



Checklist of flowering plants of Bhal region, Gujarat, India.

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Abstract: Biodiversity plays an important role in improving the quality of human life. Biodiversity provides so many services to human welfare. Maintenance of atmospheric gases composition, regulation of biogeochemical cycles, prevention of soil erosion, maintaining soil fertility, maintaining water balance, natural pest control within ecosystem are some of the essential services. The angiosperm flora of Gujarat is mostly varied in extent and composition. This paper deals with the floral diversity of Bhal region with special focus on regions of Ahmedabad District, Gujarat. It includes total 145 flowering plant species belonging to 117 genera and 55 families with maximum number of habits of tree in particular season of post monsoon to winter.

(Keywords: Biodiversity, ecosystem, angiosperm, Gujarat, Ahmedabad, botanical name, vernacular name, forest, herbaceous)

I. INTRODUCTION:

Biodiversity is defined as “the total variability of life on the earth [1]. Biodiversity deals with the degree of nature’s variety in biosphere. This variety can be observed at three levels: the genetic variability within species, the variety of species within a community and the organization of species in an area into distinctive plant and animal communities [2]. The existence of living organisms in different geographical conditions with related biotic and abiotic factors influencing their quality and quantity leads to the concept of biodiversity. The importance of the distribution of organisms is evident in the studies on biodiversity whose major focus is on taxonomical and ecological [3].

Floristic study includes the study of all flowering plants in selected area and flowering plants include gymnosperms and angiosperms. Angiosperms are the largest group in the Plant kingdom in the world. There are 250000 species, 12000 genera and 300 families in the world while India has 45000 plant species. Species diversity varies greatly through space and time [5]. Disturbance is widely believed to be one of the main factors influencing variation in species diversity [4].

The angiosperm flora of Gujarat is mostly varied in extend and composition. There are 2198 species of higher plants belonging to 902 genera and 155 families. From which 1808 plant species are listed in flora of Gujarat [7]. Which represent 12.91% of flora of country, although this list is incomplete.

Floristic studies have acquired increasing importance in recent years in response to the need of developing and under developing countries to assess their plant wealth [6]. The whole Bhal region is a barrel tract of marshy and saline land which is physically handicapped and infertile. This is the most backward region of Gujarat with a low degree of infrastructural facilities and economic development, despite its

famous for wheat production. Bhal region is mainly agro-climatic zone of Gujarat. Natural habitat of plants are comparatively less in number because it is cultivated region of Gujarat. Main crop of this region is wheat, special variety called as “Bhaliya” wheat.

II. LITERATURE REVIEW:

Meena, S. L. (2014) have reported the total 900 plant species belonging to 118 families and 464 genera from which 716 species of dicots and 184 species of monocot in the district of Ahmedabad and Gandhinagar, Gujarat [10]. Patel, R. S., Riya, K., and Neha, P. (2018) reported 14 species of malvaceae family in Kankaiya zoological garden, Ahmedabad from which 8 wild, 6 cultivated out of which 12 shrubs and 2 herbs [11]. Patel, R.S., Riya, K. and Neha, P. (2018) have listed 20 species of ornamental plants by surveying the \Butterfly Park and One Tree Hill garden of Kankariya, Ahmedabad [12]. Oza, R.A. (1991) have studied the taxonomical and ecological flora of and around Bhavnagar and listed 528 species belonging to 110 families of which the dicotyledons with their 436 species belonging to 86 families outnumbered the monocotyledons which contributed only 92 species spread over 21 families [13]. Maitreya, B.B. (2015) has reported 133 species belonging to 108 genera and 45 angiospermic families by surveying the plant diversity of angiosperm at Takhteshwar temple and around Bhavnagar city, Gujarat, India [14]. Bharat B Maitreya (2015) have published the floristic diversity of Sabarmati river of Gujarat which include the plant species of 384 genera and 542 species belong to 114 angiospermic families. Dicots were represented by 93 families and 459 species while Monocots were represented by 21 families and 83 species [15]. Patil, M.V. and Patil, D.A. (2005) have listed 30 Plant species belonging to 20 families from aboriginal and rural populace of Nasik District, Maharashtra [16]. Patil, M.V. and Patil, D.A. (2000) reported 36 wild edible angiosperm species from Nasik District of Maharashtra [17]. Janakiraman, J. and Jalal, J. (2015) have listed 436 plant species of angiosperms belonging to 259 genera and 67 families including 22 endemic taxa. Out of which, 67 species are of grasses of Great Indian Bustard Wildlife Sanctuary, Maharashtra [18]. Joshi, V.N. and Kumbhojkar, M.S. (1997) have studied floristic diversity of Vetal hill and its adjacent hills in greater Pune area from s1986 to 1997 and listed 416 species belonging to 316 genera and 101 families [19]. Wagh, V.V. and Jain. A.K. (2013) have studied the Jhabua district, situated in the western most part of Madhya Pradesh and listed 692 species of angiosperms under 469 genera belonging to 115 families. Out of these, 150 species in 102 genera and 20 families belongs to monocot and 542 species in 367 genera and 95 families belongs to dicot [20].

