

Submission of Project Completion report

For

“Systematic Identification and Documentation of plant in Waghai Botanical Garden”

Submitted to

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By

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General Information:

- ❖ **Project Title:** Systematic Identification and Documentation of plant in Waghai Botanical Garden Phase II
- ❖ **Principal investigator/consultant:** Dr. Padamnabhi S. Nagar
- ❖ **Brief Scientific Summary of the project:** Waghai Botanical Garden is one of the major plant diversity treasures having exclusive plants from all over country and world. There are more than 1200 plant species reported from the garden. In the present study a total of **502** plant species were collected and identified based on their morphological and phenological characters, out of which 409 are Dicot, 80 Monocot, 5 Gymnosperms, and 8 Pteridophytes. Further from habitat perspective there are 234 are Herbs, 74 are Shrub, 136 Tree, and 58 climbers were collected and documented.
- ❖ **Duration:** 9 month
- ❖ **Date of Completion:** March 2019
- ❖ **Institute:** The Maharaja Sayajirao University of Baroda
- ❖ **Division:** Faculty of Science
- ❖ **Department:** Botany
- ❖ **Discipline:** Plant Taxonomy

Objectives of the project:

- **Plant Identification:** Identification of rich plant diversity of Waghai Botanical Garden
- **Documentation:** Documentation of rare, endangered, threatened, and state addition plants with proper identification.
- **Research:** Undertake botanical research and develop excellent referral system for plants dried and live condition, with documentation of natural resources of the South Gujarat.

SITE SPECIFICATION:



Fig: 1. Map of Study area



Fig: 2. Field image of Waghai Botanical Garden

INTRODUCTION

South Gujarat has the highest plant diversity in Gujarat. It is estimated there are more than 1300 plant species by (Tadvi, 2015). It represents the deciduous and evergreen flora of Gujarat. As per recent report on Status of Rare Endangered and Threatened plant of Gujarat, out of 26 plants, 15 plants were exclusively found in southern part of Gujarat. This region is known for highest diversity of not only the endemic and medicinal plants but also for rare threatened and endangered plants too. It comprises the region below to the river Tapi and spreads between $72^{\circ}40'18''$ – $21^{\circ}27'15''$ E longitude & $20^{\circ}04'12''$ – $74^{\circ}02'59''$ N latitude and covers an area of 14,820.26 sq. km.

Waghai Botanical Garden is unique floristic hot spot, situated in the southern part of Gujarat. There are more than 7 major Botanical garden in Gujarat state, among them Waghai Botanical Garden is considered as one of the leading Botanical garden of the state. It is located around 2 km from Waghai town in to the Dang District. The garden was established in 1966 and spreads in 24 hactor between $20^{\circ}45'.100$ N - $73^{\circ}30.031$ 'E, longitude $20^{\circ}45'.365$ 'N - $73^{\circ}29.788$ 'E latitude.

The Botanical Garden is divided into 10 different plots, which represent all forest types occurring in India as classified by Champion and Seth as shown in figure 1.

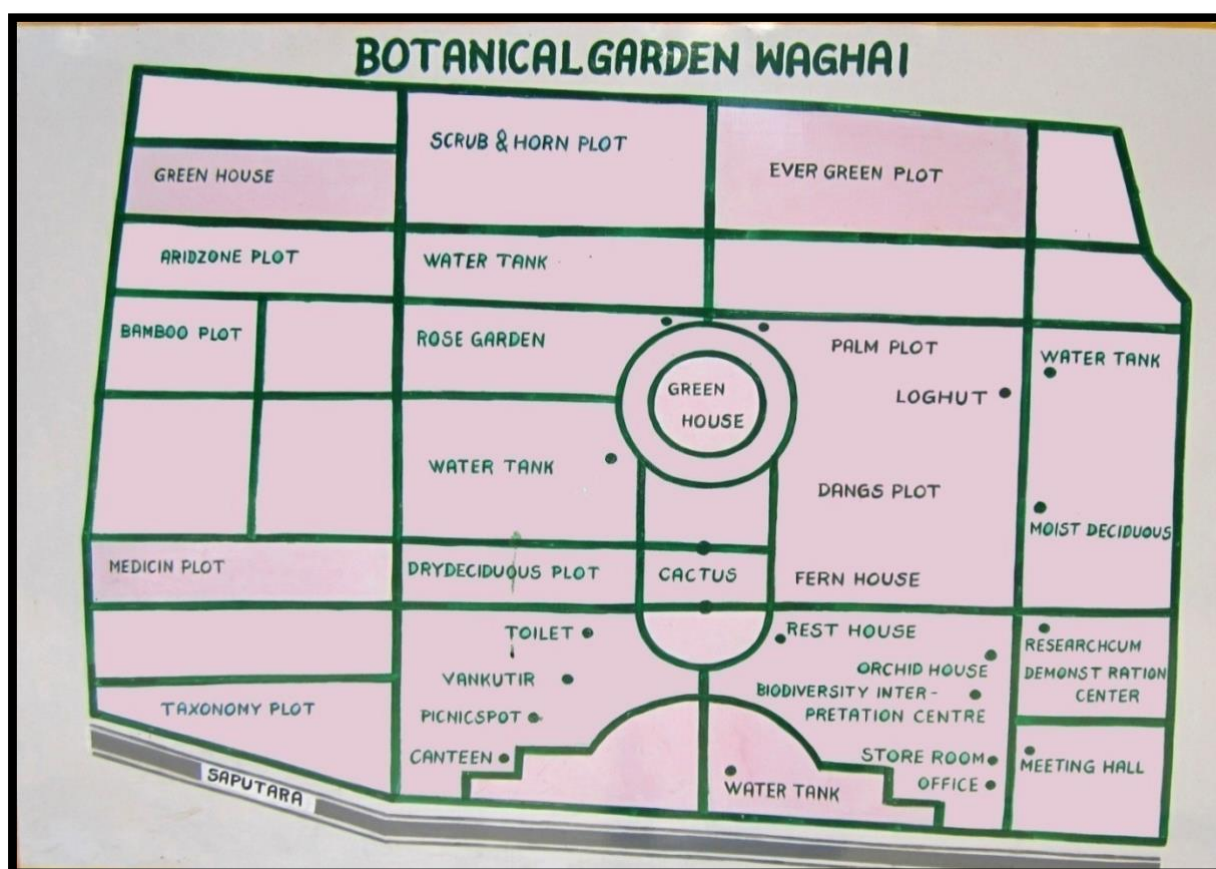


Figure 3: Map of different plots in Waghai Botanical Garden

1) Evergreen Plot:

