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Plant diversity of angiosperm at Takhteshwer temple and around, Bhavnagar City, Gujarat, India

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Abstract

Takhteshwer temple situated on rocky hill area in the middle of Bhavnagar city. It's a place of tourist interest for religious purpose and view of entire city from the place. Forest department and local people planned to plantation of trees in scheme of social forestry and Municipal Corporation take interest for development of the area. Floristic composition survey carried out from 2013 to 2014 at Takhteshwer temple and around. Angiosperms are surveyed and identified, phenological study in each month of year and prepare a complete list of plants forming a vegetation community of the area. The study area shows a plant diversity comprise of **108** genera and **133** species belong to **45** angiospermic families. It was found that habit compose of **29 Trees, 12 Shrubs, 80 Herbs and 07 Climbers and 05 Twiners** in the area. These are cultivated and wild species. Ephemerals grown in monsoon which covered the ground area.

Keywords: Plant diversity, Takhteshwer, Bhavnagar.

1. Introduction

The research paper give information about plant species belongs to Angiosperms which are *grow in the area* of Takhteshwer temple and around, Bhavnagar city. Plant species play an important role in urban ecosystem. Urban area and developing city need proper plantation and grow more number of Plant species. Plant species have been listed systematically including indigenous, cultivated and naturalized plants ^[1,2]. 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 ^[13]. Santa pau, H. (1962) ^[1] published Flora of Saurashtra, Part-I and Bole, P. V. and Pathak, J. M. (1988) ^[2] published Flora of Saurashtra, Part-II-III, Mitaliya, K. D. & Bhatt, D.C. (1998) ^[3] done ethnobotanical study of Angiosperms of Bhavnagar.

2. Study Area

Takhteshwer temple situated on rocky hill area in Bhavnagar city 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 semiarid 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 months from November to February are mild, the average temperature being around 20 °C-30 °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 plants of Takhteshwer temple and around, the results obtained from extensive field survey in all seasons 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 available floras ^[4, 5, 6, 8, 9, 10, 14, 15, 16] and authenticated by experts from University department and research institutes. The photographs of plant species were taken during field trip. Survey of plants made for a two years during 2013 to 2014. The plant list categorized according to their systematic positions following Bentham & Hookers classification system.

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4. Result: Analysis of Angiosperms

Table 1: List of Plants, Local Name (Gujarati), Families, Habit.**List of Surveyed Angiosperms Plant Species**

[T-Tree, S-Shrub, Us-Undershrub, H-Herb, Cl-Climber, Tw-Twiner,]

