RESULTS:

Trees represent nature's evolutionary effort of 4,500 million years and it is a long story of organization and development from a unicellular state to a multicellular organism with differentiation of forms and functions. Finally trees achieve their growth forms and leaf canopy with orientation of leaves lined with palisades of chlorophyll in order to intercept solar energy for photosynthesis. In a close-canopied forest ecosystem reaching for sunlight is the deriving force of plant species and this result in taller and higher tree formations. The trees stand out as the most important constituent in the mosaic of plant communities, as trees provide the microhabitat or niche for different groups of plants, insect, ants and birds. Out of 2,50,000 flowering plant species, there are approximately about 37,500 tree species, roughly representing 14% of the world's flowering plants. These tree species are considered as the most vulnerable group due to man's greed. They are hence called the "Wooden Dinosaurs" of our age (Oza and Rajput, 2006).

Taxonomic literature

The first step in the investigation of the literature is to learn the floristic studies made of the area by previous investigators. This may be of direct or indirect evidences as manuals of the region or more especially earlier floras. Each of these previous reports must be analyzed critically. All the statements in the previous works must be held tentative status until each has been challenged and verified. Some of the data sources used in present study as well other literatures which would be helpful in future similar exercise is mentioned below.

General Taxonomic Indexes:

An index is an alphabetic catalogue of taxa with reference to their publication. It is prepared to depict a synoptical background of the work done in respect of manes of flowering plants published throughout the world. These include

Index Kewensis Plantarum Phaneragamarum 2 Vols 16 Supplements 1893-1992. This work is a corner-stone to the literature on the systematics of Flowering Plants. The compilation of original work was made possible by a gift of money from Charles Darwin. It was compiled at the Royal Botanical Gardens by B Daydon Jackson and his clerical assistants under the Direction of J. D. Hooker. It was published in 1893-1895 in 2 volumes followed by Supplements regularly published at 5 years interval. To make this data generally available the whole Index Kewensis has been published in CD-ROM in 1993 that contains about 9,68,000 records. Index Londinensis to illustrations of flowering plants, Ferns and Fern allies. Oxford 1920-31, with one-2volume supplement, 1941. This index was originally issued in 6-volumes (1929-1931) by O. Stapf, and a two volume supplement was produced in 1941. A 6-volume work providing an alphabetical index, by genus and species, to the illustrations of flowering plants and ferns from 1753 to end of 1920. It accounts for illustrations of all Latin-named plants in categories below the rank of the species as well as those given binomials. The work was complied at the Royal Botanic Gardens, Kew, by Otto Stapf and his clerical assistants under the auspices of the Royal Horticultural Society of London. Although now greatly out of date, is still a very valuable source of references. Index Holminesis is a serial publication, commenced in 1969 and not yet completed, which is a World Bibliography of Distribution Maps of Vascular Plants. It is complied and published in Sweden. Gray Herbarium Card Index: A card index issued quarterly to subscribers, accounting for all new names and new combinations applied in any category to the flowering plants and Pteridophytes of the Western Hemisphere. It is invaluable to students of New World since it accounts for Latin names given to vascular plants since 1885 irrespective of the category and irrespective of whether published in a New World or Old World publication. Approximately 2,60,000 cards have been issued up to 1950. Flowering plant index of Illustrations and Information compiled by R T Issacson (1979) and Index Nominum Genaricum (1986) etc.

Floras

A flora is an inventory of the plants of a definite area. This inventory is usually authenticated by citation of herbarium specimen and localities of their occurrence. The plants are usually arranged according to some recognized system of classification. Depending on the scope and the area covered the flora can be categorized as (1) Local flora – which covers a limited geographical area, for example Flora of Delhi by J. K. Maheshwari (1963); (2) Regional flora includes a larger geographical area usually a country, for example Flora of British India by Sir J. D. Hooker (1872-97); (3) Continental flora covers entire continent, for example Flora Europaea by T. G. Tutin *et al* (1964-80) and Flora Australiensis by G. Bentham (1863-78); (4) Comprehensive treatment which have a broader scope, although no world flora has ever been written, several important works have attempted a world wide view, for example Genera Plantarum of G. Bentham and J. D. Hooker (1862-83). Botanical Survey of India is actively engaged in documentation of plant diversity in the form of district, state, regional and national flora in different series entitled under Flora of India.

Some of the floras which can be helpful in locating more references on taxonomy and floristic are - Gamble. J. S. and Fischer, C. E. C. Flora of the Presidency of Madras 3 vol 1915-1938; Kanjilal, U. N. Flora of Assam vol 5 1934-1940; Dalzell, N. A. and A. Gibson the Bombay Flora 1861; Haines, H. H. the Botany of Bihar and Orissa. 1921-1925; Nairne, A. K. the Flowering Plants of Western India 1894; Roxburgh, W. Flora Indica 1820-1824; Talbot, W. A. Forest Flora of the Bombay Presidency and Sind.1909-1911; Trimen, H. A handbook of the Flora of Ceylon. 1893-1931; Henry A. N. *et al* . Flora of Tamil Nadu. 3 vol. 1989; Sharma *et al* Flora of Karnataka 1984; Shetty, B. V. and V. Singh. Flora of Rajasthan. 3 Vol 1987-1993; Verma, D. M., Balakrishnan, N. P., Dixit, R. D. (1993) Flora of Madhya Pradesh. Vol. I-II-III. Botanical Survey of India, Calcatta; Singh, N. P., Karthikeyan, S. (2000) Flora of Maharashtra state. Vol. I-II-III. Botanical Survey of India, Calcatta; Cooke,

T. (2006) Flora of the Presidency of Bombay. Vol. I-III. Bishen Sing Mahendra Pal Sing, Dehra Dun; Pullaiah, T., Chennaiah, E. (1997) Flora of Andhra Pradesh (India). Scientific Publishers, Jodhpur (India); Santapau, H. (1962) The Flora of Saurashtra. Vol. I-II. Saurashtra Research Society, Rajkot; Shah, G. L. (1978) Flora of Gujarat State, (Vol. I & II), Sardar Patel University., Vallabh Vidhynagar; Hooker, J. D. (Reprinted-1984) Flora of British India. Vol. I-VII. International Book Distributors, Dehra Dun; Hijra, P. K., Sharma, B. D., Sanjappa, M., Sastry, A. R. K. (1996) Flora of India. Vol. I-V. Botanical Survey of India, Calcatta; Brandis, D. (Reprinted-2007) Forest Flora of North-West and Central India. Bishen sing Mahendra Pal sing, Dehra Dun; Brandis, D. (Reprinted-2007) Illustrations of the Forest Flora of North-West and Central India. Bishen Sing Mahendra Pal Sing, Dehra Dun; Deshpande, S., Sharma, B. D., Nayar, M. P. (1993) Flora of Mahabaleshwar and adjoinings, Maharashtra. Vol. I-II. Botanical Survey of India, Calcatta; Kamble, S. Y., Pradhan, S.G. (1988) Flora of Akola District, Maharashtra. Botanical Survey of India, Calcatta; Blatter, E, Hallberg, F. (1984) The Flora of the Indian Desert. Scientific Publishers, Jodhpur (India); Patel, R.I. (1968) Forest Flora of Melghat. Bishen Sing Mahendra Pal Sing, Dehra Dun; Kumar, S. (2001) Flora of Haryana (Materials). Bishen Sing Mahendra Pal Sing, Dehra Dun; Singh, V. (1983) Flora of Banswara District. Botanical Survey of India, Howrah; Shetty, B.V., Pandey, R.P. (1983) Flora of Tonk District. Botanical Survey of India, Howrah.

Manuals

A Manual is a more exhaustive treatment than a flora, always having key for identification, description and glossary but generally covering a specialized groups of plants for example Manual of Cultivated Plants by L. H. Bailey (1949).

Monographs and **Revisions**

A monograph is a comprehensive treatment to a taxonomic group, generally a genus or a family dealing compilation of worldwide available all significant

information concerning taxon. Some of the examples are - Babcock, E. B. 1947. The Genus Crepis Part I & II; Baum, B. R. 1977. Oats : Wild and Cultivated. Monograph of the Genus Avena L. [Poaceae]; Goodspeed, T. H. 1955. The Genus Nicotiana; Blakeslee, A. F. et. al. 1959. The genus Datura; Mirov, N. T. 1967. The Genus Pinus. A revision is generally less comprehensive than a monograph and is often based only on herbarium studies. It incorporates less introductory material and includes a synoptic literature review.

Conspectus and Synopsis

A conspectus enlists all taxa with all or major synonyms with or without short diagnosis and with a brief mention of the geographical range. An ideal example of a conspectum is Species Plantarum of C. Linnaeus (1753). A synopsis is a list of taxa with much abbreviated diagnostic distinguishing statements that are often in form of keys.

Periodicals (Journals)

Taxonomic journal provides the information on the results of ongoing research. Some of the International Journals are - Annals of the Missouri Botanical Garden (Ann. Mo. Bot. Gard.); Bartonia; Bishop Museum Bulletin; Botanical Gazette (Bot. Gaz.); Botanical Review (Bot. Rev.); Brittonia; Bull. Torrey Bot. Club.; Caldesia; Castanea; Claytonia; Darwiniana; Journal of the Arnold Arboreum; Lloydia; Rhodora; Candollea; Kew Bulletin; Linnaea; Journal of Linnean Society of Botany, Taxon. The journals published in India are - Bulletin of Botanical Society of India; Journal of Economic and Taxonomic Botany; Journal of Bombay Natural History Society; Bulletin of Botanical Society of Bengal; Rheedia.

Glossaries and Dictionaries

Numerous valuable dictionaries have been published but by far the most useful is Dictionary of Flowering Plants and Ferns by J. C. Willis. The 8th edition revised by Airy Show appeared in 1973. Other important dictionaries are -

Gray, A. A structural Botany or Organography on the Basis of Morphology; Jackson, B. D. Glossary of Botanical Terms; Gerth, V. W. H. L. A Dictionary of Plant Names.

Catalogues

They are the periodicals, usually issued at regular intervals, that provide either a] a bibliography of Current literature of a particular subject, b] an abstract of papers or books in special fields, c] reviews of the titles of current literature, d] any combination of these functions. For example: Catalogue of the Library of the British Museum; Catalogue of the Library of the Mussachusetts Horticultural Society; Catalogue of the Library of the the Royal Botanical Gardens, Kew; The Lindley library-Catalogue of books, pamphlets, manuscripts and drawings etc.

Maps and Castography

Outline maps, Topographic Maps are important to show the distribution of plants. Road maps, geological maps are essential for any other floristic or monographic research.

Books

There are several books which includes various information regarding plants with good photographs and illustrations can be referred during floristic studies, especially for trees, which are - Menon, S.; Bagla, P. (2000) Trees of India. Timeless books, New Delhi; Randhawa, M. S. (1983) Flowering Trees. National Book Trust, India; Swaninathan, M. S.; Kocchar, S. L. (2003) Groves of Beauty and Plenty. An Atlas of Major Flowering Trees of India. MacMillan India Ltd; Warman, C. K. (1999) Trees of India. CBS Publishers & Distributors, New Delhi; Singh, S. P. (2002) Tree Farming, Agrotech Publishing Academy, Udaipur; Swarup, V. (1997) Ornamental Horticulture. Macmillan India Limited, NewDelhi; Sahni, K. C. (1998) The book of Indian trees. Bombay Natural History Society, Oxford university press, New Delhi; Battler, E. and Walter, S. M. (1997) Some Beautiful Indian Trees. Bombay

Natural History Society; Trees of Delhi; Agarwal, V. S. (1986) Economic Plants of India. Kailash Prakashan, Calcutta; Ambastha, S. P., Ramchandran, K. Kashyapa, K. and Ramesh Chand (Eds.) (1986) The useful plants of India. PID, CSIR, New Delhi; Bedi, R. (2000) Floral Spectrum of India. Pelican Creation International, Noida.

Table - 10 :Major biological data and information sources on the internet

Subject	Source	Link
Biomedical literature	PubMed	www.ncbi.nlm.gov/entrez/query.fcgi
Nucleic acid sequence	GenBank SRS at EMBL/EBI	www.ncbi.nlm.gov/entrez/query.fcgi?db=Nucleotide http://srs.ebi.ac.uk
Genome sequence	Entrez Genome TIGR databases	www.ncbi.nlm.gov:80/entrez/query.fcgi?db=Genome www.tigr.org/tdb/
Protein structure	Protein Data Bank	www.rcsb.org/tdb/
Protein sequence	GenBank SWISS-PORT at ExPASy PIR	www.ncbi.nlm.gov:80/entrez/query.fcgi?db=Protein www.expasy.ch/spro/ www-nbrf.georgetown.edu
Protein and peptide mass spectroscopy	PROWL	http://prowl.Rockefeller.edu
Post-translational modifications	RESID	www-nbrf.Georgetown.edu/pirwww/search/textresid.html
Biochemical and biophysical information	ENZYME BIND	www.expasy.ch/enzyme/ www.ncbi.nlm.nih.gov:80/entrez/query.fcgi?db=Structure
Biochemical pathways	PathDB KEGG WIT	www.ncgr.org/software/pathdb/ www.genome.ad.jp/keeg/ wit.mcs.anl.gov/WIT2/
Microarray	Gene Expression Links	http://industry.ebi.ac.uk/-alan/MicroArray/
2D-PAGE	SWISS-2D PAGE	www.expasy.ch/ch2d/ched-top.html
Web resources	The EBI biocatalog IUBio Archive	www.ebi.ac.uk/biocat/ http://iubio.bio.indiana.edu
Data of Angiosperms		http://www.delta-intkey.com/angio/www/annonace.htm
Tree identification guide		http://www.arborday.org/trees/whattree/
Medicinal plants data		http://www.impgc.com/plantinfo_A.php?id=1022
World species information		http://www.worldagroforestrycentre.org/sea/Products/AFDbases/AF/asp/SpeciesInfo.asp?SpID=18019

(Gibas and Jambeck, 2001)

Table - 11 :List of largest Herbaria in the world:

Herbarium	Place with code	Number of specimens
Royal Botanic Gardens	Kew [K]	65,00,000
Komarov Botanic Institute	Leningrad [LE]	60,00,000
Museum National d'Histoire Naturelle	Paris [P]	60,00,000
British Museum (Natural History)	London [BM]	50,00,000
Conservatoire et Jardin Botaniques	Geneva [G]	50,00,000
Universite de Lyon	Lyon [LY]	38,00,000
Harvard University Cambridge	U. S. A. (A+FH+GH)	38,00,000
Istituto Botanico della Universita	Florence [FI]	33,00,000
Universite de Montpellier	Montpellier [MPU]	33,00,000
Herbarium of Missouri Botanical Garden	St. Louis (MO)	40,00,000

Table - 12 :List of important Herbaria of India:

Herbarium	Place with code	Number of specimens
Central National Herbarium	Calcutta (CAL)	20,00,000
Herbarium of the Forest Research Institute	Dehradun (DD)	3,00,000
Madras Herbarium	Coimbatore (MH)	1,50,000
Herbaria of the National Botanic Research Institute	Lucknow (NBG)	80,000
Herbarium of the Botanical Survey of India	Central Circle Allahabad (BSA)	26,440
Regional Herbarium of the Botanical Survey of India	Shillong (ASSAM)	86,400
Regional Herbarium of the Botanical Survey of India	Dehradun (BSD)	42,000
Regional Herbarium of the Botanical Survey of India	Pune (BSI)	1,20,000
Blatter Herbarium St. Xaviers College	Mumbai. (BLAT)	1,00,000
Industrial Section Botanical Survey of India	Indian Museum Calcutta (BSIS)	50,000

Table - 13 :Important Botanical Gardens of the World

Name of Botanical Gardens	Place
Royal Botanical Gardens	Kew, England
Missouri Botanical Gardens	St. Louis, USA
New York Botanical Gardens	New York, USA
Hiroshima Botanical Garden	Hiroshima, Japan
National Garden, Shinjuku Gyoen	Tokyo, Japan
Royal Botanical Garden	Edinburgh, England
Montreal Botanical Gardens	Montreal, Canada
Brooklyn Botanical Garden and Arboretum	Brooklyn, USA

Fair Child tropical Garden	Miami, USA
Beijing Botanical Garden	Beijing, China
Royal Botanical Garden	Sydney, Australia
Botanical Garden	Peradeniya, Sri Lanka

Table - 14 :Important Botanical Gardens in India

Name of Botanical Gardens	Place
Indian Botanical garden	Culcutta
National Orchidarium and Botanical Garden	Shillong
Barpani Experimental Garden	Shillong
Experimental Botanical Garden	Dehra Dun
National Orchidarium and Botanical Garden	Yercaud
Experimental Botanical Garden	Allahabad
Experimental Botanical Garden	Itanagar
Government Garden	Allahabad
Rab Bagh	Amritsar
Lalbagh Garden	Bangalore
Government Garden	Eden Garden Culcutta
Narendra Narayan Park	Cooch Behar
Sim's Park	Coonoor
Pomological Station	Coonoor
Lloyd Botanical Garden	Darjeeling
Botanical Garden Forest Research Institute and Colleges	Dehra Dun
Botanical Garden National Botanical Research Institute	Lucknow
Government Botanical Garden	Ootacamund
The Botanical Garden	Pondicherry
Jawaharlal Nehru Botanical Garden	Rumtek Sikkim
Government Botanical Garden	Trivandrum

The Flora of Gujarat State was published by Shah (1978). This was first of its kind in the country. In this flora abut 1808 angiospermic taxa belonging to 155 families and 827 genera were enlisted. Total 252 tree species were recorded in

Gujarat flora belonging to 156 genera and 57 families. The studies at Gujarat Ecology Commission, Vadodara renewed the interest of all concerned in the floristic exploration. Anonymous (1996) compiled all the work carried out beyond 1978 (Shah, 1978) and prepared the base line report. This report was published as - The Biological Diversity of Gujarat (1996) and the number of explored plant species reached to 2198. Kshirsagar *et al* (2002) explored South Gujarat region and seven more angiospermic plant species were recorded. Therefore the number has reached to 2,205 (Singh and Parabia, 2003).

Based on these records, the present study involved 383 tree species belonging to 225 genera and 74 families. The families with major number of tree species are Sterculiaceae, Fabaceae, Caesalpiniaceae, Mimosaceae and Bignoniaceae. The details included in database for each selected tree species are local name, english name, description of species, identification characters, phenology, distribution, origin/native, ecology, category of threat, special characteristics, economic importance, horticultural value, medicinal value, suitable environmental conditions, agricultural value, uses etc. The efficacy survey of the prepared CD-ROM was also done. Other experts were also included for their suggestions and recommendations to improve the program. Further, efforts are initiated for this dataset and be hosted on the World Wide Web under the address www.gujtrees.com.

Table - 15 : List of tree species of Gujarat state

No	Family and Botanical name	Local name	English name
	ANGIOSPERMAE		
1	**Dilleniaceae**		
	Dillenia indica Roxb	Mota karmal, Kelia saag/Kargar, /Chulta	Elephant Apple
	Dillenia pentagyna Roxb	Karmal	Karmal, Dog Teak, Dillenia, Nepali elephant apple
2	**Magnoliaceae**		
	Michelia champaca L	Champo, Soneri champo	Fragrant Himalayan champaca
	Magnolia grandiflora L	Magnolia	Southern magnolia, bull bay
3	**Annonaceae**		
	Annona muricata DC	Lakshmanfal	Graviola, Brazilian pawpaw, Soursop, prickly custard apple
	Annona reticulata L	Ramfal	Bullock's Heart, Bull's Heart
	Annona squamosa L	Sitafal	Custard Apple
	Annona squamosa L var *paranjpya*		
	Artabotrys hexapetalous (L f) Bhandari		ylang-ylang
	Miliusa tomentosa (Roxb) Sinclair	Umbh	
	Polyalthia cerasoides (Roxb) Bth & Hk f ex Bedd	Um, Umda nu Zad	Lao
	Polyalthia longifolia (Sonn) Thw	Aasopalav	Mast tree
	Polyalthia longifolia (Sonn) Thw var *pendula*	Aasopalav, Pendula	Pendula
4	**Capparaceae**		
	Capparis cartlaginea Decne		
	Capparis decidua (Forssk) Edgew	Kerdo	
	Capparis grandis L f	Motokanthar, Thikari, Dumero, Padribor	
	Crateva adansonii DCsubsp o*dora* (Buch-Ham) Jacobs	Vayvarno	
	Crateva magna (Lour) DC	Vayvarno, Veno	Sacred Barna
	Crateva tapia L		
5	**Bixaceae**		
	Bixa orellana L	Sindur	Annato, Lipstick tree
6	**Cochlospermaceae**		
	Cochlospermum religiosum (L) Alst	Ganeri,Ganiyari	Buttercup tree, Yellow silk Cotton Tree
7	**Flacourtiaceae**		
	Casearia championii Thwaites	Tandol	
	Casearia graveolens Dalz	Kirambira, Manji	
	Casearia tomentosa Roxb	Manjo	

No	Family and Botanical name	Local name	English name
	Flacourtia indica (Burm f) Merr	Gargugal, Lodri, Tatni, Ladudi	
	Flacourtia montana Grah	Lodri	
	Hydnocarpus pentandra (Buch-Ham) Oken		
8	**Tamaricaceae**		
	Tamarix aphylla (L) Karst Deutsch	Lal zhau	Tamarix
	Tamarix dioica Roxb ex Roth	Achhilaijo paras, Bhuri paras	Tamarix
	Tamarix indica Willd	Lai	Tamarix
	Tamarix stricta Boige		Tamarix
9	**Clusiaceae**		
	Calophyllum inophyllum L.	Udi	
	Garcinia indica (Thouars) Choicy	Kokam	
	Garcinia mangostana L	Mangustan	
	Garcinia xanthochymus Hook f ex T		
	Mesua ferrea L. *ferrea*	Nagkesar	
10	**Malvaceae**		
	Kydia calycina Roxb	Goyani, warang, Waring, moti hirvani, Fofadiyo	
	Thespesia populnea L	Paraspiplo, Pardesi bhindi	
11	**Bombacaceae**		
	Adansonia digitata L	Rukhado	African Baobab tree
	Bombax ceiba L	Shimlo, Savar, Saval, Simdo	Silk Cotton tree
	Bombax ceiba var *alba*		
	Bombax insigne Wallich	Simul	
	Ceiba pentandra (Linn) Gaertn	Kapok	White silk cotton
12	**Sterculiaceae**		
	Eriolaena candollei Wall	Bothi	
	Eriolaena hookeriana Wight & Arn	Bother	
	Eriolaena quinquelocularis (Wight & Arn) Wight		
	Eriolaena stocksii Hook f & Thomas ex Mast		
	Firmiana colorata (Roxb) R Br	Kodaro, Kedaro, Khavas	
	Gauzuma ulmifolia Lam	Rudrakshi	Gauzuma
	Helicteres isora L	Antedi, Mardasingi	
	Kleinhovia hospita L	Kleinhovia	
	Pterospermum acerifolium (L) Willd	Muchkund	Maple twist
	Pterospermum xylocarpum (Gaertn) Sant & Wagh		
	Pterygota alata (Roxb) R Br	Narikella	Buddha's coconut
	Sterculia foetida L	Jungli badam	Wild almond and Poon tree
	Sterculia guttata Roxb ex DC	Kukar	
	Sterculia urens Roxb	Kadai, Dadio, Kadayo, Kagdoi, Katai-jo-Jad	
	Sterculia villosa Roxb ex DC	Sardol, Udal	
	Theobroma cacao L	Coffee nu zad	Coffee tree

No	Family and Botanical name	Local name	English name
13	**Tiliaceae**		
	Erinocarpus nimmonii Grah ex Dalz	Jangli bhendi	
	Grewia abutilifolia Vent *ex* Juss	Kad dhamni	
	Grewia asiatica L	Phalsa	
	Grewia columnaris Sm		
	Grewia damine Gaertn		
	Grewia flavescens A Juss	Chodhari dhamni	
	Grewia serrulata DC	Kaori	
	Grewia tiliafolia Vahl	Dhaman	
14	**Zygophyllaceae**		
	Guaicum officinale L		
15	**Averrhoaceae**		
	Averrhoa carambola L	Kamarakh	Carambola tree
16	**Rutaceae**		
	Aegle marmelos (L) Corr	Bili	Bael tree, Golden apple
	Bergera koenigii (L) Spr	Mitho Limdo, Kadipatti	Curry leaf tree
	Citrus limettoides Tanaka		
	Citrus limon (L) Burm f	Limbu	Lemon
	Citrus medica Wight & Arn	Bijoru	
	Citrus sinensis (L) Obserck	Narangi	Orange
	Limonia acidissima L	Kothu, Kothi	Wood apple tree
	Murraya paniculata (L) Jack	Kamini, Kunti, Jaswanti	Chinese boxwood
17	**Simaroubaceae**		
	Ailanthus excelsa Roxb	Moto Arduso, Alvo	Tree of Heaven
	Quassia amara L		
18	**Balanitaceae**		
	Balanites aegyptiaca (L) Del	Ingore, Hingoriyo, Angario, Regorea	
19	**Ochnaceae**		
	Ochna obtusata DC	Ramdhan champa	Golden champa
20	**Burseraceae**		
	Boswellia serrata Roxb *ex* Colebr	Gugal, Dhupelio,Salai	Incense tree
	Commiphora wightii (Arn) Bhandari	Gugal	
	Garuga pinnata Roxb	Kakad, Kakadiyo, Kadkado, Toda kakad	
21	**Meliaceae**		
	Azadirachta indica A Juss	Limdo	Neem
	Melia azedarach L	Bakan limdo	Persian Lilac
	Melia dubia Cav	Nimbara	
	Soymida febrifuga (Roxb) A. Juss	Ragat Rohido, Royan, Rohn, Royani, Rohini	
	Swietenia macrophylla King	Mahanim	

No	Family and Botanical name	Local name	English name
	Swietenia mahagoni (L) Jacq	Mahogany	Mahogany tree
	Toona hexandra (Wall ex Roxb) Roem	Toon	Toon
	Trichilia connaroides (Wt & Arn) Bentvelzen		
22	**Flindersiaceae**		
	Chloroxylon swietenia DC	Halda	
23	**Celastraceae**		
	Cassine glauca (Rottb) O Ktze	Bhut Zad, Bhutalan, Alan, Zadbhataka, Bhutako, Bhutadi	
	Mytenus senegalensis (Lam) Excell	Vikdo, Viko	
24	**Rhamnaceae**		
	Ziziphus caracutta Roxb	Katbor	
	Ziziphus glabrata Heyne *ex* Roth	Boydi	
	Ziziphus mauritiana Lamk	Bor, khatibor	The Chinese date
	Ziziphus xylopyra (Retz) Willd	Ghat bor, Ghutbor	
25	**Sapindaceae**		
	Lepisanthes tetraphylla (Vahl) Radlk		
	Sapindus emarginatus Vahl	Aritha	Soap-nut tree
	Sapindus laurifolius Vahl	Aritha, Arithi	
	Schleichera oleosa (Lour) Oken	Kosumdi, Kusum, Kosim	
26	**Anacardiaceae**		
	Anacardium occidentale L	Kaju	Cashew nut
	Buchanania cochinchinensis (Lour) Almeida	Charoli, Charolo, Chavar	Chironji Tree, Almondette, Calumpong nut
	Lannea coromandelica (Houtt) Merr	Moyno, Modad	Odina
	Mangifera indica L	Ambo	Mango
	Rhus mysorensis G Don	Dasan, Dasni, Dasarani, Davan	
	Semecarpus anacardium L f	Bibba, Bhilamo	
	Spondias pinnata (L f) Kurz	Ambado, Khatambo	
27	**Moringaceae**		
	Moringa concanensis Nimmo	Jangli Saragavo, Kadvo Sargavo, Dungrau Sargavo	Drumstick tree
	Moringa oleifera Lamk	Saragavo, Mitho Saragavo	Drumstick tree
28	**Fabaceae**		
	Butea monosperma (Lamk) Taub	Kesudo, Khakharo, Palas	Flame of the forest
	Butea monosperma var *lutea* (Witt) Maheshwari	Safed khakharo	
	Dalbergia lanceolaria L f	Tantoshi, Dharan	
	Dalbergia lanceolaria L f ssp *paniculata* Roxb	Patrado, Patarali, Pataral, Pathad	
	Dalbergia latifolia Roxb	Sisam	Indian rosewood
	Dalbergia sissoo Roxb	Motosisam, Sissoo	North Indian rosewood

No	Family and Botanical name	Local name	English name
	Derris umbellatum (L) DC	Karanj	
	Erythrina blakei Hort		Black coral tree
	Erythrina suberosa Roxb	Jagariyo-Khakharo, Janghariyo, Kaltariyo	Corky coral tree
	Erythrina variegata L	Pangaro, Pangara	Indian Coral tree
	Erythrina variegata var *picta* (L) Blatter & Millard		
	Gliricidia sepium (Jacq) Kunth ex Walp	Gliricidia	Gliricidia
	Milletia peguensis Ali	Milletia	
	Ougeinia oojeinensis (Roxb) Hockhr	Tanach	
	Pongamia pinnata (L) Pierrre	Karanj, Kanji	Indian beach
	Pterocarpus marsupium Roxb	Biyo	Indian Kino Tree
	Pterocarpus marsupium Roxb var *acuminata* Prain		
	Sesbania grandiflora (L) Poir	Agathio	
	Sesbania javanica Miq		
	Sesbania sesban L var *bicolor*	Shevari, Jayanti	
	Sesbania sesban L var *picta*		
29	**Caesalpiniaceae**		
	Bauhinia foveolata Dalz	Chamuli	
	Bauhinia malabarica Roxb	Khati chamuli	
	Bauhinia purpurea L	Kanchner, Shwet kanchner, Champakathi, Palpaliyo	Camel's foot
	Bauhinia racemosa Lamk	Kasotri, Asotri, Apto, Asondaro, Rakta kanchnar, Asitro	Mountain Ebony
	Bauhinia tomentosa L	Pilo asondaro	
	Bauhinia variegata L	Kanchnar	Orchid tree
	Caesalpinia coriaria (Jacq) Willd	Libi-Libi, Divi-divi	
	Caesalpinia sappan L		
	Cassia auriculata L	Aval	
	Cassia fistula L	Garmalo	Golden shower
	Cassia javanica L	Java ki Rani	Apple- blossom cassia
	Cassia montana hyene ex Roth	Moti aval	
	Cassia renigera Wall *ex* Benth	Pink cassia	Pink cassia
	Cassia roxburghii DC	Urimedi	The Burmese pink cassia
	Cassia siamea Lamk	Kasid	Cassia, Kassod Tree, Siamese Senna
	Cassia surattensis Burm f	Mota tarvad	
	Delonix elata (L) Gamble	Sandsro	
	Delonix regia (Bojer *ex* Hook) Rafm	Gulmohor	Gold mohur
	Hardwickia binata Roxb	Anjan	
	Parkinsonia aculeata L	Rambaval	Horse bean tree
	Peltophorum pterocarpum (DC) Baker *ex* K Heyne	Tamraphali	Copper pod tree
	Saraca asoca (Roxb) de Wilde	Ashok	Ashoka tree and Sorrow less tree
	Tamarindus indica L	Khati amli	Tamarind
30	**Mimosaceae**		
	Acacia auriculiformis A Cunn *ex* Benth	Bangali baval	Australian wattle

No	Family and Botanical name	Local name	English name
	Acacia catechu (L f) Willd	Khair	Black cutch
	Acacia chundra (Roxb *ex* Rottl) Willd		
	Acacia eburnea (L f) Willd		
	Acacia farnesiana (L) Willd	Talbaval	
	Acacia ferruginea DC	Kanti	
	Acacia leucophloea (Roxb) Willd	Hermobaval, Samadi, Aniyar/Rinjado	White-bark acacia
	Acacia mangium Willd		
	Acacia nilotica (L) Del ssp *cupressiformis* (J L Stewart) Ali & Faruqui	Ramkanta	
	Acacia nilotica (L) Willd *ex* Delile ssp *indica* (Benth) Brenan	Bawal, Desibaval	Black babool
	Acacia nilotica (L) Willd *ex* Delile ssp *subulata* (Vatke) Brenan		
	Acacia planifrons Wight & Arn	Chhatario baval	
	Acacia polycantha Willd ssp *polycantha*	Gobita	
	Acacia senegal (L) Willd	Goradio Baval	Gum Arabic
	Acacia tomentosa Willd	Aniyar, Anjar	
	Acacia tortilis (Forsk) Hayne	Israeli bawal	
	Adenanthera pavonina L	Ratanjali, Ratangunj	Red bead tree and Coral pea
	Albizia amara (Roxb) Boivin var *amara*	Kansar	bitter albizia
	Albizia lebbeck (L) Benth	Kalo saras, Siris, Moti Haradi	Indian walnut and Parrot tree
	Albizia odoratissima (L f) Benth	Dholo sirish	
	Albizia procera (Roxb) Benth	Gular, Kilai	
	Dichrostachys cinerea (L) Wight & Arn	Saknali, Mordhundhiyu	
	Leucaena latisiliqua (L) Gillis	Pardesi baval, Lisobaval, Subaval	
	Parkia biglandulosa Wight & Arn	Chanduphal	African Locust
	Pithecellobium dulce (Roxb) Benth	Gorasamli	Pithecellobium and Manila tamarind
	Prosopis cineraria (L) Druce	Khijdo, Shami	
	Prosopis juliflora (Swartz) DC	Gando baval	Mesquit
	Prosopis stephaniana (M Bieb) Kunth ex Spreng	Patkandi, Bethi-Khijadi	
	Samanea saman (Jacq) Merr	Ratosarsado	Rain tree and Monkey pod
31	**Rhizophoraceae**		
	Bruguiera gymnorrhiza (L) Savigny	Sanvar	
	Rhizophora mucronata Poir	Karod	
32	**Combretaceae**		
	Anogeissus acuminata (Roxb ex DC) Guill	Dhau	
	Anogeissus latifolia (Roxb *ex* DC) Wall ex Guill & Perr	Dhavdo	
	Anogeissus sericea Brandis	Dhao, Dhankara, Andarukh	Anogeissus
	Lumnitzera racemosa Willd		
	Terminalia bellirica (Gaertn) Roxb	Baheda, Bedo	Belleric Myrobalan
	Terminalia catappa L	Deshi badam	Almond tree
	Terminalia chebula Retz	Harde	Chebulic myrobalan
	Terminalia cuneata Roth	Arjunsadad, Panisadad	White murdah
	Terminalia elliptica Willd	Sadad	

No	Family and Botanical name	Local name	English name
	Terminalia paniculata Roth		
33	**Myrtaceae**		
	Callistemon citrinus (Curtis) Skeels	Bottle brush	Bottle brush
	Callistemon viminalis (Soland ex Gaertn) G Don		
	Eucalyptus citriodara Hook	Nilgiri	
	Eucalyptus globulus Labill	Nilgiri	Tasmanian blue gum tree
	Eucalyptus grandis Hill ex Maiden	Nilgiri	
	Eucalyptus robusta Sm	Nilgiri	
	Pimenta dioica (L) Merr	All spice	
	Psidium guajava L	Jamphal	Guava
	Syzygium cumini (L) Skeels	Jambu	Jambolana tree, Black plum
	Syzygium heymeanum (Duthie) Wall *ex* Gamble	Jal jamuni, Jal jambu	
	Syzygium rubicundum Wight & Arn	Vagdau jambu	
34	**Lecythidaceae**		
	Careya arborea Roxb	Kumbh, Kumbhi, Kumbhiyo	
	Couroupita guianensis Aubl	Shivlingi	Cannnonball tree, Tope gola
35	**Barringtoniaceae**		
	Barringtonia acutangula (L) Gaertn	Tivar	
36	**Melastomataceae**		
	Memecylon umbellatum Burm f		
37	**Lythraceae**		
	Lagerstroemia indica L	Chinai mendhi	
	Lagerstroemia microcarpa Wight	Nana bhondara	
	Lagerstroemia parviflora Roxb	Bondara, Bhondara, Bhondaro, Kakadiyo	
	Lagerstroemia speciosa (L) Pers	Moto bhondaro	Queen's tree, Pride of India
38	**Punicaceae**		
	Punica granatum L	Dadam	Pomegranate
39	**Caricaceae**		
	Carica papaya L	Papayu, Papaya	Papaya
40	**Alangiaceae**		
	Alangium salvifolium (L f) Wang	Ankol, Ankal	
41	**Rubiaceae**		
	Haldina cordifolia (Roxb) Ridsd	Haldu, Haldu, Hetkalam, Kanbo	Yellow Teak
	Benkara malabarica (Lam) Tirvengadum		
	Catunaregam spinosa (Thunb) Tirveng	Mindhad	
	Ceriscoides turgida (Roxb) Tirveng		
	Gardenia resinifera Roth	Pendri, Jangli champo,	