III. MATERIAL AND MATHOD:

3.1 FIELD SURVEY:

The Field survey was an important part of the study. field survey has been started from Dholka taluka, Gujarat from November, 2019. The field work was carried out from November, 2019 to February 2020. As it is surveyed in particular season, from late monsoon to winter. The maximum area of this region is located in the district Ahmedabad, followed by Bhavnagar, Kheda and a smaller part of Anand District. This work has been done with the special focus on the area covered by Ahmedabad district in Bhal region.

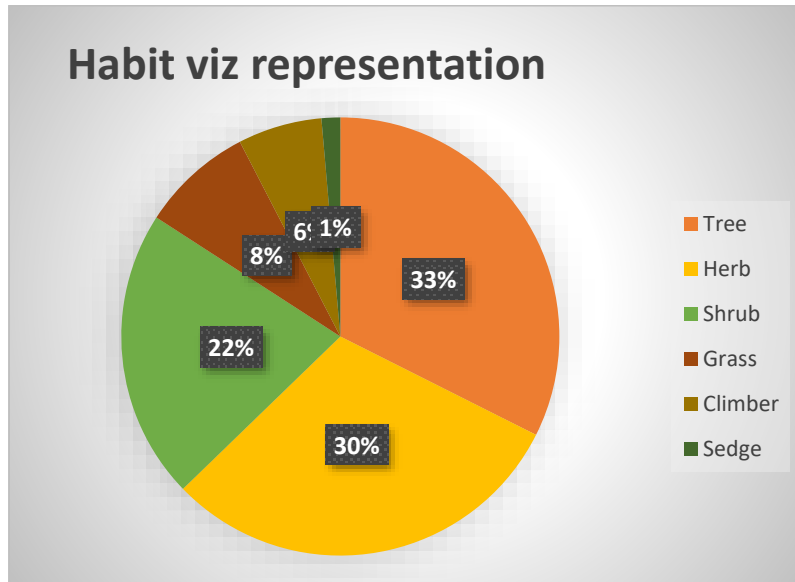
In the field, the plant species were documented and plant specimens were also collected along with their flowering parts for preparing herbaria. This was useful for identifying plants specimens from the flora. During field work, photographs of plants along with their habits, leaves, stem and floral parts were taken (if available). The collected plant specimens were carefully pressed and poisoned with HgCl₂. The herbarium sheets were labelled, numbered and deposited in the Herbarium of Gujarat University. Field notes were taken so as to have information on the plant's name, habit, habitat and the characteristics of the species along with the plant family.

The plant species were identified with the help of literature [8][7][9] available in the library of the Botany Department, Gujarat University, The Serenity Library, Ahmedabad and St. Xavier's College, Ahmedabad. Photographs of plants were captured with a digital camera.