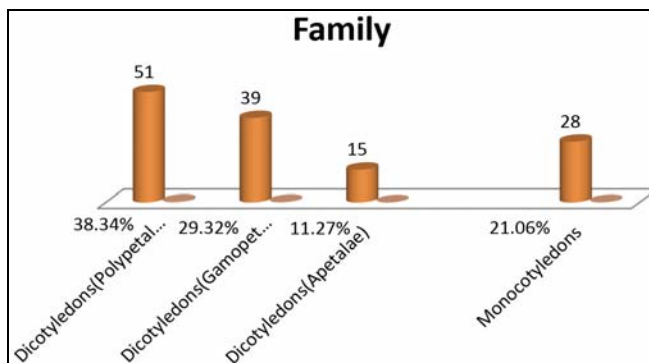
Sr. No	BOTANICAL NAME	LOCAL NAME (In Gujarati)	FAMILY NAME	HABIT
1	<i>Polyalthia longifolia</i> var. <i>pandula</i>	Asopalav	ANONACEAE	T
2	<i>Cocculus hirsutus</i> (L.) Diels.	Vevdi	MENISPERMACEAE	Tw
3	<i>Tinospora cordifolia</i> (Willd) Miers.	Galo,	MENISPERMACEAE	Tw
4	<i>Argemone mexicana</i> L.	Darudi	PAPAVERACEAE	H
5	<i>Cleome viscosa</i> L.	Pili talavni	CLEOMACEAE	H
6	<i>Polygala erioptera</i> Dc.	Patsan, Bhonyasan	POLYGALACEAE	H
7	<i>Portulaca oleracea</i> L.	Moti luni	PORTULACACEAE	H
8	<i>Abutilon indicum</i> (L.) Sw.	Khapat	MALVACEAE	Us
9	<i>Hibiscus rosa-sinensis</i> L.	Jasud	MALVACEAE	S
10	<i>Sida cordifolia</i> L.	Bala	MALVACEAE	Us
11	<i>Corchorus aestuans</i> L.	Chunch	TILIACEAE	H
12	<i>Corchorus trilocularis</i> L.	Kadvi chunch	TILIACEAE	H
13	<i>Triumfetta rhomboidea</i> Jacq	Zipti	TILIACEAE	Us
14	<i>Triumfetta rotundifolia</i> Lam.	Zipti, Golzipti	TILIACEAE	H
15	<i>Tribulus terrestris</i> L.	Bethu Gokharu	ZYGOPHYLLACEAE	H
16	<i>Aegle marmelos</i> (L.) Corr	Bili	RUTACEAE	T
17	<i>Ailanthus excelsa</i> Roxb.	Arduso	SIMAROUBACEAE	T
18	<i>Azadirachta indica</i> A.Juss.	Limdo	MELIACEAE	T
19	<i>Melia azedarach</i> L.	Bakan limdo	MELIACEAE	T
20	<i>Zizyphus mauritiana</i> Lam.Bor,	Bordi	RHAMNACEAE	T
21	<i>Zizyphus nummularia</i> (Burm.f.) W.& A.	Chani Bor	RHAMNACEAE	S
22	<i>Moringa oleifera</i> Lam.	Mitho Saragavo	MORINGACEAE	T
23	<i>Alysicarpus longifolius</i> (Rottle.ex. Spreng)	Ghoda samervo	FABACEAE	H
24	<i>Crotalaria linifolia</i> L.	Adabau San	FABACEAE	Us
25	<i>Crotalaria medicaginea</i> Lam.	Adbau Methi	FABACEAE	H
26	<i>Dalbergia sissoo</i> Roxb.	Moto sisam	FABACEAE	T
27	<i>Derris indica</i> (Lam.) Bennet.	Kanaji, Karanj	FABACEAE	T
28	<i>Gliricidia sepium</i> L.	<i>Gliricidia</i>	FABACEAE	T
29	<i>Goniogyna hirta</i> (Willd)Ali		FABACEAE	H
30	<i>Indigofera cordifolia</i> Heyne.		FABACEAE	H
31	<i>Indigofera linifolia</i> Retz.	Jinki Gali	FABACEAE	H