No	Family and Botanical name	Local name	English name
		Dikamali	
	Gardenia turgida Roxb var *turgida*	Gangdi, Tadholi, Findarko	
	Hymenodictyon orixense (Roxb) Mabb	Madhu-mahudo, Munjal mahudo, Dundaro	
	Ixora brachiata Roxb	Garbale	Ixora
	Ixora coccinea L	Ixora	Scarlet Ixora
	Ixora finlaysoniana Wall *ex* G Don		Ixora
	Ixora pavetta Andr	Nevari, Nevadi	Ixora
	Meyna laxiflora Robyns	Fendi, Matakalu	
	Mitragyna parvifolia (Roxb) Korth	Kalam, Ganthodiyo	
	Morinda citrifolia L	Aal	Morinda
	Morinda pubescens J E Sm	Aledi, Aal	Morinda
	Neolamarckia cadamba (Roxb) Bosser	Kadam	Kadam tree
	Pavetta crassicaulis Bremek		
	Semecarpus anacardium L f	Bibba, Bhilamo	
	Tamilnadia uliginosa (Retz) Tirveng & Sastre	Gengdu	
	Wendlandia heynei (R&S) Santapau and Merchant	Til	
42	**Myrsinaceae**		
	Aegicerus corniculatum (L) Blanco	Chaori	
	Jacquinia ruscifolia Jacq		
43	**Sapotaceae**		
	Chrysophyllum cainito L		
	Madhuca indica J f	Mahudo	Mowrabutter tree
	Manilkara hexandra (Roxb) Dubard	Rayan	
	Manilkara zapota (L) van Royen	Chikoo	Sapota, Chickoo
	Mimusops elengi L	Borsalli	Bullet wood tree
44	**Ebenaceae**		
	Diospyros chloroxylon Roxb	Ninai	
	Diospyros cordifolia Roxb	Makrol	Mountain persimmon
	Diospyros malabarica (Desr) Kostel	Kala tendu	
	Diospyros melanoxylon Roxb	Timru, Tendu	Ebony Persimmon
45	**Oleaceae**		
	Nyctanthes arbor-tristis L	Parijatak, Sari	Tree of sorrow, Coral jasmine, Night Jasmine
	Schrebera swietenioides Roxb	Mokho	
46	**Salvadoraceae**		
	Salvadora oleoides Decne	Mithijar	
	Salvadora persica L	Piludi	Toothbrush tree
47	**Apocynaceae**		
	Alstonia scholaris (L) R Br	Saptparni	Devil's tree
	Cascabella thevetia (L) Lippold	Pili karen	Yellow oleander
	Holarrhena pubescens (Buch - Ham) Wall ex G Don	Kado, Kadvo Indrajav, Kada	Easter tree, Ivory tree

No	Family and Botanical name	Local name	English name
	Plumeria alba L	Safed champa	Frangipani tree
	Plumeria rubra L	Champa	Frangipani tree
	Wrightia arborea (Dennst) Mabb	Dudhlo	Wrightia
	Wrightia tinctoria R Br	Kadi, Dudhkadi	Wrightia
48	**Loganiaceae**		
	Strychnos nux-vomica L	Zer kochlu	Nux vomica tree, Strychine tree
	Strychnos potatorum L f	Katas	
49	**Boraginaceae**		
	Cordia dichotoma Forster	Van gundo	Cordia, Indian Cherry
	Cordia domestica Roth	Godadio sag	
	Cordia gharaf (Forsk) Ehrenb & Asch	Nani gundi	
	Cordia macleodii (Griff) Hook f & Thomson	Dahivi	
	Cordia monoica Roxb	Khatgundi	
	Cordia sebestena L	Lal lasora	Geiger tree, Scarlet cordia
	Cordia wallichii G Don	Jangli gundi, Gadha saag	
	Ehretia aspera Roxb	Nani vadhvari	
	Ehretia laevis Roxb	Datrango, Tambudiyo	Heliotrope tree
50	**Bignoniaceae**		
	Crescentia alata H B & K		
	Crescentia cujete L	Kadvi tumbi	Calabash tree
	Dolichandrone atrovirens (Heyne *ex* Roth) Sprague	Padad	
	Dolichandrone falcata (Wallich & DC) Seem	Matarsingi, Netarsing	
	Haplophragma adenophyllum (Wall) P Dop		Trumpet tree
	Heterophragma quadriloculare (Roxb) K Schum	Varas	
	Jacaranda mimosifolia D Don	Jacaranda	Jakaranda
	Kigelia africana (Lam) Benth	Undhafulo	Sausage tree
	Millingtonia hortensis L f	Akash nim	Indian cork tree
	Oroxylum indicum (L) Venten	Tetu, Tetavo, Talvarsing, Titodi	
	Radermachera xylocarpa (Roxb) K Schum	Khadsing	
	Spathodea campanulata P Beauv	Pitchkari	Indian Tulip tree, Fountain tree
	Stereospermum chelenoides (L f) DC	Parul	
	Stereospermum colais (Buch - Ham ex Dillw) Mabb		
	Tabebuia argentea (Bur & Schume) Britt	Peela Tabebia	Yellow Tabebia
	Tabebuia pallida (Lindl) Miers	Cuban pink trumpet	Cuban pink trumpet
	Tabebuia rosea (Bertol.) DC.	Rosy trumpet tree	Rosy trumpet tree
	Tecoma capensis (Thunb) Lindl		
	Tecoma stans (L) H B & K	Parul	Yellow Bells
	Tecomella undulata (Sm) Seem	Ragat Rohido, Royan, Rohn, Royani	Tecomella, Desert teak
51	**Verbenaceae**		
	Callicarpa tomentosa (L) Murray		
	Clerodendrum multiflorum (Burm f) O Ktz		
	Gmelina arborea Roxb	Sevan	Malay- Bushbeech, White teak

No	Family and Botanical name	Local name	English name
	Holmskioldia sanguinea Retz		
	Tectona grandis L f	Saag	Teak
	Vitex negundo L	Nagod, Nagodi	Chaste Tree, Vitex
52	**Avicenniaceae**		
	Avicennia marina (Forssk) Vierh	Tivar	
	Avicennia officinalis L	Tivar	
53	**Polygonaceae**		
	Coccoloba uvifera L		
54	**Myristicaceae**		
	Myristica fragrans Houtt	Jayfal	
55	**Lauraceae**		
	Cinnamomum camphora (L) Nees & Eberm	Kapur	Camphor
56	**Proteaceae**		
	Grevillea robusta A Cunn *ex* R Br	Silver oak	Silver oak
57	**Santalaceae**		
	Santalum album L	Chandan	Sandalwood
58	**Euphorbiaceae**		
	Antidesma ghaesembilla Gaertn	Ghonduri	
	Breynia retusa (Dennst) Alston	Komboi	
	Bridelia hamiltoniana Wall *ex* Muell - Arg		
	Bridelia retusa (L) Spreng	Asan, Monj, Datiyo	
	Bridelia squamosa (Lam) Gehrm	Asan	
	Cicca acida L	Khata-amla, Harfarevdi, Harpharori	
	Drypetes roxburghii (Wallich) Hurusawa	Putranjivi	Indian Amulet tree
	Emblica officinalis Gaertn	Amla	Indian Gooseberry
	Euphorbia antiquorum L	Tridharo thor	
	Euphorbia ligularia Roxb	Thor	
	Euphorbia nivulia Buch - Ham	Thor	
	Macaranga peltata (Roxb) Muell-Arg	Chandiva	
	Mallotus philippensis (Lam) Muell-Arg	Shendri, Kukhro, Kapilo	
	Ricinus communis L	Diveliyo	
	Sapium insigne Bth	Sherod	Sapium
	Trewia nudiflora L		
	Trewia polycarpa Bth	Petar	
59	**Ulmaceae**		
	Holoptelea integrifolia (Roxb) Planch	Kanjo, papada, Audo, Kanaj	Indian - elm
	Trema orientalis (L) Bl	Gol, Vanjli	
	Trema politoria Planch	Gol	
60	**Urticaceae**		
	Boehmeria macrophylla Hornem		

No	Family and Botanical name	Local name	English name
61	**Moraceae**		
	Artocarpus heterophyllus Lam	Fanas	Jack fruit
	Broussonetia papyrifera Vent		
	Ficus amplissima J E Sm	Payar, Gharfado/Sapipal	bat tree
	Ficus arnottiana (Miq) Miq	Khadak payar	
	Ficus benghalensis L	Vad	Banyan
	Ficus benjamina L	Pimpri	Ficus, Java fig
	Ficus carica L	Anjir	
	Ficus drupacea Thunb	Pipli	
	Ficus elastica Roxb	Rubber plant	Indian rubber plant
	Ficus exasperata Vahl	Karavati, Kharoti, Bhoi-umber, Karchi	
	Ficus heterophylla L f		
	Ficus hispida L f	Dedh umardo	Ficus
	Ficus benghalensis var *krishnae* (C DC) Corner	Krishna vad	Krishna's Butter Cup
	Ficus microcarpa L f	Nandrak vad, mamleseri	
	Ficus nervosa Heyne *ex* Roth		
	Ficus racemosa L	Umaro, umbar, gular	Cluster fig
	Ficus religiosa L	Piplo	Peepal
	Ficus rumphii Bl	Pipli, Payar, Pipri, Piper	
	Ficus virens Ait	Pipli	
	Morus alba L	Shetur	White mulberry
	Streblus asper Lour	Kharoti	Sandpaper tree
62	**Casuarinaceae**		
	Casuarina equisetifolia L	Mayurpankhi, Sharu	Beef- wood tree
63	**Salicaceae**		
	Salix tetrasperma Roxb		
	MONOCOTYLEDONS		
64	**Musaceae**		
	Ensete superbum (Roxb) Cheesm		
	Musa paradisiaca L	Kela	Banana
65	**Strelitziaceae**		
	Ravenala madagascariensis J F Gmel		
66	**Arecaceae**		
	Areca catechu L	Sopari	
	Borassus flabellifer L	Taad	The Palmyra palm
	Caryota urens L	Shivjata	Fish tail palm
	Cocos nucifera L	Nariyeli, Tarafoo	Coconut palm
	Dypsis lutescens (H. Wendl.) Beentje & Dransf.	Golden cane palm	Golden cane palm
	Elaeis guineensis Jacq	Oil pam	Oil pam
	Hyphaene dichotoma (White) Furtado	Ravan tad	Indian doum palm
	Livistona chinensis R Br	Chinese palm	Chinese Fan palm
	Nipa fruticans Thumb		
	Phoenix acaulis Roxb ex Buch-Ham		
	Phoenix dactylifera L	Khajur	

No	Family and Botanical name	Local name	English name
	Phoenix sylvestris (L) Roxb	Khajuri, Sindhi	Wild date palm
	Roystonea oleracea (Jacq) O F Cooke		
	Roystonea regia (HB&k) O F Cook	Bottle palm	Bottle palm
67	**Pandanaceae**		
	Pandanus odoratissimus L f	Kevro, Vekdo	Thatch screw pine
68	**Poaceae**		
	Bambusa arundinacea (Retz) Willd	Kanti vaans	Bamboo tree
	Dendrocalamus strictus (Roxb) Nees	Narvans, Manvel vans	
	GYMNOSPERMAE		
69	**Cycadaceae**		
	Cycas circinalis L	Cycas	Queen sago
	Cycas revoluta Thunb	Cycas	Sago palm
	Cycas rumphii Miq	Cycas	Queen sago, Bread palm
70	**Cupressaceae**		
	Biota orientalis (L) Endl	Mayurpankhi	
	Cupressus sempervirens L		
	Juniperus bermudiana L		
	Juniperus chinensis L	Chinese Juniper	Chinese Juniper
	Juniperus procumbens L		
71	**Zamiaceae**		
	Zamia furfuracea L f	Zamia	Cardboard palm
	Zamia integrifolia L f	Zamia	Zamia
72	**Podocarpaceae**		
	Podocarpus gracilior Plig		Fern pine
73	**Araucariaceae**		
	Araucaria columnaris (G Frost) Hook	Aurocaria	
	Araucaria heterophyllus (Salisb) Franco	Aurocaria	Monkey puzzle tree
74	**Pinaceae**		
	Pinus roxburghii Sarg	Chir	Pine tree

Artificial Key to the Families

Embryo with two cotyledons (rarely one by reduction). Vascular bundles of the stem usually arranged in a single ring; cambium usually present. Leaves usually reticulately veined. Flowers usually 5- to 4-merous.

Class I Dicotyledon

Embryo with one cotyledon. Vascular bundles of the stem usually scattered; cambium usually absent. Leaves usually parallel veined. Flowers usually 3-merous.

Class II Monocotyledon

Class I Dicotyledon

1. Petals free; flowers dichlamydeous.....**Sub-class I Polypetalae**
    2. Sepals distinct; ovary superior or immsersed in the disk
        3. Torus small or elongated, not expanded .....**Series I Thalamiflorae**
        3. Torus thickened or expanded into a fleshy disk ..... **Series II Disciflorae**
    2. Sepals united; ovary usually included in calyx tube or inferior .....
    Series III Calyciflorae

1. Petals united .....**Sub-class II Gamopetalae**
        4. Ovary inferior ..... **Series 1. Inferae**
        4. Ovary superior :
            5. Carpels more than 2 .....**Series 2. Heteromerae**
            5. Carpels 2 .....**Series 3. Bicarpellatae**

1. Perianth generally calycine, single or absent .....**Sub-class III Monochlamydae**

Sub-class: Polypetalae

Series I: Thalamiflorae

1. Stamens numerous (15 or more)
    2. Carpel free, usually many but some times reduce to one
        3. Habit terrestrial
            4. Leaves not as above
                5. Leaves exstipulate, speals and petals valvate;
                thalamus not elongate; fruit fleshy..... ***Annonaceae***

2. Carpels two or more, syncarpous; ovary uni-to multilocular

6. Flowers actinomorphic; ovary not as above

7. Ovary rasied on gynophore; if sessile, leaves compound .... ***Capparaceae***

7. Ovary sessile; leaves simple, entire, or lobed:

8. Plants without sap; petals absent; flowers pale greenish- yeallow..... ***Flacourtiaceae***

9. Placentation usually axile sometimes basal

10. Stamens monadelphous; anthers 1-2 celled

11. Anthers one-celled

12. Mostly herbs or shrubs, rarely trees; fruit a dehiscent capsule or of indehiscent cocci; carpels 5- many; pollen rough; leaves mostly simple ..... ***Malvaceae***

11. Anthers 2- celled ..... ***Sterculiaceae***

10. Stamens distinct, arising from a raised or contracted torous; anthers 2-celled ..... ***Tiliaceae***

1. Stamens few (not more than 10)

13. Carpels united, herbs, shrubs or trees

14. Placentation pariteal

15. Leaves scale-like; seeds plumose or winged ..... ***Tamaricaceae***

15. Leaves well developed; seeds not as above

16. Petals cruciform; stamens if 6, not tetradynamous; disc never in the form of glands ..... ***Capparaceae***

14. Placentation axile or sometimes basal

17. Leaves alternate; sepals valvate; plants stellately hairy:

18. Stamens monadelphous, antheriferous throughout its length; stamens united at base only, fruit not prickly ..... ***Sterculiaceae***

18. Stamens distinct ..... ***Tiliaceae***

Series – II: Disciflorae

1. Placentation parietal; fruit 3-valved, elongated, pod-like capsule ..... ***Moringaceae***

2. Flowers zygomorphic

3. Flower not spurred; anthers free; leaves ternately compound, leaflet not glandular ..... ***Sapindaceae***

2. Flowers actinomorphic

4. Ovary syncarpous but styles more or less connate or solitary (seldom carpels free e.g. *Buchanania* in Anacardiaceae)

5. Fruit indehiscent winged or not; seeds exarillate ***Rhamnaceae***

5. Fruit a dehiscent capsule, not winged; seeds arillate ***Celastraceae***

6. Leaves aromatic, gland-dotted ..... ***Rutaceae***

6. Leaves not gland–dotted, stamens monadelphous .....***Meliaceae***

7. Plants usually with acrid resinous juice; stem bearing resinous passages ... ***Anacardiaceae***

8. Leaves simple

9. Plants usually armed with prickles; flowers in axillary fascicles; ovule one in each loculus ..... ***Rhmnaceae***

10. Stamens 4 – 5; calyx not accrescent ..... ***Celastraceae***

8. Leaves compound

11. Leves bifoliolate; plants armed ..... ***Balanitaceae***

12. Plants resinous; leaves gland–dotted ..... ***Burseraceae***

13. Trees; ovule one in each loculus

14. Flowers regular; styles 2 – 5, cannate; overy lobed; fruit winged, 1-seeded ..... ***Simaroubaceae***

14. Flowers irregular; style 1, simple, sometimes divided above; ovary not lobed; fruit 2–3 lobed, drupe ***Sapindaceae***

Series – III: Calyciflorae

1. Leaves mostly compound, rarely simple

2. Stipules when present, not adnate to the petiole; carpel 1; fruit legume

3. Flowers papilionaceous ..... ***Fabaceae (Papilionaceae)***

3. Flowers zygomorphic but not papilionaceous ..... ***Caesalpiniaceae***

1. Leaves simple; fruit a capsule, achene, drupe, berry, nut or schizocarpic

4. Habit terrestrial

5. Stamens usually indefinite

6. Calyx free from the ovary, ovary superior

7. Petals crinkled, episepalous and crumpled in bud; margins crisped, erose or fimbriate; leaves not fleshy; ovules on axile placentation; shrubs or trees ... ***Lythraceae***

6. Calyx more or less adnate to the ovary, ovary inferior

8. Leaves alternate, without intramarginal nerves and not glandular puncatate

9. Ovary one-celled ..... ***Alangiaceae***

10. Locules or the ovary superposed; flowers red or orange coloured; fruit a berry with hard, woody rind ..... ***Punicaceae***

10. Ovary 4–loculate; flowers white; fruit fibrous drupe ... ***Lecythidaceae***

8. Leaves opposite, glandular–punctate with intra–marginal nerves ..... ***Myrtaceae***

5. Stamens usually definite, not more than 10

11. Ovary inferior or ½ - inferior

12. Not halophytic species; leaves alternate, if opposite then exstipulate; fruit and seeds not as above, capsule trigonous

13. Trees, shrubs or woody climbers ***Combretaceae***

11. Ovary superior

14. Soft-wooded tree with latex; leaves palmately fid-to partite, with long hollow petiole; petals united ..... ***Caricaceae***

Sub-class II: Gamopetalae

1. Ovary completely inferior
    2. Leaves opposite; stipules inter-or intra-petiolar ..... ***Rubiaceae***

1. Ovary superior
    3. Carpels more than 2
        4. Flowers usually unisexual, stamens inserted on the receptacle ..... ***Ebenaceae***
        4. Flowers bisexual; stamens inserted on the corolla
            5. Plants with milky juice; leaves not gland-dotted; corolla 4-8 lobed; stamens as many as corolla lobes and opposite to them, staminodes; ovary 2-8 celled ..... ***Sapotaceae***
    3. Carpels 2 (rarely 3-4, if then plants aquatic)
        6. Plants with milky latex or greenish-yellow sap
            7. Pollen masses not agglutinated into pollinia, style one; anthers sagittate; stigma hour-glass shaped or dumb-bell shaped ..... ***Apocynaceae***
        6. Plants without milky-latex or greenish-yellow sap
            8. Flowers actinomorphic
                9. style entire or shortly 2-lobed ..... ***Boraginaceae***
                9. style once forked or style 2 ..... ***Ehretiaceae***
                    10. Leaves opposite or at least lower ones opposite
                        11. Stamens 2 ..... ***Oleaceae***
                        11. Stamens 4-5, intraxylary phloem present in wood.... ***Loganiaceae***
            8. Flowers zygomorphic
                12. Leaves usually compound; if simple, seeds winged; fruit elongated ..... ***Bignoniaceae***
                12. Leaves usually simple; fruit not elongated, seeds not winged, ovules 1 or 2 in each cell ..... ***Verbenaceae***

Subclass III Monochlamydae

1. Ovary superior
    2. Flowers bisexual, perianth present
        3. Trees, leaves exstipulate, bipinnatisect ..... ***Proteaceae***
    2. Flowers unisexual or polygamous
        3. Ovary 3-celled ..... ***Euphorbiaceae***
        3. Ovary 1-celled
            4. Calyx absent; flowers in erect or pendulous, catkins or spikes
                5. Leaves much reduced, scale-like; stamen 1; ovary 1- celled; ovules 2, basal; fruit 1-seeded, samariod nuts crowded into woody cone; seeds not hairy ..... ***Casuarinaceae***
                5. Leaves well developed; fruit not as above; stamens 2 or more; ovary 1 celled with 2-4 parietal or basal placentas; fruit a capsule; seeds hairy
            4. Calyx present, 4-8-lobed; inflorescence various, cymose, spike or hypanthodium
                6. Plants with milky-juice; anthers inflexed in bud; leaves not oblique at base; fruit commonly multiple ..... ***Moraceae***
                6. Plants with watery-sap anthers erect in bud; leaves oblique at base; fruit a samara, nut or drupe ..... ***Ulmaceae***
1. Ovary inferior
    7. Root parasites; flowers unisexual; disc epigynous or perigynous ***Santalaceae***

Class II Monocotyledoneae

1. Leaves fan-shaped or pinnate, usually very long or very broad, forming a terminal crown, fibrous, long petiolate ..... ***Arecaceae***
1. Leaves not as above

2. Perianth none, at least in male flowers (if the flowers unisexual) or rudimentary or of scales or bristles, not petaliod

    3. Stem mostly hollow, cylindrical or flattened; leaves ligulate; leaf sheaths split; fruit a caryopsis ..... ***Poaceae***

2. Perianth represented by scales or bristles; if perianth absent, inflorescence not made up of spikelets; flowers not subtended by chaffy bracts (glume or scales)

    4. leaves spinulose on margins and keels ..... ***Pandanaceae***

    4. leaves not as above

        5. Stem false, composed of convolute leaf sheaths ....***Musaceae***

Database of trees

DILLENIACEAE

Trees or shrubs, leaves simple with parallel nerves, sheathing petiole, petals free, stamens numerous, carpels free, style not persistent.

1. Nerve ending of leaves with small tufts of hairs ..... D. *pentagyna*

1. Nerve ending of leaves not as above .....D. *indica*

Dillenia indica L. Sp. Pl. 535. 1753; Hook.f. & Thoms. in Hook. f. Fl. Brit. India 1:36. 1872, p.p.; Cooke, Fl. Pres. Bombay 1:6. 1958 (Repr.); Majumdar in Sharma et al. Fl. India 1:155, f.22. 1993; Venkanna & Prasanna in Singh *et al.* Fl. Maharashtra St. Dicot. 1:160.2000.

Local Name: Mota karmal, **English Name:** Elephant Apple

Identification Characters: Leaves parallel veined, flowers white, calyx persistent

Description: It is an evergreen large shrub or small to medium-sized tree growing to 15 m tall. The leaves are 15-36 cm long, with a conspicuously corrugated surface with impressed veins. The flowers are large, 15-20 cm diameter, with five white petals and numerous yellow stamens. The fruit is a 5-12 cm diameter aggregate of 15 carpels, each carpel containing five seeds embedded in an edible pulp.

Phenological Data: Fls: Apr.- May, Frs: May - June.

Distribution: All through the plains of India, specially Andhra Pradesh, Tamil Nadu and Assam.

Localities in Gujarat: planted in the botanical garden of Rajpipla and Waghai Botanical Garden

Origin\Native: India to Borneo & Java, tropical Asia

Ecology: Full sun to light shade, Regular water, keep soil moist

Category of threat: Not common

Special Characteristics: Parallel veined leaves

Economic Importance: ornamental

Horticultural Value: Fruits are edible. The juicy pulp is aromatic but very acid and requires cooking. Unripe fruits are also cooked and pickled.

Method for Propagation: By sowing seeds

Suitable Environmental Conditions: Tropical, Hot and relatively dry climate grown on many types of soils, but does better on acidic sandy loams.

Agricultural Value: Cultivated for edible fruits.

Uses: The fruit pulp is used in curries, jam, and jellies.

Dillenia pentagyna Roxb. Pl. Corom. 1:21, t.20. 1795; Hook. f. & Fl. Brit. India 1:38. 1872, p.p.; Cooke, Fl. Pres. Bombay 1:6. 1958 (Repr.); Majumdar in Sharma et al. Fl. India 1:156, f.22. 1993; Venkanna & Prasanna in Singh et al. Fl. Maharashtra St. Dicot. 1:160.2000.

Fig. 1: *Dillenia pentagyna* a. Leaf, b. Flower, c. Fruits

Fig. 2: *Dillenia indica* a, b. Fruits, c. Seeds

Fig. 3: *Miliusa tomentosa* a. Flower, b. Fruits

Fig. 4: *Garcinia mangostana*

Fig. 5: *Casearia tomentosa* a. Leaves, b. Fruits

Fig. 6: *Averrhoa carambola*

Local Name: Karmal, **English Name:** Dillenia, **Sanskrit Name:** Aksikiphal, Punnaga

Identification Characters: Leaves parallel veined, flowers yellow, calyx persistent

Description: It is an evergreen large shurb small to medium-sized tree growing to 4-8 m tall. The leaves are crowded at the end of branches, with a conspicuously corrugated surface with impressed parallel veins. The flowers are large, 15-20 cm diameter, with five yellow petals and numerous yellow stamens. The fruit is globose, orange coloured, seeds brown smooth.

Phenological Data: Fls: Apr.- May, Frs: May - June.

Distribution: All through the plains of India, specially Andhra Pradesh, Tamil Nadu and Assam.

Localities in Gujarat: Found in forests of Chhotaudepur, Dangs, Rajpipla

Origin\Native: India to Borneo & Java, tropical Asia

Ecology: Full sun to light shade, Regular water, keep soil moist

Category of threat: common

Special Characteristics: parallel veined leaves

Economic Importance: ornamental

Horticultural Value: Fruits are edible.

Medicinal Value: According to Ayurveda, the plant pacifies vitiated *vata, kapha,* wounds, diabetes, neuritis, pleurisy, pneumonia, and burning sensation.

Method for Propagation: By sowing seeds

Suitable Environmental Conditions: Tropical, Hot and relatively dry climate grown on many types of soils, but does better on acidic sandy loams.

Agricultural Value: Cultivated for edible fruits.

Uses: The fruit pulp is edible. Wood is used for house posts, rafters and planking.

MAGNOLIACEAE

Trees or shrubs with oil glands in stems and leaves, leaves simple, flowers regular large, sepals and petals trimerous

1. leaves simple, ovaries separated from them by a short interval, carpels in fruit closely packed, ovules 2, fruit cylindric .....*Magnolia*

2. leaves simple, ovaries separated by a distinct internodes from stamens, carpels in fruit more or less distant .....*Michelia*

MAGNOLIA

Magnolia grnadiflora L. Syst. Ed. 10, 1082. 1759; Almeida, Fl. Mah. 1:9. 1996.

Local Name: Champo, **English Name:** Magnolia

Identification Characters: Leaves leathery, bud-scale stipules, flowers trimerous, stamens many

Description: Evergreen trees, leaves simple, alternate, elliptic, oblong, bud-scale stipules; flowers terminal solitary, white, fragrant, sepals - 3, petals many, stamens many spirally arranged, carpels many. Fruits etario of follicles, seeds red.

Phenological Data: Fls - Frs: Mar.- May.

Distribution: America, Asia

Localities in Gujarat: Found as an ornamental in the private garden, planted

Origin\Native: Southern America

Ecology: Water-logging is intolerable. The tree is shallow-rooted and doesn't need deep soil suitable in hot and dry climate

Category of threat: Common

Special Characteristics: leathery leaves, white aromatic flowers

Economic Importance: Ornamental

Horticultural Value: Planted in gardens for beautiful white flowers

Medicinal Value: bark extract is used in fever

Method for Propagation: By sowing seeds and grafting.

Suitable Environmental Conditions: Late winter, dry weather

Agricultural Value: Cultivated for ornamental purposes.

Uses: Oil is used in perfumery.

MICHELIA

Michelia champaca L. Sp. Pl. 536. 1753; Hook. f. & Thomas. In Hook. f. Fl. Brit. India 1: 42. 1872; Cooke, Fl. Pres. Bombay 1: 8. 1958 (Repr); Nooteb. In Blumea 31:113. 1985; Raju in Sharma et al. Fl. India 1: 175. 1993.

Local Name: Soneri Champo, **English Name:** Golden champa

Identification Characters: flowers trimerous, yellow with aromatic oil, stamens many

Description: Evergreen trees, grey rough bark. leaves simple, alternate, lanceolate, coraiceous, shortly petiolate; flowers axillary solitary, yellow, fragrant, sepals and petals many, stamens many spirally arranged, carpels many. Fruits etario of follicles, seeds red.

Phenological Data: Fls - Frs: Apr. – July.

Distribution: Tropical Asia

Localities in Gujarat: Found as an ornamental in the private garden, planted

Origin\Native: Southeast Asia

Ecology: Water-logging is intolerable. The tree is shallow-rooted and doesn't need deep soil suitable in hot and dry climate

Category of threat: Common

Special Characteristics: yellow aromatic flowers

Economic Importance: Ornamental

Horticultural Value: Planted in gardens for beautiful yellow flowers

Medicinal Value: bark extract is used in fever, cough and rheumatism.

Method for Propagation: By sowing seeds and grafting.

Suitable Environmental Conditions: Late winter, dry weather

Agricultural Value: Cultivated for ornamental purposes.

Uses: Oil is used in perfumery.

ANNONACEAE

Trees or shrubs, leaves simple, flowers exstipulate, thalamus not elongate

1. Trees evergreen, anther cell concealed by the overlapping connectives, petals valvate in bud
    2. Inner and outer whorls of peals present .....*Polyalthia*
    2. Inner whorl of peals minute or absent .....*Annona*
1. Trees deciduous, anther cell not concealed by the overlapping connectives, petals unequal .....*Miliusa*

ANNONA

1. Fruits green covered with long curved spines .....A. *muricata*
1. Fruits subglobose or heart shaped, slightly areolated .....A. *reticulata*
1. Fruits globose or cordate-ovoid with well marked projecting areols....A. *squamosa*

Annona muricata DC. Sp. Pl. 536. 1753; Mitra in Sharma et al. Fl. India 1:206, 1993; Mudaliar & Prasad in Singh et al. Fl. Maharashtra St. Dicot. 1:163.2000.

Local Name: Hanuman phal.

Description: Small evergreen trees, glabrous branches. Leaves obovate, acuminate. Flowers solitary axillary, sepals 3, triangular, persistent, petal 6 in two whorls, yellow. Fruits muricate covered with long curved spines, green. Seeds many, brown. Native to Tropical America. Occasionally cultivated for plantation in gardens.

Phenological Data: Fls and Frs: April – Oct.

Distribution: Central and South America, Caribbean

Localities in Gujarat: Planted in Indroda Park, Gandhinagar

Origin\Native: West Indies and South America.

Ecology: Water-logging is intolerable. The tree is shallow-rooted and doesn't need deep soil suitable in hot and dry climate, can not stand frost

Category of threat: Common

Special Characteristics: Fruits with curved spines.

Economic Importance: Ornamental

Horticultural Value: Planted in gardens

Medicinal Value: Leaves, fruit, seeds, bark, roots are medicinally used, the fruit and its juice used for worms and parasites, fevers, to increase mother's milk after childbirth, an astringent for diarrhea and dysentery. Seeds are crushed and used against internal and external parasites, head lice, and worms. The bark, leaves, and roots are considered sedative, antispasmodic, hypotensive, and nervine, and a tea is made for various disorders toward those effects.

Method for Propagation: By sowing seeds and grafting.

Suitable Environmental Conditions: Late winter, dry weather, tropical climate

Agricultural Value: Cultivated for ornamental purposes.

Uses: The fruit is eaten, pleasant taste and low sugar content.

Annona reticulata L. Sp. Pl. 537. 1753; Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1: 78. 1872; Cooke, Fl. Pres. Bombay 1: 15. 1958 (Repr). Shah, Fl. Guj. 1:50; 1978,

Mitra in Sharma et al. Fl. India 1: 207. 1993. Singh, et al Fl. Maha. Dicot. 1: 163. 2000.

Local Name: Ramphal, **English Name:** Bullock's heart.

Identification Characters: Flowers creamy – yellow, petals two seriate, each petal at the base with a connectivity, fruit syncarp, smooth with solid exterior, pistils marked by depressions.

Description: Evergreen trees (2n = 14). A small bushy tree, not much different in its external appearance than A. *squamosa*. The fruit of the species is however much larger, smoother on the outer surface with hexagonal markings. It has fewer seeds but the pulp is of a poor quality.

Phenological Data: Fls: Sept- Feb., Frs: Dec- May.

Distribution: Andhra Pradesh, Tamil Nadu and Assam.

Localities in Gujarat: Found as an ornamental in the private garden, planted in botanical garden of the Maharaja Sayajirao University of Baroda.

Origin\Native: West Indies and South America.

Ecology: Water-logging is intolerable. The tree is shallow-rooted and doesn't need deep soil suitable in hot and dry climate

Category of threat: Common

Special Characteristics: Spreading branches with zigzag branchlets with oil cavities on stem.

Economic Importance: Fruit tree

Horticultural Value: Fast-growing and responds well to mulching, improved by judicious pruning, Fruits are edible. The fruit is harvested after its colour changes patterns; some times ripeness is determined by feel. The skin is very thin and the fruit must therefore be handled carefully. The ripening fruits must be covered with bags or nets to avoid damage from fruit bats.

Medicinal Value: The leaf decoction is given as a vermifuge. Crushed leaves or a paste of the flesh may be poulticed on boils, abscesses and ulcers. The unripe fruit is rich in tannin; is dried, pulverized and employed against diarrhea and dysentery. The bark is very astringent and the decoction is taken as a tonic and also as a remedy for diarrhea and dysentery. Fragments of the root bark are packed around the gums to relieve toothache. The root decoction is taken as a febrifuge.

Method for Propagation: By sowing seeds and grafting.

Suitable Environmental Conditions: Late winter, dry weather

Agricultural Value: Cultivated for edible fruits.

Uses: The fruit is eaten, pleasant taste and low sugar content.

Annona squamosa L. Sp. Pl. 537. 1753; Hook. f. & Thoms. In Hook f. Fl. Brit. India 1: 78. 1872; Cooke, Fl. Pres. Bombay 1: 15, 1958 (Repr.). Shah, Fl. Guj. 1:50; 1978, Mitra in Sharma et al. Fl. India 1:207. 1993. Singh et al Fl. Maha. Dicot. 1: 165. 2000.