Evergreen plot is a mimic of forest type observed in Southern and North Eastern part of India. Which includes plants like *Callophyllum*, *Mesua*, *Artocarpus heterophyllus*, *Duabanga grandiflora*, *Hopa ponga*, *Carallia brachiata* etc. in the present study, 33 plant species has been reported. Many of the plants found from this plot are addition to flora of Gujarat.

2) Moist Deciduous Plot:

These plots are prepared by considering forest species available in the Southern Western Ghats, North India and Andaman & Nicobar Island. Plants includes from the plot are such as *Largerstromia indica*, *Shorea robusta*, *Dillenia indica*, *Albizia procera* etc. during the investigation total of 15 plant species reported from this plot.

3) Dry Deciduous Plot:

Dry Deciduous plot has vegetation similar to that of forest type of Madhya Pradesh, Gujarat, Andra Pradesh, Karnataka, Tamilnadu, and Punjab which comprises of 9 species. The representative species in such forest type are *Anogeissu latifolia*, *Diosphyros montana*, *Semicarpus anacardium*, etc.

4) Scrub and Thorn Plot:

This plot includes plants found in forest of Madhya Pradesh, Maharashtra, Andhra Pradesh and Rajasthan. This plot represents 8 plant species few examples are *Acacia pinnata*, *Zizyphus mauritiana* etc.

5) Arid Zone Plot:

The plot comprised of environment than that of arid zone of India as found in North Gujarat and Rajasthan. The vegetation of the plot includes species like *Cappris zeylanica*, *Tamrix indica*, *Opuntia ficus-indica* and some perennial grasses. Study comprises 10 plant species collected and documented from this plot.

6) Taxonomy Plot:

The plot was developed for the identification, nomenclature and classification of plant kingdom. The significance of the plot is to provide insight details of the complexity in plant diversity with the help of many plant species herbaria present in the WBG. In the present study resulted a total of 15 plant species has been reported.

7) Medicinal Plot:

This plot was added to the garden in subsequent years of its formation. It has collection of 30 species which have medicinal usages in Ayurveda, Unani, Siddha, Homeopathy and modern medicines.

8) Bamboo Plot:

The plot comprised of 6 bamboo species found in different regions of India. Few examples are *Bamboosa tuldodies*, *Bamboosa vulgaris* etc. during the investigation 3 plant specimens of bamboo has benn studied and documented. Remaining species were in vegetative condition which required sexual organs for further verification.

9) Dangs Plot:

This plot represents the species occurring in Dang forest. It has 8 species. Plants reported such as *Meyna laxiflora*, *Holoptelia integrifolia*, *Carissa carandas*, etc.

10) Cacti and Succulent Plot:

Cacti and succulents have always attracted people across world. The plot is prepared in a house for different varieties of cacti and their attractive flowers; it is not only attract visitors but also attracts the insect and flower watcher who want to study plant animal interactions and botanist for study purposes. Cacti plot covers not only succulent plant but also comprises surrounding vegetation like *iz.* Annual and perennial plant.

11) Research and Demonstration Center:

WBG has Library of 552 books which includes books on different Flora, Horticulture, Floriculture, Agriculture and the published Forest Reports.

Waghai Botanical gardens has developed and flourished through a long tradition of exchanging, studying, displaying and conserving plants from the last few years. It serves as a place of serenity and wonder for medicinal plants used by the tribals of Dangs. Waghai Botanical Garden has 1200 plant species of which major collection is of Dr. R.I. Patel - An eminent Taxonomist of Gujarat. Dr. B.G.Vashi; and other collection includes of Dr. J.R.Parmar and Mr. K. L. Dubey's herbaria collection. Objective of the project was to identify and update the flora with their accepted names and document this unique flora in the Waghai Botanical Garden.

METHODOLOGY

Collection:

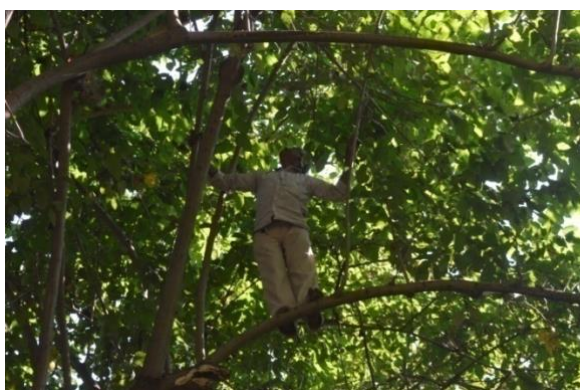


Fig: 4. Field collection

Waghai Botanical Garden was established in 1966 it is situated about 2 Kms. away from Waghai, on Waghai-Saputara Road in Dangs District, Gujarat. It is largest garden in Gujarat spreads over an area of 24 Hectar. The Botanical Garden is divided into different plots, which represent all forest types occurring in India as classified by Champion and Seth. Total of 10 plots of the garden was explored till date of which approx 50% diversity was studied and documented. Detailed methodologies were as follow:

- 1) **Field collection:** Twig with good flowers need to be collected for the specimen. The portion of the specimen should have to contain clear phyllotaxy and the branching



system. For small herb, collection of more specimens as could fix on the herbarium sheet

- 2) Place the voucher in the field press such that identifying features (flowers, fruits, both sides of leaves) can be easily inspected when dried



- 3) After to the Pressing, sample should be keep inside blotting paper or presser for certain period for drying the plant sample



- 4) After drying the sample, procced it further for poisoning and mounting.
Preparation of poisoning Solution: Solution was prepared with ratio of 9:6:4 (90 ml of 70% alcohol solution, 6 ml formalidehyde, 4 ml glacial acitic acid + 0.001% mercuric chloride.)