IV. RESULT AND DISCUSSION:

The study reveals total 145 flowering plant species belonging to 117 genera and 55 families during the particular season of post monsoon to winter. Maximum number of plants belong to 8 families; Poaceae, Fabaceae, Solanaceae, Asteraceae, Malvaceae, Caesalpiniaceae, Euphorbiaceae and Acanthaceae. Out of which 47 trees, 44 herbs, 31 shrubs, 12 grasses, 9 climbers and 2 sedges are present as different habit of plants.

Graph:1 Habit viz representation



Graph:2 Most representative families with genus and species

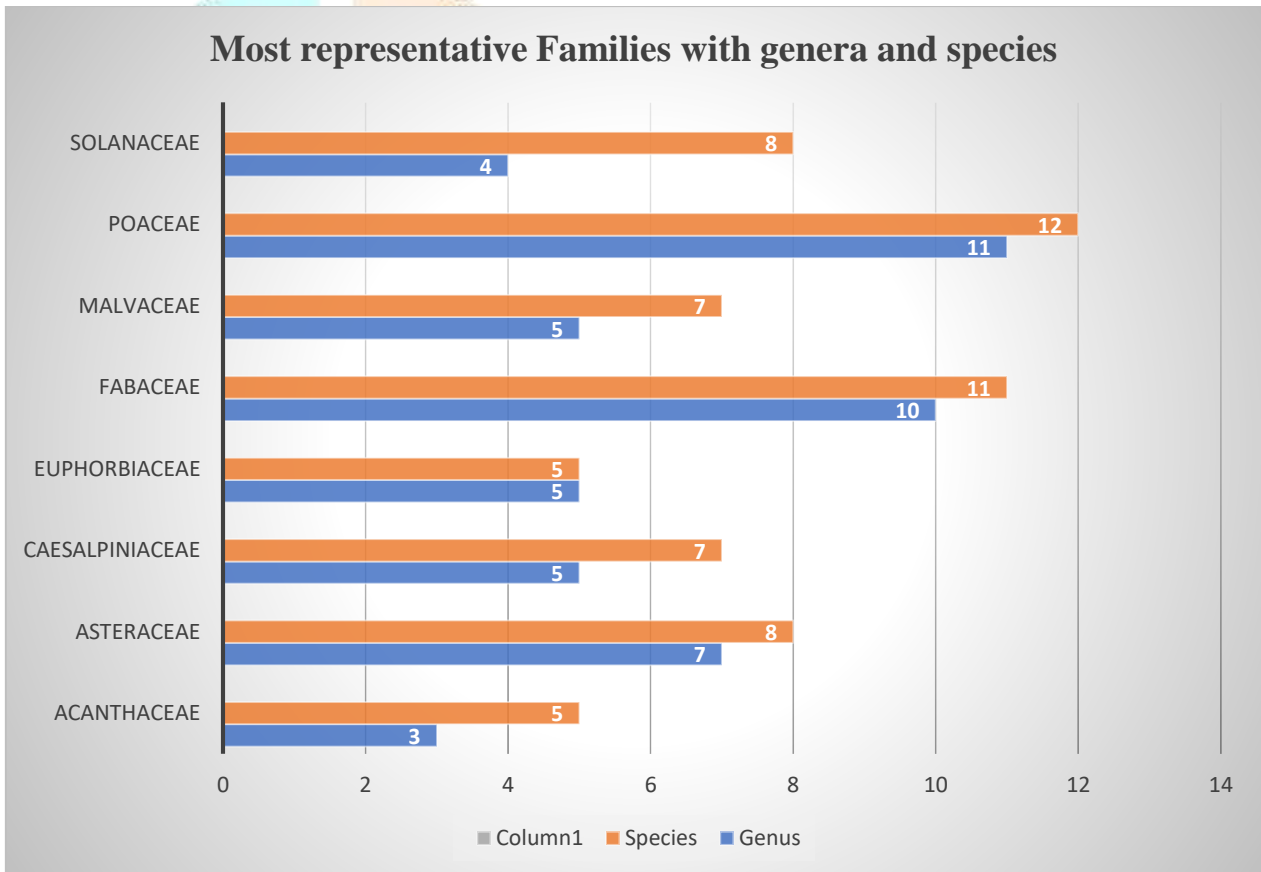


Table: 1 Checklist of flowering plants of Bhal region

Sr No.	Plant Name	Common name	Family	Habit
1	<i>Abutilon indicum</i> (L.) Sw.	Kanski, Khapat	Malvaceae	Shrub
2	<i>Acalypha India</i> L.	Vaichikato, Dadari, Dadarjo, Dadaro	Euphorbiaceae	Herb
3	<i>Achyranthus aspera</i> L.	Anghedi, Anghedo	Acanthaceae	Herb
4	<i>Achyranthus sp.</i>		Acanthaceae	Herb
5	<i>Aegle marmelos</i> L.	Bili, Bili-patra	Rutaceae	Tree
6	<i>Aloe vera</i> (L.) Burm. f.	Khorpad, Kuvarpthu	Asparagaceae	Herb
7	<i>Alternanthera polygonodius</i> (L) R Br ex Sweet		Amaranthaceae	Herb
8	<i>Amaranthus hybridus</i> L	Rajgaro	Amaranthaceae	Herb
9	<i>Ammannia baccifera</i> L.	Jal Agio, Lal Agio	Lythraceae	Herb
10	<i>Antigonon leptopus</i> Hook. & Arn.	Ice-cream creeper	Polygonaceae	Climber
11	<i>Apluda mutica</i> L.		Poaceae	Grass
12	<i>Aristida hystrix</i> L.f.		Poaceae	Grass