Local Name: Sitaphal, **English Name:** Custard apple, **Sanskrit Name:** Ganda-gatra, Sitaphala.

Identification Characters: Flowers creamy yellow, fruit a syncarp, fruit tuberculed, of loosely cohering pistils that separate and fall apart.

Description: A deciduous trees (2n = 14). A small tree. Leaves about 6 to 12 cm. long with pellucid oil glands. Flowers greenish, solitary or 2 to 4 together, drooping. Fruit globose, green, with a bumpy and tubercle outer skin. Pulp soft, white, aromatic and sweet containing large black shining seeds.

Phenological Data: Fls: Apr.- Aug. Frs: June – Aug.

Fig. 7: *Annona reticulata* a. Habit, b. Flower, c. Fruits

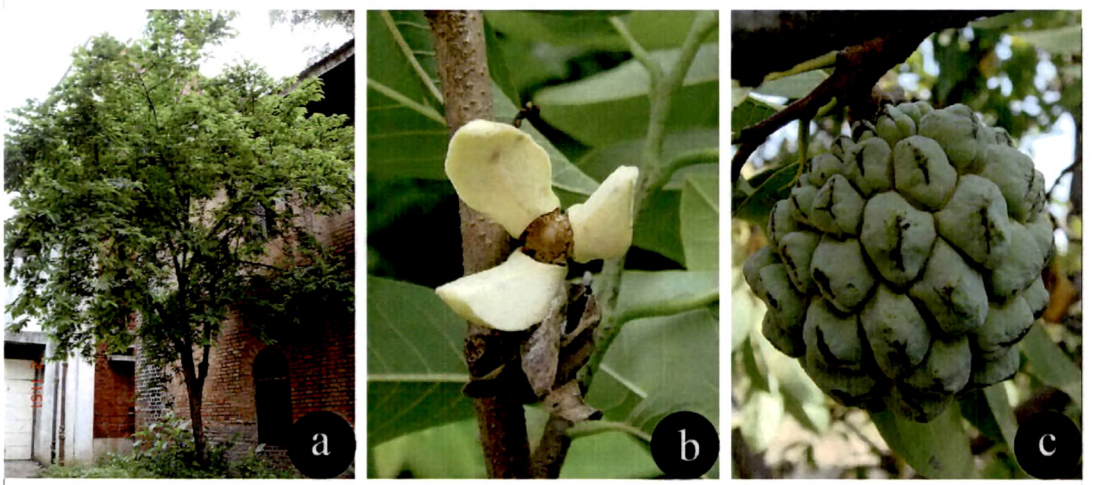


Fig. 8: *Annona squamosa* a. Habit, b. Flower, c. Fruit

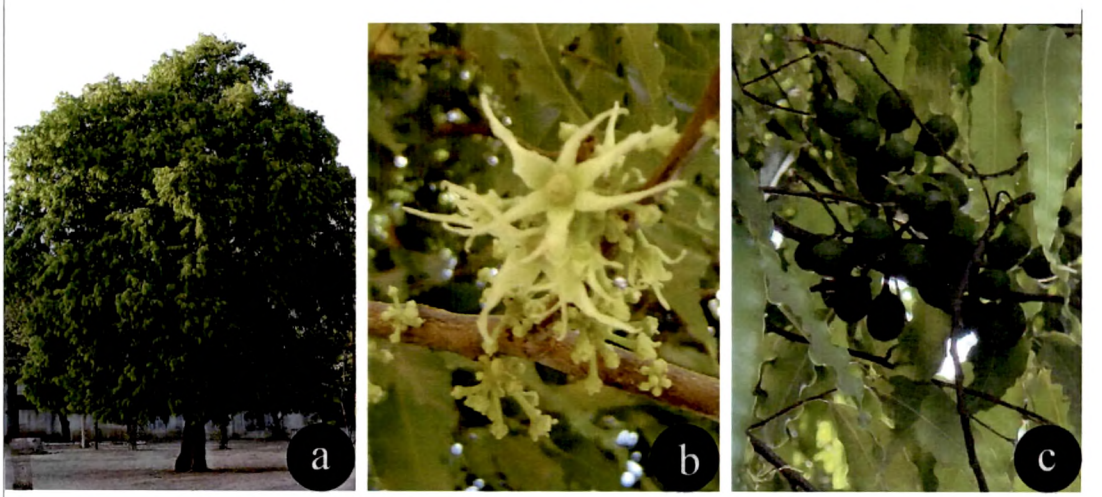


Fig. 9: *Polyalthia longifolia*, a. Leaf, b. Flower, c. Fruit

Distribution: All through the plains of India, specially Andhra Pradesh, Tamil Nadu and Assam.

Localities in Gujarat: planted as a fruit tree in the gardens in the Maharaja Sayajirao University campus, forests of central and northern Gujarat, Ratanmahal, Chhotaudepur, Gir

Origin\Native: West Indies and South America.

Ecology: Water-logging is intolerable. The tree is shallow-rooted and doesn't need deep soil suitable in hot and dry climate

Category of threat: Common

Special Characteristics: Spreading branches with zigzag branchlets with oil cavities on stem.

Economic Importance: Fruit tree

Horticultural Value: Fruits are edible. The fruit should be picked before it fully ripens and then stored in cellars for ripening. Mature fruits treated with 50-60 g carbide ripened in 2 days and thereafter remained in good condition only 2 days at room temperature

Medicinal Value: Seeds, leaves, and the immature fruits contain an insecticidal principle, which is attributed to anonine a benzylisoquinoline alkaloid. Crushed leaves are sniffed to overcome hysteria and fainting spells; they are also applied on ulcers and wounds and a leaf decoction is taken in cases of dysentery.

Method for Propagation: By sowing seeds or by grafting

Suitable Environmental Conditions: Tropical, Hot and relatively dry climate

Agricultural Value: Cultivated for edible fruits.

Uses: The ripe fruit is an excellent dessert. A cooling drink is made from its pulp. Pulp is also used for flavoring ice-creams.

MILIUSA

Miliusa tomentosa (Roxb.) Sinclair in Gardn. Bull. Singapore 14:378. 1965; Sant. in Bull. Bot. Surv. India 3: 20. (1961) 1962; Shah, Fl. Guj. 1:51; 1978, Mitra in Sharma et al. fl. India 1: 221. 1993. *Uvaria tomentosa* Roxb. Pl. Cor. 1:31, t. 35. 1795. *Saccopetalum tomentosum* Hook f. & Thoms. Fl. Ind. 152. 1855 & in Hook f. Fl. Brit. India 1: 88. 1872; Cooke, Fl. Pres. Bombay 1: 17. 1958 (Repr.) Singh, et al Fl. Maha. Dicot. 1: 169. 2000.

Local Name: Umbadi

Description: A deciduous tree. young shoots densely tomentose. Leaves elliptic – ovate or elliptic – lanceolate, apex acuate, base subacute. Flowers axillary, solitary or fascicled, all parts tomentose.

Phenological Data: Fls and Frs: February - April.

Localities in Gujarat: Throughout in deciduous forests except Kachchh (Shah, 1978).

POLYALTHIA

1. Flowers in fascicles or cymes, petal linear ..... P. *longifolia*

1. Flowers solitary or 1-3 together, petal ovate ..... P. *cerasoides*

Polyalthia longifolia (Sonn.) Thw. Enum. Pl. Zeyl. 398. 1864; Hook. f. & Thoms. in Hook. f. Fl. Brit. India 1: 62. 1872; Cooke, Fl. Pres. Bombay 1: 13. 1958 (Repr.); Shah, Fl. Guj. 1:52; 1978, Mitra in Sharma et al. Fl. India 1: 274. 1993. *Uvaria*

longifolia Sonn. Voy. Ind. 2: 233, t. 131. 1782. Singh, et al Fl. Maha. Dicot. 1: 175. 2000.

Local Name: Asopalav, **English Name:** Mast tree, Indian fir

Identification Characters: Flowers greenish – yellow, petals membranous two seriate, linear to linear lanceolate or ovate; wavy; flowers fascicled, axillary or on leafless branches; fruit an etario of berries;

Description: Evergreen trees (2n = 18). 5-10 m tall trees, bark light- blackish brown. Leaves glossy, dark green, lanceolate, glabrous, and petiolate. Flowers inconspicuous, very small, whitefish green, starshaped, Fruit long, ovate-oblong, glabrous, pale- yellow. Seeds long, glabrous, shining.

Phenological Data: Fls: Dec. – June; Frs: Apr – Aug.

Distribution: Indigenous to India, Found growing wild in the southernmost parts of India, a very common tree in eastern India.

Localities in Gujarat: Planted along roads and in gardens (Shah, 1978).

Origin\Native: Ceylon and Bengal

Ecology: Suitable in hot and dry climate

Category of threat: Common

Special Characteristics: Its graceful column with downward sweeping branches, straight trunk

Economic Importance: Ornamental, Avenue tree

Horticultural Value: For manicured gardening and landscape architecture

Medicinal Value:

Method for Propagation: Seeds, Stem cutting, Air layering

Suitable Environmental Conditions: Tropical climate

Agricultural Value: Cultivated for gardening and landscaping purposes.

Uses: Favorite as an avenue tree, planted in public and private gardens in close rows along the boundary wall, the wood is used for barrels, drums, boxes, scaffolding and carriage shafts. Festoons of leaves are often used to make arches or are strung across doors during religious ceremonies.

ARTABOTRYS

Artabotrys hexapetalous (L.f.) Bhandari in Baileya 12 (4): 147. 1964; Mitra in Sharma et al. Fl. India 1:251, f. 40. 1993; Mudaliar & Prasad in Singh et al. Fl. Maharashtra St. Dicot. 1:175.2000. *Annona hexapetala* L. f. suppl. Pl. 270. 1781. *Artabotrys odoratissimus* R. Br. In Bot. Reg. 5:t. 423. 1820; Hook. f. & Thoms. In Hook. f. Fl. Brit. India 1:54. 1872, Cooke, Fl. Pres. Bombay 1:10. 1958 (Repr.).

Local Name: Hirava Chapha, Madan Mast.

Description: Small tree. Leaves oblong-lanceolate, acuminate apex. Flowers solitary on hooked peduncles, drooping, fragrant. Ripe carpels ovoid, seeds 1-2, deeply grooved. Cultivated for fragrant flowers. Common throughout. Native to Tropical Asia.

Phenological Data: Fls: Apr. – July; Frs: Sept. – Feb.

Polyalthia longifolia (Sonn.) Thw var *pendula*

Local Name: Asopalav, **English Name:** Sorrowless tree

Identification Characters: Peundulous branches and conical shaped habit

Description: Evergreen tree. Cylindrical to conical habit, branches slender dropping, flowers grennish yellow, cyme. Indigenous to South India and Sri Lanka. Popular cultivated platn thorough out india. Planted along

roadside, in gardens and along with houses. Native to Tropical Asia. Cultivated for plantation along road side and gardens.

Phenological Data: Fls and Frs: April - May

Distribution: Indigenous to India, Found growing wild in the southernmost parts of India, a very common tree in eastern India.

Localities in Gujarat: Planted along roads and in gardens, houses

Origin\Native: Ceylon and Bengal

Ecology: Suitable in hot and dry climate, Full Sun, Drought-tolerant; suitable for xeriscaping

Category of threat: Common

Special Characteristics: Its graceful column with downward sweeping branches, straight trunk

Economic Importance: Ornamental, Avenue tree

Horticultural Value: For manicured gardening and landscape architecture

Method for Propagation: Seeds, Stem cutting, Air layering

Suitable Environmental Conditions: Tropical climate

Agricultural Value: Cultivated for gardening and landscaping purposes.

Uses: Favorite as an avenue tree, planted in public and private gardens in close rows along the boundary wall, the wood is used for barrels, drums, boxes, scaffolding and carriage shafts. Festoons of leaves are often used to make arches or are strung across doors during religious ceremonies.

BIXACEAE

Trees, leaves alternate, stamens free, flowers pink, placentation parietal, carpels united.

Bixa orellana L. Sp. Pl. 512. 1753; Hook f & Thoms in Hook f Fl Brit. India 1. 190. 1872; Cooke, Fl. Pres. Bombay 1: 56. 1958 (Repr); Balakr in Sharma et al Fl. India 2: 381, f 70. 1993; Almeida, fl. Mah. 1:59. 1996.

Local Name: Sindur, **English Name:** Annato, Lipstick tree

Identification Characters: Sole representative of the family.

Description: Evergreen tree (2n=14) upto 5 mts in height, with a smooth grey bark, few branches and a dense foliage with prominent veins, simple heart shaped leaves with stipules, alternate; flowers are rosy pink, terminal, horse shoe shaped anthers, ovary bi-carpellate, single style, fruit in clusters, capsules reddish-brown, ovoid, covered with soft spines. Seeds small, orange-red.

Phenological Data: Fls.: Sep. – Dec. ; Frs.: Nov. – Jan.

Distribution: Southern parts of India

Localities in Gujarat: planted in gardens

Origin\Native: Tropical America and West Indies.

Ecology: Full sun, well drained soil

Category of threat: Common

Special Characteristics: Fruit produce orange red colour

Economic Importance: Ornamental

Horticultural Value: Planted in garden, shrubbery, along road side, parks

Medicinal Value: Paste protects from insect stings

Method for Propagation: By showing of its seeds

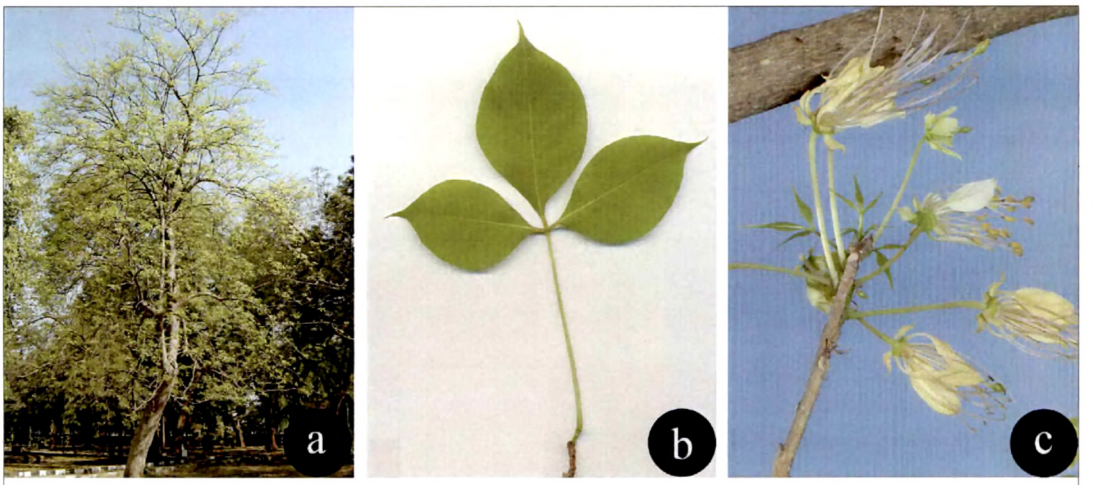


Fig. 10: *Crataeva magna* a. Habit, b. Leaves, c. Flowers

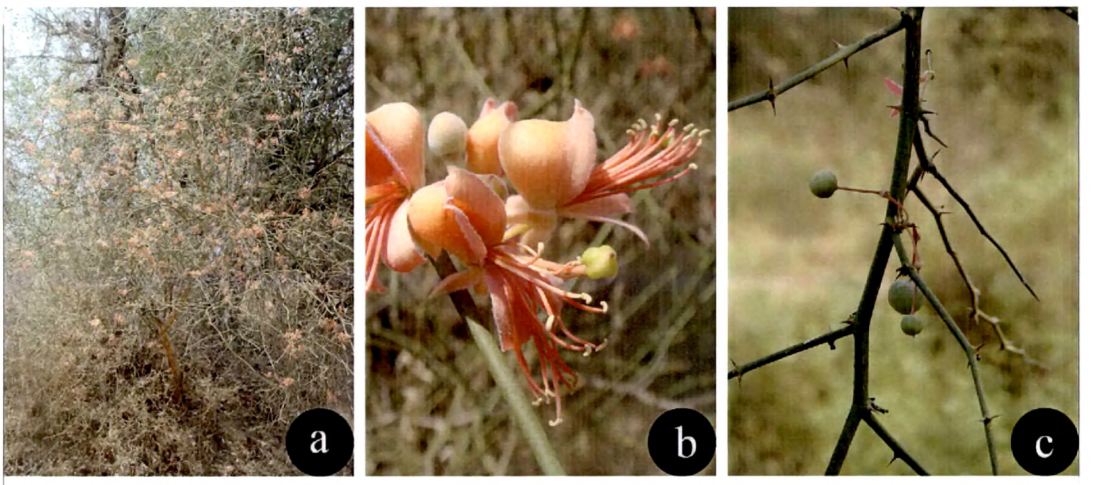


Fig. 11: *Capparis decidua* a. Habit, b. Flowers, c. Fruits

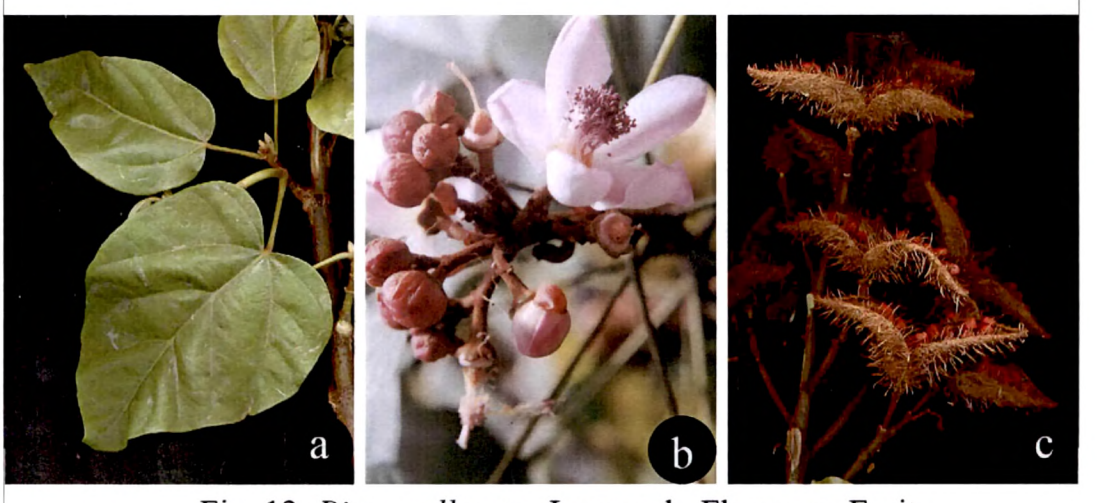


Fig. 12: *Bixa orellana* a. Leaves, b. Flower, c. Fruits

Suitable Environmental Conditions: Tropical

Agricultural Value: Cultivated for orange dye

Uses: A dye is extracted from the red pulp of the fruit. It is used for coloring shoe-polish, cotton silk, butter, cheese and confectionery. The pulp is used as an insect repellent.

CAPPARACEAE

Leaves compound, petals free, flowers hypogynous, carples united, placentation parietal, regular flower, ovary raised on a gynophore

1. Armed, Sepals biseriate .....*Capparis*

1. Unarmed, Sepals uniseriate .....*Crataeva*

CAPPARIS

1. Leaf less plants, flowers red.....C. *decidua*

1. Leaves elliptic obovate, flowers white.....C. *grandis*

Capparis decidua (Forssk.) Edgew., in J Linn. Soc. 6: 184. 1862; Jacobs in Blumea 12: 424. 1965; Raghavan in Sharma et al. Fl. India 2: 265. 1993. *Sodada deciduas* Forssk. Fl. Aeg. – Arab. 81. 1775. *Capparis aphylla* Roth. Nov. Pl. Sp. 238. 1821; Hook f. & Thoms. in Hook f. Fl. Brit. India 1: 174. 1872. Cooke, Fl. Pres. Bombay 1: 49. 1958 (Repr.). Shah, Fl. Guj. 1:68; 1978, Singh, et al Fl. Maha. Dicot. 1: 209. 2000.

Local Name: Kerdo, **Sanskrit Name:** Karira.

Description: Armed small trees. Leaves on young branches only, linear – oblong, acute – spine tipped, stipular thorns, sharp, straight, orange – yellow. Flowers in corymbs, on older shoots. Fruits ovoid, beaked, many – seeded.

Phenological Data: Fls and Frs: Throughout the year.

Localities in Gujarat: Commonly found in semi-arid and arid parts of Saurashtra, Kachchh and Central Gujarat (Shah, 1978).

Capparis grandis L. f. Suppl. 263. 1781; Hook. f. & Thoms. In Hook f. Fl. Brit. India 1: 176. 1872; Cooke, Fl. Pres. Bombay 1: 50, 1958 (Repr.); Shah, Fl. Guj. 1:69; 1978, Jacobs in Blumea 12: 456. 1965; Raghavan in Sharma et al. Fl. India 2: 274. 1993. Singh, et al Fl. Maha. Dicot. 1: 210. 2000.

Local Name: Motokanthar.

Description: Trees young branches olive – green, tomentose. Leaves elliptic – obovate, young pubescent, older glabrous or subglabrous, apex obtuse. Flowers white; outer sepals boat shaped, covered with olive – green pubescence outside.

Inner ciliate. Fruits subglobose.

Phenological Data: Fls and Frs: April - January.

Localities in Gujarat: In dry deciduous forests and also in scrub forests (Shah, 1978; Patel, 1984).

CRATEVA L.

1. Leaves abruptly acuminate, berries globose .....C. *adansonii ssp odora*

1. Leaves no as above, berries ovoid .....C. *magna*

Crataeva adansonii ssp odora (Buch – Ham) Jacobs in Blumea 12: 198. 1964; Raghvan in Sharma et al Fl. India 2: 322. 1993. C. odora Buch – Ham in Trans. Linn. Soc. 15: 118. 1827. C. *religiosa var roxburghii* (R. Br.) Hook f & Thomas in Hook f Fl Brit India 1: 172. 1872, Cooke, Fl Pres. Bombay 1: 45. 1958 (Repr).

Local Name: Vayvarna

Description: Trees, 5-10 m tall. Leaves trifoliate, leaflets ovate-obovate, margins entire. Flowers white, corymbs, sepals petaloid, ovate, petals with narrow claw. Fruit berries, seed brown.

Phenological Data: Fls and Frs: Mar. - May.

Crataeva magna (Lour.) DC., Prodr. 1:243. 1824; Jacobs in Steenis, FI Males. 1, 7: 822. 1976; Raghavan in sharma et al. FI. India 2: 324. 1993. *Capparis magna* Lour. FI. Cochinch. 1: 331. 1790. *Crateva religiosa* var. *nurvala* (Bunch-Ham) Hook. f. & Thoms. in Hook. f. FI. Brit. India 1: 172. 1872; Cooke, FI. Pres. Bombay 1: 44. 1958 (Repr.). Shah, Fl. Guj. 1:74; 1978, Jacobs in Blumea 12: 194. 1964. Singh, et al Fl. Maha. Dicot. 1: 225. 2000.

Local Name: Vayvarno, **English Name:** Garlic Tree, Sacred Barna, **Sanskrit Name :** Varuna, Kumarak.

Identification Characters: Ovary with gynophores; fruit a berry or capsule; sepals in one whorl; trees; compound leaves; fresh flowers creamy to pale yellow or with purple tinge, brown when dry; sepals free, fruit not moniliform.

Description: Deciduous trees, (2n=26); unarmed, ash coloured bark, leaves 3-foliate, long petiolate, flowers in terminal and lateral racemes; fruits across, subglobose to ovate-oblong, glabrous, papllose, scarlet or pale orange.

Phenological Data: Fls & Frs: Feb.-June.

Distribution: Wild or cultivated in Uttar Pradesh, Bihar, West Bengal, Assam and Deccan Peninsula (Western and Eastern Ghats).

Localities in Gujarat: Throughout, planted, Bulsar, Vyara, Bharuch and Rajpipla.

Origin\Native: India

Ecology: Dry areas, sensitive to frost, moist soil

Category of threat: Common

Special Characteristics: Unique clawed petals with sweet odour, leaves tri foliate.

Economic Importance: Ornamental

Horticultural Value: Used as an avenue tree along medium roads.

Medicinal Value: The bark is antipyretic, demulcent, laxative, sedative, leaves and bark are used for stomach ailments, including vomiting and other gastric irritations.

Method for Propagation: Seeds, root suckers

Suitable Environmental Conditions: Tropical

Agricultural Value: Cultivated for ornamental purposes

Uses: Planted in gardens, wood is used for making drums, models, writing boards, combs and turnery articles.

COCHLOSPERMACEAE

Trees or shrubs, leaves palmate or digitate, sepals-5, fruit 3-5 valved capsule seperate throughout the length.

COCHLOSPERMUM

Cochlospermum religiosum (L.) Alston. Handb. Fl. Cel. 6: 14. 1931; Paul & Nayar in Nayar et al. Fasc. Fl. India 19:16. 1988; Balakr. In Sharma et al. Fl. India 2: 383, f, 71. 1993. Bomabx religiosum L. Sp. Pl. 552, 1753. *Cochlopsermum gossypium* (Cav.) DC. Prodr. 1: 1824; Hook f & Thomas in Hook f fl. Brit, india 1: 190. 1872; Cooke, Fl. Pres. Bombay 1:56. 1958 (Repr).

Local Name: Buttercup tree, **English Name:** Buttercup tree, Yellow silk Cotton Tree

Identification Characters: Palmately lobed leaves, yellow flowers

Description: Deciduous tree (2n=12), upto 15 mts in height, bark smooth, ash-coloured, furrowed, stout branches, spreading, leaves dark green, clustered at the end of branches, simple, stipulate, petiolate, large, palmately lobed, 5-7 lobes, acuminate, hairy when young. Flowers yellow, terminal, in clusters, calyx cup shaped, lobed, deciduous, petals – 5, bright yellow, emarginated, ovate, stamens golden, style single. Fruit capsule, leathery, 5-lobed, pendulous. The seeds small, kidney shaped, covered with silky white cotton like threads (floss).

Phenological Data: Fls.: Feb. – Mar. ; Frs.: May. – June.

Distribution: Throughout India

Localities in Gujarat: In the forests of Rajpipla, Chhotaudepur, Ratanmahal

Origin\Native: India, Myanmar, Malaysia

Ecology: Moist soil, full sun

Category of threat: Common

Special Characteristics: Bark yield amber coloured gum

Economic Importance: Ornamental

Horticultural Value: Planted in garden, along temples, borders, roadsides

Medicinal Value: Gum is used in cough.

Method for Propagation: seeds

Suitable Environmental Conditions: Warm and dry climate

Agricultural Value: Cultivated for ornamental purposes

Uses: The floss is used in stuffing, bandage, gum obtained form bark is used in cosmetics, shoe-making, book-biding, leaves eaten by cattle, seed edible.

FLACOURTIACEAE

Trees or shrubs, leaves simple, stipulate, greenish yellow flowers, sepals free, stamens many free, fruit capsule or berry, parietal placentation.

Fig. 13: *Flacourtia indica* a. Twig, b. Flowers

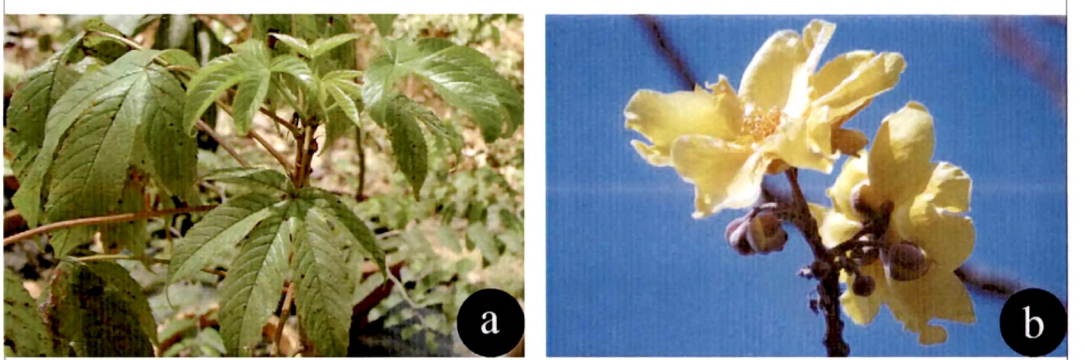


Fig. 14a: *Cochlospermum religiosum* a. Leaves, b. Flowers

Fig. 14b : *Cochlospermum religiosum*

Fig. 15: *Tamarix aphylla*

Fig. 16: *Thespesia populnea* a. Flower, b. Fruits

1. Plants unarmed, petals absent, flowers bisexual, fruit capsule, seeds arillate ..... *Casearia*

1. Plants armed or unarmed, petals absent, flowers usually unisexual, fruit berry, seeds without arillate ..... *Flacourtia*

CASEARIA Jacq.

1. Leaves tomentose, usually oblong, stipules minute .....C. *tometosa*

1. Leaves glabrous

2. Bark smooth, young branch slender, pedicels and calyx glabrous ..... C. *championii*

2. Bark lenticellate, young branch angular, pedicels and calyx hairy ..... C. *graveolens*

Casearia championii Thwaites, Enum. Pl. Zeyl. 19. 1858; Mitra in Sharma et al. F. India 2: 391. 1993. C. *esculenta* auct. Non Roxb. 1832; C. B. Cl. In Hook f Fl. Brit. India 2: 592. 1879 p.p.; Cooke, Fl. Pres. Bombay 1: 553.1958 (Repr.)

Local Name: Tandol

Description: Trees, 5-9 m tall, stems and branches lenticelled, leaves ellipitc-oblong to elliptic-lanceolate, apex acuminate, base tapering, margins entire or serrate, flowers greenish, axillary in clusters, fruit capsule, ellipsoid, 2-3 valved, yellow, seed ovoid with red aril.

Phenological Data: Fls and Frs: Feb. – July

Localities in Gujarat: In deciduous forests, Dangs, Jambughoda, rare

Uses: Wood is used as building material, fruits are edible, leaves used in stews. Root decoction is used in diabetes and piles.

Casearia graveolens Dalz. In Hook. J. Bot. & Kew Gard. Misc. 4: 107. 1852; C.B. cl. in Hook f Fl. Brit india 2: 592. 1879; Cooke, Fl. Pres. Bombay 1: 553. 1958 (Repr.); Mitra in Sharma et al Fl. India 2: 394. 1993.

Local Name: Kirambira

Description : Small trees. Stems and branches lenticelled; Leaves broadly elliptic, base rounded, apex obtuse, flowers green in axillary clusters on leafless branches, fruits capsule, ellipsoid, 3-valved, yellow. Seeds upto 12, with red aril.

Phenological Data: Fls and Frs: Feb. – July.

Localities in Gujarat: In deciduous forests, Dangs, Ratanmahal, Chhotaudepur forests, rare (Shah, 1978).

Uses: leaves and fruits are poisonous and used in fish poison, wood is used as fuel, root juice is used in jaundice and root paste is applied in piles

Casearia tomentosa Roxb. Fl. Ind. 2: 421. 1832; C.B. CL. In Hook. f. Fl. Brit. India 2: 593. 1879; Cooke, Fl. Pres. Bombay 1: 554. 1958 (Repr.). Shah, Fl. Guj. 1:77; 1978, Mitra in Sharma et al. Fl. India 2 : 397. 10993. *C. elliptica* Willd. Sp. Pl. 2:

628. 1799 nom. Superfl. (based on *anavinga lanceolate* Lam.), Singh, et al Fl. Maha. Dicot. 1: 225. 2000.

Local Name: Tondrum, Mojar

Description: Trees. Stems and branches lenticelled; bark ash coloured. Leaves elliptic – oblong, apex acute or acuminate, margins entire or serrulate. Flowers greenish – white, in short, axillary clusters; ellipsoid. Seeds arillate.

Phenological Data: Fls and Frs: January – May.

Localities in Gujarat: In deciduous forests: rare (Shah, 1978).

Uses: Wood is used in combs, bark is used in tanning, fruit is used in fish poison, wood used in carving. Leaves used in medicinal bath and is anthelmintic, root bark is used as tonic.

FLACOURTIA Commers. ex L'Herit.

1. Armed small trees 3-6 m tall, drupe 0.8-1 cm broad, midrib glabrous beneath ..... F. *indica*

1. Armed trees 8-16 m tall, drupe 1.5-2 cm broad, midrib hairy beneath ..... F. *montana*

Flacourtia indica (Burm. f.) Merr. Interpr. Rumph. Herb. Amb. 377. 1917; Sleumer in Steenis, Fl. Males 1, 5: 76 : 1954 & Blumea 30 : 241. 1985; Mitra in Sharma et al. Fl. India 2 : 402. 1993. *Gmelina indica* Burm. f. Fl. Ind. 132, t. 39, f. 5. 1768. *Flacourtia ramontchi* L'herit. Strip. Nov. 3. 59, t. 30 & 30 b. 1785; Hook f. & Thoms. in Hook f. Fl. Brit. India 1: 193. 1872, excl. var *latifolia*; Cooke, Fl. Pres. Bombay 1: 59. 1958 (Repr.). Shah, Fl. Guj. 1:78; 1978, *F. ramontchi* var. *occidentalis* Hook. F. & Thoms. in Hook. f op.cit; Cooke, op.cit. *F. ramontchi* var. *sapida* Roxb. Hook. f. op.cit; Cooke, op.cit. *F. ramontchi* var. *sapida* (Roxb.) Hook. F. & Thoms in Hook. F. op. Cit.; Cooke, op. Cit. *F. sepiaria* Roxb. Pl Cor. 1 : 48, t. 68. 1796; Hook. F & Thoms. in Hook f. op. Cit. 194; Cooke, op. Cit. 60 *F. occidentalis* Blatt. in J. Bombay Nat. Hist. Soc. 31 : 914. 1927. *F. sepiaria* var. *integrifolia* Blatt. Op. Cit, Singh, et al Fl. Maha. Dicot. 1: 236. 2000.

Local Name: Lodri, Tatni

Description: Small trees, deciduous, thorny; young twigs glabrous. Leaves usually clustered towards apices on older branches, highly variable in shape, size and indumentums, broadly elliptic ovate or obovate, apex acute, acuminate or retuse, margins crenate or sub entire. Flowers greenish-yellow in axillary, racteate, short, puberulous, racemes or terminating in short thorny twigs. Fruit berries, glabrous, reddish. Seeds oboviod-trigonous, pale yellow.

Phenological Data: Fls: Jan. – Mar. ; Frs: Feb. – May.

Localities in Gujarat: Throughout in dry deciduous forests, not common.

Uses: Wood used for ploughs and beams, leaves used as fodder. Leaves and roots used as antidote in snakebite. Ripe fruits edible, slightly acidic. Young fruits used as astringent.

Flacourtia montana Grah. Cat. Bombay Pl. 10 . 1839; Hook f. & Thoms. in Hook f. Fl. Brit. India 1: 192. 1872; Cooke, Fl. Pres. Bombay 1 : 58. 1958 (Repr.) Shah, Fl. Guj. 1:79; 1978 ; Mitra in Sharma et al. Fl. India 2 : 406. 1993, Singh, et al Fl. Maha. Dicot. 1: 237. 2000.

Local Name: Yenkdi, Attak

Description : Trees, deciduous, bark thin grey, stems thorny. Leaves ovate, base acute or rounded, glabrous and shiny above, margins crenate, tomentose along midrib and nerves beneath. Flowers in densely pubescent, bracteate, fascicled racemes, unisexual, greenish yellow. Fruits round, scarlet.