- 5) Poisoning of plant spaciments was done by two methods:
 1. Direct poisoning method: There are several methods of treating specimens for making them permanently poisonous. Specimens may be poisoned by dipping or painting them with an alcoholic solution of mercuric chloride. While trating the specimens care should be taken, should always be clearly labeled since this compound is extremely poisonous.
 2. Field posoining method: since all several methods were used for poisoning across the world, this method applies directly in to the field. In this method, specimens were placed in one big polythene bag. Solution was pored in side the polythene bag. Once gets pored tight up the mouth of the polythene. Keep as it is for certain period of time once it gets fully wet. Than dry the sample by using blotting paper.



- 6) The specimens may be whole plants or plant parts get dried, it will mount on a herbarium sheet (11.5 x 16.5 in.) long, the specimen may be attached by various methods. A common method involves smearing a glass plate with a water-soluble paste, placing the specimen on the paste, and then transferring the glued plant to the mounting sheet. Small paper envelopes called fragment packets are attached to the sheet to hold seeds, extra flowers, or any part of the specimen. Peculiar or key charecteristics should be mentioned on the herbarium notes.



- 7) Once mounted and deposited in the herbarium, the collections are referred to as herbarium specimens. Such herbarium specimens can be stored for many year.

Table 1: Plants collected from Waghai Botanical Garden from Junet 2018 to March 2019.

Sr. No	Family Name	Plant Name	Vernacular Name	Habit	Class
1.	Sterculiaceae	<i>Eriolaena stocksii</i> Hook.f. & Thomson ex Mast.	Zhad Bindo	Tree	Dicot
2..	Hypoxidaceae	<i>Curculigo orchioides</i> Gaertn.	Khajuryo	Herb	Monocot
3..	Lythraceae	<i>Lagerstroemia lanceolata</i> Wall.	Moto Bhondaro	Tree	Dicot
4.	Amaryllidaceae	<i>Pancratium triflorum</i> Roxb.	Kavlina Mama	Herb	Monocot
5.	Caesalpiniaceae	<i>Caesalpinia ferrea</i> C.Mart.	Patang	Tree	Dicot
6.	Lythraceae	<i>Lagerstroemia indica</i> L.	Chinai Mehdi	Shrub	Dicot
7.	Verbenaceae	<i>Vitex Peduncularis</i> Wall.exSchauer	Nagod Ni Jat	Tree	Dicot
8.	Rubiaceae	<i>Pavetta hispidula</i> var. <i>siphonantha</i> (Dalzell) Hook.f.		Shrub	Dicot
9.	Combretaceae	<i>Terminalia tomentosa</i> Wight & Arn.	Sadad	Tree	Dicot
10.	Asclepiadaceae	<i>Cryptolepis buchananii</i> Roem. & Schult.	ChamarDudheli	Climber	Dicot
11.	Lythraceae	<i>Punica granatum</i> L.	Dadham	Shrub	Dicot
12.	Liliaceae	<i>Zephyranthes citrina</i> Baker	Yellow Lili	Herb	Monocot
13.	Rosaceae	<i>Rosa indica</i> var. <i>ochroleuca</i> Lindl.	Gulab	Herb	Dicot
14.	Rosaceae	<i>Rosa indica</i> var. <i>minima</i> Bean	Gulab	Herb	Dicot
15.	Rosaceae	<i>Rosa indica</i> L.	Gulab	Herb	Dicot
16..	Solanaceae	<i>Petunia nyctaginiflora</i> Juss.	Petunia	Herb	Dicot
17.	Solanaceae	<i>Petunia violacea</i> Lindl.	Petunia	Herb	Dicot
18.	Apocynaceae	<i>Catharanthus roseus</i> var. <i>albus</i>	Barmasi	Herb	Dicot
19.	Apocynaceae	<i>Catharanthus ovalis</i>	Barmasi	Herb	Dicot
20.	Apocynaceae	<i>Vinca erecta</i> Regel & Schmalh.	Barmasi	Herb	Dicot
21	Apocynaceae	<i>Catharanthus roseus</i> var. <i>roseus</i>	Barmasi	Herb	Dicot
22.	Apocynaceae	<i>Vinca rosea</i> L.	Barmasi	Herb	Dicot
23.	Apocynaceae	<i>Vinca rosea</i> L.	Barmasi	Herb	Dicot
24.	Zygophyllaceae	<i>Tribulus terrestris</i> L.	Gokhru	Herb	Dicot
25.	Amaranthaceae	<i>Amaranthus viridis</i> L.	Matla Ni Bhaji	Herb	Dicot
26.	Amaranthaceae	<i>Digera muricata</i> (L.) Mart.	Matla Ni Bhaji	Herb	Dicot