32	<i>Rhynchosia minima</i> (L.) Dc.	Nahni Kamalvel	FABACEAE	Cl
33	<i>Tephrosia purpurea</i> (L.) Pers.	Sarpankho	FABACEAE	H
34	<i>Bauhinia racemosa</i> Lam.	Apto	CAESALPINIACEAE	T
35	<i>Bauhinia purpurea</i> Lam.	Kanchnar	CAESALPINIACEAE	T
36	<i>Caesalpinia pulcherima</i> L.	Galtoro	CAESALPINIACEAE	S
37	<i>Cassia auriculata</i> L.	Aval	CAESALPINIACEAE	S
38	<i>Cassia fistula</i> L.	Garmalo	CAESALPINIACEAE	T
39	<i>Cassia obtusifolia</i> L.	Punvadio	CAESALPINIACEAE	H
40	<i>Cassia occidentalis</i> L.	Kasundro	CAESALPINIACEAE	H
41	<i>Cassia siamea</i> Lam.	Kasod	CAESALPINIACEAE	T
42	<i>Cassia tora</i> L.	Kuvandio	CAESALPINIACEAE	H
43	<i>Delonix regia</i> (Boj.) Raf.	Gulmohor	CAESALPINIACEAE	T
44	<i>Peltophorum pterocarpum</i> (Dc.) Backer	Tamrafali	CAESALPINIACEAE	T
45	<i>Pithecellobium dulce</i> (Roxb.) Bth.	Goras Amla	MIMOACEAE	T
46	<i>Prosopis chilensis</i> (Sw.) DC.	Gando baval	MIMOACEAE	S
47	<i>Quisqualis indica</i> L.	Madhumalti	COMBRETACEAE	Cl
48	<i>Terminalia arjuna</i> (Roxb.) W. &A.	Arjun sadad	COMBRETACEAE	T
49	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Behda,	COMBRETACEAE	T
50	<i>Coccinia grandis</i> (L.) Voigt.	Ghilodi	CUCURBITACEAE	Cl
51	<i>Mukia maderaspatana</i> (L.) M.Roem.	Chanak Chibadi	CUCURBITACEAE	Cl
52	<i>Blumea eriantha</i> Dc.	Kapurio	ASTERACEAE	H
53	<i>Chrysanthemum indicum</i> DC.	Gul daudi	ASTERACEAE	H
54	<i>Launaea procumbens</i> (Roxb.) Rama	Moti Bhonpatr	ASTERACEAE	H
55	<i>Parthenium hysterophorus</i> L.		ASTERACEAE	H
56	<i>Sphaeranthus indicus</i> L.	Gorakh Mundi	ASTERACEAE	H
57	<i>Tagetes pattula</i> L.	Galgota	ASTERACEAE	H
58	<i>Tridax procumbens</i> L.	Bhangro	ASTERACEAE	H
59	<i>Vernonia anthelmintica</i> (L.) Willd.	Kaljiri	ASTERACEAE	H
60	<i>Xanthium strumarium</i> L.	Gadariyu	ASTERACEAE	H
61	<i>Manilkara hexandra</i> (Roxb.) Dub.	Rayan	SAPOTACEAE	T
62	<i>Catharanthus roseus</i> (L.) G.Don.	Barmashi	APOCYNACEAE	H