Phenological Data: Fls: Jan. – Mar. ; Frs: Feb. – May.

Localities in Gujarat: Not common, pavagadh and Dangs.

Uses: fruits are edible used for jellies, wood used in building purpose.

Hydnocarpus pentandra (Buch.-Ham.) Oken. Allg. Naturgesch. 3, (2): 1381. 1841; Mitra Sharma et al Fl. India 2: 422. 1993. *Chilmoria pentandra* Buch.-Ham. in Trans. Linn. Soc. Lond 13: 501. 1822. *Hydnocarpus wightiana* Bl. Rumph. 4: 22. 1848; Hook. f. & Thomas in Hook. f. Fl. Brit. India 1: 196. 1872; Cooke, Fl. Pres. Bombay 1: 60. 1958 (Repr).

Description: Deciduous large tree, branches slightly pubescent. Leaves thinly coriaceous, elliptic or oblong-lanceolate, acuminate, often deeply serrate. Flowers white. Fruit globose, tomentose, and brownish at maturity, hard.

Phenological Data: Fls - Frs: Mar.- Aug.

Localities in Gujarat: Frequent in deciduous forests

Uses The seed oil is used in the treatment of leprosy. It is also useful in rheumatic pains and sprains.

TAMARICACEAE

Leaves scale like, alternate; flower actinomorphic, pentamerous, stamens few, parietal placenta; capsule 3-5 valved, seeds winged.

TAMARIX L.

1. stamens 5
    2. flowers unisexual ..... T. *dioica*
    2. flowers bisexual
        3. flowers usually in interrupted spike ..... T. *aphylla*
        3. flowers usually in racemose panicles ..... T. *indica*

1. stamens 10 ..... T. *stricta*

Tamarix aphylla (L.) Karst. Deutsch. Fl. 641. 1880-1883; Shetty & Pandey in Sharma et al. Fl. India 3: 22. 1993; almeida, fl. Mah. 1: 80. 1996. *Thuja aphylla* L. Ent. Pl. 1: 32. 1755 p.p. *Tamarix articulata* Vahl, symb. Bot. 2: 48, t. 32 1791 nom.

Illeg.; T. Dyer in Hook f. Fl. Brit. India 1: 249. 1874; Cooke, fl. Pres. Bombay 1: 75. 1958 (Repr.).

Local Name: Lal jhav nu zad, **English Name:** Tamarix

Description: 4-6 m tall trees, reddish-purple rough bark. Leaves minute, scaly, sheathing. Flowers bisexual, pale to bright rosy purple, in interrupted panicles, capsule conical and glabrous.

Phenological Data: Fls: July – Sept.; Frs : Aug.- Nov.

Localities in Gujarat: Kutch, Saurashtra.

Category of threat: Common

Special Characteristics: scally leaves

Economic Importance: Ornamental tree

Horticultural Value: Planted in gardens.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Moist tropical climate

Agricultural Value: Cultivated for ornamental purposes

Uses: Bark and galls used for tanning and as a mordant in dying. Wood used for handles, brush backs, ploughs, frameworks of beds. Bark is bitter and astringent used in eczema, galls used in gargles, leaves used as fodder.

Tamarix dioica Roxb. *ex* Roth. Nov. Pl. Sp. 185, 1821; T. Dyer in Hook. f. Fl. Brit. India 1: 249. 1874; Cooke, Fl. Pers. Bombay 1: 75. 1958 (Repr.); Shetty & Pandey in Sharma et al. Fl. India 3: 24. 1993.

Local Name: Achhilaijo paras, Bhuri paras, **English Name:** Tamarix

Description: 3-6 m tall deciduous trees. Branches spreading and drooping, leaves minute, scaly, sheathing. Flowers pale to bright rosy purple, dioecious, numerous, pink in drooping spikes with triangular bracts. Capsules three valved and oblong.

Phenological Data: Fls & Frs : Apr.-Aug.

Localities in Gujarat: Common. Kutch, Surashtra, North Gujarat (Talod) and in river bed of Narmada near Bharuch.

Category of threat: Common

Special Characteristics: scally leaves

Economic Importance: Ornamental tree

Horticultural Value: Planted in gardens.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Moist tropical climate

Agricultural Value: Cultivated for ornamental purposes

Uses: Wood used in polo sticks and fuel wood. The tree is mostly planted in saline areas where it grows very well. Bark is used in tanning. Cultivated for ornamental purposes, planted in garden and roadside.

Tamarix indica Walld. In Ges. Naturf. Freunde Berlin Neue Schr. 4: 214. 1803; Shetty & Pandey in Sharma et al. Fl. India 3: 25. f. 8. 1993; Almeida, Fl. Mah. 1: 81. 1996. *T. gallica* var *indica* (Willd.) Ehrenb. In Linnea 2: 276. 1827; T. Dyer in Hook. f. Fl. Brit. India 1: 248. 1874; Cooke, Fl. Pres. Bombay 1: 75. 1958 (Repr.) *T. Gallica*

auct. Non L. 1753; T. Dyer in Hook f Op. Cit. *T. troupii* Hole in Indian Forester 45: 247. 1919.

Local Name: Jhav nu zad, **English Name:** Tamarix

Description: 3-4 m small trees. Branches slender pendulous, bark greenish brown rough, leaves subacute with triangular semiampelxicaul base. Flowers minutely pedicellate in terminal paniculate spike, pale to bright pink. Capsule 3 valved, ovoid, seed ellipsoidal, densely hairy at apex.

Phenological Data: Fls & Frs : Aug.-Mar.

Localities in Gujarat: Kutch, Saurashtra, North Gujarat.

Category of threat: Common

Special Characteristics: scally leaves

Economic Importance: Ornamental tree

Horticultural Value: Planted in gardens.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Moist tropical climate

Agricultural Value: Cultivated for ornamental purposes

Uses: Wood used in agricultural implements. Gall on leaves and twigs are astringent used in diarrhea, dysentery.

Tamarix stricta Boiss. Diag. (Ser II) 2: 57, 1856; Hooker, Fl. Brit. India 1: 249, 1872, Talbot Fot. Fl. Pres. Bomb. & Sind 1: 88, 1909; Cooke, Fl. Pres. Bomb. 1: 76, 1967; Shah, Fl. Gujarat St. 1: 89, 1978.

Description: Small tree. Leaves closely sheathing, minutely amplexicaul. Flower rose colored, terminal, spikes. Capsules conical, white.

Phenological Data: Fls & Frs : October

Localities in Gujarat: Saurashtra

Category of threat: Common

Special Characteristics: scally leaves

Economic Importance: Ornamental tree

Horticultural Value: Planted in gardens.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Moist tropical climate

Agricultural Value: Cultivated for ornamental purposes

CLUSIACEAE

Trees or shrubs with yellowish green resin, leaves simple, leathery, flowers regular in panicles, calyx free, stamens many, placentation axile, basal or parietal, fruit berry, drupe or capsule

1. Leaves veins reticulate, stigma sessile or subsessile .....*Garcinia*

1. Leaves veins parallel, stigma on slender style.....*Calophyllum*

CALOPHYLLUM L.

Calophyllum inophyllum **L.** Sp. Pl. 513. 1753; T. and in Hook f Fl. Brit. India 1: 273. 1874; Cooke, Fl. Pres. Bombay 1: 84. 1958 (Repr.); N.P. Singh in Sharma et al. Fl. India 3: 92. 1993.

Local Name: Udi, Tamanu, **English Name:** Ballnut, **Sanskrit name:** Punnaga

Description: A middle sized ornamental tree, grey smooth bark, glabrous; leaves elliptic, coriacious, obtuse or retuse at apex, rounded at base; flowers scented white 1 inch in diameter, in axillary racemes; fruits drupes, smooth, yellow.

Phenological Data: Fls & Frs : Dec. – Jan..

Origin/native: Polynesia and Southeast Asia

Distribution: Australia, India, Malaysia

Localities in Gujarat: planted in Gandhinagar, Waghai Botanical garden.

Category of threat: Common

Ecology: tolerates varied kinds of soil, coastal sand, clay or even degraded soil

Economic Importance: Ornamental

Horticultural Value: with its decorative leaves, fragrant flowers and spreading crown it is very popular as ornamental tree, planted in gardens

Medicinal Value: oil from fruit is used as a anti-inflammatory agent and for many skin conditions

Method for Propagation: seeds

Suitable Environmental Conditions: Warm and dry climate

Agricultural Value: Cultivated for ornamental purposes

Uses: Ornamental and shade tree, wood is durable under water used in boats, for making domestic vessels and bowls. Seed oil is used in skin diseases and rheumatism. The floral decoction is used in eczema. Fruits eaten by bats and squirrels.

GARCINIA L.

1. Flowers pentamerous .....G. *xanthochymus*

1. Flowers tetramerous

2. stamens surrounding a rudimentary ovary, ovary 5-12 celled.....
G. *mangostana*

2. stamens forms a central round or 4- sided mass with numerous 2-celled anthers .....G. *indica*

Garcinia indica (Thou.) Chois. In DC. Pourdr. 1:561. 1824; T. Anders. Hook. f. & Fl. Brit. India 1:261. 1874, Cooke, Fl. Pres. Bombay 1:80. 1958 (Repr.); Singh in Sharma et al. Fl. India 3:113, 1993; Godbole & Das in Singh et al. Fl. Maharashtra St. Dicot. 1:276. 2000.

Local Name: Kokam, Ratamba, **English Name:** Butter tree

Description: Evergreen tree, 10-20 m tall, branches drooping. Leaves thick leathery, dark green, elliptic-oblong, acute or abruptly acuminate at apex. Flowers mostly purple or yellow red in few-flowered terminal or

axillary fascicled, male flower 4-8, outer sepals smaller than inner, stamens on a short column, anthers 2-celled, female flowers usually solitary. Fruit berries, globose, dark purple, ovary 5-7 celled. Seed compressed, 5-7.

Phenological Data: Fls: Nov.- Feb, Frs: May. - Jun.

Distribution: originally from Malay Peninsula, Sri Lanka and Myanmar, planted in the garden as an ornamental tree, frequent in evergreen and deciduous forests, western ghat

Localities in Gujarat: Botanical garden of the Maharaja Sayajirao University, Baroda

Uses: Fruits are edible, the peel of fruit is used in cooking.the fat from seed is used medicinally called 'Kokam butter'.

Garcinia mangostana L. Sp. Pl. 443. 1753; T. and in Hook f Fl. Brit. India 1: 260. 1874; N. P. Singh in Sharma et al Fl. India 3: 148. 1993.

Local Name: Mangustan, **English Name:** Mangosteen tree

Description: Evergreen tree, 20-25 m tall, conical crown, bark brown smooth. Leaves thick coriaceous, dark green, long, elliptic- oblong, acute or shortly acuminate at apex, with numerous secondary nerves joined by distinct intramarginal veins. Male flowers rare pale green or creamy yellow, sepals 4, coriaceous, persistent, petals 4, stamens many. Bisexual flowers solitary or geminate, sepals 4, orbicular, persistent, petals 4, purple, fleshy, stamens many. Berries dark purple, smooth, surrounded by sepals at base. Seeds upto 8, compressed.

Phenological Data: throughout the year.

Distribution: cultivated species, prefers humidity

Localities in Gujarat: Botanical garden of the Maharaja Sayajirao University, Baroda

Uses: planted in gardens

Garcinia xanthochymus Hook.f. in Hook. f. Fl. Brit. India 1:269. 1874; Cooke, Fl. Pres. Bombay 1:82. 1958 (Repr.); Singh in Sharma et al. Fl. India 3:129, 1993; Godbole & Das in Singh et al. Fl. Maharashtra St. Dicot. 1:277. 2000.

Local Name: Jharambi, Ota, **English Name:** Yellow mangosteen, False mangosteen

Description: Evergreen tree, upto 10 m tall with quadrangular branchlets. Leaves thick, coriaceous, dark green, oblong-lanceolate, acute. Male flowers fascicled on old wood, pedicellate, sepals 5, ciliate along margins, petals 5, white, anthers 2- celled,. Female flowers fascicled on old wood, stigmas 5. berries subglobose, yellow when mature, seeds 1-4.

Phenological Data: Fls - Frs: Feb - May

Localities in Gujarat: evergreen forests along the westerns ghats

MALVACEAE

Mucilaginous, often present with stellate hairs, leaves simple, alternate, free lateral stipules, flowers solitary, axillary, corolla contorted, placentation axile, pollen rough, anthers one celled, stamens monadelphous, seeds many reniform.

1. Corolla yellow with purple base, fruits not winged..... *Thespesia*

1. Corolla white or pink, fruits winged ..... *Kydia*

KYDIA Roxb.

Kydia calycina Roxb. Pl. Cor. 3:12, t. 215, 1811; Mast. In Hook. f. Fl. Brit. India 1: 348. 1874; Cooke, Fl. Pres. Bombay 1: 100. 1958 (Repr.). Shah, Fl. Guj. 1:109; 1978, Paul & Nayar in Nayar et al. Fasc. Fl. India 19: 160. 1988; Paul in Sharma et al. Fl. India 3: 344. 1993. Singh, et al Fl. Maha. Dicot. 1: 317. 2000.

Local Name: Warang

Descreption: Moderate sized deciduous trees, grey rough bark, young branches with stellate tomentum. Leaves lobed, broadly ovoid, stellate hairy above, grey-tomentose beneath. Flowers in terminal panicles, polygamous; Capsules globose enclosed in persistent calyx. Seeds reniform – ellipsoid.

Phenological Data: Fls: Oct. – Nov. ; Frs: Nov. - Jan.

Localities in Gujarat: common in deciduous forests, Saurashtra, Dangs (Patel, 1984).

Uses: leaves use as fodder, wood is used in agricultural implements, matchboxes, light packing cases.

THESPESIA Soland ex Corr.

Thespesia populnea (Linn.) Soland *ex* Corr. in Ann. Mus. Herb. Paris. 9: 290, t. 8, f. 1. 1807; Mast in Hook, f. fl. Brit. India 1:345. 1874; Cooke. Fl. Pres, Bombay 1: 121. 1958 (Repr.). Shah, Fl. Guj. 1:117; 1978, Bross. In Blumea 14: 106. 1966; Paul & Nayar in Nayar et al. Fasc. Fl. India 19: 225. 1988; Paul in Sahrma et al. Fl. India 3: 352. 1993. *Hibiscus populneus* L. Sp. Pl. 694. 1753. Singh, et al Fl. Maha. Dicot. 1: 330. 2000.

Local Name: Paras piplo, Pardesi bhindi, **English Name:** Indian tulip tree, **Sanskrit Name:** Parisha, Garda-bhanda.

Identification Characters: Leaves broadly ovate, entire; younger parts peltatley scaly flowers bisexual, sulphur-yellow when fresh, with a chocolate-brown or deep-purple spot within at base; fruits not winged;

Description: Evergreen trees (2n = 26), 8-15 m tall, Grey smooth bark, fissured. Leaves simple, alternate, petiolate, entire, acuminate, dark green, heart shaped, stellate-tomentose beneath, veins white. Flowers pendulous, axillaries, solitary, calyx cup shaped, sepals 5, green; petals 5, bright yellow, crinkled, stamens white, stamens numerous, fused, anther lobes golden. Fruit capsule 2-3.5 cm across, globose, depressed on top, minutely stellate-scaly. Seeds ovoid or cuneate-oblong, black, hairy.

Phenological Data: Fls: Dec. – Feb.; Frs: Apr. - May

Distribution: India, tropical countries

Localities in Gujarat: Planted in gardens and along roadsides; rarely wild (Shah, 1978).

Origin\Native: Burma, Tropical Asia and Pacific Islands.

Ecology: Light porous soil, full sun

Category of threat: Common

Special Characteristics: Poplar like leaves, leaf tip pointed like Pipal (*Ficus religiosa*), bark yields dye

Economic Importance: Ornamental shade tree

Horticultural Value: Planted in gardens and on road sides.

Medicinal Value: Bark is astringent, used in diarrhea

Method for Propagation: Seeds and Cutting.

Suitable Environmental Conditions: Moist tropical climate

Agricultural Value: Cultivated for ornamental purposes

Uses: Wood is used in boat building. Manufacture of cartwheels. Flowers and fruits yield yellow dye. Seed oil is used as a luminant.

BOMBACACEAE

Usually deciduous trees, leaves palmately compound, inflorescence solitary axillary, flowers regular, bisexual, petals free showy, carpels 2-5, axile placentation, pollen smooth, anthers 1 – celled.

1. Armed tree calyx truncate, irregularly 3-5 lobbed ..... *Bombax*

1. Unarmed tree

    2. trunk much enlarged at base calyx 5 cleft ..... *Adansonia*

    2. Trunk smooth green in colour, calyx cup shaped .....*Ceiba*

ADANSONIA L.

Adansonia digitata L. Sp. Pl. 1190. 1753; Mast, in Hook, f. Fl. Brit. India 1: 348. 1874; Cooke. Fl. Pres. Bombay 1: 126. 1958 (Repr.). Shah, Fl. Guj. 1:118; 1978, Nayar & Biswas in Sharma et al. Fl. India 3: 404. 1993. Singh, et al Fl. Maha. Dicot. 1: 345. 2000.

Local Name: Sampudizo zad, Rukhado, **English Name:** African Baobab tree, **Sanskrit Name:** Ravana-amblika, Shitphalam, Goraxi-panchparni.

Identification Characters: Trunk much enlarged toward base, gradually becoming thinner and branched above the middle, unarmed; flowers solitary, Pendulous; involucre bracts 2; fruit woody, indehiscent baccate; seeds reniform, embedded in fleshy pulp

Description: Deciduous tree (2n = 96,144), 10-20 m tall, grey smooth bark, leaves alternate, large, smooth, digitately compound, leaflets 5-7, sessile or subsessile, obovate-oblong or elliptic-oblong, densely silky-brown-hairy, at length glabrous above. Flowers white, large, scented, hanging, calyx 5 lobed, hairy, petals 5, white, wrinkled, stamens numerous, golden or purple anthers, style slender, stigmas radiating. Fruit long ellipsoidal, pale-brown, densely hairy. Seeds kidney shaped

Phenological Data: Fls: Apr.-May; Frs: June-Dec.

Distribution: India, Africa, Northern Australia

Localities in Gujarat: Cultivated, Vadodara city and Sindhrot road near Vadodara

Origin\Native: Africa.

Ecology: Sandy soils, dry, warm climate,

Category of threat: Common

Special Characteristics: The trunk is enormously huge, bottle shaped

Economic Importance: Ornamental

Horticultural Value: Planted along roadside

Medicinal Value: The fruit is used for curing dysentery and bilious headache.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Warm dry environments

Agricultural Value: Cultivated for ornamental purposes

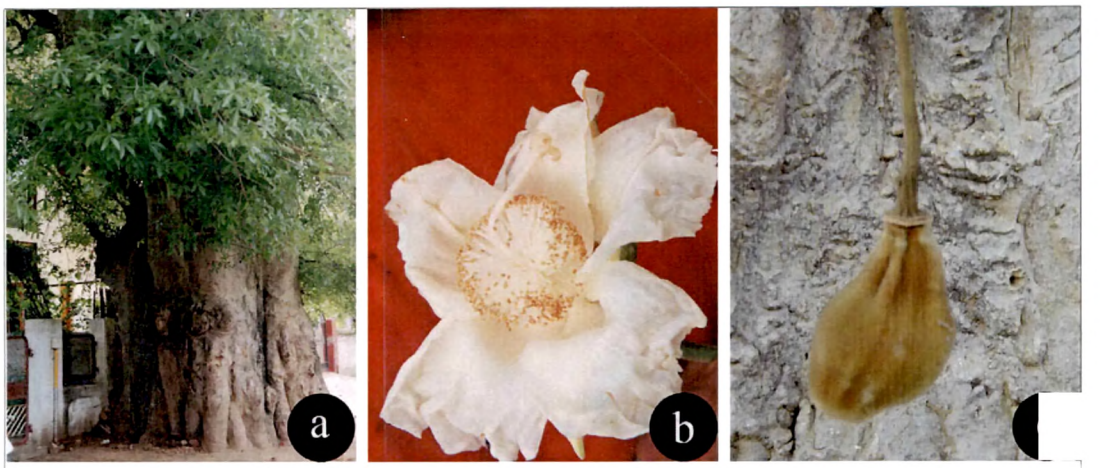


Fig. 17: *Adansonia digitata*, a. Habit b. Flower, c. Fruit

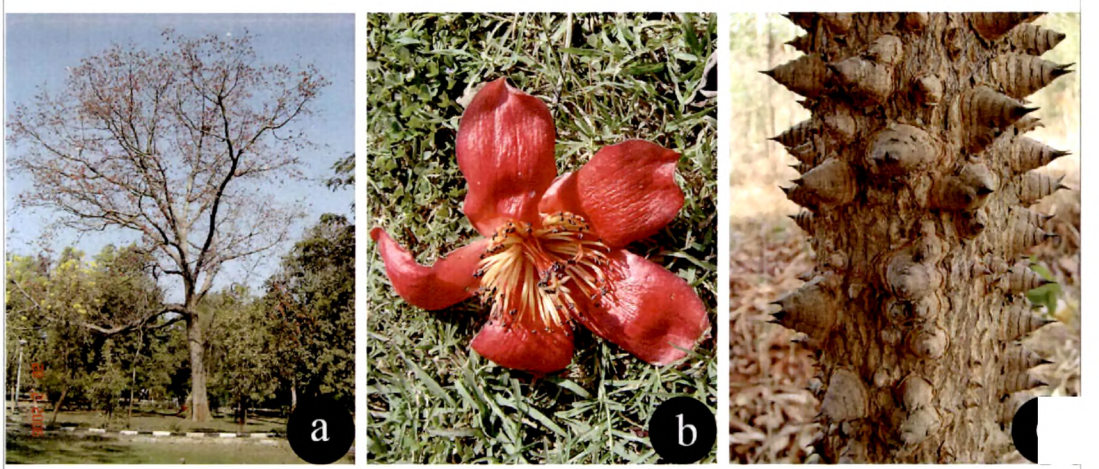


Fig. 18: *Bombax ceiba,* a. Habit, b. Flower, c. Bark

Fig. 19: *Ceiba pentandra* a. Habit b. Fruits, c. Dehisced Fruit

Uses: The bark fiber is used for making ropes. The bark is also used in the paper industry. Leaves used in fodder.

BOMBAX L.

1. Trunk prickly, leaflets lanceolate, filaments flattened .....B. *ceiba*

1. Trunk rarely prickly, leaflets obovate, filaments filiform .....B. *insigne*

Bombax ceiba L. Sp. Pl. 511. 1753; Robyns in Taxon 10: 157. 1961 & in Bull. Jard. Bot. Bruxelles 33: 88, f. 7. 1963; Nayar & Biswas in Sharma et al. Fl. India 3: 398, f. 111. 1993. *B. malabaricum* DC. Prodr. 1: 479. 1824; Mast in Hook, f. Fl. Brit. India 1: 349. 1874; Cooke, Fl. Pres. Bombay 1: 127. 1958 (Repr.). Shah, Fl. Guj. 1:118; 1978, Singh, et al Fl. Maha. Dicot. 1: 343. 2000.

Local Name: Shimalo, Savar, **English Name:** Silk Cotton tree, **Sanskrit Name:** Shalmali

Identification Characters: Trunk uniformly thick, armed, flowers bright-to deep-red, seldom white or yellow, crowded on leafless braches, involucral bracts absent or fugacious, capsule dehiscent; seeds not embedded in pulp.

Description: A deciduous tree (2n = 72), 10-30 m tall, branches horizontal, grey, glabrous bark, prickles conical, black. Leaves crowded at ends of branches, alternate, petiolate, digitately 5-7 foliate; leaflets ovate – lanceolate or elliptic-lanceolate, glabrous, bright-green, lobes 5-7. Flowers 6-8 cm or more across, sessile, crowded, at ends of leafless branches, sepals cup shaped, fleshy, corolla showy red colured, stamens numerous, anthers lobes twisted, arranged in 5 bundles, opposite to each petals, style single, ovary 5 celled, stigma 5-lobed. Capsule 5-valved, valves ovate-lanceolate, woody, rough, glabrous, dark-reddish-brown, minutely apiculate, silky floss.

Phenological Data: FLS: Feb.-Apr.; FRS: Mar.-June.

Distribution: Through out in deciduous and scrub forests.

Localities in Gujarat: deciduous and scrub forests, botanical garden of the Maharaja Sayajirao university of Baroda

Origin\Native: India, Burma, Ceylon and Java-Sumatra.

Ecology: Hot and dry environment, full sun.

Category of threat: Common

Special Characteristics: Bark is covered conical prickles

Economic Importance: Ornamental

Horticultural Value: Planted in gardens, along roadside

Medicinal Value: Gum is extracted and used in native medicine.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Warm climate

Agricultural Value: Cultivated for ornamental purposes

Uses: The tree attracts plenty of birds when in bloom for nectar and for the edible fleshy petals. Wood is used in construction; silky floss surrounding the seeds is used for stuffing pillows. Seeds are eaten after burning the floss from dried fruits.

Bombax insigne Wall. Pl. Asiat. Rat. 1: 71, tt. 79 & 80. 1830; Nmast. In Hook f Fl. Brit. India 1: 349. 1874; Cooke, Fl. Pres. Bombay 1: 128. 1958 (Repr.); Robyns in Bull. Jard. Bot. Brux. 32: 112. 1963; nayar & Biswas in Sharma et al Fl. India 3: 398. 1993.

Local Name: Savar

Identification Characters: Trunk uniformly thick, armed, flowers scarlet or white, crowded on leafless braches, capsule dehiscent; seeds not embedded in pulp.

Description: A deciduous tree, 10-30 m tall; branches horizontal, grey, sometimes prickles. Leaves crowded at ends of branches, alternate, petiolate, digitately 5-7 foliate. Flowers sessile, crowded, at ends of leafless branches, corolla showy scarlet or white, sepals cup shaped, fleshy, stamens numerous, ovary 5 celled, stigma 5-lobed. Capsule 5 angular, woody, rough, dark-reddish-brown, silky floss.

Phenological Data: Fls: Feb.-Apr.; Frs: Mar.-June.

Distribution: Through out in deciduous and scrub forests.

Localities in Gujarat: deciduous forests

Ecology: Hot and dry environment, full sun.

Category of threat: Common

Special Characteristics: Bark is covered conical prickles

Economic Importance: Ornamental

Horticultural Value: Planted in gardens, along roadside

Medicinal Value: Gum is extracted and used in native medicine.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Warm climate

Agricultural Value: Cultivated for ornamental purposes

Uses: The tree attracts plenty of birds when in bloom for nectar and for the edible fleshy petals. Wood is used in construction; silky floss surrounding the seeds is used for stuffing pillows. Seeds are eaten after burning the floss from dried fruits.

CEIBA Mill. Emend. Gaertn.

Ceiba pentandra (L.) Gaerth. Fruct. Sem. Pl. 2: 244, t 133. 1791; Robyns in Dassan. & fosb. Rev. Handb. Fl. Ceylon 1 : 70, 1980; Nayar & Biswas I Sharma et al Fl. India 3: 400, f. 112. 1993. *Bombax pentandrum* L. Sp. Pl. 511. 1753. *Eriodendron pentandrum* (L.) Kurz in J. Asiat. Soc. Bengal 43: 113. 1874. *E. anfractuosum* DC. Prodr. 1: 479. 1824; Mast. In Hook, f. Fl. Brit. India 1: 350. 1874; Cooke, Fl. Pres. Bombay 1: 128. 1958(Repr.). Singh, et al Fl. Maha. Dicot. 1: 345. 2000.

Local Name: Dholo Shimlo, **English Name:** True Kapok/White silk cotton.

Identification Characters: Bark is green and smooth, leaves digitate.

Description: Deciduous tree (2n = 72, 80). 10-15 m tall, massive tree attaining enormous height. The branches, arranged in whorls, spread horizontally, decreasing in length while ascending; bark smooth, green. The leaves are palmately compound with about 5-9 leaflets, entire. Flowers white, axillary clusters, bell shaped persistent sepals, 5, petals 5, fleshy, stamens 5, fused at the base, ovary five – celled, style stout. Fruit oblong capsule. Seeds black, embedded in white silky hairs in fruits.

Phenological Data: Fls: Feb.- Mar, Frs: Mar.- Apr.

Distribution: Throughout India, Sri Lanka, Philippines, Cambodia

Localities in Gujarat: Planted along road side in Vadodara city
Origin\Native: Amazon and Sri Lanka.
Ecology: Full sun
Category of threat: Common
Special Characteristics: Bark is green
Economic Importance: Ornamental
Horticultural Value: Planted along roadside, gardens and parks
Method for Propagation: Seeds.
Suitable Environmental Conditions: Tropical climate
Uses: The pale yellow floss is world famous for use in life belts. It is a hedge tree. It is also used as insulator for heat and used for making refrigerators, cold storage plants and hospitals.

STERCULIACEAE

Trees with soft wood, stellate hairs and mucilage present, leaves simple or digitately compound, alternate, stipulate, flowers regular, bisexual, stamens united, anthers 2-celled.

1. flowers bisexual, petals present
    2. ovary raised on gynophore, fruits spirally twisted ..... *Heliectres*
    2. ovary not raised on gynophore, fruits not spirally twisted
        3. staminodes present ..... *Pterospermum*
        3. staminodes absent ..... *Eriolaena*
1. flowers unisexual, petals absent
    4. flowers bright-ornage, follicles membranous ..... *Firmiana*
    4. flowers pale yellow, follicles woody .....*Sterculia*

ERIOLAENA A. P. DC.

1. involucral bracts entire or toothed ..... E. *quinquelocularis*
1. involucral bracts multisect
    2. penduncles few flowered .....E. *stocksii*
    2. penduncles many flowered
        3. style densely hairy, capsule tuberculate ..... E. *hookeriana*
        3. style glabrous, capsule not tuberculate ..... E. *candollei*

Eriolaena hookeriana Wight & Arn. Prodr. 70. 1884; Mast. In Hook f Fl. Brit. India 1: 370. 1874; Cooke, Fl. Pres. Bombay 1: 139. 1958 (Repr.); Malick in Sharma et al. Fl. India 3: 415, f 116. 1993.

Local Name: Rudrakshi, **English Name:** Gauzuma.

Fig. 20: *Eriolaena hookeriana* a. Leaves, b. Fruits

Fig. 21: *Gauzuma ulmifolia* a. Flowering twig, b. Fruits

Fig. 22: *Helicteres isora* a. Flower, b. Fruits

Fig. 23: *Firmiana colorata*

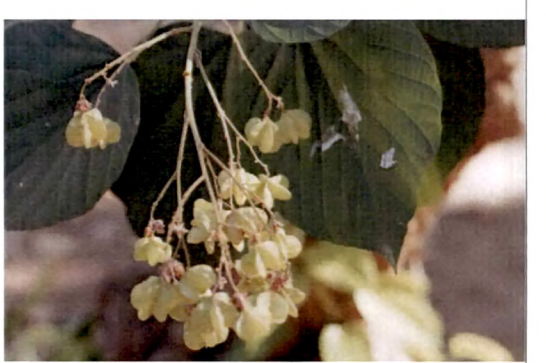


Fig. 24: *Kleinhovia hospita*

Identification Characters:

Description: Deciduous trees, 4-6 m tall trees. Leaves broadly ovate, minutely stellate-hairy, flowers yellow, many in cymes; capsule ovoid, subacute at apex, tuberculate, 10-valved, woody; seeds winged papery, brown

Phenological Data: Fls. – Aug. – Sept. & Frs.: Sept. – Nov..

Distribution: Throughout India

Localities in Gujarat: Chhotaudpeur forests, Rampura forests in Dahod district

Origin\Native: India.

Ecology: Any soil, warm climate

Category of threat: Common

Special Characteristics: Leaves rough, tuberculated acute fruits

Suitable Environmental Conditions: Temperate and tropical environment

FIRMIANA Marsili.

Firmiana colorata (Roxb.) R. Br. In Bennett & Brown, Pl. Jav. Rar. 235. 1844; Kosterm. in Reinwardtia 5: 386. 1961; Malick in Sharma et al. Fl. India 3: 420, f. 117. 1993. *Sterculia colorata* Roxb. Pl. Cor. 1: 26, t. 25. 1795 & Fl. Ind. 3: 146. 1832; Mast. in Hook, f. Fl. Brit. India 1: 359. 1874; Cooke, Fl. Pres. Bombay 1: 133. 1958 (Repr.). Shah, Fl. Guj. 1:121; 1978, *S. rubicunda* wall. ex Mast op. cit. 360. Singh, et al Fl. Maha. Dicot. 1: 353. 2000.

Local Name: Kodaro

Description : Tress, 8 – 10 m tall. Leaves broadly ovate, palmately 5 – 7 lobed, apex obtuse or acute to acuminate, base deeply cordate. Flowers orange – red. Seeds ovoid, compressed, smooth.

Phenological Data: Fls and Frs: February – May

Localities in Gujarat: reported from Pavagadh, Chhotaudepur and Saurashtra; rare (Shah, 1978).

GUAZUMA L.

Guazuma ulmifolia Lamk. Encycl. 3: 52. 1789; Robyns in Ann. Miss. Bot. Gard. 51: 102, 1964. Malick in Sharma et al. Fl. India 3: 424. 1993. *Theobroma guazuma* L. sp. Pl. 782. 1753. *Guazuma tomentosa* H. B & K. Nov. Gen. Pl. Sp. 5: 320. 1826; Mast. In Hook, f. Fl. Brit. India 1: 375. 1874: Cooke, Fl. Pres. Bombay 1: 144, 1958 (Repr.). Shah, Fl. Guj. 1:122; 1978, Singh, et al Fl. Maha. Dicot. 1: 365. 2000.

Local Name: Rudrakshi, **English Name:** Gauzuma.

Identification Characters: Leaves inequilateral at base, flowers bisexual, yellow, petals deciduous or persistent, clawed, ovary not raised on a gynophore, stamens 15-20, fertile stamens 13, 3 stamens in each fascicle, sterile stamen petaloid, capsule minutely tuberculate, seeds not winged.

Description: Evergreen trees (2n = 16). 5-8 m tall trees with rough, brownish bark. Leaves petiolate, obliquely ovate-oblong, stellately hairy, toothed margin, acute apex. Flowers in terminal and axillary cymes, small, yellowish-brown, sepal 5, campanulate, petals 5, hooded, 2 narrow appendages with each petal, stamens and staminodes connate together form a monadelphous cup, ovary pentacarpellary syncarpus, style 5, hairy. Fruit capsule, mucilaginous, oblong, woody, tuberculate, black when ripe.

Phenological Data: Fls. & Frs.: Throughout the year.

Distribution: Throughout India and America

Localities in Gujarat: Cultivated in gardens and along roadsides, seldom an escape (Shah, 1978).

Origin\Native: Tropical America.

Ecology: Any soil, warm climate

Category of threat: Common

Special Characteristics: Leaves rough

Economic Importance: Ornamental shade tree

Horticultural Value: Planted along roadside and in gardens

Medicinal Value: Bark was formally used for asthma, at the present as a remedy for promoting hair growth.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Temperate and tropical environment

Agricultural Value: Cultivated as garden plant

Uses: Wood used for ribs of small boats, barrel stoves, furniture, shoe-lace, paneling, charcoal for gun powder, juice is employed to clarify syrup in manufacture of sugar.

HELICTERES L.

Helicteres isora L. Sp. Pl. 963. 1753; Mast in Hook, f. Fl. Brit. India 1: 365. 1874; Cooke. Fl. Pres. Bombay 1: 136. 1958 (Repr.). Shah, Fl. Guj. 1:122; 1978, Malick in Sharma et al. Fl. India 3: 426. 1993. Singh, et al Fl. Maha. Dicot. 1: 355. 2000.