27.	Scrophulariaceae	<i>Mecardonia procumbens</i> (Mill.) Small	Koperiya ni Jat	Herb	Dicot
28.	Asclepiadaceae	<i>Leptadenia reticulata</i> (Retz.) Wight & Arn.	Dodi	Climber	Dicot
29.	Poaceae	<i>Desmostachya bipinnata</i> (L.) Stapf	Kunda Ghas	Herb	Monocot
30.	Tiliaceae	<i>Grewia tiliifolia</i> Vahl	Dhaman	Tree	Dicot
31.	Mimosaceae	<i>Acacia nilotica</i> (L.) Delile	Kalo Baval	Tree	Dicot
32.	Ebanaceae	<i>Diospyros buxifolia</i> (Blume) Hiern		Tree	Dicot
33.	Phyllanthaceae	<i>Antidesma ghaesembilla</i> Gaertn.	Ragat Rohido	Shrub	Dicot
34.	Malvaceae	<i>Hibiscus rosa-sinensis</i> L. var. <i>rubro-plenus</i> Sweet	Jasud	Shrub	Dicot
35.	Malvaceae	<i>Hibiscus rosa-sinensis</i> var. <i>rosa-sinensis</i>	Jasud	Shrub	Dicot
36.	Malvaceae	<i>Hibiscus rosa-sinensis</i> cv . <i>Sylvia</i> Goodman	Jasud	Shrub	Dicot
37.	Apocynaceae	<i>Plumeria obtusa</i> L.	Champo	Shrub	Dicot
38.	Apocynaceae	<i>Plumeria alba</i> L.	Champo	Shrub	Dicot
39.	Amaranthaceae	<i>Aerva lanata</i> (L.) Juss.	Gorakhganjo	Herb	Dicot
40.	Asteraceae	<i>Xanthium strumarium</i> L.	Gadaryu	Herb	Dicot
41.	Liliaceae	<i>Zephyranthes rosea</i> Lindl.	Lal lily	Herb	Monocot
42.	Liliaceae	<i>Zephyranthes candida</i> (Lindl.) Herb.	Safad lily	Herb	Monocot
43.	Malvaceae	<i>Hibiscus rosa-sinensis</i> L.	Jasud	Shrub	Dicot
44.	Rubiaceae	<i>Pentas lanceolata</i> (Forssk.) Deflers	-	Shrub	Dicot
45.	Asparagaceae	<i>Ophiopogon clarkei</i> Hook.f.	-	Herb	Monocot
46.	Asparagaceae	<i>Chlorophytum breviscapum</i> Dalzell	-	Herb	Monocot
47.	Amaryllidaceae	<i>Scadoxus multiflorus</i> (Martyn) Raf.	Football lily	Herb	Monocot
48.	Moraceae	<i>Artocarpus hirsutus</i> Lam.	Jungli Fanas	Tree	Dicot
49.	Verbenaceae	<i>Vitex altissima</i> L.f.	Nagod ni Jat	Tree	Dicot
50.	Asclepiadaceae	<i>Dregea volubilis</i> (L.f.) Benth. ex Hook.f.	Dhorshree	Climber	Dicot
51.	Rubiaceae	<i>Mitragyna parvifolia</i> (Roxb.) Korth.	Kalam	Tree	Dicot
52.	Meliaceae	<i>Chukrasia tabularis</i> A.Juss.	Toon ni jat	Tree	Dicot
53.	Orchideaceae	<i>Geodorum laxiflorum</i> Griff.	Hare kand	Herb	Monocot
54.	Urticaceae	<i>Pilea microphylla</i> (L.) Liebm.	-	Herb	Dicot
55.	Rosaceae	<i>Rosa</i> sp.	Gulab	Herb	Dicot
56.	Verbenaceae	<i>Clerodendrum chinense</i> (Osbeck) Mabb.	Hajare Mogro	Herb	Dicot
57.	Begoniaceae	<i>Begonia maculate</i> Raddi	Begonia	Herb	Dicot

58.	Araceae	<i>Philodendron ceylon</i> golden	Panfuti ni jat	Herb	Monocot
59.	Araliaceae	<i>Polysciasbal fouriana</i> (André) L.H.Bailey	-	Shrub	Dicot
60.	Marantaceae	<i>Calathea ornate</i> (Linden) Körn.	-	Herb	Monocot
61.	Lythraceae	<i>Cuphea hyssopifolia</i> kunth	-	Sub-Shrub	Dicot
62.	Marantaceae	<i>Maranta leuconeura</i> E.Morren	-	Herb	Monocot
63.	Rubiaceae	<i>Hymenodictyon orixense</i> (Roxb.) Mabb.	Kadvai	Tree	Dicot
64.	Fabaceae	<i>Dalbergia latifolia</i> Roxb.	Sisam	Tree	Dicot
65.	Fabaceae	<i>Vigna radiata</i> var. <i>sublobata</i> (Roxb.)Verdc.	Jungli Adad	Climber	Dicot
66.	Convolvulaceae	<i>Ipomoea pes-tigridis</i> L.	Gadad khura	Climber	Dicot
67.	Fabaceae	<i>Desmodium laxiflorum</i> DC.	Safed Shalparni	Under shrub	Dicot
68.	Asteraceae	<i>Acanthospermum hispidum</i> DC.	Gokhru	Herb	Dicot
69.	Acanthaceae	<i>Neuracanthus sphaerostachys</i> Dalzell	Kubo	Herb	Dicot
70.	Euphorbiaceae	<i>Acalypha malabarica</i> Müll.Arg.	Aagye	Herb	Dicot
71.	Lamiaceae	<i>Plectranthu sovatus</i> Benth.	Moti Tulsi	Herb	Dicot
72.	Fabaceae	<i>Desmodium velutinum</i> (Willd.) DC.	Tarute	Herb	Dicot
73.	Malvaceae	<i>Abelmoschus ficulneus</i> (L.)Wight & Arn.	Bhinda ni Jat	Shrub	Dicot
74.	Fabaceae	<i>Desmodium dichotomum</i> (Willd.) DC.	Papdo	Herb	Dicot
75.	Poaceae	<i>Ischaemum indicum</i> (Houtt.) Merr.	Bilokada Ghas	Herb	Monocot
76.	Poaceae	<i>Setaria verticillata</i> L.	Pakkad Ghas	Herb	Monocot
77.	Asteraceae	<i>Elephantopus scaber</i> L.	Nilva	Herb	Dicot
78.	Fabaceae	<i>Dendrolobium triangulare</i> (Retz.)Schindl.	Salparni ni jat	Herb	Dicot
79.	Fabaceae	<i>Tadehagi triquetrum</i> (L.) H.Ohashi	Salparni ni jat	Herb	Dicot
80.	Commelinaceae	<i>Cyanotis cristata</i> (L.)D.Don	-	Herb	Monocot
81.	Asperagaceae	<i>Dracaena fragrans</i> (L.) Ker Gawl.	Drecina	Herb	Dicot
82.	Malvaceae	<i>Abutilon indicum</i> (L.) Sweet	Bejay ni Jat	Herb	Dicot
83.	Asteraceae	<i>Solidago virgaurea</i> L.	-	Herb	Dicot
84.	-	-	-	Herb	Dicot
85.	Malvaceae	<i>Hibiscus lobatus</i> (Murray) Kuntze	-	Herb	Dicot
86.	Verbenaceae	<i>Verbena hybrida</i> Groenl. &Rumpler	-	Herb	Dicot
87.	Apocynaceae	<i>Ichnocarpus frutescens</i> (L.) W.T.Aiton	Sariva ni Jat	Climber	Dicot
88.	Begoniaceae	<i>Begonia deliciosa</i> Linden ex Fotsch	Arealia	Herb	Dicot