63	<i>Nerium indicum</i> Mill.	Lal Karen	APOCYNACEAE	S
64	<i>Thevetia peruviana</i> (Pers.) Merrill	Pili Karen	APOCYNACEAE	T
65	<i>Calotropis gigantea</i> (L.) R.Br.	Moto ankado	ASCLEPIADACEAE	S
66	<i>Calotropis procera</i> (Ait.) R.Br.	Nano ankado	ASCLEPIADACEAE	S
67	<i>Pergularia daemia</i> (Forsk.) Chior	Chamar Dudheli	ASCLEPIADACEAE	Tw
68	<i>Cryptostegia grandiflora</i> R.Br.	Rubbervel	PERIPLOCACEAE	Cl
69	<i>Cordia sebestana</i> L.	<i>Cordia</i>	EHRACEAE	T
70	<i>Heliotropium indicum</i> L.	Hathi Sundho	BORAGINACEAE	H
71	<i>Trichodesma zeylanicum</i> (Burm.f.) R.Br.	Undhafuli	BORAGINACEAE	H
72	<i>Convolvulus microphyllus</i> (Roth.) Sieb.	Shankhaval	CONVOLVULACEAE	H
73	<i>Convolvulus arvensis</i> L.	Veldi	CONVOLVULACEAE	H
74	<i>Evolvulus alsinoides</i> (L.) L.	KaliShankhaval	CONVOLVULACEAE	H
75	<i>Ipomoea eriocarpa</i> R.Br.	Bodi Fudardi	CONVOLVULACEAE	H
76	<i>Ipomoea fistulosa</i> Mart.	Naffatvel	CONVOLVULACEAE	S
77	<i>Ipomoea nil</i> (L.) Roth.	Kaladana	CONVOLVULACEAE	Tw
78	<i>Merremia gangetica</i> (L.) Cufod.	Undardi	CONVOLVULACEAE	H
79	<i>Datura metel</i> L.	Dhanturo	SOLANACEAE	H
80	<i>Physalis minima</i> L.	Popti, Parpoti	SOLANACEAE	H
81	<i>Solanum surattense</i> Burm.f.	Bhony Ringni	SOLANACEAE	H
82	<i>Lindenbergia muraria</i> (Roxb.) P.Bruehl.	Patharchatti	SCORPHULARIACEAE	H
83	<i>Pedalium murex</i> L.	Ubhu Gokharu	PEDALIACEAE	H
84	<i>Sesamum indicum</i> L.	Tal	PEDALIACEAE	H
85	<i>Martynia annua</i> L.	Vinchudo	MARTYNIACEAE	H
86	<i>Adhatoda vasica</i> (L.) Nees.	Ardushi	ACANTHACEAE	S
87	<i>Barleria prionitis</i> L.	Pilo Kantasheliyo	ACANTHACEAE	H
88	<i>Vitex negundo</i> L.	Nagod, Nagud	VERBENACEAE	S/T
89	<i>Lantana indica</i> L.	jangali gandhari	VERBENACEAE	S
90	<i>Ocimum sanctum</i> L.	Tulsi	LAMIACEAE	H
91	<i>Boerhavia repanda</i> (L.) Druce	Satodi	NYCTAGINACEAE	H
92	<i>Boerhavia diffusa</i> L.	GhetuliSatodi	NYCTAGINACEAE	H
93	<i>Bougainvillea spectabilis</i> Willd.	Boganvel	NYCTAGINACEAE	Cl
94	<i>Achyranthes aspera</i> var. aspera	Anghedi	AMARANTHACEAE	H
95	<i>Digera muricata</i> (L.) Mart.	Kanejro	AMARANTHACEAE	H
96	<i>Acalypha indica</i> L.	Khokoli	AMARANTHACEAE	H
97	<i>Pedilanthus tithymaloides</i> (L)	Vilayati kharsani	EUPHORBIACEAE	H
98	<i>Dalechampea scandens</i> L.	Khoti khajavani	EUPHORBIACEAE	Tw
99	<i>Euphorbia heterophylla</i> L.	Lalpatti	EUPHORBIACEAE	H
100	<i>Euphorbia hirta</i> L.	Nagli Dudheli	EUPHORBIACEAE	H
101	<i>Phyllanthus urinaria</i> L.	Bhony Ambli	EUPHORBIACEAE	H
102	<i>Ficus benghalensis</i> L. Vad	Vad	MORACEAE	T
103	<i>Ficus drupacea</i> Thunb.	Pipli	MORACEAE	T
104	<i>Ficus racemosa</i> L.	Umbaro	MORACEAE	T
105	<i>Ficus religiosa</i> L.	Piplo	MORACEAE	T
106	<i>Canna indica</i> L.	Bajarbattu	CANNACEAE	H
107	<i>Crinum asiaticum</i> L.	Nagdaman	AMARYLLIDACEAE	H
108	<i>Polyanyhus tuberosa</i> L.	Gulchhadi	AMARYLLIDACEAE	H
109	<i>Aloe barbadensis</i> Mill.	Kuvarpathu	LILIACEAE	H
110	<i>Asparagus racemosus</i> Willd.	Shatavari	LILIACEAE	Cl
111	<i>Commelina benghalensis</i> L.	Shishmulyu	COMMELINACEAE	H
112	<i>Commelina forskalaei</i> Vahl.	Shishmulyu	COMMELINACEAE	H
113	<i>Phoenix sylvestris</i> (L.) Roxb.	Khajuri	ARECACEAE	T
114	<i>Cocos nucifera</i> L.	Nariyeli	ARECACEAE	T
115	<i>Cyperus rotundus</i> L.	Moth	CYPERACEAE	H
116	<i>Cyperus tuberosus</i> Rottb.	Nagarmoth	CYPERACEAE	H
117	<i>Aristida adscensionis</i> L	Lapadu	POACEAE	H
118	<i>Apluda mutica</i> L. Phophul	Batkan ghas	POACEAE	H
119	<i>Brachiaria setigera</i> (Retz)	Kaneru	POACEAE	H
120	<i>Cenchrus biflorus</i> Roxb.	Motu Dhramn	POACEAE	H
121	<i>Cenchrus ciliaris</i> L.	Jhinu Dhramnu	POACEAE	H
122	<i>Chloris barbata</i> Sw.	Mindadiu	POACEAE	H
123	<i>Cynodon dactylon</i> (L.) Pers.	Darbh, Dharo	POACEAE	H
124	<i>Dactyloctenium aegyptium</i> (L.) P.Beauv		POACEAE	H
125	<i>Chrysopogon fulvus</i> (Spr. ocniov.)	Khad sundhiu	POACEAE	H
126	<i>Dichanthium annulatum</i> (Forsk.)	Zinzvo	POACEAE	H
127	<i>Digitaria adscendens</i> (H.B.&K.)	tanodiyu	POACEAE	H
128	<i>Echinochloa colonum</i> L.	Samo	POACEAE	H
129	<i>Eragrostis ciliaris</i> (L.) R.Br.	Murmur	POACEAE	H
130	<i>Eragrostis tenella</i> (L.) P.Beauv.	Kalavo, Limor	POACEAE	H