Local Name: Mardasingh, **English Name:** East Indian Screw Tree, **Sanskrit Name:** Mriga-shinga, Avartani, Avartaphala.

Identification Characters: flowers bisexual, ovary raised on a gynophore, follicles spirally twisted.

Description: Deciduous tree. 3-5 m tall with smooth, pale to dark brown bark. Leaves obovate or elliptic oblong, seldom almost orbicular, scabrid hairy. Flowers axillary, bright red in coloured. Fruits twisted follicles woody, at length pale brown and almost glabrous.

Phenological Data: Fls: July.- Oct, Frs: Aug.- Apr.

Distribution: Throughout India, Pakistan, Sri Lanka, Malayan Peninsula and Australia.

Localities in Gujarat: Throughout, forests of Vadodara, Dahod, Panchmahal districts, planted in Botanical garden of Maharaja Sayajirao University, Baroda.

Category of threat: Common

Special Characteristics: Twisted fruit

Economic Importance: Ornamental

Horticultural Value: Planted in gardens

Medicinal Value: Fruits are used in the treatment of diarrhea, root juice has been used in the treatment of diabetes

Method for Propagation: Seeds.

Uses: Tree is used as fuel, good source of strong fiber obtained from the bark

PTEROSPERMUM Schreb.

Pterospermum acerifolium Willd. Sp. Pl. 3:729. 1800; Mast. in Hook. f. Fl. Brit. India 1:368. 1874, Cooke, Fl. Pres. Bombay 1:137. 1958 (Repr.); Chandra in Sharma et al. Fl. India 3:448, 1993; Moorthy in Singh et al. Fl. Maharashtra St. Dicot. 1:371. 2000.

Local Name: Muchkund, **English Name:** Maple twist.

Identification Characters: Acer shaped leaves

Description: Evergreen tree (2n = 38). 7-9 m tall and majestic tree, smooth grey bark. Leaves simple, petiolate, large, thick, leathery, peltate, rounded in shape, palmately veined, irregularly lobed, dark green above and Greyish white on the under surface. It is a spreading tree with a more or less conical formation. The flowers are large, bisexual, pleasantly scented, white, in cymes, leathery calyx covered with rusty pubescence, sepals 5, thick, fleshy, linear, tomentose, brown, petals 5, linear oblong, upright, white, stamens 15, yellowish white, ovary 5 angled. Fruit capsule, woody, hairy, brown. Seeds large, brown.

Phenological Data: Fls: Apr.- Jun, Frs: May.

Distribution: Sub Himalayan tract, West Bengal, Bihar, Western Ghats, Andaman

Localities in Gujarat: planted in Maharaja Sayajirao Univeristy campus and Fatehgunj area at Vadodara city

Origin\Native: South East Asia and Western Malaya.

Ecology: Warm climate, high rain, grow well at river banks

Category of threat: Common

Special Characteristics: Umbrella like leaves, flowers blooms at night

Economic Importance: Ornamental

Horticultural Value: Planted in gardens, along roadside, avenue tree

Medicinal Value: Wood is an astringent tonic

Method for Propagation: Seeds and cuttings.

Suitable Environmental Conditions: Evergreen rain forests

Agricultural Value: Good coppice tree, cultivated for ornamental purpose

Uses: Wood is used for carving, musical instruments and as a source of dye.

PTERYGOTA

Pterygota alata (Roxb.) R. Br. in Bennet. & R. Br., Pl. Jav. Rar. 234. 1844; Malick in Sharma et al. Fl. India 3:455. 1993; Moorthy in Singh et al. Fl. Maharashtra St. Dicot. 1:374. 2000. *Sterculia alata* Roxb. Pl. Corom. 3:84, t.287. 1820; Mast. In Hook. f. Fl. Brit. India 1:360. 1874, Cooke, Fl. Pres. Bombay 1:133. 1958 (Repr.).

Local Name: Sterculia, **English Name:** Buddha's coconut.

Identification Characters: Flowers unisexual or polygamous, petals absent, flowers pale-yellow or olive-green; follicle coriaceous or woody, dehiscing when ripe.

Description: Deciduous tree. (2n=40) 15-20 m tall and handsome tree. Straight trunk, globular crown, bark smooth, grey, fissured. Leaves large, broadly ovate, entire, both surfaces smooth and shining, acute, Flowers in short, rusty, tomentose racemes, strongly smelling, polygamous, unisexual or bisexual, male, female and bisexual flowers born on same tree, sepals in 5-6 whorls, valvate, brown, partite, thick, fleshy campanulate, stellately tomentose, red or purple within, petal absent, male flower with monadelphous stamens, anther lobes 5; female flowers with 5 distinct style, with vestigial anthers; in bisexual flowers 5 sessile anthers in the sinuses formed by the carpels. Fruit large, globose follicle and woody.

Phenological Data: Fls: Jan.- Fab, Frs: Mar.- Apr.

Distribution: North-east India, Western ghats, Andaman and Nicobar islands.

Localities in Gujarat: Sayaji baug, Vadodara

Origin\Native: India, Myanmar, Bangladesh

Ecology: Hot, dry climate, full sun

Category of threat: Common

Special Characteristics: Leaves are variously shaped

Economic Importance: Ornamental

Horticultural Value: Avenue tree, planted in gardens

Method for Propagation: Seeds.

Suitable Environmental Conditions: Warm climate

Agricultural Value: Cultivated for ornamental purposes

Uses: The wood is strong and lasting and is used for making packing bases, tea- boxes and boats.

STERCULIA L.

1. leaves entire .....S. *guttata*

1. leaves not entire

2. leaves digitate ..... S. *foetida*

2. leaves palmately lobed

3. follicle armed with sharp stinging haris ..... S. *urens*

3. follicles rusty villous and without stinging haris ..... S. *villosa*

Sterculia foetida L. Sp. Pl. 1008. 1753; Mast. in Hook, f. Fl. Brit. India 1: 354. 1874; Cooke, fl. Pres. Bombay 1: 131. 1958 (Repr.); Malick in Sharma et al. Fl. India 3: 459, 461, f. 126. 1993. Singh, et al Fl. Maha. Dicot. 1: 375. 2000.

Local Name: Jangli- Badam, **English Name:** Wild almond and Poon tree.

Identification Characters: Flowers unisexual or polygamous, petals absent, flowers pale-yellow or olive-green; follicle coriaceous or woody, dehiscing when ripe.

Description: Deciduous trees (2n = 40). Moderate size, upto 30 m tall, straight trunk, horizontally spreaded branches, bark fidged, grey. Leaves petiolate, caduceus stipules, pamlately compound, leaflet 5-7, crowded at the end of branches, elliptic-lanceolate, acute. Flowers in axillary racemes panicles, drooping, reddish, male, female and bisexual flowers on same tree, without petals, sepals 5, cleft, red, woolly, 10-15 stamens fused to form staminal column, hairy, curved. Fruit woody capsules – follicles, stalked, boat-shaped, beaked, bright red.

Phenological Data: Fls: Mar. - May. Frs: Apr. - July.

Distribution: Throughout India, Sri Lanka, Myanmar, Australia

Localities in Gujarat: Throughout, planted in Sayaji baug, Vadodara and in botanical garden of the Maharaja Sayajirao Univeristy of Baroda.

Origin\Native: Indo- China, Malaya, Sumatra, Borneo, Africa and Australia.

Ecology: Dry, hot, well drained soil.

Category of threat: Common

Special Characteristics: Bark yields gum

Economic Importance: Ornamental

Horticultural Value: Planted along boundary, parks and gardens, roadside tree

Medicinal Value: Seeds laxative

Method for Propagation: Seeds.

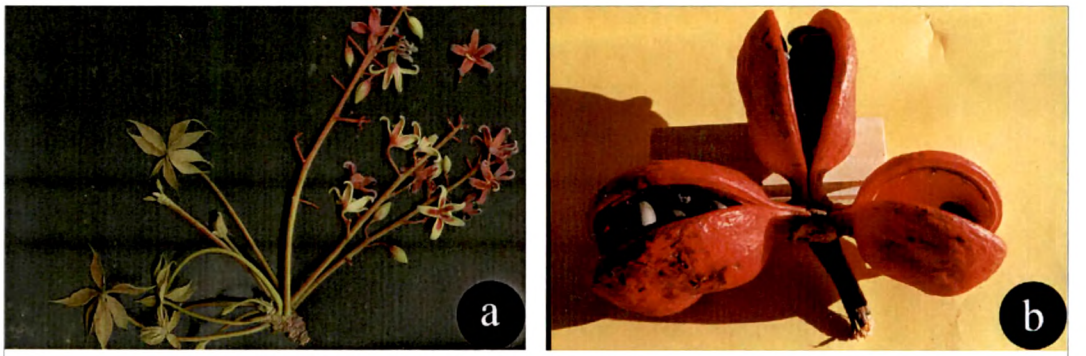


Fig. 25: *Sterculia foetida* a. Flowering twig, b. Fruits

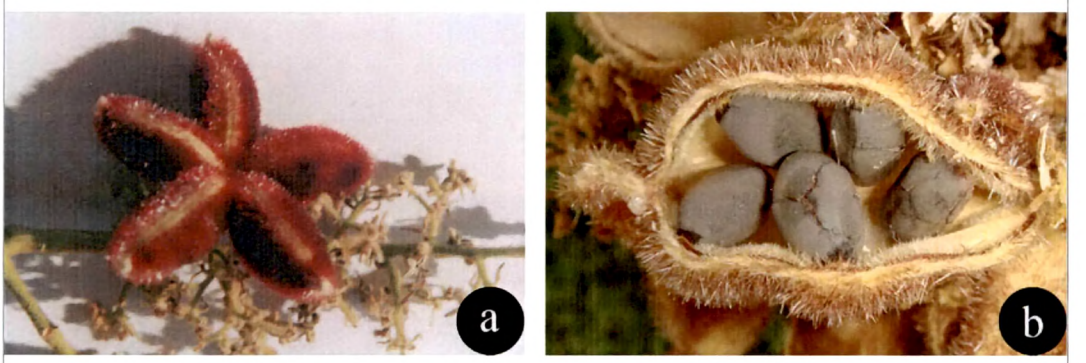


Fig. 26: *Sterculia urens* a. Flower, b. Fruit

Fig. 27: *Pterygota alata* a. Leaves, b. Inflorescence

Fig. 28: *Pterospermum acerifolium* a. Flower, b. Fruit

Suitable Environmental Conditions: Tropical climate

Agricultural Value: Cultivated for ornamental purposes

Uses: Seeds eaten raw or roasted, act as purgative. Bark yields fibers.

Sterculia urens Roxb. Pl. Cor. t. 24. 1795; Hook. f. Fl. Brit. India 1: 355. 1874; Cooke, Fl. Pres. Bombay 1: 131. 1958 (Repr.). Shah, Fl. Guj. 1:124; 1978, Malik in Sharma et al. Fl. India 3: 470. 1993. Singh, et al Fl. Maha. Dicot. 1: 359. 2000.

Local Name: Kadayo, **English Name:** Indian tragacanth, Karaya tree

Identification Characters: Panicles erect; Flowers unisexual or polygamous, petals absent, flowers olive-green, hairy, hairs somewhat irritant; follicle coriaceous or woody, bright purple, densely hairy, hairs irritant; dehiscing when ripe.

Description: Deciduous tree. 8-18 m tall, straight trunk, horizontal spreaded branches, giving a cone shape, with bark smooth, Greyish-white or pink, peeling off in papery scales. Leaves velvety-hairy, lobes deltoid-ovate. Flowers viscidly hair, ovoid-oblong. Seeds black, oblong, minutely wrinkled.

Phenological Data: Fls: Jan. - Feb, Frs: Apr. –May.

Distribution: Throughout India

Localities in Gujarat: deciduous and scrub forests of Chhotaudepur, Naswadi, at GEER foundation Gandhinagar.

Origin\Native: India, Sir Lanka

Ecology: hot, dry, full sun

Category of threat: Common

Special Characteristics: bark yields gum

Economic Importance: Ornamental

Horticultural Value: planted in gardens, roadside, avenue tree

Medicinal Value: gum is used medicinally

Method for Propagation: Seeds.

Suitable Environmental Conditions: warm climate

Agricultural Value: cultivated for ornamental purposes

Uses: Plant is used in the making of toys and musical instruments. The gum called Karaya gum used in cosmetics and also used in the medicine. The seed is also edible by tribal people.

TILIACEAE

Trees with mucilage, leaves simple, alternate or opposite, dentate, inflorescence cymose, flowers regular, bisexual, calyx caduceus, stamens many free or slightly connate, carpels 2-5, syncarpous, fruit capsule, drupe or berry.

1. petals entire or slightly emarginated at apex ..... G. *abutilifolia*
1. petals bifid or notched at apex
    2. petal gland as long as petal ..... G. *serrulata*
    2. petal gland upto half the length of petal
        3. Leaves 5-6 nerved from base, stipules foliaceous .....G. *tiliifolia*

3. Leaves 3 nerved from base, stipules not foliaceous .....G. *damine*

4. leaves stellately hairy or tomentose at least on lower surface

5. leaves broadly ovate or suborbicular ..... G. *asiatica*

5. leaves not as above

6. leaf margins subentire ..... G. *damine*

6. lave margins serrate to crenate-serrate ..... G. *flavescens*

GREWIA L.

Grewia tiliaefolia Vahl, Symb. Bot. 1: 35. 1790; Mast in Hook. F. FI. Brit. India 1 : 386. 1874 ('tiliaefolia'); Cooke, FI. Pres. Bombay 1: 150 1958 (Repr.). Shah, Fl. Guj. 1:133; 1978, Daniel & Chandrab. in Sharma et al. FI India 3: 511, f. 140. 1993. *G. tiliifolia* Vahl var. *leptopetala* (Brandis) T. Cooke, FI. Pres. Bombay 1: 142, 1901 [1: 150, 1958 (Repr.)]. *G. inequalis* Bl. Bijdr. 115. 1825; Almeida, Fl. Mah. 1: 185, 1996. *G. omequalis* var. *leptopetala* (T. Cooke). Almeida, op. cit. 186. Singh, et al Fl. Maha. Dicot. 1: 393. 2000.

Local Name: Dhaman, **Sanskrit Name:** Dharmana, Dhanu-vruskha

Description: Trees. Leaves, ovate, acuminate at apex, obliquely cordate at base. Margins serrate to crenate – serrate. Glabrescent above, pubescent or tomentose beneath. Inflorescence of umbellate cymes. Flowers yellow; stamens many; ovary glabrous, hirsute. Drupes across, entire or 2 –lobed, sparsely hirsute.

Phenological Data: Fls and Frs: April – September.

Localities in Gujarat: Throughout in deciduous forests, occasional seldom in scrub forests (Shah, 1978).

ZYGOPHYLLACEAE

Samll trees; leaves compound opposite, coraceous, stipulate; inflorescence solitary, cyme or panicles; flowers regular or irregular, bisexual, calyx 5, persistant, corolla 5, free, stamens 5, carpels 4-5 united, placentation axile; fruits capsule, drupe or berry.

Guaicum officinale L. Sp. Pl. 381. 1753; Blatt. & Mill. Beaut. Ind. Trees. ed. 2. 90. 1954; P. Singh & V. Singh in Hajra et al Fl. India 4: 59. 1997.

English Name: Lignum vitae tree.

Identification Characters: flowers with prominent disc.

Description: Evergreen small tree, stem crooked, leaves compound, leaflets four opposite glabrous, ellicptic obovate, flowers blue, axillary and terminal panicles, pentamerous, fruit obordate drupes, orange when ripes.

Phenological Data: Fls: - Frs: Mar. - Sept.

Distribution: Throughout India, cultivated.

Localities in Gujarat: Saurashtra, planted at Maharaja Sayajirao University vadodara

Origin\Native: South America, West Indies

Ecology: Warm, moist climate

Category of threat: Common

Special Characteristics: Glossy leaves

Economic Importance: Ornamental tree

Horticultural Value: Planted in gardens

Medicinal Value: Resinous gum is used in rhumetism

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical to temperate environment

Agricultural Value: Cultivated for ornamental purposes

AVERRHOACEAE

Trees or shrubs with compound, alternate, exstipulate leaves; inflorescence axillary panicles; flowers regular, bisexual, sepal and petal 5, free, stamens 10, connate at base; fruit berry, 5 lobed, placentation axile.

AVERRHOA

Averrhoa carambola L. Sp. Pl. 428. 1753; Edg. & Hook. f. Fl. Brit. India 1:439. 1874, Cooke, Fl. Pres. Bombay 1:178. 1958 (Repr.); Manna in Hajra et al. Fl. India 4:257. 1997; Kulkarni in Singh et al. Fl. Maharashtra St. Dicot. 1:435. 2000.

Local Name: Kamrakh, **English Name:** Carambola tree and Chinese Gooseberry.

Identification Characters: Flowers in axillary panicles, violet-purple, leaves alternate imparipinnate.

Description: Deciduous tree (2n = 22, 24). 3-4 m tall trees. Bark grey, smooth, drooping branches. Leaves alternate, compound, imparipinnate; leaflets 5-11, elliptic, glabrous above, pubescent beneath, terminal one largest, acuminate. Flowers small, violet-purple, axillary panicle, sometimes grown on old trunks, sepal 5, petals 5, campanulate, whitish- purple, stamens 10, 5 short staminodes, carpels 5, fused, style 5, distinct. Fruit berry, fleshy, 5-angled, star shaped, greenish-yellow to orange-red, acidic, edible. Seeds small, ovoid, arrilate.

Phenological Data: Fls: June- Oct, Frs: Oct.- Dec.

Distribution: Throughout India, cultivated

Localities in Gujarat: Planted in Maharaja Sayajirao University botanical garden, Vadodara

Origin\Native: Malaysia

Ecology: Warm, moist climate

Category of threat: Common

Special Characteristics: Star shaped fruits

Economic Importance: Ornamental fruit tree

Horticultural Value: Planted in gardens for flowers and angled fruit

Medicinal Value: Fruit is rich in vitamins, minerals, to cure internal hemorrhages, fever

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical environment

Agricultural Value: Cultivated for edible fruits

Uses: Fruits are used for making pickles and chutney. Timber is used in furniture

RUTACEAE

Trees with oil glands, leaves simple or compound with oil glands; inflorescence

axillary or terminal cymes; flowers fragrant, regular, bisexual, cushion like disk present; fruits berry or drupe.

1. Plants armed, leaves palmately compound
    2. Leaves unifoliate, pericarp leathery ..... *Citrus*
    2. Leaves multifoliate, pericarp woody
        3. Leaves 3- foliate,..... *Aegle*
        3. Leaves 5-7 foliate ..... *Limonia*

1. Plants unarmed, leaves pinnately compound .....*Murraya*

AEGLE Correa.

Aegle marmelos (L.) Corr. in Trans. Linn. Soc. London 5: 223. 1800; Hook. f. FI. Brit. India 1: 516. 1875; Cooke, FI. Pres. Bombay 1: 204. 1958 (Repr.). Shah, Fl. Guj. 1:144; 1978, Almeida FI. Mah. 1 : 198. 1996; Nair & Nayar in Hajra et al. FI. India 4: 264. 1997. *Crateva marmelos* L. Sp. PI. 444. 1753. *Aegle marmelos* var. *mahurensis* Zate in Indian J. For. 5 : 36. 1982. Singh, et al Fl. Maha. Dicot. 1: 464. 2000.

Local Name: Bili, **English Name:** Bael tree and Golden apple, **Sanskrit Name:** Sriphala, Bilvaphala, Vasapatra, Malur, Shailush.

Identification Characters: Armed tree; leaves 3-foliolate, rachis not winged; flowers bisexual, stamens 30-60, fruit rind woody.

Description: Deciduous trees (2n = 18, 36). Thorny, 5-10 m tall; bark Greyish-white or Greyish-brown, corky, branches with straight sharp, axillary hard spines. Leaves alternate, compound, smooth, trifoliate, leaflets, ovate-elliptic or elliptic-lanceolate, glabrous, toothed margin. Flowers greenish or creamy-white, in axillary panicles, scented, sepal 5, thick, petal 5, white, imbricate, stamens numerous, filaments short, anther lobes linear, ovary may celled. Fruit globose or subglobose, with rough rind; greenish-white rind, yellow on ripening. Seeds obliquely lenticular or oblong wrinkled, pale-brown, glabrous.

Phenological Data: Fls: Dec.- Feb, Frs: Feb.-July.

Distribution: India, Pakistan, Myanmar, Bangladesh, Nepal

Localities in Gujarat: Throughout the state, Planted along road side in cities like Vadodara, Ahemdabad

Origin\Native: India

Ecology: Moderate soil and light, swampy and alkaline soil

Category of threat: Common

Special Characteristics: Axillary spines, trifoliate leaves

Economic Importance: Ornamental foliage tree

Horticultural Value: Planted in gardens, along side temples

Medicinal Value: The pulp of the fruit has highly medicinal and nutritive value, used in dysentery

Method for Propagation: Seeds.

Suitable Environmental Conditions: Hilly and dry places

Agricultural Value: Most scared trees of India, cultivated for plantation in villages and forests.

Uses: Wood is used for making various agricultural implements. A delightful summer drink is made from its fresh pulp. The leaves are also offered to Lord Shiva. The young fruit is used for making pickles.

Fig. 29: *Aegle marmelos* a. Leaves, b. Spines, c. Fruits

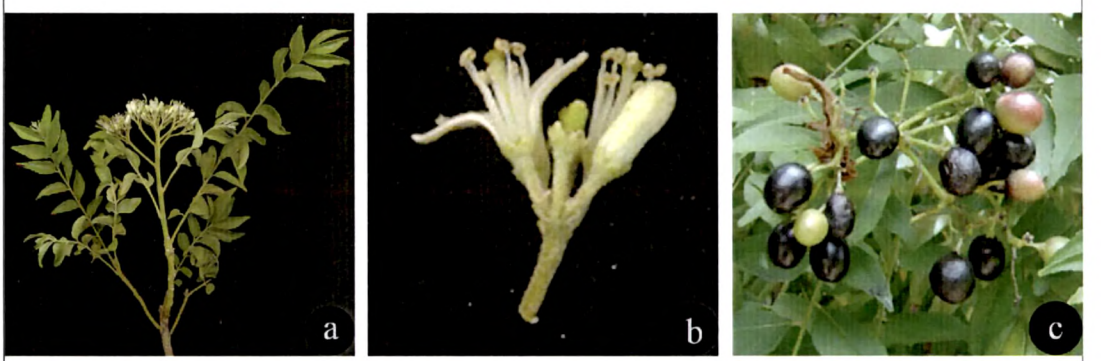


Fig. 30: *Bergera koenigii* a. Flowering twig, b. Flowers, c. Fruits

Fig. 31: *Citrus lemon* a. Leaves, b. Flower, c. Fruit

Fig. 32: *Limonia acidissima* a. Flowers, b. Fruit

Fig. 33: *Murraya paniculata*

CITRUS L.

Citrus limon (L.) Burm f. Fl. Ind. 173. 1768; Bailey, Man. Cult. Pl. (ed. 2) 609. 1949; Nair & Nayar I Harjra et al. fl. India 4: 282. 1997. *C. medica* var. *limon* L. Sp. Pl. 782. 1753. *C. medica* var. *limonum* (Wight & Arn.) Hook, f. Fl. Brit. India 1: 515. 1875; Cooke. Fl. Pres. Bombay 1: 201. 1958 (Repr.). Shah, Fl. Guj. 1:144; 1978, *C. karna* Raf. Syl. Tell. 142. 1838; Naik FI. Osmananbad 64. 1979. Singh, et al Fl. Maha. Dicot. 1: 484. 2000.

Local Name: Limbu, **English Name:** Lemon, **Sanskrit Name:** Nimba-phala.

Identification Characters: Armed tree; leaves unifoliolate; stamens 20-60; fruit rind leathery.

Description: Evergreen tree. 2-6 m tall, thorny, with pale-greenish-yellow, rough bark. Leaves compound, unifoliate, elliptic-oblong or elliptic-ovate, glabrous, gland-dotted, dark green, thick. Flowers white, fragrant, axillary, solitary or 2-3 clustered, sepal 5, petal 5, white, stamens numerous, yellow, filaments short, style yellow short. Fruit hesperidium, globose or ovoid, bright-yellow, mamillate. Seeds ellipsoid, white, and glabrous.

Phenological Data: Fls. and Frs: Throughout the year.

Distribution: Throughout India

Localities in Gujarat: Planted in gardens and houses

Origin\Native: A cultivated hybrid from central India

Ecology: Need full sun, fertile, well drained soils, plenty of water, cannot withstand frosts

Category of threat: Common

Special Characteristics: Leaves and fruits with sour odour and taste

Economic Importance: Ornamental fruit tree

Horticultural Value: Planted in parks, gardens, home

Medicinal Value: Fruits used in skin diseases, rich in vitamin C

Method for Propagation: Seeds, Cuttings, air layering and budding.

Suitable Environmental Conditions: tropical and sub-tropical climates

Agricultural Value: Cultivated for edible fruits

Uses: Fruit is used mainly for making 'sharbat' in summer. It is also used for pickles.

LIMONIA L.

Limonia acidissima L. Sp. Pl. ed. 2, 1 : 554. 1762; Nair & Nayar in Hajra et al. Fl. India 4: 294, f. 75. 1997. *Schinus limonia* L. Sp. Pl. 389. 1753 p. p. *Feronia elephantum* Corr. in Trans. Linn. Soc. London 5: 225. 1800: Hook. f. Fl. Pres. Bombay 1: 203. 1958 (Repr.).

Local Name: Kothu, **English Name:** Wood apple tree.

Identification Characters: Armed tree, leaves multifoliolate, imparipinnate, leaflets 5-7, rachis not winged; flowers polygamous, stamens 10-12.

Description: Evergreen trees (2n = 18). 8-10 m tall trees, straight trunk, spreading branches, with Greyish-brown, rough branches, spiny, spines are straight, stout, at the base of leaf. Leaves compound, opposite, leaflets 5-7, obovate, glabrous, imparipinnate, dark green, entire, wedge shaped. Flowers small, numerous, pale-greenish-yellow, at length brown, in lateral and terminal panicles, polygamous, sepals 5-6m, minute, petal 5-6, 10-12 stamens, short, subulate filaments, anthers dark red. Fruit berry, 6-8 cm across, globose,

many-seeded with greenish-white or pale-yellow rind, woody, fleshy acidic or sweet pulp. Seeds numerous, small, flat.

Phenological Data: Fls: Mar.- July, Frs:Mar.-Dec.

Distribution: India, Sri Lanka

Localities in Gujarat: Planted throughout in cities along roadside

Origin\Native: India and Java.

Ecology: full sun, well drained soils

Category of threat: Common

Special Characteristics: bark yields gum

Economic Importance: Ornamental fruit tree

Horticultural Value: Planted in gardens, roadside, home, roadside, borders

Medicinal Value: the fruit pulp is used in gum and throat problems, use against snake bite

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical

Agricultural Value: Cultivated for fruits

Uses: Fruits are edible, used as purgative. Fruits are also used for making *sharbat* and for delicious pickles, chutney.

MURRAYA L.

1. leaflets usually 10-25, pubescent .....M. *koenigii*

1. leaflets 5-7, glabrescent .....M. *paniculata*

Murraya koenigii (L.) Spreng., Syst. Veg. 2: 315. 1825; Hook. f. Fl. Brit. India 1:503. 1875, Cooke, Fl. Pres. Bombay 1:193. 1958 (Repr.); Nair & Nayar in Hajra et al. Fl. India 4:351. 1997; Jadhav in Singh et al. Fl. Maharashtra St. Dicot. 1:473. 2000. *Bergera koenigi* L. Mant. Pl. Alt. 563. 1771.

Local Name: Kadipatti, **English Name:** Curry leaf tree, **Sanskrit Name:** Kedariya, Ketariya.

Identification Characters: Unarmed tree, leaflets 11-25, not aromatic.

Description: Deciduous tree. 3-5 m tall, large shrubs or small trees, with dark-brown or nearly black bark. Leaves alternate, compound, imparipinnate; ovate, ovate-lanceolate or somewhat ovate-rhomboid, gland-dotted, serrate, acuminate, sessile or nearly so, glabrous. Flowers creamy-white or dirty white, terminal, paniculate cymes, scented; sepals 5, united, lobed, persistent, green; petals 5, white, free; stamens 10, free, in two whorls (5+5), dorsifixed anthers, stigma sticky; style short; ovary superior. Fruits ovoid, berry, black when mature, one seeded.

Phenological Data: Fls: Mar.-May, Frs: May. - June.

Distribution: Throughout India, Malaysia, South Africa, Sri Lanka, Vietnam

Localities in Gujarat: Planted in gardens and near houses

Origin\Native: India and Sri Lanka

Ecology: Full sun or shade, need water but prefers well drained soil

Category of threat: Common

Special Characteristics: Leaves with sweet aromatic odour

Economic Importance: Ornamental

Horticultural Value: Planted in gardens and house

Medicinal Value: Leaves are rich in an essential oil, leaves and bark used as a tonic and a stomachache

Method for Propagation: Seeds.

Suitable Environmental Conditions: Warm and moist climate

Agricultural Value: Cultivated for leaves

Uses: The leaves are widely used for flavoring curries. They are digestive and appetizers.

Murraya paniculata (L.) Jack., Malay.Misc. 1: 31. 1820; Nair & Nayar in Hajra et al. Fl. India 4:352. 1997; Jadhav in Singh et al. Fl. Maharashtra St. Dicot. 1:473. 2000. *Chalcas paniculata* L. Mant. Pl. Alt. 68. 1767. *M. exotica* L. Mant. Pl. Alt. 563. 1771 (Murraea); Hook. f. Fl. Brit. India 1:502. 1875, Cooke, Fl. Pres. Bombay 1:193. 1958 (Repr.).

Local Name: Kamini, Kunti, **English Name:** Chinese boxwood and Satin wood.

Identification Characters: Unarmed tree, leaflets 3-9, aromatic.

Description: Evergreen trees (2n= 18). Small trees, 3-5 m tall, with a pale-yellowish-brown, rough, corky bark. Leaves compound, imparipinnate, alternate, ovate, ovate-lanceolate or ovate-rhomboid, coriaceous, glossy, acuminate, entire. Flowers white, in terminal and axillary, paniculate cymes, sepals 5, green, fused, persistent, petal 5, white, gland dotted, campanulate, stamens 10 in two whorls, inner whorl opposite to petal and outer whorl alternate to petal, ovary superior, bicarpellary, axile placenta, nectoriferous disc, style single, long, green, stigma bifid. Fruit berries, ovoid, bright red- orange when mature.

Phenological Data: Fls. and Frs: Throughout the year.

Distribution: Throughout India, Malaya, China, Australia, Polynesia

Localities in Gujarat: Planted in gardens and houses

Origin\Native: China, Ceylon and Australia

Ecology: Full sun or shade

Category of threat: Common

Special Characteristics: flowers and fruits are sweetly scented

Economic Importance: Ornamental flowering tree

Horticultural Value: Planted in gardens, house, topiary, hedges

Medicinal Value: stem and root used in diarrhea, leaves are stimulant, astringent, dysentery, antidote for snake-bite

Method for Propagation: Seeds, Cuttings.

Suitable Environmental Conditions: Warm and moist climate

Agricultural Value: Cultivated for flowers

Uses: Leaves and flowers are used in perfumes, also used in medicines. The wood is used for making waling sticks and mathematical instruments.

SIMAROUBACEAE

Trees mostly with pinnately compound leaves rarely simple; inflorescence axillary racemes, panicles or spike; flowers regular, bisexual, stamens free, placentation axile; fruit one seeded, capsule, schizocarp, samara, drupe or berry.

1. leaves simple ..... *Quassia*

1. Leaves compound .....*Ailanthus*

AILANTHUS Desf.

Ailanthus excelsa Roxb. Pl. Cor. 1 : 24, t. 23. 1795; Bennett in Hook. f. Fl. Brit. India 1; 518. 1875; Cooke, Fl. Pres. Bombay 1: 205. 1958 (Repr.). Shah, Fl. Guj. 1:146; 1978, Basak in Fasc. Fl. India 4 : 4. 1980. Singh, et al Fl. Maha. Dicot. 1: 489. 2000.

Local Name: Moto Arduso, **English Name:** Tree of Heaven, **Sanskrit Name:** Arlu, Mahanimba.

Identification Characters: Leaves crowded at ends of branches; flowers yellow; fruit spindle shaped.

Description: Deciduous trees (2n = 62). 10-20 m tall, straight cylindrical trunk, branches large, at right angles from the stem, greenish-white or grey, smooth bark; leaves crowded at ends of branches, compound, alternate to sub opposite, ovate-lanceolate, coriaceous, densely pilose, at length glabrous, light green, unequal at base, toothed, acute. Flowers small, yellow, terminal and axillary, hairy panicles, ill-smelling, polygamous flowers on same tree, sepals,4-5; petals 4-5, stamens 10, small filaments; 2-4 stamens in bisexual flowers. Fruit samara, spindle-shaped, glabrous, one-seeded reticulately veined. Seeds glabrous, oblong.

Phenological Data: Fls: Jan. – May., Frs: Feb. – May.

Distribution: Throughout India

Localities in Gujarat: Throughout, frequent in scrub forests, rarely in cleared, dry deciduous forests, along roadside in major cities

Origin\Native: India

Ecology: Can grow in saline, alkaline, arid zones, sand dunes, rocky places, fast growing tree,

Category of threat: Common

Special Characteristics: Flowers are peculiarly ill-smelled

Economic Importance: Ornamental

Horticultural Value: Planted in gardens, roadside as wind breaks and shelter, avenue tree, shade tree

Medicinal Value: The bark is used as medicine for cattle, gum is also medicinally used, leaf extract is used in skin diseases.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Hot and dry climate

Agricultural Value: Cultivated for ornamental purposes and for social forestry programmes

Uses: The wood is used for making packing cases, country boats, toys, handles and match box. The wood pulp is used in paper.

BALANITACEAE

Small trees, spiny; leaves compound, bifoliolate, alternate; inflorescence, axillary, cymes; flowers regular, bisexual, green, fruit drupe

BALANITES Delile.

Balanites aegyptiaca (L.) Del. in Descr. Egypt. Hist. Nat. 2: 221, t. 28, f. 1. 1813; Basak in Fasc. Fl. India 4: 20. 1980. *Ximenia aegyptiaca* L. Sp. Pl. 1194. 1753. *Balanites roxburghii* Planch. in Ann. Sci. Nat. 4, 2: 258. 1854; Bennett in Hook. F.