89.	Asparagaceae	<i>Chlorophytum comosum</i> (Thunb.) Jacques	-	Herb	Monocot
90	Asteraceae	<i>Callistephus chinensis</i> (L.) Benth.	-	Herb	Dicot
91.	Oleaceae	<i>Chionanthus mala-elengi</i>	-	Tree	Dicot
92.	Meliaceae	<i>Cipadessa baccifera</i> (Roth) Miq.	-	Shrub	Dicot
93.	Caryophyllaceae	<i>Dianthus brilliant star</i>	Dianthus	Herb	Dicot
94.	Caryophyllaceae	<i>Ddianthus bulbisii</i>	Dianthus	Herb	Dicot
95.	Caryophyllaceae	<i>Dianthus caryophyllus</i>	Dianthus	Herb	Dicot
96..	Caryophyllaceae	<i>Dianthus chinensis</i>	Dianthus	Herb	Dicot
97.	Caryophyllaceae	<i>Dianthus japonicus</i>	Dianthus	Herb	Dicot
98.	Euphorbiaceae	<i>Euphorbia leucocephala</i> Lotsy	-	Herb	Dicot
99.	Malvaceae	<i>Hibiscus rosa sinensis</i> (Orange)	-	Shrub	Dicot
100	Celastraceae	<i>Lophopetalum wightianum</i> Arn.		Tree	Dicot
101	Solanaceae	<i>Petunia hybrida</i> Vilm.	Petunia	Herb	Dicot
102.	Solanaceae	<i>Petunia multiflora</i>	Petunia	Herb	Dicot
103.	Lamiaceae	<i>Salvia splendens</i> Sellow ex Schult.	-	Herb	Dicot
104.	Araceae	<i>Syngonium podophyllum</i> Schott	-	Climber	Monocot
105.	Asteraceae	<i>Tagetes patula</i> L.	-	Herb	Dicot
106.	Asteraceae	Chrysanthemum large pink buttons	Sevanti	Herb	Dicot
107.	Asteraceae	Chrysanthemum multiflorum	Sevanti	Herb	Dicot
108.	Asteraceae	Chrysanthemum single pink	Sevanti	Herb	Dicot
109.	Asteraceae	Chrysanthemum white button	Sevanti	Herb	Dicot
110.	Poaceae	<i>Themeda triandra</i> Forssk.	Bhatdi ghas	Herb	Monocot
111.	Poaceae	<i>Chionachne koenigii</i> (Spreng.) Thwaites.	Kanchan ghas	Herb	Monocot
112.	Rubiaceae	<i>Ixora brachiata</i> Roxb.		Shrub	Dicot
113.	Asparagaceae	<i>Chlorophytum saundersiae</i> (Baker) Nordal.	-	Herb	Monocot
114.	Poaceae	<i>Cymbopogon schoenanthus</i> . Spreng.	Bhutran lili cha	Herb	Monocot
115.	Fabaceae	<i>Lablab purpureus</i> (L.) Sweet	Papdi	Climber	Dicot
116.	Moringaceae	<i>Moringa concanensis</i> Nimmo ex Dalzell &A.Gibson	KadvoSaragvo	Tree	Dicot
117.	Asteraceae	<i>Cyathocline purpurea</i> Kuntze	-	Herb	Dicot

118.	Malvaceae	<i>Hibiscus vitifolius</i> L.	Chokkhi Bhindi	Herb	Dicot
119	Linderniaceae	<i>Lindernia oppositifolia</i> (L.) Mukerjee	Babrun ni jat	Herb	Dicot
120	Moraceae	<i>Ficus exasperata</i> Vahl.	Bhoi Umbro	Tree	Dicot
121.	<i>Fabaceae</i>	<i>Butea monosperma</i> (Lam.) Kuntze	Palash	Tree	Dicot
122.	<i>Malvaceae</i>	<i>Bombax ceiba</i> L.	Safad Simlo	Tree	Dicot
123.	<i>Fabaceae</i>	<i>Desmodium</i> Sp.	Papda ni jat	Under shrub	Dicot
124.	Euphorbiaceae	<i>Trewia nudiflora</i> L.	-	Tree	Dicot
125.	Malvaceae	<i>Ceiba pentandra</i> (L.) Gaertn.	Kapok	Tree	Dicot
126.	Fabaceae	<i>Cassia fistula</i> L.	Garmalo	Tree	Dicot
127.	Acanthaceae	<i>Justicia gendarussa</i> Burm.f.	Mehndi n i jat	Herb	Dicot
128.	Begoniaceae	<i>Begonia</i> (Senator Series Group) 'Senator Scarlet'	Begonia red	Herb	Dicot
129.	Begoniaceae	<i>Begonia x semperflorens-cultorum</i>	Begonia white	Herb	Dicot
130	Begoniaceae	<i>Begonia</i> 'Senator Pink'	Begonia pink	Herb	Dicot
131.	Commelinaceae	<i>Tradescantia pallida</i> (Rose) D.R.Hunt.	-	Herb	Monocot

Many of the plants were critically studied for its morphological features. But it is showing variation as per the floral description. Probably more details insight in the flora will give out many out roots and new discoveries. From the above table few species shows variation in floristic characters. Once they identify, it will include in database of Waghai Botanical Garden