13	<i>Argemone mexicana</i> L	Aphin	Papavaraceae	Herb
14	<i>Azadirachta indica</i> (L.) Juss.	Margos Tree, Neem Tree	Meliaceae	Tree
15	<i>Balanites aegyptiaca</i> (L.) Delile	Hingot	Balanitaceae	Tree
16	<i>Basella rubra</i> L.		Basellaceae	Tree
17	<i>Blumea eriantha</i> L.		Asteraceae	Herb
18	<i>Blumea lucera</i> (Burm.f) DC	Kapurio	Asteraceae	Herb
19	<i>Boerhavia diffusa</i> L	Satodi	Nyctaginaceae	Herb
20	<i>Boerhavia erecta</i> L.		Nyctaginaceae	Herb
21	<i>Bougainvillea spectabilis</i> Wild.	Bouganvel	Nyctaginaceae	Climber
22	<i>Brassica juncea</i> (L) Czern	Rai	Brassicaceae	Herb
23	<i>Butea monosperma</i> (Lamk.) Taub.	Kesudo	Fabaceae	Tree
24	<i>Caesalpinia pulcherrima</i> L.	Pride of Barbados, Peacock flower	Caesalpinaceae	Shrub
25	<i>Calotropis gigantea</i> (L) Dryand	Aakdo	Asclepiadaceae	Shrub
26	<i>Calotropis procera</i> (Aiton) Dryand	Nano Aakdo	Asclepiadaceae	Shrub
27	<i>Capparis decidua</i> (Forssk) Edgew	Kerda	Capparidaceae	Shrub
28	<i>Cassia tora</i> L	Kuvandio	Caesalpinaceae	Herb
29	<i>Casuarina equisetifolia</i> L.	Saru	Casuarinaceae	Tree
30	<i>Cesalpinia bipinnata</i> L.		Cesalpinaceae	Tree
31	<i>Cicer arietinu</i> L.	Chickpea	Fabaceae	Herb
32	<i>Citrus limon</i> (L.) Burm. f.	Limbu	Rutaceae	Tree
33	<i>Clerodendrum phlomidis</i> L.	Arani	Verbenaceae	Shrub
34	<i>Cocos nucifera</i> L.	coconut	Arecaceae	Tree
35	<i>Commelina benghalensis</i> L	Shishmuliu	Commelinaceae	Herb