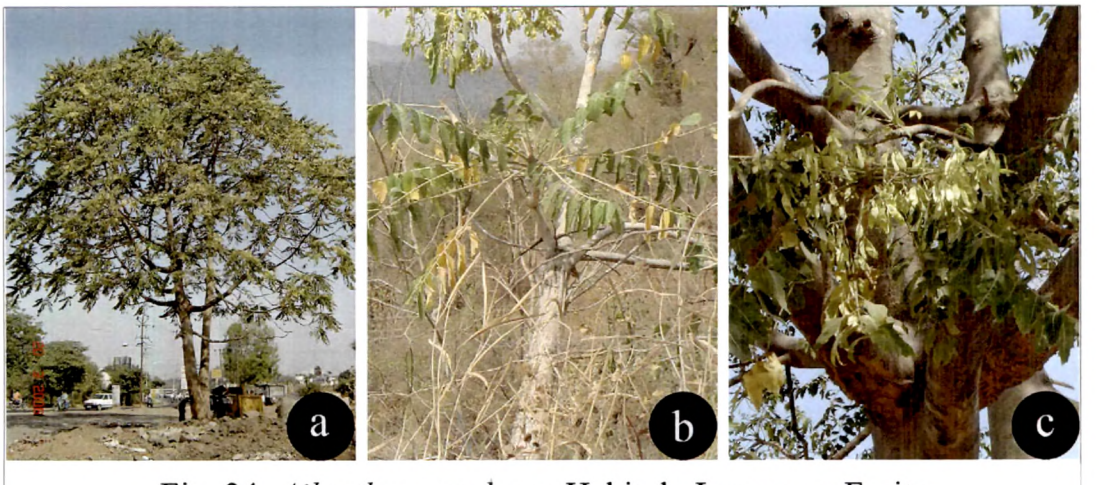


Fig. 34: *Ailanthus excelsa* a. Habit, b. Leaves, c. Fruits

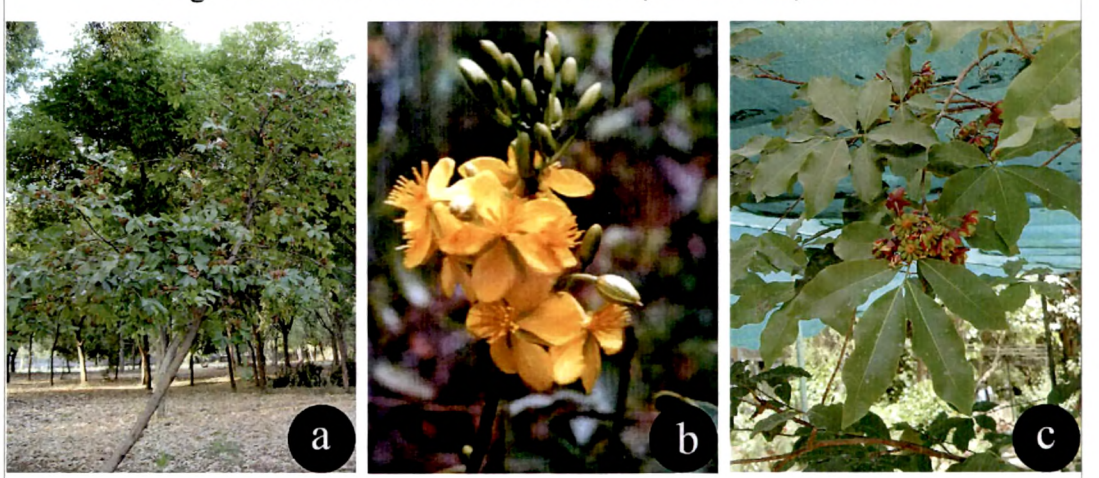


Fig. 35: *Ochna obtusata* a. Habit, b. Flowers, c. Fruits

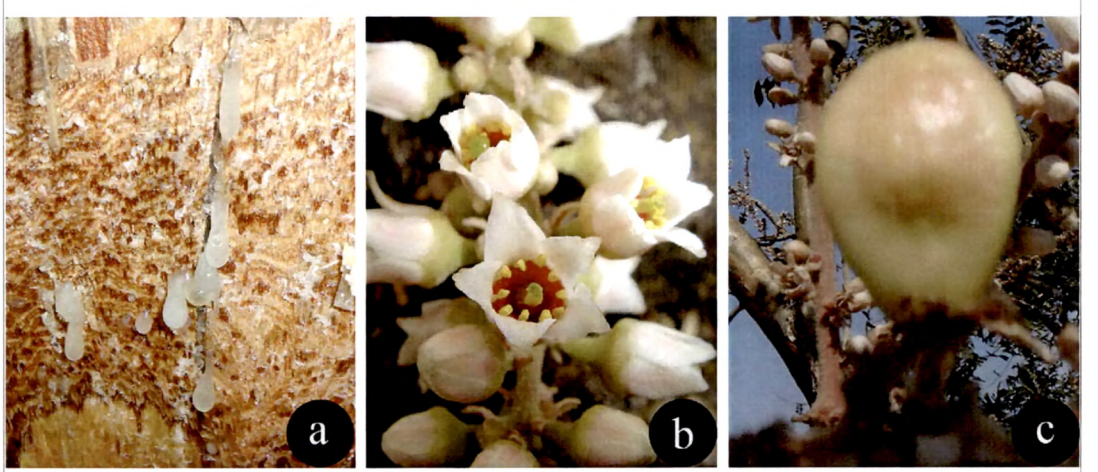


Fig. 36: *Boswellia serrata* a. Gugal gum, b. Flowers, c. Fruit

FI. Brit. India 1 : 522. 1875; Cooke, FI. Pres. Bombay 1: 207. 1958 (Repr.). Shah, Fl. Guj. 1:146; 1978. Singh, et al Fl. Maha. Dicot. 1: 491. 2000.

Local Name: lagore, **Sanskrit Name:** Tailaphala, Ingudi, Dirghakanta, Tapas-vriksha.

Description: Shrubs or trees, younger parts pubescent, spines long, often with leaves and flowers. Leaves bifoliolate; apex obtuse or acute or rarely mucronulate, base rounded or cuneate. Flowers greenish–white, in axillary, short peduncle, cymes or fascicles. Drupes woody angular, 5 – grooved, yellow when ripe. Seeds solitary, strong.

Phenological Data: Fls and Frs: March – June.

Localities in Gujarat: Throughout, in scrub forests (Shah, 1978).

Uses: The flowers are fragrant. The fruit pulp is fetid smelling, said to be edible and also used for cleansing silk and cotton. Bark used as anathematic for cattle and its juice used as fish-poison. Wood is used for walking sticks and as fuel.

OCHNACEAE

Trees or small trees, leaves smooth shiny, flowers yellow, fruites berry or drupe.

Ochna obtusata DC. In Ann. Mus. Natl. Hist. Nat. 17: 411. t. 11. 1811, *O. squarrosa* auct. Non L., 1753; Bennet. In Hook. f. Fl. Brit. India 1:523. 1875, Cooke, Fl. Pres. Bombay 1:208. 1958 (Repr.); Safui & Nayar in Hajra et al. Fl. India 4:40. 1997; Moorthy in Singh et al. Fl. Maharashtra St. Dicot. 1:492. 2000.

Local Name: Ramdhan champa, **English Name:** Golden champa.

Description: Deciduous tree (2n = 24,28). 5-6 m tall, bark thin, smooth, grey. Leaves simple, alternate, dark green, leathery, oblong-elliptic, minutely serrated, the young leaves being deep copper coloured or fleshy pink. The flowers bright yellow, delicately perfumed and make a pleasant contrast with the dark brown branches and new copper leaves. Sepals 5, persistent, scarlet, petals 5-10, bright yellow, numerous stamens, filaments short, carpels fused, style single. Each individual carpel develops into a separate fruit. Thalamus swells on which 4-8 berry like fruits arranged in circle surrounded by persistent calyx. Fruit is drupe

Phenological Data: Fls: April. - June, Frs: June. - July.

Distribution: Assam, Bihar, Orissa, Myanmar, Sri Lanka

Localities in Gujarat: Planted in Arboratum and botanical garden of the Maharaja Sayajirao University of Baroda

Origin\Native: India, Burma and Ceylon

Ecology: Full sun, well drained soil

Category of threat: Common

Special Characteristics: Flowers are fragrant

Economic Importance: Ornamental flowering tree

Horticultural Value: Planted in gardens for beautiful bright flowers

Medicinal Value: The roots are used as an antidote to snake bite. The bark is used in the medicine.

Method for Propagation: Seeds and cuttings.

Suitable Environmental Conditions: Tropical climate

Agricultural Value: Cultivated for flowers

Uses: It is planted as an ornamental tree in the garden.

BURSERACEAE

Deciduous shrubs or trees with resin ducts; leaves simple or compound, serrate; flowers regular small, stamens 5-10, free; fruits berry or capsule.

1. fruit dehiscent ..... *Boswellia*
1. fruit indehiscent
    2. leaflets less than 3 pairs, calyx toothed, disc copular ..... *Commiphora*
    2. leaflets 6-15 pairs, calyx 5-fid, disc lining the calyx tube ..... *Garuga*

BOSWELLIA Roxb. ex Colebr.

Boswellia serrata Roxb. ex. Colebr. in Asiat. Res. 9 : 379, t. 5. 1807; Bennett in Hook. f. Fl. Brit. India 1: 528. 1875; Cooke, Fl. Pres. Bombay 1: 210. 1958 (Repr.). Shah, Fl. Guj. 1:147; 1978. Singh, et al Fl. Maha. Dicot. 1: 494. 2000.

Local Name: Gugal, **English Name:** Incense tree, **Sanskrit Name:** Shallaki, Nagvadhu, Gajbhakshya.

Identification Characters: Unarmed; leaves pinnate, panicles pubescent; flowers bisexual, creamy – white, alternate, stamens long; drupe trigonous, dehiscent; pyrenes heart-shaped, separating.

Description: Deciduous tree, Medium sized, 10-15 m tall, bark pinkish to reddish, smooth, peeling of in to papery scales. Leaves compound, alternate, at ends of branches, long, leaflets sessile, ovate to ovate-lanceolate, hairy. Flowers white, in axillary racemes, at ends of branches. Drupes glabrous, pyrenes reticulately veined, glabrous, retuse at end.

Phenological Data: Fls. & Frs. : Dec. – Apr.

Distribution: Throughout India

Localities in Gujarat: Throughout in deciduous forests, Rampura forest quarters, Rajpipla forests.

Origin\Native: India

Ecology: Full sun, well drained soil

Category of threat: Common

Special Characteristics: Yields gum, highly scented

Economic Importance: Ornamental

Horticultural Value: Planted along roadside

Medicinal Value: Leaves used medicinally

Method for Propagation: Seeds

Suitable Environmental Conditions: Warm and dry climate

Agricultural Value: Planted for ornamental purposes

Uses: The leaves and bark used to make 'Dhup'.

GARUGA Roxb.

Garuga pinnata Roxb. Pl. Cor. 3 : 5, t. 208. 1819; Bennett in Hook. f. Fl. Brit. India 1 : 528. 1875; Cooke, Fl. Pres. Bombay 1 : 211.1958 (Repr.). Shah, Fl. Guj. 1:148; 1978, Kalkman in Blumea 7 : 468. 1953. Singh, et al Fl. Maha. Dicot. 1: 495. 2000.

Local Name: Kakad, **English Name:** Lao, **Sanskrit Name:** Kakad-phala.

Identification Characters: leaves pinnate, panicles pubescent; flowers bisexual, creamy – white, fruit indehiscent.

Description: Trees. Leaves long; leaflets ovate or ovate – lanceolate, pubescent on lower side, apex acuminate, base oblique. Flowers across, creamy white in axillary and terminal panicles. Fruit fleshy glabrous drupes, seeds winged

Phenological Data: FLS. & FRS. : Feb. – Aug.

Distribution: Throughout India (Andamans), Bangladesh, China (South), Thailand, Indochina, Laos (Khammouan).

Localities in Gujarat: Throughout in deciduous forests (Shah, 1978).

Origin\Native: India

Ecology: Full sun, well drained soil

Category of threat: Common

Economic Importance: timber

Horticultural Value: Planted along roadside

Medicinal Value: Leaves used medicinally in asthma and bronchitis along the honey.

Method for Propagation: Seeds

Suitable Environmental Conditions: Warm and dry climate

Agricultural Value: Planted for timber value

Uses: The wood is used for furniture making. Oleo-resin gum is used in fumigation.

COMMIPHORA

Commiphora wightii (Arn.) Bhandari in Bull. Bot. Syrv. India 6: 327 & 1965 & Fl. Indian Des. 96, f 34 1978. *Balsalmedendron wightii* Arn. in Ann. Na. Hist. Soc., 3: 86. 1839. B. *roxburghii* Stocks in J. Asst. Soc. Beng. 2: 391. 1848 non ARn. 1839, Bennet in Hook f Fl. Breit. India 1: 529. 1875. B. *mukul* Hook ex Stocks in Hook J. Bot. & Kew Gard. Misc. 1:259, t 8 1849, Bennett in Hook f op cit. *Commiphora mukul* (Hook ex Stocks) Engl. in DC. Mon, Phan, 4: 12 1883. Cooke, Fl. Pres. Bombay 1: 212 1958 (Repr.).

Local Name: Gugal, **English Name:** Mukul myrrh tree, Indian bedellium, **Sanskrit Name:** Guggulu

Identification Characters: leaves pinnate, resinous gum present

Description: It is a shrub or small tree, reaching a maximum height of 4 m, with thin papery bark. The branches are thorny. The leaves are simple or trifoliate, the leaflets ovate, 1–5 cm long, 0.5–2.5 cm broad, irregularly toothed. It is gynodioecious, with some plants bearing bisexual and male flowers, and others with female flowers. The individual flowers are red to pink, with four small petals.

Phenological Data: FLS. & FRS. : Feb. – June

Distribution: common in northern India, northern Africa, central Asia.

Localities in Gujarat: Throughout in deciduous forests (Shah, 1978).

Origin\Native: India

Ecology: Full sun, tolerant of poor soil

Special Characteristics: Yields gum, highly scented

Category of threat: Common

Economic Importance: Medicinal plant

Horticultural Value: Planted in gardens, parks and medicinal gardens

Medicinal Value: widely used in modern medicine for treatment of heart ailments, resinous gum is used in ulcers, rheumatism.

Method for Propagation: Seeds

Suitable Environmental Conditions: arid and semi-arid climates

Agricultural Value: cultivated for medicinal value

Uses: gum is used in fumigation purpose.

MELIACEAE

Trees with scented wood, leaves compound, alternate, leaflets oblique at base; inflorescence, terminal or axillary panicles; flowers regular, bisexual annular disct, stamens usually united, monadelphous, necteriferous disc present between petals and stamens; fruit capsule, berry or drupe.

1. Leaves penta or more foliolately compound, staminal tube lobed ..... *Trichilia*
1. Leaves pinnately compound
    2. Leaves 2-3 pinntely compound, ... *Melia*
    2. Leaves 1- pinnately compound
        3. Leaves paripinnate
            4. stamens free ..... *Toona*
            4. stamens connate forming staminla tube..... *Soymida*
        3. Leaves imparipinnate ..... *Azadirachta*

AZADIRACHTA A. Juss.

Azadirachta indica A. Juss. In Mem. Mus. Hist. Nat. paris 19 : 220, t. 2, f. 5, 1830; Cooke, Fl. Pres. Bombay 1: 220. 1958 (Repr.). Shah, Fl. Guj. 1:149; 1978, *Melia azadirachta* L. Sp. Pl. 385. 1753; Hiern in Hook. f. Fl. Brit. India 1 : 544. 1875. Singh, et al Fl. Maha. Dicot. 1: 502. 2000.

Local Name: Limdo, **English Name:** Neem, **Sanskrit Name:** Nimba.

Identification Characters: Leaflets serrate or crenate; flowers white, staminal column cylindric; fruit a drupe, one-loculate, disc absent, one seeded; seeds not winged.

Description: Evergreen tree (2n = 28, 30). 10-15 m tall, with light-black, slightly longitudinally furrowed bark. Leaves compound, alternate, crowded near ends of branches, leaflets 4-6 pairs, deeply serrated, acute, falcate, ovate-lanceolate, glabrous. Flowers white, small, in panicles, axillary or on old wood, scented, sepals 5, petals 5, spathulate, ciliate, stamens 10, filaments fuse to form tube in which anthers are inserted near teeth, ovary 3- celled, style with 3 stigmas. Fruit drupe, green, ovoid-oblong, smooth. Yellow. Seed hard, ellipsoid, glabrous.

Phenological Data: Fls: Mar.- May, Frs: June – Aug.

Distribution: Throughout India, Sri Lanka, Myanmar

Localities in Gujarat: Throughout, planted along roadsides, self-sown and/or wild in forests (Shah, 1978).

Fig. 37: *Azadirachta indica* a. Flower, b. Fruits

Fig. 38: *Melia azedarach* a. Habit, b. Flower

Fig. 39: *Toona hexandra* a. Flowers, b. Fruits

Fig. 40: *Mytenus senegalensis* a. Flowers, b. Fruits

Origin\Native: Indomalaya and S. E. Asia.

Ecology: Full sun, moderate water, slow growth, tolerate salinity and drought

Category of threat: Common

Special Characteristics: Characteristic bitter odour and taste

Economic Importance: Ornamental foliage tree

Horticultural Value: Planted in gardens, house, roadside, avenue, shade tree

Medicinal Value: Leaves are used medicinally to cure fever, skin diseases, small pox; twigs used in toothache, mouth infections

Method for Propagation: Seeds.

Suitable Environmental Conditions: Semi desert, dry climate

Agricultural Value: Cultivated for medicinal and ornamental purposes

Uses: The twigs repels insects. Wood is used for shipbuilding, house furniture and carts. Leaves used in manufacturing of soaps, antiseptics and hair oil. It is a good air purifier tree.

MELIA L.

1. flwoers greenish white .....M. *dubia*

1. flowers lilac .....M. *azedirach*

Melia azedarach L. Sp. Pl. 384. 1753; Hiern in Hook. F. Fl. Brit. India 1 : 544. 1875; Cooke, Fl. Pres. Bombay 1 : 218. 1958 (Repr.). Shah, Fl. Guj. 1:150; 1978. Singh, et al Fl. Maha. Dicot. 1: 505. 2000.

Local Name: Bakanlimdo, **English Name:** Persian Lilac, **Sanskrit Name:** Nimba, Pichumand, Prabhadra, Parvatnimba, Mahanimba, Sarvatrobhadra.

Identification Characters: Leaflets serrate or crenate; flowers lilac, anthers purple, as long as teeth of staminal column, staminal column cylindric; fruit a drupe, 5-loculate, disc present, each locule one seeded or less seeded by reduction; seeds not winged, planted.

Description: Deciduous tree (2n = 28). 5-10 m tall, with dark-brown, shallowly longitudinally furrowed bark. Leaves alternate, compound, 2-3 pinnate, leaflets opposite, unequal at base, serrate, acute, ovate-lanceolate or elliptic-lanceolate, glabrous, subsessile. Flowers axillary panicles, small, sepals, 5, petals 5, spathulate, stamens 10, filaments fused to form central dark violet tube, toothed, anthers lobes inside the tube, ovary 5-celled, clavate stigma, 5-toothed. Fruits drupes, ellipsoid-oblong, yellow when mature, 4-5-seeded.

Phenological Data: Fls: Apr.- May, Frs: May- July.

Distribution: India, Europe, America, China, Myanmar

Localities in Gujarat: Throughout, planted along road side in city area

Origin\Native: Persia and China.

Ecology: full sun, moderate water, tolerate drought and cold

Category of threat: Common

Special Characteristics: yield gum, aromatic odour

Economic Importance: Ornamental

Horticultural Value: Planted in gardens, house, roadside, avenue

Medicinal Value: seeds used in rheumatism, leaves used in headache, hysteria. Fruit consumption in large quantity can be poisonous.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Warm dry climate

Agricultural Value: cultivated for ornamental purposes

Uses: Juice of the leaves is used as a remedy against intestinal worms. Trunk of the tree yields gum. It is cultivated as an avenue and shade tree.

Melia dubia Cav. Diss. 7: 364. 1789; Ramam. In Sald. & Nicols. Fl. Hassan. Dt. 94. 1978 (2nd Repr.) *M. Composita* Willd. Sp. Pl. 2: 559. 1799; Hiern in Hook f Fl. Brit. India 1: 545 1875; Cooke Fl. Pres. Bombay 1: 218. 1958 (Repr.).

Local Name: Limbara.

Identification Characters: Leaflets serrate or crenate; flowers yellow or creamy-yellow, anthers white, longer than teeth of staminal column, staminal column cylindric.

Description: Deciduous trees. 15-20 m tall, wild tree, with rough, dark-brown bark. Leaves compound, pinnate, ovate to ovate-lanceolate or elliptic-lanceolate, nearly glabrous, serrate, acute. Flowers creamy-yellow, congested, in terminal panicles, anthers white, longer than teeth of staminal column, staminal column cylindric. Fruit ovoid, subglobose or ellipsoidal, smooth, yellow, a drupe, 5-loculate, disc present, each locule one seeded or less seeded by reduction. Seeds not winged.

Phenological Data: Fls. and Frs: Jan.-Mar.

Distribution: Throughout India

Localities in Gujarat: Found in the Sayaji baug, Vadodara.

Origin\Native: Subtropical.

Ecology: full sun, moderate water, tolerate drought and cold

Category of threat: Common

Special Characteristics: aromatic odour

Economic Importance: Ornamental

Horticultural Value: Planted in gardens, house, roadside, avenue

Method for Propagation: Seeds.

Suitable Environmental Conditions: Warm dry climate

Agricultural Value: cultivated for ornamental purposes

Uses: Wood used for building purpose, furniture.

SOYMIDA Juss.

Soymida febrifuga (Roxb.) A. Juss. In Mus. Hist. Nat. paris 19 : 251, t. 22, f. 26. 1830; Hiern in Hook. f. Fl. Brit. India 1: 567. 1875; Cooke, Fl. Pres. Bombay 1: 228. 1958 (Repr.). Shah, Fl. Guj. 1:150; 1978, *Swietenia febrifuga* Roxb. Bot. Descr. Swietenia 1. 1793 & in Med. Fasc. Obs. 6: 129. 1795 & Pl. Cor. 1: 18, t. 17. 1795. Singh, et al Fl. Maha. Dicot. 1: 508. 2000.

Local Name: Rohan.

Description: Trees. Leaves dark – green, crowded at ends of branches; leaflets 3 – 6 pairs, elliptic or oblong, pennierved, apex abtuse. Flowers white, in axillary panicles. Fruits obovoid, woody. Seeds compressed, winged.

Phenological Data: Fls and Frs: February – July.

Localities in Gujarat: Throughout, Common in forests

Swietenia mahagoni (L.) Jacq. Enum. Pl. Carib. 20. 1760. *Cedreka nagagibu* L. Syst. Nat. ed 10, 940. 1759.

Local Name: Mahogany, **English Name:** Mahogany tree

Description: Deciduous tree, 18-22 m tall, bark rugose, grey; leaves paripinnate, leaflets 2-4 pairs, opposite, base oblique; flowers greenish yellow, in axillary pendulous panicles; capsules ovoid; seed many, winged, flat.

Phenological Data: Fls: May. - July, Frs: July. - Aug.

Distribution: Throughout India

Localities in Gujarat: Throughout, Common, Found in the Railway Staff College, Sayaji Park and Botanical garden.

Origin\Native: Tropical America and West indies.

Category of threat: Common

Special Characteristics: Sweetly scented

Economic Importance: Ornamental

Method for Propagation: Seeds.

Suitable Environmental Conditions: Warm and dry climate

Uses: The wood is used for making shipbuilding, wardrobes, cabinets and furniture. These plants grow very fast. It is also used in the reclamation of soil.

TOONA Roem.

Toona hexandra (Wall. Ex Roxb.) Roem. Syn. Hesp. 139. 1849; Moorthy in Singh et al. Fl. Maharashtra St. Dicot. 1:508. 2000. *Cedrela hexandra* Wall. ex Roxb. Fl. Ind. 2:425. 1824. *Toona ciliata* Roem. Syn. Hesp. 136. 1846; Jain & Bennet in Hajra et al. Fl. India 4:504. 1997. *Cedrela toona* Roxb. ex Rottl. & Willd. in Ges. Naturf. Fr. Ber., Nueue Schr. 2:198. 1803; Hiren in Hook. f. Fl. Brit. India 1:568. 1875, Cooke, Fl. Pres.

Local Name: Kudak, Toona.

Description: Trees. 10-15 m tall; leaves abruptly pinnate, leaflets 4-8 pairs, elliptic-oblong, base inequilateral; flowers white in drooping terminal pubescent panicles; capsules ovoid, 5-angled, seeds winged.

Phenological Data: Fls and Frs: Dec. – May.

Localities in Gujarat: Throughout, Common (Shah, 1978)

FLINDERSIACEAE

Trees, or shrubs; with essential oils; leaves alternate, or opposite; petiolate; non-sheathing; gland-dotted; aromatic; compound; pinnate, ternate, or unifoliolate; exstipulate, entire; inflorescences terminal, or axillary; flowers small; regular; 5-merous; fruit non-fleshy, dehiscent, a capsule (woody).

CHOLORXYLON DC.

Cholorxylon swietenia DC. Prodr. 1: 625. 1824 Hiren in Hook f. F. Brit. India 1: 569, 1874; Cooke, Fl. Pres. Bombay 1: 231. 1958 (Repr.)

Local Name: Girya, Behru.

Description: Trees. Bark furrowed, corky; leaves alternate, main rachis densely pubescent, leaflets oblong-lancoelate; flower white, in branched terminal panicles; capsules oblong, seeds winged.

Phenological Data: Fls and Frs: Jan. – April.

Localities in Gujarat: Throughout, Common (Shah, 1978).

CELASTRACEAE

Trees, shrubs or climbers; leaves simple, alternate; inflorescence axillary cyme; flowers regular, bisexual; fruit capsule, berry, samara or drupe

1. plants armed, leaves alternate ..... *Maytenus*

1. plants unarmed, leaves opposite or subopposite ..... *Celastrus*

CASSINE

Cassine glauca (Rottb.) O. Ktze. Rev. Ge. Pl. 1:114. 1891; Londhe in Singh et al. Fl. Maharashtra St. Dicot. 1:520. 2000. *Mangifera glauca* Rottb. Nye. Samml. Kongel. Norske Vid. Selsk. Skr. 2:534, t. 4. f.1. 1783. *Elaeodendron glaucum* (Rottb.) Pers. Syn. 1:241. 1805; Law. In Hook. f. Fl. Brit. India 1:623. 1875, Cooke, Fl. Pres. Bombay 1:248. 1958 (Repr.).

Local Name: Bhutako.

Description: Trees. 4-6 m tall; leaves elliptic, inflorescence divaricates, axillary, paniculate, dichotomously cyme, flowers greenish – white, disc 4-5 angled, fruits drupes, obovoid, stalked.

Phenological Data: Fls and Frs: Aug. – April.

Localities in Gujarat: Throughout, Common (Shah, 1978).

Uses: seeds used in rheumatism, fever.

MAYTENUS Molina.

Maytenus senegalensis (Lam.) Excell. In Bot. Soc. Brot. 2, 26; 223. 1952; Almeida, Fl. Mah. 1:243, f. 1996. *Celastrus senegalensis* Lam. Encycl. 1:400. 1763. *Maytenus emarginata* (Willd.) Ding Hou in Steenis, Fl. Males. 1, 6:241. 1962; *Celastrus montatana* Bth. Fl. Austr. 1:400. 1863; Laws in Hook. f. Fl. Brit. India 1:621. 1875; Cooke, Fl. Pres. Bombay 1:247. 1958 (Repr.). Shah, Fl. Guj. 1:153; 1978, M. *emarginata* (Willd.) Thw. Enu. 409. 1864; Laws. In Hook. f. op. Cit. Singh, et al Fl. Maha. Dicot. 1: 525. 2000.

Local Name: Vikalo, **Sanskrit Name:** Vikantaka.

Description: Shrubs. Leaves obovate. Flowers white or yellowish. calyx ciliate. Capsules concave at tip, purple when ripe. Seeds rugose, black.

Phenological Data: Fls and Frs: September – February.

Localities in Gujarat: Throughout in plains and low hills, in hedges or in forests undergrowth; common (Shah, 1978).

Uses: leaves used in jaundice.

RHAMNACEAE

Spiny trees; leaves simple, alternate, 3-5 nerved, stipules modified into spines; inflorescence cymes or fascicles; flowers regular, small, greenish, bisexual; fruits drupe, capsule or samara.

ZIZYPHUS Mill.

1. plants unarmed, leaves glabrous to glabrescent beneath
    2. flowers in sessile cymes ..... Z. *glabrata*
    2. flowers in penduncled cymes ..... Z. *caracutta*
1. plants armed, leaves tomentose beneath
    3. styles distinct ..... Z. *xylopyra*
    3. styles connate .....Z. *mauritiana*

Zizyphus mauritiana Lamk. Encyl. 3 : 319. 1789; Bhandari & Bhansali in Nayar et al. Fasc. FI. India 20 : 99. 1990. *Z. jujuba* (L.) Gaertn. Frtuct. 1 : 203. 1788 non Mill. 1768; Laws. In Hook. f. FI. Brit. India 1 : 632. 1875 non Lam. 1789; Cooke, FI. Pres. Bombay 1 : 256. 1958 (Repr.). Shah, Fl. Guj. 1:155; 1978. Singh, et al Fl. Maha. Dicot. 1: 544. 2000.

Local Name: Bor, **English Name:** Zizyphus/ The Chinese date, **Sanskrit Name:** Badari.

Identification Characters: Armed tree, flowers in axillary fascicles, petals 5, leaves whitish or buff coloured tomentose beneath, fruit 1.25 cm or more in diameter.

Description: Evergreen trees (2n = 48). Trees 3-8 m tall, armed with stipule curved spines, seldom unarmed, with blackish-brown, or light-black, longitudinally fissured bark; spreading, drooping branches with zig-zag branchlets. Leaves ovate, ovate-oblong or suborbicular, dark green serrate or entire, at the leaf base present a pair of spines, one spine is curved like a hook and the other is straight. Flowers small greenish-yellow or creamy-white, in axillary fascicle, calyx lobes 5, petals 5, spathulate, hooded over 5 stamens present opposite to petals, style 2, connected in middle. Fruit globose, ovoid or ellipsoid-oblong, glabrous, reddish-yellow drupe.

Phenological Data: Fls: Sep.-Feb, Frs: Nov.- Feb.

Distribution: Throughout India, Myanmar, China

Localities in Gujarat: Throughout, a few varieties are cultivated in some parts of Gujarat, in Vadodara found in the Sayaji park, Pratap nagar, the Maharaja Sayajirao University campus, Makarpura, Gorwa, Chani and Harni.

Origin\Native: Eastern Mediterranean.

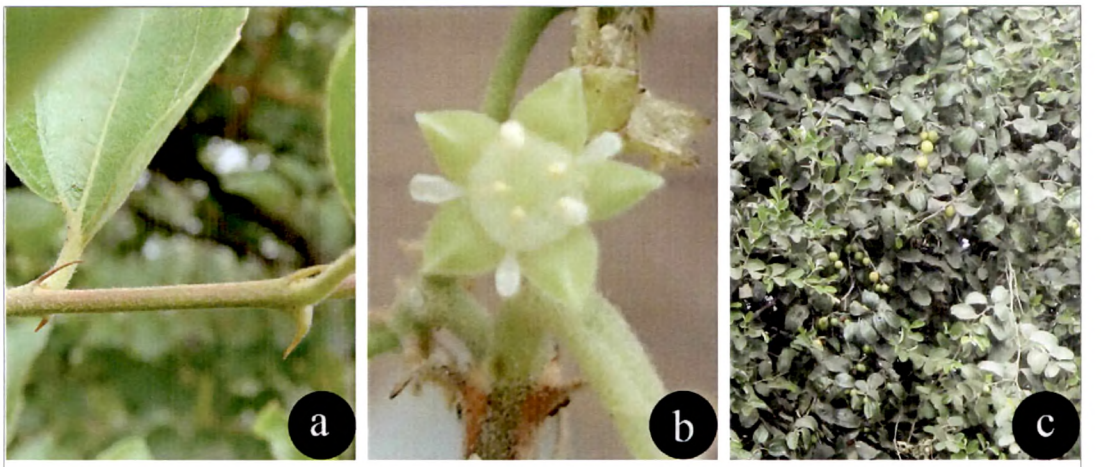


Fig. 41: *Ziziphus mauritiana*, a. Spines, b. Flower, c. Fruits

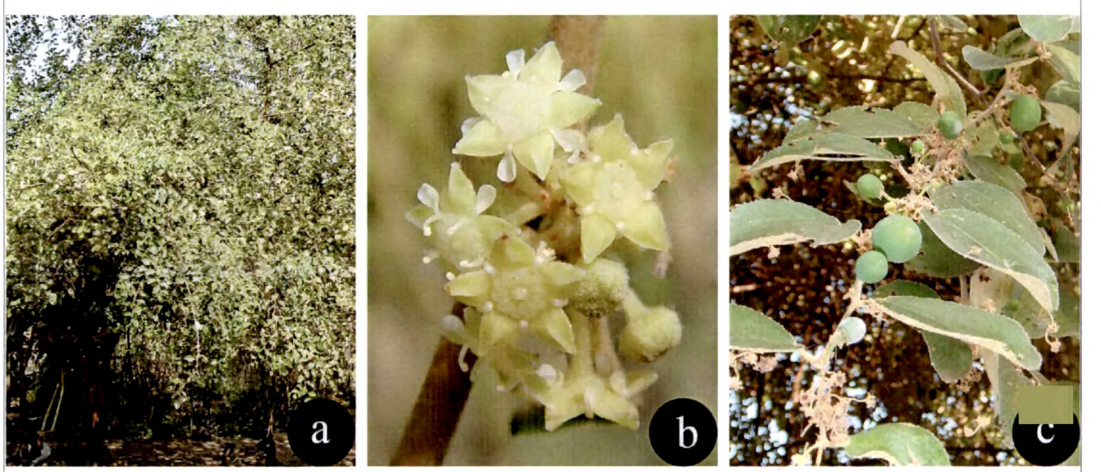


Fig. 42: *Ziziphus xylopyra,* a. Habit, b. Flowers, c. Fruits

Fig. 43: *Sapindus emarginatus* a. Leaves and Flower, b.Fruits

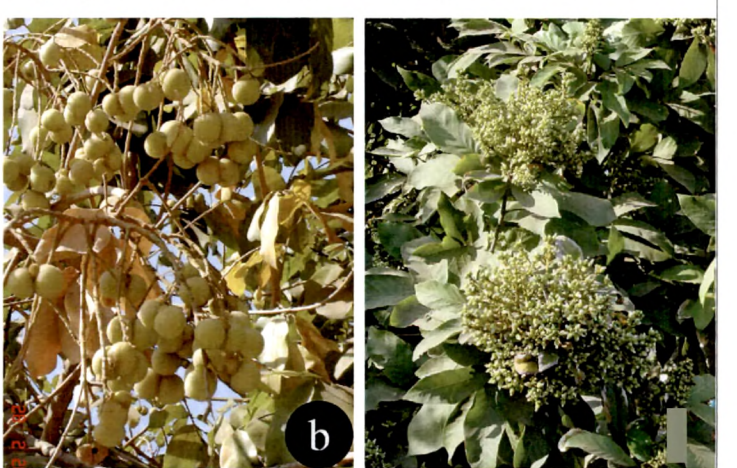


Fig. 44: *Sapindus laurifolius*

Ecology: Can grow in dry and poor soil, light demander, fast growing tree
Category of threat: Common
Special Characteristics: leaves with 3 prominent veins
Economic Importance: Ornamental fruit tree
Horticultural Value: Planted in gardens, house for fruits
Medicinal Value: seeds are used in medicines.
Method for Propagation: Seeds, Cuttings, Root cuttings
Suitable Environmental Conditions: hot and dry climate
Agricultural Value: cultivated for fruits
Uses: Fruits are edible, Wood is used as fuel.

Zizyphus xylopyra (Retz.) Willd. Sp. PI 1:1104. 1798; Laws. in Hook f. Fl. Brit. India 1:634. 1875; Cooke, Fl. Pres. Bombay 1:258. 1958 (Repr.). Shah, Fl. Guj. 1:157; 1978, Bhandari & Bhansal in Nayar et al. Fasc. Fl. India. 20:112. 1990. *Rhamnus xylopyra* Rietz. Obs. Bot. 2:11. 1781. Singh, et al Fl. Maha. Dicot. 1:546. 2000.