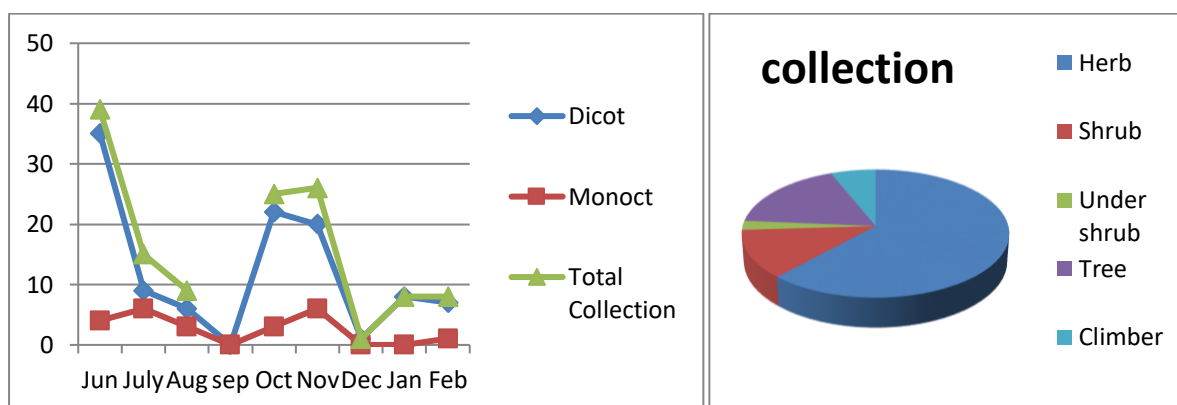
OBSERVATIO AND DISCUSSION:

- An extensive field work was done during, June 2018 to March 2019.
- During the field visit total of **131** plant specimens were collected of which 80 are **Herb**, 16 **Shrub**, 3 **Under shrub** 24 **Tree**, and 8 **Climber** of which 108 are **Dicots**, 23 **Monocots**. All the herbarium of each plant specimens was prepared.

Table 2 & 3 : Catagories of different plants collected during field visit

Collections of plant specimens					
Field Visit.	Dicot	Monocot	Gymnosperm	Pteridophytes	Total Collection
1 st June 2019	35	4	-	-	39
2 nd July 2019	9	6	-	-	15
3 rd Aug 2019	6	3	-	-	09
4 th Sep 2019	-	-	-	-	-
5 th Oct 2019	22	3	-	-	25
6 th Nov 2019	20	6	-	-	26
7 th Dec 2019	1	-	-	-	01
8 th Jan 2019	8	-	-	-	08
9 th Feb 2019	7	1	-	-	08
Grand Total	108	23	-	-	131

Collections of plant specimens						
Sr. No	Herb	Shrub	Under Shrub	Tree	Climbers	Total
1 st June 2019	20	09	-	08	02	39
2 nd July 2019	08	02	-	04	01	15
3 rd Aug 2019	06	01	01	01	-	09
4 th Sep 2019	-	-	-	-	-	-
5 th Oct 2019	19	01	01	01	03	25
6 th Nov 2019	20	03	-	02	01	26
7 th Dec 2019	-	-	-	-	01	01
8 th Jan 2019	03	-	01	04	-	08
9 th Feb 2019	05	-	-	03	-	08
Grand Total	81	16	03	23	08	131



EXCLUSIVE PLANTS OF WAGHAI BOTANICAL GARDEN:

Waghai Botanical Garden is rich in plant resources, many of the unique plants are exclusively found in the Waghai Botanical Garden. This unique plant species has its own peculiar characteristics in sexual organs and they get differs from species to species; this unique features are the key characteristics for identification and classification of plants at genus and species level. In the present studies 11 various plant species were collected from the various plots for iz. Ever green plot, Western Ghat plot, Dang Plot, etc. this all are addition to the flora of Gujarat.

No.	Family Name	Plant name	Vernacular name	Habit	Class	Fig no.
32.	Ebanaceae	<i>Diospyros buxifolia</i> (Blume) Hiern		Tree	Dicot	.5
48.	Moraceae	<i>Artocarpus hirsutus</i> Lam.	Jungli Fanas	Tree	Dicot	6
49.	Verbenaceae	<i>Vitex altissima</i> L.f.	Nagod ni Jat	Tree	Dicot	7
50.	Asclepiadaceae	<i>Dregea volubilis</i> (L.f.) Benth. exHook.f.	Dhorshree	Climber	Dicot	8
52.	Meliaceae	<i>Chukrasia tabularis</i> A.Juss.	Toon ni jat	Tree	Dicot	9
53.	Orchideaceae	<i>Geodorum laxiflorum</i> Griff.	Hare kand	Herb	Monocot	10
70.	Euphorbiaceae	<i>Acalypha malabarica</i> Müll. Arg.	Aagye	Herb	Dicot	11
87.	Apocynaceae	<i>Ichnocarpus frutescens</i> (L.) W.T.Aiton	Sariva ni Jat	Climber	Dicot	12
91.	Oleaceae	<i>Chionanthus mala-elengi</i>	-	Tree	Dicot	13
100	Celastraceae	<i>Lophopetalum wightianum</i> Arn.		Tree	Dicot	14
112.	Rubiaceae	<i>Ixora brachiata</i> Roxb.		Shrub	Dicot	15

Table No. 4: Exclusive plants of Waghai Botanical Garden



Fig No.5 *Diospyros buxifolia* (Blume) Hiern



Fig No. 6 *Artocarpus hirsutus* Lam.



altissima L.f.



Fig No. 7 *Vitex*
Fig No.8 *Dregea volubilis* (L.f.) Benth.



Fig No.9 *Chukrasia tabularis* A.Juss.



Fig No.10 *Geodorum laxiflorum* Griff.





Fig No.11 *Acalypha malabarica* Müll.Arg.



Fig No. 13 *Chionanthus mala-elengi*



Fig No.12 *Ichnocarpus frutescens* (L.)
W.T.Aiton



Fig No.14 *Lophopetalum wightianum* Arn.



