathodea campanulata</i> Beaun.	Pitchkari	BIGNONIACEAE
114	<i>Tecoma stans</i> L.	Vasanti	BIGNONIACEAE
115	<i>Gmelina arborea</i> Roxb.	Sevan, Sivan	VERBENACEAE
116	<i>Tectona grandis</i> L.	Sag	VERBENACEAE
117	<i>Vitex negundo</i> L.	Nagod, Nagud	VERBENACEAE
118	<i>Santalum album</i> L.	chandan	SANTALACEAE
119	<i>Bridelia retusa</i> (L.) Spr.	Asan, Monj	EUPHORBIACEAE
120	<i>Drypetus roxburghii</i> (Wall.)	Putranjivi	EUPHORBIACEAE
121	<i>Emblia officinalis</i> Gaertn.	Amla	EUPHORBIACEAE
122	<i>Holoptelea integrifolia</i> (Roxb.)	Kanjo, Papada	ULMACEAE
123	<i>Ficus benghalensis</i> L.	Vad	MORACEAE
124	<i>Ficus tsiela</i> C de C.	piper	MORACEAE
125	<i>Ficus drupacea</i> Thunb.	Pipli	MORACEAE

126	<i>Ficus hispida</i> L.f. Kalo	umbaro	MORACEAE
127	<i>Ficus racemosa</i> L.	Umbaro	MORACEAE
128	<i>Ficus religiosa</i> L.	Piplo	MORACEAE
129	<i>Morus alba</i> L.	Shetur	MORACEAE
130	<i>Casuarina equisetifolia</i> Forst.	Sharu	CASUARINACEAE
131	<i>Cocos nucifera</i> L.	Nariel	ARECACEAE
132	<i>Phoenix sylvestris</i> (L.) Roxb.	Khajuri	ARECACEAE
133	<i>Roystonea regia</i> (H.B.&K.)	Bottle palm	ARECACEAE
134	<i>Caryota urens</i> L.	Shivjata	ARECACEAE
135	<i>Livistona chinensis</i> R.Brown	Chinese fan palm	ARECACEAE
136	<i>Livistona rotundifolia</i> Mart.	Pankhatad	ARECACEAE
137	<i>Borassus flebelifer</i> L.	Tadi	ARECACEAE
138	<i>Corypha umbraculifera</i> L.	Talipot palm	ARECACEAE
139	<i>Calamus flagellum</i> Gritt.	Netar	ARECACEAE

**Table 2:** List of Families (including total No. of genera and species)

Sr. No.	Family	Genera	Species
1	Annonaceae	2	4
2	Capparaceae	1	1
3	Cochlospermaceae	1	1
4	Tamaricaceae	1	1
5	Malvaceae	1	1
6	Eleocarpaceae	1	1
7	Bombacaceae	3	3
8	Sterculiaceae	3	4
9	Tiliaceae	1	1
10	Rutaceae	4	5
11	Simaroubaceae	1	1
12	Balanitaceae	1	1
13	Burseraceae	1	1
14	Zygophyllaceae	1	1
15	Meliaceae	2	2
16	Celastraceae	1	1
17	Rhamnaceae	1	1
18	Sapindaceae	1	1
19	Anacardiaceae	1	1
20	Moringaceae	1	1
21	Fabaceae	6	7
22	Caesalpiniaceae	8	15
23	Mimosaceae	6	10
24	Combretaceae	2	6
25	Lecythidiaceae	1	1
26	Barringtoniaceae	1	1
27	Myrtaceae	4	4
28	Punicaceae	1	1
29	Caricaceae	1	1
30	Alangiaceae	1	1
31	Rubiaceae	6	6
32	Sapotaceae	4	4
33	Ebenaceae	1	2
34	Salvadoraceae	1	2
35	Apocynaceae	5	5
36	Loganiaceae	1	1
37	Ehretiaceae	2	4
38	Bignoniaceae	10	10
39	Verbenaceae	3	3
40	Santalaceae	1	1
41	Euphorbiaceae	3	3
42	Ulmaceae	1	1
43	Moraceae	2	7
44	Casuarinaceae	1	1
45	Arecaceae	8	9
TOTAL		109	139

**Table 3:** Statistical Analysis of Families, Genera & Species

ANGIOSPERMS	Families		Genera		Species	
	No.	%	No.	%	No.	%
Dicotyledons	44	97.77%	101	92.66%	130	93.52%
<i>Polypetalae</i>	30	66.66%	60	55.04%	80	57.55%
<i>Gamopetalae</i>	09	20.00%	33	30.27%	37	26.61%
<i>Apetalae</i>	05	11.11%	8	07.33%	13	09.35%
Monocotyledons	01	02.22%	8	07.33%	9	06.47%
Total	45	100%	109	100%	139	100%

## 5. Discussion & Conclusion

Dicots were represented by 44 families and 130 species while Monocots were represented by 01 families and 09 species. The following table no. 3 gives the number and percentage of families, genera and species belong to Dicotyledons and Monocotyledons. The present research paper on enumeration of Tree species indicated that what extent the Trees in the area, The analysis of the Tree plant species in the area gives the result that the total Angiosperm flora including naturalized and indigenous plants comprises of about **139 species** belong to **109 genera** of **45 families**. The dominant families of Dicotyledon are *Caesalpiniaceae* with 15 spp., *Mimosae* with 10 spp, *Bignoniaceae* with 10 spp. The dominant families of the Monocotyledons are *Asteraceae* with 09 species respectively.

The cultivated plants belong to dicotyledons are **81** and **07** belong to monocotyledons. The wild plants belong to dicotyledons are **49** and **02** belong to monocotyledons. **Plant Species:** Great value for the species indicate great diversity and importance of the particular habitat or ecosystem.

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