Local Name: Ghatbor.
Description : Straggling shrubs or occasionally trees armed or not. Leaves occasionally elliptic – oblong or suborbicular, obliquely cordate at base. Flowers in pubescent, paniculate cymes. Fruits across, globose, hard and woody. seeded.
Phenological Data: Fls and Frs: April – July.
Localities in Gujarat: In all zones; occasional in deciduous forests, rare in scrub forests (Shah, 1978).

SAPINDACEAE

Trees, shrubs or climbers; leaves alternate; inflorescence panicle or dichotomous cyme; flowers small bisexual or unisexual, annular disc between petals and stamens; fruit nuts capsules or samara, drupe or berry.

1. leaves compound, flowers irregular ..... *Lepisanthes*
1. leaves compound, flowers regular
    2. fruits entire ..... *Schleichera*
    2. fruits lobed ..... *Sapindus*

SAPINDUS L.

1. apex of leaf emarginatus ..... S. *emarginata*
1. apex of leaf acuminate ..... S. *laurifolius*

Sapindus emarginatus Vahl, Symb. Bot. 3: 54. 1794. *S. trifoliatus* Hiern. in Hook. f. Fl. Brit. India 1: 682.1875, p.p. non L.1753. *S. laurifolius* Vahl. var. *emarginatus* (Vahl.) t. Cooke, Fl. Pres. Bombay 1: 267. 1902. [1 : 284. 1958 (Repr.)]. Shah, Fl.

Guj. 1:164; 1978. Singh, et al Fl. Maha. Dicot. 1: 576. 2000.

Local Name: Aritha, **English Name:** Soap-nut tree.

Identification Characters: Fruit drupe, contain saponin which can be used as soap.

Description: Deciduous trees. 5-10 m tall trees, with longitudinally fissured, rough, brown bark. Leaves compound, leaflets obovate or obovate-oblong, emarginated or obtuse, dull and hairy on nerves above, pubescent beneath; petals present, glabrous within, few hairs at claw. Flowers white, terminal, rusty-brown-tomentose panicles. Fruit drupe, connate half their length, separating in to cocci, indehiscent, wingless. Seeds globose, smooth, and black.

Phenological Data: Fls: Sep.-Dec., Frs: Nov.- Dec.

Distribution: Throughout India

Localities in Gujarat: Planted at the Maharaja Sayjirao University campus Vadodara, found in forests

Origin\Native: Tropical, Subtropical and S. America.

Ecology: Well drained soil

Category of threat: Common

Special Characteristics: Saponins present in the fruit pericarp which can be used as soap

Economic Importance: Ornamental

Horticultural Value: Planted in gardens and parks as curiosity

Medicinal Value: Fruits are expectorants

Method for Propagation: Seeds, Cuttings.

Suitable Environmental Conditions: Cool climate

Agricultural Value: Cultivated for ornamental purposes and fruits

Uses: Berries contain saponin, may be use as soap to wash hair, woolen clothes. The wood is used for making furniture.

Sapindus laurifolius Vahl. Symb. Bot. 3 : 54. 1794; Cooke, FI. Pres. Bombay 1 : 284. 1958 (Repr.). Shah, Fl. Guj. 1:164; 1978, *S. trifoliatus* acut. Non L. 1753; Hiern in Hook. f. FI. Brit. India 1 : 682. 1875 p.p. Singh, et al, Fl. Maha. Dicot. 1: 576. 2000.

Local Name: Aritha, **Sanskrit Name:** Phenila, Phenil, Aristha

Description : Trees, high. Leaves abruptly pinnate; leaflets 2 – 3 pairs, lanceolate or elliptic – oblong, glabrous on both sides or sometimes pubescent beneath, base acute or rounded. Flowers across, white or greenish – white, in terminal, rusty pubescent panicles; calyx pubescent; petals longer than calyx. Drupes–lobed, brownish when ripe.

Phenological Data: Fls and Frs: Nov. – March

Localities in Gujarat: Planted as a hedge at some places (Shah, 1978)

SCHLEICHERA Willd.

Schleichera oleosa (Lour) Oken in Allg. Naturgesch. 3 (2) : 1341. 1841; Merr. In J. Arnold Arbor. 31 : 284. 1950. *Pistacia oleosa* Lour. FI. Cochinch. 2 : 615. 1790. *Schleichera trijuga* Willd. Sp. PI. 4 (2) : 1096. 1805; Hiern in Hook. f. FI. Brit. India 1 : 681. 1875; Cooke, FI. Pres. Bombay 1 : 283. 1958 (Repr.). Shah, Fl. Guj. 1:165; 1978. Singh, et al Fl. Maha. Dicot. 1: 577. 2000.

Local Name: Ujjal.

Description: Trees. Leaves paripinnate, young leaves reddish; leaflets oblong or elliptic – oblong, coriaceous, nerves strongly plaited below, apex obtuse – round or acute, base cuneate – subcordate. Flowers greenish – white.

Phenological Data: Fls and Frs: March – May.

Localities in Gujarat: In deciduous forests in south, central Gujarat and Saurashtra; occasional, planted in Indroda park Gandhinagar.

ANACARDIACEAE

Trees often with resinous juice; leaves alternate, simple or compound; inflorescence axillary or terminal panicles; flowers regular, small, unisexual or bisexual; fruit drupe or nut.

1. leaves simple
    2. flowers hermaphrodite ..... *Buchanania*
    2. flowers polygamous
        3. fruit a nut, peduncle enlarged in fruit ..... *Anacardium*
        3. fruit a drupe, peduncle not enlarged as above ..... *Mangifera*

1. leaves compound
    4. leaves with intramarginal nerves ..... *Spondias*
    4. Leaves not as above
        5. Branches spiny, leaves trifoliolate ..... *Rhus*
        5. Branches not spiny, leaves 7-9 foliolate ..... *Lannea*

ANACARDIUM L.

Anacardium occidentale L. Sp. Pl. 383. 1753; Hook. f. Fl. Brit. India 2 : 20. 1876; Cooke, Fl. Pres. Bombay 1 : 292. 1958 (Repr.). Shah, Fl. Guj. 1:166; 1978. Singh, et al Fl. Maha. Dicot. 1: 581. 2000.

Local Name: Kaju, **English Name:** Cashew nut, **Sanskrit Name:** Kajut, Kajutak, Vrut-taruskar, Piyalchar.

Identification Characters: Leaves simple; flowers pale to bright pink, carples united, stamens 8-10, flowers polygamo-dioecious; fruit nut, seated on an enlarged fleshy receptacle.

Description: Evergreen tree, 4-6 m tall, light black rough shallowly longitudinally fissured bark, leaves obovate-oblong or elliptic-obovate, glabrous, coraceous, panicles in terminal, nuts ong reniform, pale greenis yellow, at times dark – purple.

Phenological Data: Fls: & Frs: Sep. - Apr.

Distribution: Native to tropical America, from Mexico and West Indies to Brazil and Peru.

Localities in Gujarat: planted in the Maharaja Sayajirao Uuniversity arboretum, Divya forests in Dahod district.

Origin\Native: Tropical America

Ecology: Do not tolerate frost, sun tolerant

Category of threat: Common

Special Characteristics: bean shaped nut

Economic Importance: fruit tree

Horticultural Value: planted in gardens

Medicinal Value: The fruit bark juice and the nut oil are used for cancerous ulcers, corns, warts, and even elephantiasis

Method for Propagation: Seeds

Suitable Environmental Conditions: Warm Temperate Moist to Tropical Very Dry to Wet Forest Zones

Agricultural Value: cultivated for fruits

Uses: Seeds are edible. Fruits or seeds of the cashew are consumed whole, roasted, shelled and salted. The cashew "apple," the enlarged fully ripe, fruit may be eaten raw, or preserved as jam or sweetmeat. Timber is used in furniture making, boat building, packing cases and in the production of charcoal. Bark used in tanning.

BUCHANANIA Spreng.

Buchanania cochinchinensis (Lour.) Almeida, FI. Mah. 1 : 287. 1996. *Toluifera cochinchinensis* Lour. FI. Cochinch. 262. 1790. *B. Lanzan* Spreng. In J. Bot. (Schrad.) 2 : 234. 1800; Cooke, FI. Pres. Bombay 1 : 293. 1958 (Repr.). Shah, Fl. Guj. 1:166; 1978, *B. latifolia* Roxb. FI. Ind. 2 : 385. 1832; Hook. F. FI. Brit. India 2 : 23. 1876. Singh, et al Fl. Maha. Dicot. 1: 582. 2000.

Local Name: Charoli, **Sanskrit Name:** Piyalak, Priyal, Sneha-bij.

Description : Trees, young branches silky tomentose. Leaves broadly oblong, apex emarginate, base rounded. Inflorescence terminal, panicles long. Flowers across, white. Drupes across, subglobose, reddish – purple when ripe; stone hard.

Phenological Data: Fls and Frs: January – May.

Localities in Gujarat:: In deciduous forests of Dangs, Rajpipla, Panchmahals, Pipargota forest guest house, Ratanmahal; occasional.

LANNEA A. Rich.

Lannea coromandelica (Houtt.) Merr. in J. Arnold Arbor. 19:353. 1939. *Dialium coromandelicum* Houtt. Nat. Hist. 2, 2: 39, t. 5, f. 2. 1774. *Odina wodier* Roxb. FI. Ind. 2 : 293. 1832; Hook. f. FI. Brit. India 2 ; 29. 1876; Cooke FI. Pres. Bombay 1: 296. 1958 (Repr.). Shah, Fl. Guj. 1:167; 1978. Singh, et al Fl. Maha. Dicot. 1:584. 2000.

Local Name: Moladi, **English Name:** Odina, **Sanskrit Name:** Jhingini

Identification Characters: Leaves compound, leaflets more than 3; drupe long ellipsoid-oblong or subreniform, red or reddish-brown when ripe.

Description: Deciduous tree. 10-15 m tall, deciduous trees, with Greyish-white or ash-co-loured, bark, sometimes with black patches. Crowded at ends of branches; ovate, ellipatic-oblong or elliptic-lanceolate, glabrous, membranous. Flowers minute, yellowish, tinged red, sessile, panicles at ends of leafless branches. Drupes smooth, glabrous.

Phenological Data: Fls: Feb-July, Frs: Apr.- Aug.

Distribution: tropical regions

Localities in Gujarat: Found in the Sayaji park, Laxmi Vilas palace, EME temple and chani in Vadodara city. Common in forests of Chhotaudepur, Baria, Panchmahal, Rajpipla, Ratanmahal, Sabrakantha.

Origin\Native: Tropical Africa and Indomalaya

Ecology: strong light demander, fire resistant and good coppicer, good drainage

Category of threat: common

Economic Importance: timber tree

Horticultural Value: used for afforestation

Method for Propagation: Seeds.

Suitable Environmental Conditions: warm climate, dry deciduous forests

Agricultural Value: cultivated for timber

Uses: Bark is source of dyes. Monkeys eat young leaves. The wood is used as a timber.

MANGIFERA L.

Mangifera indica L. Sp. Pl. 200. 1753; Hook. f. Fl. Brit. India 2 : 13. 1876; Cooke, Fl. Pres. Bombay 1 : 291. 1958 (Repr.). Shah, Fl. Guj. 1:167; 1978. Singh, et al Fl. Maha. Dicot. 1: 584. 2000.

Local Name: Ambo, **English Name:** Mango, **Sanskrit Name:** Rasal, Kokilanand

Identification Characters: Glossy dark green leaves

Description: Evergreen trees. 15-20 m tall, with light-black or blackish-brown, rough, longitudinally fissured bark, round canopy. Leaves simple, lanceolate, glabrous, crowded at ends of branches, glossy, dark green, wavy margin, acute apex, pulvinate leaf base. Flowers small, numerous, terminal panicles, creamy-white or greenish-yellow, carples united, stamens 1-5 only one fertile and longest, flowers polygamo-dioecious; style - 1; fruit drupes variable in size and shape, yellow to reddish-yellow when ripe. Seeds large, hard, oblong, glabrous, smooth, non edible.

Phenological Data: Fls: Mar.- Apr. Frs: Apr.- July.

Distribution: India, Sri Lanka, Myanmar.

Localities in Gujarat: Throughout; several varieties such as Afus, Payari, Langdo, Malgubba, Totapuri, Dasheri, Kesar and Ladvo are planted; found in the Maharaja Sayajirao University campus, Laxmi Vilas palace, Chiku Vadi, Sayaji park and also planted in Vishvamitri, Gorwa, Chani, Harni and Vaghodia road in Vadodara.

Origin\Native: South East Asia and Malaya.

Ecology: Full sun, well drained soil

Category of threat: Common

Special Characteristics: Fruits are sweet in odor and taste

Economic Importance: Ornamental fruit tree

Horticultural Value: Planted in gardens, house, roadside, shade tree, avenue tree.

Medicinal Value: Bark and seeds used medicinally

Method for Propagation: Seeds, Cutting, Grafting.

Suitable Environmental Conditions: Warm climate

Agricultural Value: Cultivated for edible fruits

Uses: Fruits are edible (only mesocarp), used as dry slices in chutney and pickles. Stem is used as substitute for gum arabic. Wood makes valuable timber. It is also known as "King of Fruit". It is a national fruit of India.

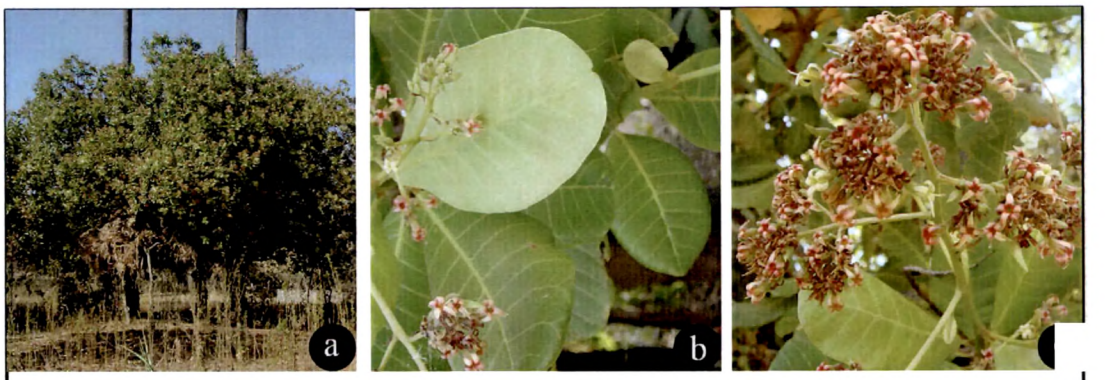


Fig. 45: *Anacardium occidentale* a. Habit, b. Leaves , c. Inflorescence

Fig. 46: *Buchanania cochinchinensis* a. Habit, b. Inflorescence, c. Fruits

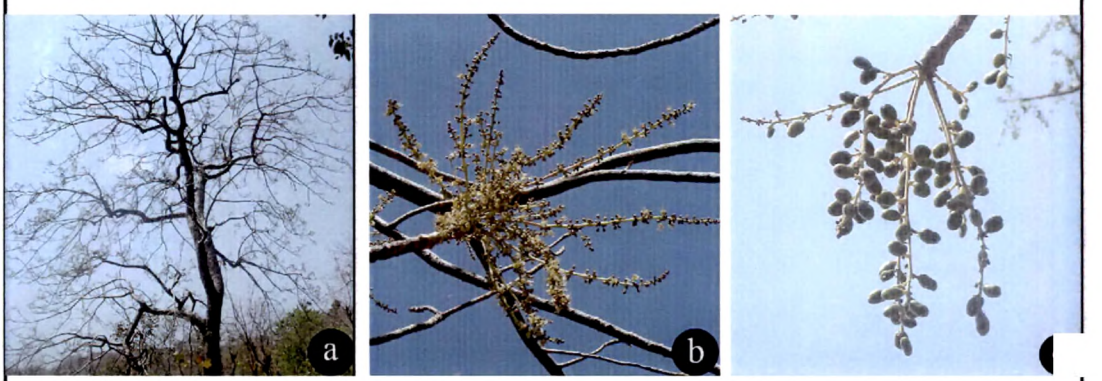


Fig. 47: *Lannea coromandelica* a. Habit, b. Inflorescence, c. Fruits

Fig. 48: *Mangifera indica* a. Habit, b. Inflorescence, c. Fruits

SPONDIAS L.

Spondias pinnata (L.f.) Kurzi in Prelim. Rep. For & Veg. Pegu Append. A. 44. & B. 42. 1875. *Mangifera pinnata* L. f. Suppl. 156. 1781. *Spondias mangifera* Willd. Sp. Pl. 2 : 751. 1799. Nom. Illeg.; Hook. f. Fl. Brit. India 2 : 42. 1876; Cooke, Fl. Pres. Bombay 1 : 299. 1958 (Repr.). Shah, Fl. Guj. 1:169; 1978, *S. acuminata* Roxb. Fl. Ind. 2 : 453. 1832; Hook. f. op. Cit. ; Cooke, op. Cit. 300. Singh, et al Fl. Maha. Dicot. 1: 587. 2000.

Local Name: Ambado, **English name:** Wild Mango

Description : Deciduous tree, 10-15 m tall, with yellowish brown, smooth branches. Leaf stalks are 10-15 cm long. Leaves are 30-40 cm long, compound with 5-11 opposite leaflets. Leaflets are stalked, ovate-oblong to elliptic-oblong, papery. Leaf base is wedge- shaped to rounded, often oblique, margin toothed or entire, with a tapering tip. Tiny flowers are borne in panicles at the end of branches. Flowers sessile, white, sepals triangular, petals ovate-oblong, pointed. Fruit is ellipsoid to elliptic-ovoid, yellowish orange at maturity, 3.5-5 × 2.5-3.5 cm. Inner part of endocarp is woody and grooved, outer part is fibrous. Mature fruit is usually with 2 or 3 seeds.

Phenological Data: Fls and Frs: December – July.

Distribution: India, Burma (Myanmar), China (South, Hainan), Malesiya to Solomons, Thailand, Indochina, Laos (Khammouan).

Localities in Gujarat: In deciduous forests of Dangs, Baria, Chhotaudepur and Panchmahals

Ecology: Full sun, well drained soil

Category of threat: Common

Special Characteristics: Leaves are sour in taste

Medicinal Value: The bark is recommended for stomach ache, dysentery, rheumatism and swollen joints.

Method for Propagation: Seeds

Suitable Environmental Conditions: Warm climate

Uses: The timber is used for making interior furniture. The young leaves, flowers, fruits, edible. The leaves are used in making food preparations like *Handvo, Dal* and *Sabji* by tribals of Baria and Chhotaudepur forests

MORINGACEAE

Trees, wood soft, gum present; leaves compound, alternate 2-3 pinnate; inflorescence axillary panicles; flowers irregular, large, white or yellow; fruit capsule, long beaked, seeds winged.

MORINGA Adans.

1. flowers white, leaves usually tripinnate .....M. *oleifera*

1. flowers yellow, leaves usually bipinnate .....M. *concanensis*

/

Moringa concanensis Nimmo in Grah. Cat. Bomb. Pl. 43 : 1839; Hook. f. Fl. Brit. India 2 : 45. 1876; Cooke, Fl. Pres. Bombay 1 : 301. 1958 (Repr.). Shah, Fl. Guj. 1:169; 1978, Verdc. in Kew Bull. 40 : 12. 1985. Singh, et al Fl. Maha. Dicot. 1: 589. 2000.

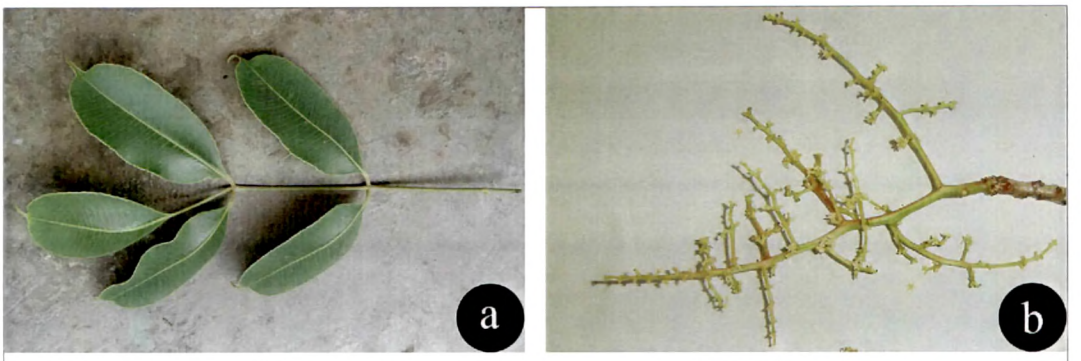


Fig. 49: *Spondias pinnata* a. Leaves, b. Inflorescence

Fig. 50a: *Moringa oleifera* a. Habit, b. Leaves

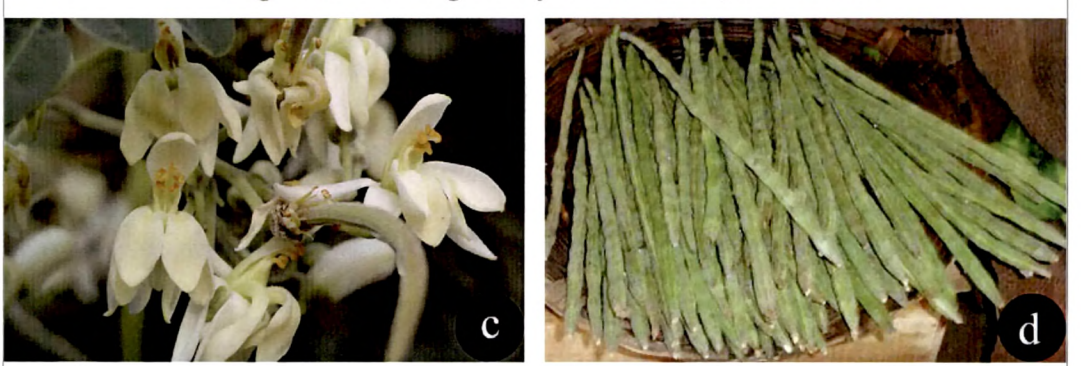


Fig. 50b: *Moringa oleifera* c. Flowers, d. Fruits

Fig. 51: *Moringa concanensis* a. Leaves, b. Flowers

Local Name: Jangli saragavo.

Identification Characters: leaves 2-pinnate, veins distinct; flower white or creamy white with red tinge, wild.

Description: Deciduous tree. 8-10 m tall trees, with rough, greyish-brown trunk. Broadly elliptic or suborbicular, rarely obovate, glabrous. Flowers bisexual, bracteate, scented, in axillary panicles or at ends of branches; sepal 5; petals 5, spathulate, yellowish white, 4 petals deflexed and one is erect, anthers are attached to erect petal, 10 stamens, 5 long straight functional with hairy base, other 5 are staminodes. Fruit long, pendulous capsule, subtorulose, deeply striate. Seeds triangular, winged on angles, glabrous.

Phenological Data: Fls: Oct.-Dec, Frs: Jan.- Mar.

Localities in Gujarat: In forests of Chhotaudepur and Baria; In Vadodara city found in the Laxmi Vilas Palace, Vishvamitri, Makarpura, Atladara, Chani, Harni, Gorwa and Gotri.

Method for Propagation: Seeds.

Uses: The wood is used for making toys and matchbox. The wood is also used as a fuel wood.

Moringa oleifera Lamk. Encycl. 1 : 398. 1785; verdc. in Kew Bull. 40 : 7. 1985. *M. pterygosperma* Gaertn. Fruct. 2 : 314. 1791; Hook. f. Fl. Brit. India 2 : 45. 1876; Cooke, Fl. Pres. Bombay 1 : 301. 1958 (Repr.). Shah, Fl. Guj. 1:170; 1978. Singh, et al Fl. Maha. Dicot. 1: 590. 2000.

Local Name: Saragvo, **English Name:** Horse radish tree, Drumstick tree, **Sanskrit Name:** Srigru, Shobhajan, Svetashigu, Krishnagandha.

Identification Characters: leaves 3-pinnate, veins not distinct; flower white or creamy-white, planted or self sown.

Description: Deciduous tree (2n = 28). 5-10 m tall; with rough, Greyish-brown, corky bark. Leaves compound, alternate, tripinnate; leaflets opposite, leathery, dark green, ovate, obovate or oblong, glabrous. Flowers bisexual, bracteate, scented, in axillary panicles or at ends of branches; sepal 5; petals 5, spathulate, yellowish white, 4 petals deflexed and one is erect, anthers are attached to erect petal, 10 stamens, 5 long straight functional with hairy base, other 5 are staminodes. Fruit long, pendulous capsule, subtorulose, deeply striate. Seeds triangular, winged on angles, glabrous.

Phenological Data: Fls. and Frs: Throughout the year.

Distribution: Sub-Himalayan tract, Jammu and Kashmir, West Bengal, Indonesia

Localities in Gujarat: Planted or self-sown, near houses, throughout. In Vadodara city found in the Maharaja Sayajirao University of Baroda campus, Chani, Gorwa, Subhanpura, Alkapuri, Gotri, Old padara road, Atladara, Chikuvadi, Panigate, Makarpura, Tarsali, Ajwa road, Vaghodia road, Sama, Laxmi Vilas Palace, EME and also planted as a vegetabal tree in the gardens.

Origin\Native: Northwest India

Ecology: Well drained soil, moderate light

Category of threat: Common

Special Characteristics: Flowers are scented

Economic Importance: Ornamental fruit tree

Horticultural Value: Planted along roadside, in garden, house

Method for Propagation: Seeds and cuttings.

Suitable Environmental Conditions: Tropical climate

Agricultural Value: Cultivated for edible fruits

Uses: Fruit are edible, used in curry and as vegetable. Leaves and flowers are also used as vegetables. Seed oil

is used as a fixative in perfume industry. The wood is also used as fuel, and making of cases and matchbox.

FABACEAE (PAPILIONACEAE)

Trees, leaves simple or compound; inflorescence racemes or solitary; flowers irregular, bisexual, pentamerous, bracteates, vexillary, petals free, unequal, papilionaceous, posterior petal biggest vexillum, wings and keels two partly united, mostly 10 stamens; fruit legume or pod.

1. leaves 3- foliolate
    2. Plants armed, pods subterete torulose ..... *Erythrina*
    2. Plants unarmed, pods flat, non torulose
        3. flowers orange-red ..... *Butea*
        3. flowers white ..... *Ougeinia*
1. leaves more than 3-foliolate
    4. pods many seeded
        5. leaflets 15-30 ..... *Sesbania*
        5. leaflets 9-21 ..... *Gliricidia*
    4. pods 1-4 seeds
        6. leaflets opposite
            7. pods flat, hard, not winged ..... *Pongamia*
            7. pods flat thin winged ..... *Derris*
        6. leaflets alternate
            8. flower small, creamy white, pods oblong strap shaped, not winged ..... *Dalbergia*
            8. flower large, yellow, pods orbicular, winged .... Pterocarpus
    4. pods 2-5 seeded, dehiscent, stamens diadalphous ..... *Milletia*

BUTEA Koening ex. Roxb.

1. flowers orange-red ..... B. *monosperma*
1. flowers yellow ..... B. *monosperma* var. *lutea*

Butea monosperma (Lam.) Taub. in Engl. & Prantl. Pflanzenfam. 3 (3) : 365. 1894; Sanj. Legumes of India 99. 1991. *Erythrina monosperma* Lam. Encycl. 2 : 391. 1785. *Butea frondosa* Roxb. ex Willd. Sp. PI. 2 : 917. 1802. Nom. Spuerfl. Baker in Hook. f. FI. Brit. India 2 : 194. 1876; Cooke, FI. Pres. Bombay 1 : 395. 1958 (Repr.). Shah,

Fig. 52: *Butea monosperma,* a. Habit, b. Inflorescence, c. Fruits

Fig. 53: *Butea monosperma* var. *lutea*

Fig. 54: *Dalbergia lanceolaria* ssp. *paniculata* a. Leaves, b. Fruits

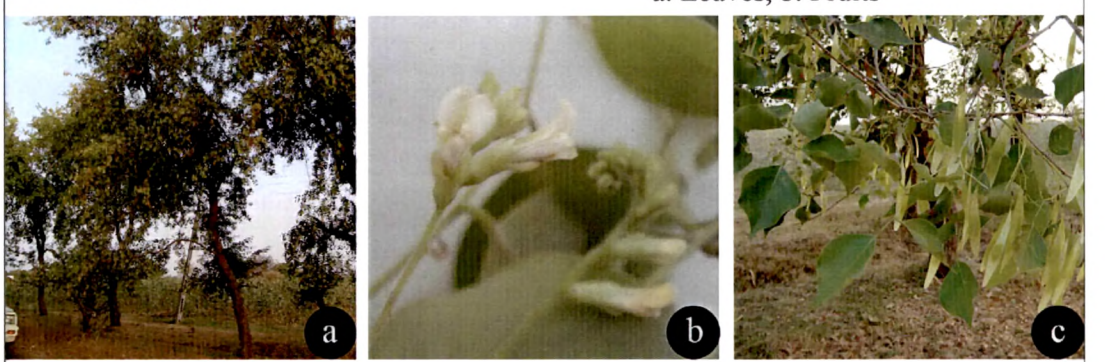


Fig. 55: *Dalbergia sissoo* a. Habit, b. Flowers, c. Fruits

Fig. 56: *Erythrina blakei* a. Habit, b. Inflorescence

Fig. 57: *Erythrina variegata*

Fl. Guj. 1:185; 1978, Singh, et al Fl. Maha. Dicot. 1: 610. 2000.

Local Name: Khakhro, Palas, Kesudo, **English Name:** Flame of the forest.

Identification Characters: leaflets 3; unarmed; pods flat, not torulose; flowers orange-red.

Description: Deciduous tree (2n = 18). 5-20 m tall, bark rough, ash-coloured or pale-to dark-brown, deeply longitudinally fissured, irregular branching. Coriaceous, almost glabrous, obovate, ovate-rhomboid or elliptic-oblong. Racemes compact, on leafless branches. Sandy-brown, oblong, one-seeded, densely hairy. Seeds dark-brown, polished, elliptic-oblong, rounded on edges.

Phenological Data: Fls: Mar.- Apr, Frs: Apr.- May.

Distribution: Throughout India, Sri Lanka

Localities in Gujarat: Throughout; common, in Vadodara city found in the Maharaja Sayajirao University of Baroda campus, Laxmi Vilas Palace, and some other garden.

Origin\Native: India, Burma and Ceylon.

Ecology: Full sun, drought resistant, tolerant to saline soil

Category of threat: Common

Special Characteristics: Flower yield an orange – red dye

Economic Importance: Ornamental flowering tree

Horticultural Value: Planted in roadside, gardens

Medicinal Value: Seed oils used as an anthelminitic, Gum is used for tanning, diarrhea

Method for Propagation: Seeds.

Suitable Environmental Conditions: Warm and dry climate

Agricultural Value: Cultivated for flowers

Uses: A valuable tree for recovering salt lands. Young roots yield fiber, wood is used in house building. Orange-red dye is obtained from the infusion of the flowers, which is used in 'Holi' festival and dying cloths. The tree is source of Lac and Gum.

Butea monosperma var. ***lutea*** (Witt) Mahesh. in Bull. Bot. Surv. India 3: 92. (1961) 1962; Sant. in Rec. Bot. Surv. India 16:66. 1967 (3rd Rev. ed.) *B. frondosa* var. *lutea* Witt, Descr. List. N. & Berar Circ. C.P. 75. 1916. Singh, et al Fl. Maha. Dicot. 1: 610. 2000.

Local Name: Pilo Khakhro.

Description: Trees. Leaves 3 – foliolate; leaflets obovate, ovate – rhomboid, glabrous above, silky pubescent beneath. Flowers yellowish or canary – yellow. Pods oblong, brownish, 1 – seeded.

Phenological Data: Fls: Mar.- Apr, Frs: Apr.- May.

Distribution: Throughout India

Localities in Gujarat: Found in forests of Baria at Pipargota village forests and Ratanmahal.

Origin\Native: India, Burma and Ceylon.

Ecology: Full sun, drought resistant, tolerant to saline soil

Category of threat: Common

Special Characteristics: Flower yield an yellow dye

Economic Importance: Ornamental flowering tree

Horticultural Value: seldom planted in gardens

Medicinal Value: Seed oils used as an anthelminitic, Gum is used for tanning, diarrhea

Method for Propagation: Seeds.

Suitable Environmental Conditions: Warm and dry climate

Agricultural Value: Cultivated for flowers

Uses: A valuable tree for recovering salt lands. Young roots yield fiber, wood is used in house building. Orange-red dye is obtained from the infusion of the flowers, which is used in '*Holi*' festival and dying cloths. The tree is source of Lac and Gum.

DALBERGIA L. f.

1. Stamens 9, monadelphous

    2. Leaflets 3-5, acuminate ..... D. *sissoo*

    2. Leaflets 5-7, obtuse or emarginate.....D. *latifolia*

1. stamens 10, diadelphous (5+5)

    3. leaflets with prominent parallel nerves, standard with a callosity at base of limb ..... D. *lanceolaria* ssp *lanceolaria*

    3. leaflets with reticulate nerves, standard without a callosity at base of limb ..... D. *lanceolaria* ssp. *paniculata*

Dalbergia lanceolaria subsps. ***lanceolaria*** Roxb. Suppl. 316. 1781; Baker in Hook. f. Fl. Brit. India 2 : 235. 1876; Cooke. Fl. Pres. Bombay 1 : 425. 1958 (Repr.). Shah, Fl. Guj. 1:201; 1978, Sanj. Legumes of India 136. 1991. Singh, et al Fl. Maha. Dicot. 1: 655. 2000.

Local Name: Dharan, patradi, dandosi.

Description : Trees, 3-10 m high; bark Greyish – white. Leaflet elliptic – oblong or ovate – obovate, puberulous beneath. Flowers white or pinkish, in axillary or terminal, leafless panicles. Pods strap shaped, stipitate, 1 – 3 seeded.

Phenological Data: Fls and Frs: March – June.

Distribution: Africa, Asia. In India - Andhra Pradesh, Karnataka, and Tamil Nadu

Localities in Gujarat: In deciduous forests, common (Shah, 1978).

Origin\Native: India, Nepal, Malaysia

Ecology: shade tolerant but sensitive to drought and fire, moderate light demander, well-drained, deep, moist soils

Category of threat: common

Special Characteristics: scented flowers

Economic Importance: Timber

Horticultural Value: planted as a timber plant.

Medicinal Value: tannin of the bark is used in diarrhea, indigestion, worms and leprosy

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical environment

Agricultural Value: cultivated for timber

Uses: It is the best wood for making furniture. Leaves used as fodder

Dalbergia lanceolaria subsps. ***paniculata*** (Roxb.) Thoth. in Bull. Bot. Surv. India 25:171. 1985; Sanj. Legumes of India 137. 1991. *D. paniculata* Roxb. Pl Cor.2:8 t. 114. 1799; Baker in Hook f. Fl. Brit. India 2: 236. 1876; Cooke, Fl. Pres. Bombay 1: 426. 1958 (Repr.)

Local Name: Patrado.

Description: Deciduous tree. 10-15 m tall with grey bark; leaves compound, ovate to lanceolate, obtuse or emarginated, glabrous, flowers creamy-white, in terminal panicles, pod oblong-lanceolate, seeds 1-3.

Phenological Data: Fls - Frs: Feb. - May.

Distribution: Africa, Asia. In India - Andhra Pradesh, Karnataka, and Tamil Nadu

Localities in Gujarat: In deciduous forests in hilly regions; rather common (Shah, 1978).