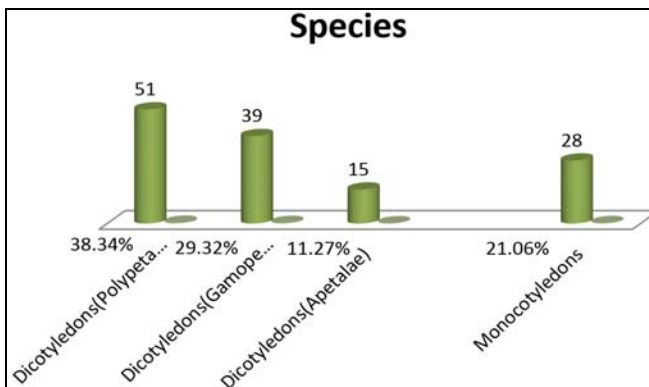
131	<i>Melanocenchris jacquemontii</i> J. & S.		POACEAE	H
132	<i>Paspalum disticum</i> Roxb.		POACEAE	H
133	<i>Setaria glauca</i> (L.) P.Beauv.	Kutri ghas	POACEAE	H

Table 2: Statistical Analysis of Families, Genera & Species

ANGIOSPERMS	Families		Genera		Species	
	No.	%	No.	%	No.	%
Dicotyledons	38	84.44%	84	77.77%	105	78.94%
<i>Polypetalae</i>	19	42.22 %	39	36.11%	51	38.34%
<i>Gamopetalae</i>	15	33.33%	35	32.40%	39	29.32%
<i>Apetalae</i>	04	08.88%	10	09.25%	15	11.27%
Monocotyledons	07	15.56%	24	22.23%	28	21.06%
Total	45	100%	108	100%	133	100%



Graph-1: Dicot-Monocot Plant Species



Graph-2: Dicot-Monocot Families

5. Discussion & Conclusion

Angiosperm plants of Takhteshwer temple and around in Bhavnagar city including indigenous, cultivated and naturalized plants. The study area shows a plant diversity comprise of **108** genera and **133** species belong to **45** angiosperm families.

Dicots were represented by 38 families and 105 species while Monocots were represented by 07 families and 28 species. The following table no. 1 gives the number and percentage of families, genera and species belong to Dicotyledons and Monocotyledons. Analysis of the plant species in the area gives result of total Angiosperm flora including cultivated, naturalized and indigenous plants comprises of about **133 species belong to 108 genera of 45 families**. It was found that habit compose of **29 Trees, 12 Shrubs, 80 Herbs and 07 Climbers and 05 Twiners** in the area. These are cultivated and wild species. The dominant families are **Poaceae** (17 species), **Caesalpinaceae** (11 species), **Fabaceae** (11 species), **Asteraceae** (09 species), **Convolvulaceae** (07 species) **Euphorbiaceae** (06species).

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