Fig No. 15 *Ixora brachiata* Roxb.

NEED FOR PROJECT EXTENTION:

- Based on earlier digitization of herbarium it was found that many of the herbarium sheet were got damaged and rottend. Furtherly many new plant species has been cultivated in the garden. Therefor there is urgent need for documentation of this unique flora in Waghai Botanical Garden.
- The investigation done till date has resulted in exploration of 502 plants which is approximately 50 % of the known plants reported from Waghai Botanical Garden, in order to know more about the plants of Waghai Botanical Garden more extensive and indepth study is required.
- Many of the plant species were observed but we could not verify as they were in vegetative condition are listed below.

Name of the plants species proposed for exploration in the next phase of project are as follow:

Sr. No	Family name	Plant name	Vernacular name	Habit
1.	Poaceae	<i>Dichanthium oliganthum</i> (Hochst. ex Steud.) Cope	Rush, rohisar	Herb
2.	Combrataceae	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	Arjun sadad	Tree
3.	Aristolochiaceae	<i>Aristolochia bracteolata</i> Lam.	Batakvel	Climber
4.	Simaroubaceae	<i>Ailanthus excelsa</i> Roxb.	Arduso	Tree
5.	Bignonaceae	<i>Campsis radicans</i> (L.) Seem.	Tilotama	Shrub
6.	Anonaceae	<i>Miliusa tomentosa</i> (Roxb.) J.Sinclair	Umbh	Tree
7.	Rutaceae	<i>Aegle marmelos</i> (L.) Corrêa	Bili patra	Tree
8.	Urticaceae	<i>Boehmeria japonica</i> (L.f.) Miq.	Japani sider	Shrub
9.	Celastraceae	<i>Cassine glauca</i> (Rottb.) Kuntze	Anand,	Tree
10.	Acanthaceae	<i>Ruellia patula</i> Jacq.	-	Herb
11.	Hydrocharitaceae	<i>Ottelia alismoides</i> (L.) Pers.		Herb

12.	Passifloraceae	<i>Passiflora foetida</i> L.	Kutharvel	Climber
13.				
14.	Guttiferaceae	<i>Garcinia indica</i> (Thouars) Choisy	Kokam	Tree
15.	Magnoliaceae	<i>Magnolia champaca</i> (L.) Baill.ex Pierre	Champo	Shrub
16.	Solanaceae	<i>Datura innoxia</i> Mill.	Datura	Herb
17.	Musaceae	<i>Ensete superbum</i> (Roxb.) Cheesman	Jungli Kel	Shrub
18.	Leguminosae	<i>Acacia jacquimontii</i>	Rathobaval	Tree
19.	Leguminosae	<i>Acacia nilotica</i> var. <i>indica</i>	Desi baval,	Tree
20.	Acanthaceae	<i>Justicia adhatoda</i> L.	Ardusi	Shrub
21.	Phyllanthaceae	<i>Breynia retusa</i> (Dennst.) Alston	Kamboi	Shrub
22.	Apocynaceae	<i>Cryptolepis dubia</i> (Burm.f.) M.R.Almeida		Climber
23.	Bignoniaceae	<i>Jacaranda mimosifolia</i> D.Don	Jakaranda	Tree
24.	Leguminosae	<i>Pithecellobium dulce</i> (Roxb.) Benth.	Goras aml	Tree
25.	Anacardiaceae	<i>Semecarpus anacardium</i> L.f.	Bhilamo	Tree
26.	Leguminosae	<i>Tephrosia purpurea</i> (L.) Pers.		Herb
27.	Combretaceae	<i>Terminalia chebula</i> Retz.	Harde	Tree
28.	Lamiaceae	<i>Vitex negundo</i> L.	Nagod	Shrub
29.	Malvaceae	<i>Abroma augusta</i> (L.) L.f.	Ulatkambal	Shrub
30.	Leguminosae	<i>Adenanthera microsperma</i> Teijsm. & Binn.	Nani ratangunj	Tree
31.	Rubiaceae	<i>Haldina cordifolia</i> (Roxb.) Ridsdale	Haldu	Tree
32.	Euphorbiaceae	<i>Vernicia fordii</i> (Hemsl.) Airy Shaw		Shrub
33.	Sapotaceae	<i>Madhuca longifolia</i> var. <i>latifolia</i> (Roxb.) A.Chev.	Mahudo	Tree
34.	Leguminosae	<i>Caesalpinia ferrea</i> C.Mart.	Patang	Tree
35.	Combretaceae	<i>Getonia floribunda</i> Roxb.	Baguli	Climber
36.	Salicaceae	<i>Casearia tomentosa</i> Roxb.	Tohndood	Shrub
37.	Burseraceae	<i>Commiphora wightii</i> (Arn.) Bhandari	Gugad	Shrub
38.	Bixaceae	<i>Cochlospermum religiosum</i> (L.) Alston	Ganeri	Tree
39.	Rubiaceae	<i>Coffea benghalensis</i> B.Heyne ex Schult.	Ganaria	Shrub
40.	Malvaceae	<i>Firmiana colorata</i> (Roxb.) R.Br.	Kodra	Tree
41.	Sapindaceae	<i>Filicium decipiens</i> (Wight & Arn.) Thwaites	Fillicum	Tree
42.	Lamiaceae	<i>Gmelina asiatica</i> L.	-	Shrub
43.	Leguminosae	<i>Haematoxylum campechianum</i> L.		Shrub
44.	Bignoniaceae	<i>Heterophragma quadriloculare</i> (Roxb.) K.Schum.	Varash	Tree
45.	Leguminosae	<i>Indigofera cassioides</i> DC.	-	Shrub
46.	Convolvulaceae	<i>Ipomoea pes-tigridis</i> L.	Vagpati	Climber
47.	Sapindaceae	<i>Koelreuteria paniculata</i> Laxm.	-	Tree
48.	Calophyllaceae	<i>Mesua ferrea</i> L.	Nagkesar	Tree
49.	Meliaceae	<i>Pleiogynium cerasiferum</i> R.Parker	-	Tree
50.	Annonaceae	<i>Polyalthia suberosa</i> (Roxb.) Thwaites	-	Tree