36	<i>Commelina diffusa</i> Burm f		Commelinaceae	Herb
37	<i>Corchorus aestuans</i> L	Chunch	Tiliaceae	Herb
38	<i>Corchorus tridens</i> L		Tiliaceae	Herb
39	<i>Cordia dichotoma</i> G Forst	Moto-gundo	Boraginaceae	Tree
40	<i>Crotalaria juncea</i> L.		Fabaceae	Shrub
41	<i>Crotalaria medicaginea</i> Lam	Ranmethi	Fabaceae	Herb
42	<i>Cucumis melo</i> L. subsp. <i>agrestis</i> (Naudin) Pangalo var. <i>agrestis</i> Naudin		Cucurbitaceae	Climber
43	<i>Cuscuta chinensis</i> Lam	Amarvel	Cuscutaceae	Climber
44	<i>Cuscuta reflexa</i> Roxb	Amarvel	Cuscutaceae	Climber
45	<i>Cynodon dactylon</i> (L) Pers	Darbh	Poaceae	Grass
46	<i>Cyperus compressus</i> L		Cyperaceae	Sedge
47	<i>Cyperus rotundus</i> L.	Chido, Moth, Chiyo	Cyperaceae	Sedge
48	<i>Datura inoxia</i> Mill.	Dhatura	Solanaceae	Herb
49	<i>Datura metel</i> L.	Kalo-dhaturo	Solanaceae	Shrub
50	<i>Datura stamonium</i> L.	Dhatura	Solanaceae	Herb
51	<i>Desmostachya bipinnata</i> (L) Stapf	Dabhado	Poaceae	Grass
52	<i>Dicanthum annulatum</i> (Forssk) Stapf	Marvel grass	Poaceae	Grass
53	<i>Diplocyclos palmatus</i> (L.) C.Jeffrey		Cucurbitaceae	Climber
54	<i>Eclipta prostrata</i> L.	Bhringrag	Asteraceae	Herb
55	<i>Eragrostis tenella</i> L	Kalavo	Poaceae	Grass
56	<i>Eucalyptus globulus</i> Labil.	Nilgiri, Tasmanian blue gum tree	Myrtaceae	Tree
57	<i>Euphorbia hirta</i> L		Euphorbiaceae	Herb
58	<i>Ficus hispida</i> L.	Kala-umbar, Bokeda	Moraceae	Tree
59	<i>Ficus religiosa</i> L.	Pipal	Moraceae	Tree
60	<i>Ficus virens</i> var. <i>wightiana</i> (Miq.) M.R.Almeida	Pepri	Moraceae	Tree
61	<i>Foeniculum vulgare</i> Mill.	Variyali	Apiaceae	Herb
62	<i>Gmelina arborea</i> Roxb.	Sevan	Lamiaceae	Tree
63	<i>Gossypium herbaceum</i> L.	Cotton, Kapas	Malvaceae	Shrub
64	<i>Hibiscus lobatus</i> (Murr) O Ktze	Tali	Malvaceae	Shrub
65	<i>Hibiscus rosa-sinensis</i> L	Jasud	Malvaceae	Shrub
66	<i>Heliotropium indicum</i> L.	Hathi-sundhi	Boraginaceae	Herb
67	<i>Holoptelea integrifolia</i> (Roxb.)Planch.	Kanaji	Ulmaceae	Tree
68	<i>Hygrophilla auriculata</i> (Schum) Heine	Kanta-sheliyo	Acanthaceae	Herb
69	<i>Indigofera tinctoria</i> L.		Fabaceae	Herb
70	<i>Ipomea aquatica</i> Forssk	Nali ni bhaji	Convolvulaceae	Herb
71	<i>Ipomea carnea</i> Jacq.		Convolvulaceae	Shrub
72	<i>Ipomoea pes-tigridis</i> L.	Wagpadi	Convolvulaceae	Climber