51.	Leguminosae	<i>Pongamia pinnata</i> (L.) Pierre	Karenj	`Tree
52.	Rosaceae	<i>Prunus cerasoides</i> Buch.-Ham. ex D.Don	-	Tree
54.	Rosaceae	<i>Pyrus pashia</i> Buch.-Ham. ex D.Don	Megul	Tree
55.	Arecaceae	<i>Sabal mexicana</i> Mart.	Sabal palm	Tree
56.	Arecaceae	<i>Sabal palmetto</i> (Walter) Lodd. ex Schult. & Schult.f.	Tad	Tree
57.	Theaceae	<i>Schima wallichii</i> Choisy	-	Tree
58.	Sapindaceae	<i>Schleichera oleosa</i> (Lour.) Merr.	Kusum	Tree
59.	Myrtaceae	<i>Syzygium rubicundum</i> Wight & Arn.	Van jamun	Tree
60.	Myrtaceae	<i>Syzygium cumini</i> (L.) Skeels	Jamun	Tree
61.	Combretaceae	<i>Anogeissus pendula</i> Edgew.	Dhavdo	Tree
62.	Capparaceae	<i>Capparis decidua</i> (Forssk.) Edgew.	Keido	Shrub
63.	Leguminosae	<i>Derris scandens</i> (Roxb.) Benth.	Karanj vel	Climber
64.	Euphorbiaceae	<i>Euphorbia nerifolia</i> L.	Bhangra thor	Shrub
65.	Combretaceae	<i>Anogeissus latifolia</i> (Roxb. ex DC.) Wall. ex Guillem. & Perr.	Dhavdo	Tree
66.	Leguminosae	<i>Bauhinia tomentosa</i> L.	Pilo asitro	Shrub
67.	Celastraceae	<i>Celastrus paniculatus</i> Willd.	Malkangani vel	Climber
68.	Leguminosae	<i>Erythrina variegata</i> L.	Pangaro	Tree
69.	Euphorbiaceae	<i>Euphorbia antiquorum</i> L.	Thoridu	Shrub
70.	Leguminosae	<i>Mimosa rubicaulis</i> Lam.	-	Tree
71.	Polygonaceae	<i>Persicaria glabra</i> (Willd.) M.Gómez	Sinori	Herb
72.	Leguminosae	<i>Prosopis juliflora</i> (Sw.) DC.	Eantobavalo	Shrub
73.	Apocynaceae	<i>Nerium oleander</i> L.	Karen	Shrub
74.	Convolvulaceae	<i>Rivea hypocrateriformis</i> Choisy	Fang bhaji	Climber
75.	Salvadoraceae	<i>Salvadora persica</i> L.	Piludi	Tree
76.	Anacardiaceae	<i>Schinus terebinthifolia</i> Raddi	-	Tree
77.	Leguminosae	<i>Sesbania grandiflora</i> (L.) Pers.	Agathio	Tree
78.	Arecaceae	<i>Areca catechu</i> L.	Sopari	Tree
79.	Burseraceae	<i>Bursera linanoe</i> (La Llave) Rzed., Calderón & Medina	Linilin oil tree	Shrub
80.	Apocynaceae	<i>Cryptostegia grandiflora</i> Roxb. ex R.Br.	Kharidodi	Shrub
81.	Poaceae	<i>Cymbopogon martini</i> (Roxb.) W.Watson	Rosa grass	Herb
82.	Leguminosae	<i>Glycyrrhiza glabra</i> L.	Jesthi madhu	Herb
83.	Leguminosae	<i>Hardwickia binata</i> Roxb.	Ajan	Tree
84.	Leguminosae	<i>Pueraria montana</i> var. <i>lobata</i> (Willd.) Sanjappa & Pradeep	Kudzu bean	Climber
85.	Bignoniaceae	<i>Sterreospermum tetragonum</i> DC	Padar	Tree
86.	Apocynaceae	<i>Vallaris solanacea</i> (Roth) Kuntze	Veleris	Shrub
87.	Rubiaceae	<i>Tamilnadia uliginosa</i> (Retz.) Tirveng. & Sastre	Gogda, Petar	Shrub
88.	Rutaceae	<i>Zanthoxylum rhetsa</i> DC.	Chiffal	Tree

89.	Menispermaceae	<i>Anamirta cocculus</i> (L.) Wight & Arn.	Kakfal	Climber
90.	Burseraceae	<i>Canarium strictum</i> Roxb.	-	Tree
91.	Lauraceae	<i>Cinnamomum verum</i> J.Presl		
92.	Meliaceae	<i>Cipadessa baccifera</i> (Roth) Miq.	Henbili	Tree
93.	Rubiaceae	<i>Spermadictyon suaveolens</i> Roxb.		Shrub
94.	Oleaceae	<i>Ligustrum robustum</i> subsp. <i>walkeri</i> (Decne.) P.S.Green		Tree
95.	Acanthaceae	<i>Eranthemum roseum</i> (Vahl) R.Br.	Dashmul	Herb
96.	Leguminosae	<i>Parkia biglobosa</i> (Jacq.) G.Don	Chandufal	Tree
97.	Bignoniaceae	<i>Pajanelia longifolia</i> (Willd.) K.Schum.	Aranthal	Shrub
98.	Calophyllaceae	<i>Poeciloneuron indicum</i> Bedd.	Punponthan, koili	Tree
99.	Lamiaceae	<i>Vitex pinnata</i> L.		Tree
100.	Poaceae	<i>Bambusa balcooa</i> Roxb.	Bamboo	

Note: Above mentioned plant species were observed during the field survey but it is in vegetative condition it is not included in the documentation. Apart from the present six month studies, further many more plants are still remains for collection, documentation and exploration

Name and Signature/Stamp with Date

a. _____

(Project Coordinator/Principal Investigator)