73	<i>Ipomea triloba</i> L.		Convolvulaceae	Climber
74	<i>Jatropha gossypifolia</i> L.		Euphorbiaceae	Shrub
75	<i>Justicia adhatoda</i> L.	Ardusi	Acanthaceae	Shrub
76	<i>Justicia diffusa</i> Willd		Acanthaceae	Herb
77	<i>Launaea procumbens</i> (Roxb.) Ramayya & Rajagopal		Asteraceae	Herb
78	<i>Lawsonia inermis</i> L.	Mehndi	Lythraceae	Shrub
79	<i>Lemna minor</i> L.		Araceae	Herb
80	<i>Limonia acidissima</i> Groff	Kotha	Rutaceae	Tree
81	<i>Ludwigia perennis</i> L.		Onagraceae	Herb
82	<i>Luffa acutangula</i> (L) Roxb	Turiya	Cucurbitaceae	Climber
83	<i>Lycopersicon lycopersicum</i> (L) Karst ex Farwell	Tomato	Solanaceae	Shrub
84	<i>Madhuca indica</i> J F Gmel	Mahudo	Sapotaceae	Tree
85	<i>Mangifera indica</i> L.	Ambo, Mango	Anacardiaceae	Tree
86	<i>Manilkara zapota</i> (L.) Van Royen.	Chiku, Sapodilla plum Billy tree	Sapotaceae	Tree
87	<i>Melia dubia</i> L.	Malabar neem	Meliaceae	Tree
88	<i>Millingtonia hortensis</i> L.f.	Kamini, Indian cork tree	Bignoniaceae	Tree
89	<i>Mimosa pudica</i> L.	Lajamni	Mimosaceae	Shrub
90	<i>Mimusops elengi</i> L.	Bakul, Borsali	Sapotaceae	Tree
91	<i>Moringa oleifera</i> Lamk.	Sargavo, Drumstick tree, Horse radish tree	Moringaceae	Tree
92	<i>Murraya koenigii</i> (L) Spreng	Kadipatta	Rutaceae	Tree
93	<i>Musa paradisiaca</i> L.	Keli, Banana plant	Musaceae	Shrub
94	<i>Nerium indicum</i> L.	Karen	Apocynaceae	Shrub
95	<i>Ocimum sanctum</i> L.	Tulsi	Lamiaceae	Herb
96	<i>Oryza sativa</i> L.	Chokha, Rice	Poaceae	Grass
97	<i>Parkinsonia aculeata</i> L.	Ram baval	Fabaceae	Tree
98	<i>Phoenix</i> sp		Arecaceae	Tree
99	<i>Phragmites vallatoria</i> (L.) Veldk.		Poaceae	Grass
100	<i>Phyllanthus fraternus</i> Webst	Bhonya amla	Euphorbiaceae	Herb
101	<i>Physalis minima</i> L.	Popti	Solanaceae	Herb
102	<i>Pithecolobium dulce</i> (Roxb.) Benth.	Vilayati Imali, Manila Tamarind	Mimosaceae	Tree
103	<i>Plumeria alba</i> L.	Champo	Apocynaceae	Tree
104	<i>Polyalthia longifolia</i> (Sonn.) Thw. var. pendula Benth. & Hk.f.	Asopalav	Annonaceae	Tree
105	<i>Pongamia pinnata</i> (L.) Pierre.	Pongam oil tree, Kanjo	Fabaceae	Tree
106	<i>Prosopis cineraria</i> (L) Druce	Khijdo	Fabaceae	Tree
107	<i>Prosopis julifera</i> (Sw.) DC	Gandobaval	Mimosaceae	Tree
108	<i>Psidium guajava</i> L.	Peru, Amrud, Guava	Myrtaceae	Tree

109	<i>Pulicaria angustifolia</i> DC.		Asteraceae	Tree
110	<i>Ricinus communis</i> L.	Castor, Aranda	Euphorbiaceae	Shrub
111	<i>Rosa indica</i> L.	Gulab	Rosaceae	Shrub
112	<i>Salvadora oleoides</i> Decne.	Piludi	Salvadoraceae	Tree
113	<i>Salvadora persica</i> L.	Piludi	Salvadoraceae	Shrub
114	<i>Saraca asoca</i> Roxb	Asok	Caesalpiniaceae	Tree
115	<i>Saraca indica</i> Auc.	Ashok tree	Caesalpiniaceae	Tree
116	<i>Senna auriculata</i> (L.) Roxb.		Caesalpinaceae	Shrub
117	<i>Sesamum indicum</i> L.	Til, tal	Pedaliaceae	Herb
118	<i>Sesbania bispinosa</i> (Jacq) WWight	Jayanti	Fabaceae	Shrub
119	<i>Setaria italica</i> (L) P Beauv	Chano	Poaceae	Herb
120	<i>Sida acuta</i> Burm f	Bala	Malvaceae	Herb
121	<i>Sida cordata</i> (Burm.f.) Borss.Waalk.		Malvaceae	Herb
122	<i>Solanum melongena</i> L.	Brinjal. Ringan	Solanaceae	Shrub
123	<i>Solanum xanthocarpum</i> L.		Solanaceae	Shrub
124	<i>Solanum diphyllum</i> L.		Solanaceae	Shrub
125	<i>Sorghum Vulgare</i> Pers.	Juvar	Poaceae	Grass
126	<i>Sorghum bicolor</i> (L.) Moench.	Jowar	Poaceae	Grass
127	<i>Suaeda fruticosa</i> (L.) forsk.		Chenopodiaceae	Herb
128	<i>Syzygium cumini</i> (L) Skeels	Jambu	Myrtaceae	Tree
129	<i>Syzygium heyneanum</i> Wall	Jal-jambu	Myrtaceae	Tree
130	<i>Tamarindus indica</i> L	Amli	Caesalpiniaceae	Shrub
131	<i>Tecoma stans</i> (L) Jussex Kunth		Bignoniaceae	Shrub
132	<i>Terminalia catappa</i> L	Deshi Badam	Combretaceae	Tree
133	<i>Thespesia populnea</i> (L) Sol ex Correa	Paras piplo	Malvaceae	Tree
134	<i>Thuja orientalis</i> L	Vidya	Cupressaceae	Shrub
135	<i>Tinospora cordifolia</i> (Burm.f) Merr	Galo	Menispermaceae	Tree
136	<i>Tridax procumbens</i> L.	Pardesi bhangaro, Ekdandi	Asteraceae	Herb
137	<i>Triticum aestivum</i> L.	Wheat	Poaceae	Grass
138	<i>Typha angustifolia</i> L.		Typhaceae	Grass
139	<i>Vachellia tortilis</i> (forssk.) Galasso and Banfi	Israeli babool	Fabaceae	Tree
140	<i>Vernonia cinerea</i> (L) Less	Sahadevi	Asteraceae	Herb
141	<i>Vigna radiata</i> (L.)R. Wilczek	Mung	Fabaceae	Shrub
142	<i>Vitex negundo</i> L	Nagod	Verbenaceae	Tree
143	<i>Vochellia nilotica</i> (L.) P. J. Hurter & Mabb.		Mimosaceae	Tree
144	<i>Xanthium strumarium</i> L.	Gokhru	Asteraceae	Herb
145	<i>Zizyphus mauritiana</i> Lam.	Bordi	Rhamnaceae	Tree

V. CONCLUSION:

The study reports total 145 species of flowering plants belonging to 117 genera and 55 families during the particular season of post monsoon to winter.

Maximum number of species belong to 8 families; Poaceae, Fabaceae, Solanaceae, Asteraceae, Malvaceae, Caesalpiniaceae, Euphorbiaceae and Acanthaceae.

Out of which 47 trees, 44 herbs, 31 shrubs, 12 grasses, 9 climbers and 2 sedges are present as different habit of plants.

The study will be helpful to students, teachers, naturalist, conservationist as well as who are interested in field of diversity study. The is also useful revision of Flora of Gujarat state.

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