Origin\Native: India, Nepal, Malaysia

Ecology: shade tolerant but sensitive to drought and fire, moderate light demander, well-drained, deep, moist soils

Category of threat: common

Special Characteristics: scented flowers

Economic Importance: Timber

Horticultural Value: planted as a timber plant.

Medicinal Value: tannin of the bark is used in diarrhea, indigestion, worms and leprosy

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical environment

Agricultural Value: cultivated for timber

Uses: wood is used for making furniture. Leaves can be used as fodder

Dalbergia latifolia Roxb. Pl. Cor. 2 : 7, t. 113. 1799; Baker in Hook. f. Fl. Brit. India 2: 235. 1876; Cooke, Fl. Pres. Bombay 1 : 422. 1958 (Repr.). Shah, Fl. Guj. 1:202; 1978, Sanj. Legumes of India 137. 1991. Singh, et al Fl. Maha. Dicot. 1: 657. 2000.

Local Name: Sisam, **English Name:** Indian rosewood and Bombay Blackwood.

Identification Characters: stamens-9, monadelphous, staminal tube split along upper side only; leaflets 5-7, subacute, obtuse or emarginated, flowers nearly sessile.

Description: Deciduous tree. 8-10 m tall trees, with grey or ash-coloured, smooth bark, dome shaped canopy, drooping branches. Leaves alternate, compound, imparipinnate, broadly ovate to lanceolate or strap-shaped, glabrous, dark green, leaflets 3-7, obtuse, rounded or emarginate top with or without a small triangular cusp, herbaceous or thinly coriaceous. Flowers creamy-white, axillary or extra-axillary panicles, ovules 3-6; pod straight, oblong-strap-shaped, seeds 1-3.

Phenological Data: Fls: May-Nov, Frs: Nov.- Jan.

Distribution: Africa, Asia. In India - Andhra Pradesh, Karnataka, and Tamil Nadu

Origin\Native: India, Nepal, Malaysia

Ecology: shade tolerant but sensitive to drought and fire, moderate light demander, well-drained, deep, moist soils

Category of threat: The species is protected under the Indian Forest Act, the export of logs or sawn timber is banned.

Special Characteristics: scented flowers and wood

Economic Importance: Timber

Horticultural Value: planted as a timber plant.

Medicinal Value: tannin of the bark is used in diarrhea, indigestion, worms and leprosy

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical environment

Agricultural Value: cultivated for timber

Uses: It is the best wood for making furniture. Leaves can be used as fodder

Localities in Gujarat: In deciduous forests in hilly regions; rather common (Shah, 1978).

Dalbergia sissoo Roxb. Fl. Ind 3 ; 223. 1832; Baker in Hook. f. Fl. Brit. India 2 : 231. 1876; Cooke. Fl. Pres. Bombay 1 : 421. 1958 (Repr.). Shah, Fl. Guj. 1:202; 1978, Sanj. Legumes of India 140. 1991. Singh, et al Fl. Maha. Dicot. 1: 662. 2000.

Local Name: Moto sisam, Sissoo, **English Name:** North Indian rosewood, **Sanskrit Name:** Krishnasara, Shisapa, Sisama.

Identification Characters: leaflets 3-5, acuminate, flowers distinctly stalked.

Description: Deciduous tree (2n = 20) 7-10m tall trees with thick, Greyish-black or light-brown, longitudinally furrowed bark, spreading canopy with drooping branches. The heartwood is golden to dark brown, and sapwood white to pale brownish white, extremely durable very resistant to dry-wood termites. Leaves alternate, compound, imparipinnate, leaflets 3-5, distantly alternate, broadly ovate or nearly orbicular, subcoriaceous, puberulous, acuminate, terminal leaflet is larger. Flowers small, papilionaceous, in axillary panicles, sessile, yellowish white; sepals 4-5, pubescent, lobes short. Petals 4-5, yellowish–white; stamens-9, monadelphous, staminal tube split along upper side only, ovary pubescent; ovules 2-4. Fruit legume, 8-10 cm long strap shaped pods, turns pale brown in color when ripe. Seeds brownish, subreniform and glabrous.

Phenological Data: Fls: Jan.-May, Frs: May. - Oct.

Distribution: Africa, Australia, India, Middle East, North America

Origin\Native: India, Nepal, and Pakistan

Ecology: any deep light soils and requiring a large amount of water, full sun

Category of threat: Common

Special Characteristics: scented flowers and wood

Economic Importance: Ornamental shade tree

Horticultural Value: Planted on roadside, as shade tree in tea plantation, windbreaks

Medicinal Value: leaf juice for eye ailments, considering the wood and bark abortifacient, anathematic, antipyretic, aperitif, aphrodisiac, expectorant, and refrigerant. They use the wood and bark for anal disorders, blood diseases, burning sensations, dysentery, dyspepsia, leucoderma, and skin ailments

Method for Propagation: Root suckers, Seeds.

Suitable Environmental Conditions: tropical environment

Agricultural Value: Cultivated for timber

Uses: It is the most important timber tree after Teak (*Tectona grandis*). The wood is used for making furniture. This is the best timber wood in India used for plywood, agricultural, and musical instruments, boats, floorings etc.

Localities in Gujarat: Planted; seldom in forests (Shah, 1978).

ERYTHRINA L.

1. Calyx not spathaceous, 2- lipped, not splitting down at base ..... E. *suberosa*

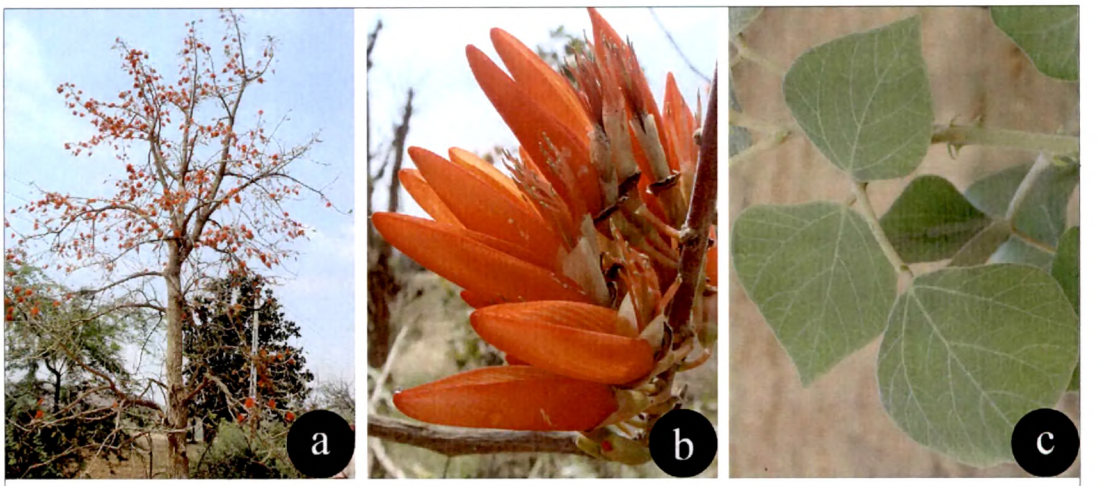


Fig. 58: *Erythrina suberosa* a. Habit, b. Inflorescence, c. Leaves

Fig. 59: *Gliricidia sepium*

Fig. 60: *Milletia peguensis* a. Leaves, b. Flowers

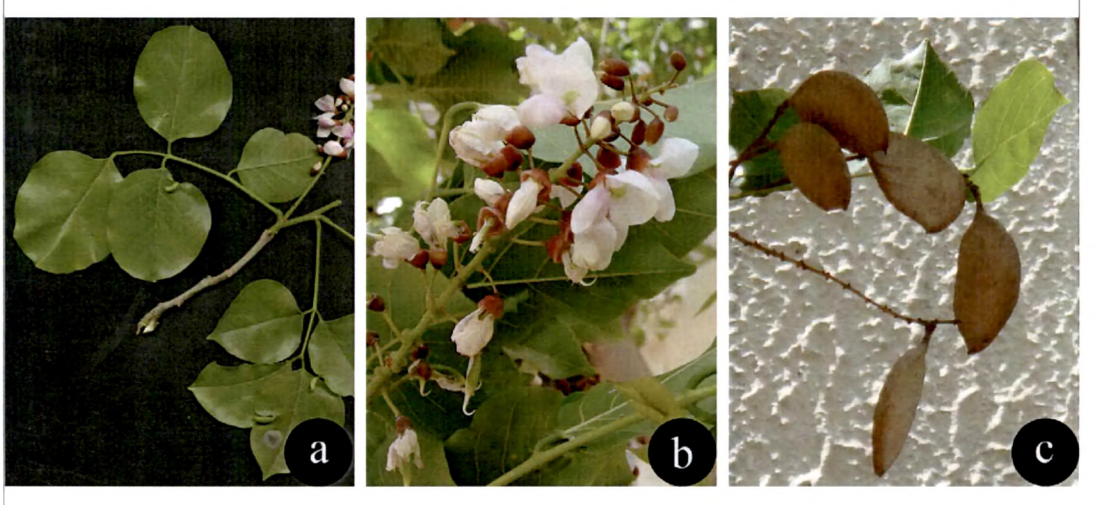


Fig. 61: *Pongamia pinnata* a. Twig, b. Flowers, c. Fruits

1. Calyx spathaceous, not 2- lipped, splitting down at base

    2. branches sparingly prickly, prickles black, calyx toothed, pods distinctly torulose, 6-8 seeded ..... E. *variegata*

    2. branches much prickly, prickles green to yellow, calyx entire, pods compressed, 2-4 seeded ..... E. *stricta*

Erythrina suberosa Roxb. Fl. Ind. 3:253. 1832; Baker in Hook, f. Fl. Brit. India 2: 189. 1876; Cooke, Fl. Pres. Bombay 1: 391. 1958 (Repr.). Shah, Fl. Guj. 1:212; 1978, Sanj. Legumes of India 173. 1991. Singh, et al Fl. Maha. Dicot. 1: 682. 2000.

Local Name: Jangario khakharo.

Description: Deciduous tree, straight trunk, corky bark, prickles on stems and branches. Leaves compound, one larger terminal leaflet rhomboid-ovate, lateral ones obliquely ovate-cordate, densely pubescent beneath; Flowers scarlet, in dense terminal racemes, Pod beaked, black, stalked; seeds oblong.

Phenological Data: Fls - Frs: Jan. - May.

Origin\Native: India and Java

Ecology: dry, moist, well drained soils. Drought and frost tender, full sun

Category of threat: Common

Special Characteristics: Bright red coloured flowers in which water is stored, birds often drink water from the flower

Economic Importance: Ornamental tree

Horticultural Value: Planted in gardens, roadside, avenue tree

Medicinal Value: Bark is astringent, febrifuge, anthelminitc, liver problems, an antidote in snake bite

Method for Propagation: Stem cuttings, Seeds.

Suitable Environmental Conditions: Tropical environment

Agricultural Value: Cultivated for ornamental purposes

Uses: Wood is used for fishing net floats and also used for carving. Fruits and leaves eaten by livestock. Dye is obtained form flowers. Bark is used for tanning and dying.

Distribution: Throughout India, Sri Lanka, Myanmar, Polynesia

Erythrina variegata L. Herb. Amboin. 10. 1754; & Amoen. Acad. 4: 122. 1759; Krukoff in J. Arnold Arbor. 53:132. 1972; Sanj. Legumes of India 173. 1991. *E. indica* Lam. Encycl. 2:391. 1876; Baker in Hook. f Fl. Brit. India 2:188. 1876; Cooke, Fl. Pres. Bombay 1:390.1958 (Repr.). Shah, Fl. Guj. 1:213; 1978, *E. indica* var *alba* Blatt. & Mill. In J. Bombay nat. Hist. Soc. 33:628. 1929. Singh, et al Fl. Maha. Dicot. 1: 683. 2000.

Local Name: Pangaro, **English Name:** Indian Coral tree, **Sanskrit Name:** Paribhadra, Kantakipalash.

Identification Characters: leaflets 3, armed, calyx not 2-liped, bark gery, not wrinkled, pods suberect torulose.

Description: Deciduous tree (2n = 42,44), straight trunk, smooth yellowish bark, prickles on stems and branches. Leaves are compound, stipulate, leaflets 3, one pair of opposite leaflets, one larger terminal leaflet, broadly ovate or ovate-rhomboid, acute, dark green. Flowers large coral-red, in dense terminal racemes, sepals

5, spathaceous, oblique, toothed, petals 5, stamens 10, diadelphous in 9+1 bundles, exerted, ovary monocarpellary, superior. Fruit is black, torulose. Ellipsoid-oblong, reddish-brown glabrous, smooth.

Phenological Data: Fls: Feb.- May, Frs: Apr.- July.

Origin\Native: India and Java

Ecology: dry, moist, well drained soils. Drought and frost tender, full sun

Category of threat: Common

Special Characteristics: Bright red coloured flowers in which water is stored, birds often drink water from the flower

Economic Importance: Ornamental tree

Horticultural Value: Planted in gardens, roadside, avenue tree

Medicinal Value: Bark is astringent, febrifuge, anthelminitc, liver problems, an antidote in snake bite

Method for Propagation: Stem cuttings, Seeds.

Suitable Environmental Conditions: Tropical environment

Agricultural Value: Cultivated for ornamental purposes

Uses: Wood is used for fishing net floats and also used for carving. Fruits and leaves eaten by livestock. Dye is obtained form flowers. Bark is used for tanning and dying.

Distribution: Throughout India, Sri Lanka, Myanmar, Polynesia

GLIRICIDIA

Gliricidia sepium (Jacq.) Kunth ex Steud. Nom.Bot. (ed. 2) Walp. Repert. Syst. 1:679. 1842; Sanjappa, Legumes of India 182. 1991; Kothari in Singh et al. Fl. Maharashtra St. Dicot. 1:770. 2000. *Robinia sepium* Jacq. Enum. Pl. Carib. 28. 1760. *Gliricidia maculate* H.B. & K. Nov. Gen. et Sp. 6:393. 1823.

Local Name: Gliricidia, **English Name:** Gliricidia, Dormouse destroyer tree

Identification Characters: leaflets 9-21; flowers not more than 2 cm long; pods linear, many seeded.

Description: Deciduous tree, 2.5-5 m tall; bark smooth, greenish-brown, lenticellate. Leaves compound, alternate, imparipinnate, ovate-oblong or elliptic-lanceolate, somewhat thick, coriaceous, glaucous-green, glabrous. Flowers rosy-pink, Lilac or nearly White, erect or drooping racemes. Fruit legume, pods green, flat, linear, glabrous, and pendent. Seeds, compressed, elliptic, and yellowish.

Phenological Data: Fls: Jan.-May, Frs: Apr. - June.

Distribution: India, Sri Lanka, West Africa, Philippines

Origin\Native: America

Ecology: well drained soil, not frost tolerant, drought tolerant

Category of threat: Common

Special Characteristics: Bark powder is used to poison mice and rats.

Economic Importance: ornamental tree

Horticultural Value: Planted in fences, roadside, shade tree

Medicinal Value: expectorant, insecticidal, head-ache, itch, prickly heat, rheumatism,

Method for Propagation: Cuttings, Seeds.

Suitable Environmental Conditions: Tropical and sub tropical environments

Agricultural Value: Cultivated for ornamental purposes

Uses: Used as an ornamental tree, fuel wood and fodder.

PONGAMIA Vent.

Pongamia pinnta L. Pierre, For. Fl. Cochinch. T. 385. 1899; Thoth. In Bull. Surv. India 3: 418, t. 1 (1961) 1962 in Taxon 30 : 44. 1981; Sanj. Legumes of India 230. 1991. *Cytisus pinnatus* L. Sp. Pl. 741. 1753 non *Derris pinnata* Lour. *Pongamia glabra* Vent. Jard. Mal. T. 28. 1803; Baker in Hook. f. Fl. Brit. India 2; 240. 1876; Cooke, Fl. Pres. Bombay 1 : 429. 1958 (Repr.). Shah, Fl. Guj. 1:203; 1978, *Derris indica* (Lam.) Bennet in J. Bombay Nat. Hist. Soc. 68. 303. 1971. Singh, et al Fl. Maha. Dicot. 1: 728. 2000.

Local Name: Karanj, **English Name:** Pongam/ Indian beach, **Sanskrit Name :** Karanja, Naktamal.

Identification Characters: leaflets more than 3, opposite; calyx dark reddish-purple; pods woody, not winged.

Description: Deciduous tree (2n = 20,22). 8-12 m tall, large spreading canopy. The bark is smooth, whitish–brown. Leaves compound, alternate, petiolate, imparipinnate, leaflets 5-9, terminal leaflet is larger, ovate-elliptic, dark green, glossy, acuminate. Leaves often marred by the presence of insects, which make ugly patches under the surface tissue. Flowers small, creamy white tinged with pink, in clusters, axillary, pendulous, sepals small, purple, corolla papilionaceous, stamens 10, diadelphous, in 9+1 bundles, ovary monocarpellary, superior. Fruit is a woody, flat legume.

Phenological Data: Fls: Apr.- June, Frs: June. - Oct.

Origin\Native: India

Ecology: sandy and rocky soils, including limestone, well suited to intense heat and sunlight, drought tolerant

Category of threat: Common

Economic Importance: Ornamental shade tree

Horticultural Value: used for landscaping purposes due to the large canopy and showy flowers, planted in gardens, avenues, roadside,

Medicinal Value: Leaves are used as green manure and as cure for skin diseases.

Method for Propagation: Seeds, Cuttings

Suitable Environmental Conditions: humid subtropical environments

Agricultural Value: Cultivated for ornamental purposes

Uses: Mainly grown as a shade tree. The wood is used in the making of parcel cases. The seed oil is used as a luminant and insecticide. It is used as a nitrogen fixing tree.

Distribution: Throughout India, Pakistan, Ceylon, China, Malaya, Tropical Australia.

Localities in Gujarat: Throughout, wild, mostly along riverbanks; also planted (Shah, 1978).

PETROCARPUS Jacq.

Pterocarpus marsupium Roxb. Pl. Cor. 2 : 9, t. 116. 1799; Baker in Hook. f. Fl. Brit. India 2; 239. 1876; Cooke, Fl. Pres. Bombay 1 : 427. 1958 (Repr.). Shah, Fl. Guj. 1:236; 1978, Sanj. Legumes of India 232. 1991. Singh, et al Fl. Maha. Dicot. 1: 729. 2000.

Local Name: Biyo, **English Name:** Malabar Kino, Indian Kino Tree

Identification Characters: leaflets alternate, more than 3; flowers yellow; pods usually orbicular, winged, not woody, 1-4 seeded.

Description: Deciduous tree, 12-18 m. tall with ash colored or yellowish grey, longitudinally fissured bark.

Leaves compound, 15-25 cm long, leaflets 5-9, 5 - 11.5 x 4.2 - 7 cm, ovate to ovate-oblong or ovate-lanceolate, glabrous, panicles 8- 30 cm long terminal and axillary, pods 3 – 5.2 cm in diameter, glabrous

Phenological Data: Fls: Apr.- May, Frs: May - Oct.

Origin\Native: India

Category of threat: Common

Medicinal Value: wood is used as an astringent and in the treatment of inflammation and diabetes. Bark of this plant is used as an astringent for toothaches; it turns the water blue as soon as it comes in contact with the water. It is good for elephantiasis, leucoderma, diarrhea, dysentery, cough and Greyness of hair.

Method for Propagation: Seeds

Suitable Environmental Conditions: Tropical

Agricultural Value: Cultivated for medicinal uses

Localities in Gujarat: In deciduous forests, not common (Shah, 1978).

CAESALPINIACEAE

Herbs, shrubs, trees or lianas; leaves simple or compound, bipinnate, alternate; inflorescence racemes, panicles or corymbs; flowers pedicellate, irregular, bisexual, sepals 5, imbricate, petals 5, free, anthers mostly 10, monocarpellary superior ovary, marginal placenta; fruits legume, seeds nonendospermic.

1. Leaves bi-foliolate, leaflets not distinct, usually united into one ..... *Bauhinia*
1. Leaves 1-2 pinnate, leaflets distinct
    2. Leaves bipinnate
        3. Calyx lobes imbricate
            4. Leaf rachis ending into a sharp spine like point, pinnae rachilla flat and leaf like .....*Parkinsonia*
            4. Leaf not as above
                5. Fruit indehiscent, winged ..... *Peltophorum*
                5. Fruit dehiscent, not winged ..... *Caesalpinia*
        3. Calyx lobes valvate .....*Delonix*
    2. Leaves unipinnate
        6. calyx tube more than 1.0 cm long ..... *Tamarindus*
        6. calyx tube less than 0.5 cm long
            7. Petals present, 5 ..... *Cassia*
            7. Petals absent
                8. Calyx tube short, ovary sessile, ovules 2 ..... *Hardwickia*
                8. Calyx tube elongate, ovary stalked, ovules many ..... *Saraca*

BAUHINIA L.

1. Flowers large, fertile stamens 3-5
    2. Leaves cleft to about half way down, fertile stamens 3 ..... B. *purpurea*
    2. Leaves cleft to about one-third way down, fertile stamens 5 .... B. *variegata*
1. Fertile stamens 10
    3. Calyx spathaceous
        4. flowers small, numerous in copious racemes ..... B. *racemosa*
        4. flower large, 1-3 or short peduncles ..... B. *tomentosa*
    3. Calyx limb divided into 5 segments
        5. Leaves 7-9 nerved ..... B. *malabarica*
        5. Leaves 15-17 nerved ..... B. *foveolata*

Bauhinia purpurea L. Sp. Pl. 375. 1753; Baker in Hook. f. Fl. Brit. India 2:284. 1878; Cooke, Fl. Pres. Bombay 1:461. 1958 (Repr.); Sanjappa, Legumes of India 5. 1991; Moorthy in Singh et al. Fl. Maharashtra St. Dicot. 1:780. 2000.

Local Name: Kachnar, **English Name:** Camel's foot and Geranium tree, **Sanskrit Name:** Kovidra, Kanchnar, Yugampatra.

Identification Characters: leaves 1 foliolate, 3-17.3 x 3.5 – 17 cm, prominently 9-13 nerved, more commonly deeply cleft from the apex, lobes obtuse or subacute; flowers pale to bright rosy-purple, large, showy, shaped like butterfly, calyx spathaceous, petals 5, stamens 3, style distinct, slender, fertile stamens 3.

Description: Deciduous tree (2n = 28). 6-20 m tall trees; bark grey or dark-brown. Leaves suborbicular, coriaceous, deeply bilobed, cordate at base, petiolate. Flowers 3-8 across, terminal racemes, purple, petals 5, stamens 3. Fruits linear, flat, apiculate reddish-brown, woody, pendent. Seeds globose, smooth, glabrous.

Phenological Data: Fls: Feb. – Mar, Frs: Mar. – Sep.

Distribution: Throughout India, China

Origin\Native: India.

Ecology: Sun to partial shade, average water needs

Category of threat: Common

Special Characteristics: Bark yields gum

Economic Importance: ornamental tree.

Horticultural Value: Planted in gardens for its large showy flowers, roadside, house

Medicinal Value: Bark, roots and flowers are medicinally used

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical environments

Agricultural Value: Cultivated for ornamental purposes

Uses: The wood is used for making agricultural implements. The bark and flower is used for dyeing and tanning.

Localities in Gujarat: Throughout, wild in deciduous forests; also planted in gardens (Shah, 1978).

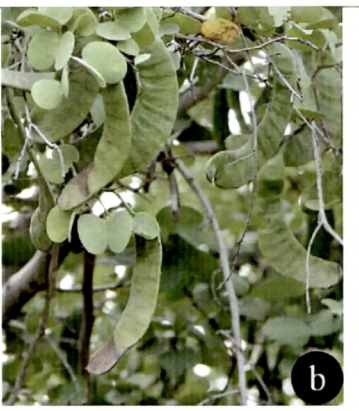


Fig. 62: *Bauhinia racemosa* a. Flowers, b. Fruits

Fig. 63: *Bauhinia tomentosa*

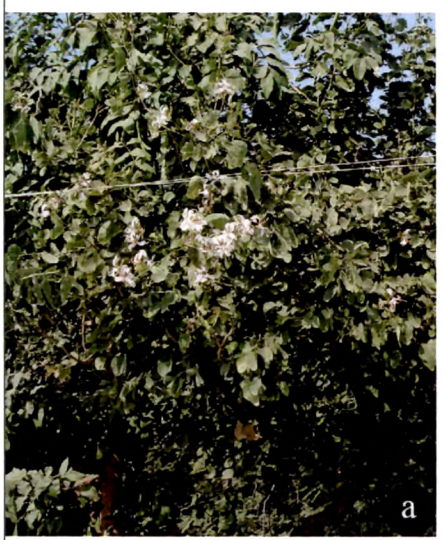


Fig. 64: *Bauhinia purpurea* a. Habit, b. Flowers, c. Fruit, d. Leaves

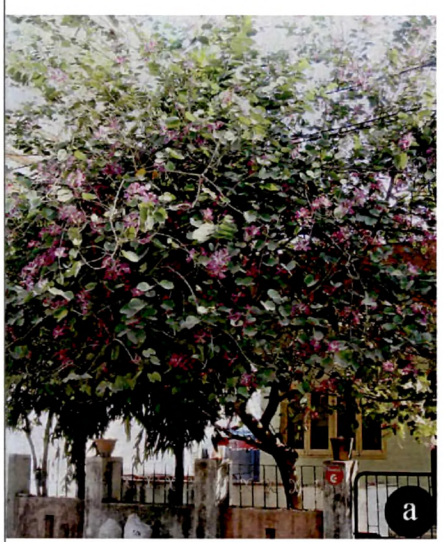


Fig. 65: *Bauhinia variegata* a. Habit, b. Flowers, c. Leaves

Bauhinia racemosa Lamk. Encycl. 1: 390. 1785; Baker in Hook. f. Fl. Brit. India. 2: 276. 1878; Cooke, Fl. Pres. Bombay 1: 459, 1958 (Repr.). Shah, Fl. Guj. 1:263; 1978, de Wit in Reinwardtia 3: 537. 1956; Sanj. Leg. India 5. 1991. Singh, et al Fl. Maha. Dicot. 1: 780. 2000.

Local Name: Kasotri, Kachnar, **English Name:** Mountain Ebony, **Sanskrit Name:** Yamalpatrak, Ashmantak, Sveta-kanchan, Anupushpak.

Identification Characters: leaves 1 foliolate, 2.5 - 6 x 4 – 8.5 cm, prominently 7-9 nerved, more commonly deeply cleft from the apex, lobes obtuse; flowers pale to creamy-yellow or bright yellow, not more than 3 cm across, in pendulous racemes, calyx spathaceous, style distinct, slender, fertile stamens 10; pods 15 - 20 x 1.5 – 2.7 cm, turgid, faintly veined.

Description: Deciduous, 3-5 m tall trees; bark dark-brown, rough, longitudinally fissured, spreading crown. Leaves suborbicular, cordate at base, bilobed, glabrous above, pubescent beneath, petiolate, 1 foliolate, 2.5-6 x 4–8.5 cm, prominently 7-9 nerved, more commonly deeply cleft from the apex, lobes obtuse; flowers pale to creamy-yellow, not more than 3 cm across, terminal and leaf-opposed racemes, calyx spathaceous, style distinct, slender, fertile stamens 10; pods 15-20 x 1.5–2.7 cm, turgid, faintly veined. Pods linear-oblong, woody, slightly curved, dark-brown or brownish-black, constricted between all or few seeds. Seeds oblong compressed, smooth, glabrous, brown.

Phenological Data: Fls: Mar.- Aug, Frs: July. - Dec

Distribution: India, Africa

Origin\Native: India.

Ecology: Sun to Partial Shade, Average Water Needs

Category of threat: Common

Special Characteristics: Bilobed / suborbicular leaves

Economic Importance: ornamental tree

Horticultural Value: Planted in gardens for its large showy flowers, roadside, house

Medicinal Value: Bark-alterative, tonic, Root-carminative, Flowers-laxative. Ayurvedic remedy for ulcers, skin diseases, TB tumors, gonorrohea, and edema. It is also prescribed to increase the white blood cells.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical environments

Agricultural Value: Cultivated for ornamental purposes

Uses: The wood is used for making agricultural implements. The bark and flower is used for dyeing and tanning.

Localities in Gujarat: Throughout in deciduous and scrub forests (Shah, 1978).

Bauhinia tomentosa L. Sp. Pl. 375. 1753; Baker in Hook. f. Fl. Brit. India 2 : 275. 1878; Cooke 1 : 459. 1958 (Repr.). Shah, Fl. Guj. 1:263; 1978, de Wit in Reinwardtia 3 ; 409. 1956; Sanj. Leg. India 6 : 1991. Singh, et al Fl. Maha. Dicot. 1: 781. 2000.

Local Name : Pilo Asondaro.

Description : Trees, young parts tomentose. Leaves broader than long, glabrous above, pubescent beneath, apex obtuse or subacute, base truncate. Flowers leaf opposed racemes. Pods flat, oblong, distinctly reticulate, puberulous. Seeds ovoid.

Phenological characters: Fls. – Frs.: Sep. – Jan.

Localities in Gujarat: Wild in Saurashtra (Girnar, between Girnar temple and Junagadh and Barda hill); and

north Gujarat (Sarneshwar and Vireshwar); abundant in Saurashtra, rare in north Gujarat (Shah, 1978).

Bauhinia variegata Linn. Sp. Pl. 375. 1753; Baker in Hook f. Fl. Brit. India 2:284. 1878; Cooke, Fl. Pres. Bombay 1:462. 1958 (Repr.); Sanj. Leg. India 6.1991. *Phanera variegata* (L.) Benth. In Miq. Pl. Jungh. 262 1852.

Local Name: Kachnar, **English Name:** Bauhinia, Mountain ebony, Orchid tree

Identification Characters: Leaves 1 foliolate, prominently 9-13 nerved, more commonly deeply cleft from the apex, lobes obtuse or subacute; flowers pale to bright rosy-purple, calyx spathaceous, style distinct, slender, fertile stamens 3.

Description: Deciduous tree (2n = 28) 5-6 m tall, spreading crown, leaves 1 foliolate, prominently 9-13 nerved, more commonly deeply cleft from the apex, lobes obtuse or subacute; flowers 1 or few, in short lateral racemes, pale to bright rosy-purple, calyx spathaceous, petals 4-6, pale purple to rose, the uppermost one darker, with purple or crimson veins or blotches, or white to yellowish, with green veins, and purplish externally, fertile stamens 5, staminodes 5, style distinct, slender, fertile stamens 3. Fruit legume, coiled upon dehiscence; several seeds.

Phenological Data: Fls: Sep.- Dec, Frs: Oct.- Jan

Distribution: India, Fiji, French Polynesia, Australia, America, Thailand

Origin\Native: India and China.

Ecology: Sun to Partial Shade, Average Water Needs, drought resistant, well-drained soil

Category of threat: Common

Special Characteristics: Fragrant flowers

Economic Importance: Ornamental tree

Horticultural Value: Planted along roadside, in gardens for its beautiful showy fragrant flowers, shade tree

Medicinal Value: The roots are used as tonic. Flowers are laxative

Method for Propagation: Seeds.

Suitable Environmental Conditions: Moist tropical, cool dry climate, subtropical and tropical climates

Agricultural Value: Cultivated for ornamental purposes

Uses: The tree yields gum. Bark is used for dyeing and tanning. Wood is used for making agricultural implements and for building purpose. The young leaves, flowers and fruits are boiled and eaten as a vegetable, or are pickled

Bauhinia malabaricum (Roxb.) Bth. In Miq. Fl. Jungh. 261. 1852; S 329. *Bauhinia malabarica* Roxb. Hort. Beng. 31. 1814 (nomen) & Fl. Ind. 2:321. 1832; Fl. Brit. India. 2:277; C 1:460; WI 1:160. Shah, Fl. Guj. 1:277; 1978.

Description: 9-14 m tall trees, with dark-brown, rough bark. Leaves nearly orbicular, coriaceous, biliobed, glabrous above, sparsely hairy beneath. Pods dark-brown, glabrous, apiculte, slightly curved, flat.

Phenological characters: Fls.: September - October – Frs.: October – December.

Localities in Gujarat: Dangs and Panchmahals; rare (Shah, 1978).

CASSIA

1. stamens 10, all antheriferous

    2. pods strap shaped, dehiscent .....C. *surattensis*

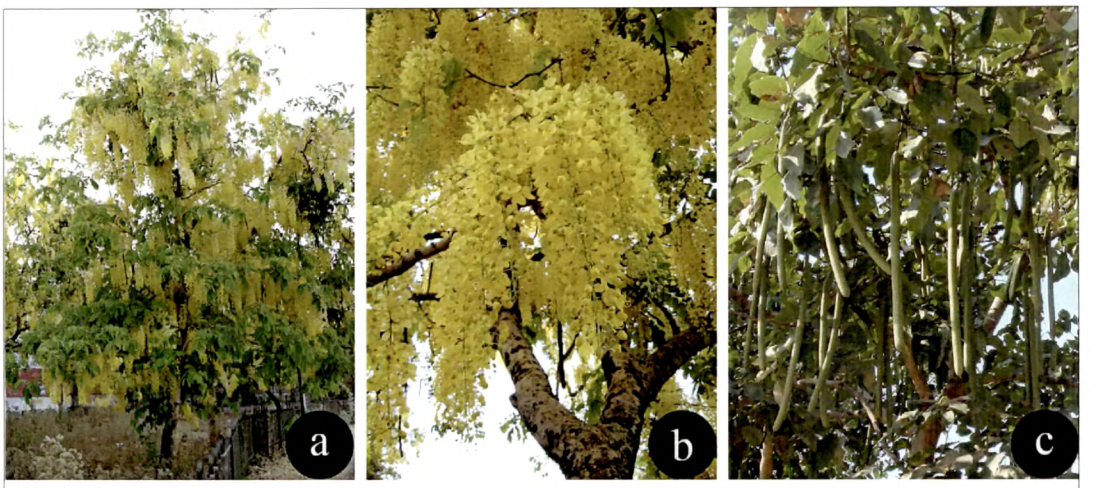


Fig. 66: *Cassia fistula* a. Habit, b. Inflorescence, c. Fruits

Fig. 67: *Cassia auriculata* a. Flowers, b. Fruits

Fig. 68: *Cassia siamea*

Fig. 69: *Hardwickia binata*

Fig. 70: *Saraca asoca* a. Habit, b. Inflorescence

2. pods terret or cylindrical, indehiscent

3. Leaflet 4-8 pairs, flowers yellow .....C. *fistula*

3. Leaflet more than 8 pairs

4. flowers dark red .....C. *javanica*

4. flowers pink or rosy pink

5. bracts acuminate ..... C. *renigera*

5. bracts cuspidate ..... C. *roxburghii*

1. Stamens only 5-7 antheriferous

6. tree 4-10 m tall, leaf rachis or petiole eglandular, flowers in spicate racemes or terminal panicles ..... C. *siamea*

6. small tree 1-2 m tall, leaf rachis or petiole glandular, flowers in axillary and terminal corymbose racemes ..... C. *auriculata*

Cassia fistula L. Sp. PI. 377. 1753; Baker in Hook. f. FI. Brit. India 2 : 261. 1871; Cooke. FI. Pres. Bombay 1 ; 444. 1958 (Repr.). Shah, Fl. Guj. 1:268; 1978, Pandey in J. Bombay Nat. Hist. Soc. 68 : 313. 1971; Sanj. Leg. India 15. 1991. Singh, et al Fl. Maha. Dicot. 1: 786. 2000.

Local Name: Garmalo, **English Name:** Golden shower, Golden rain, **Sanskrit Name:** Sampak, Suvernaka, Aragvadh

Identification Characters: leaves pinnate, petals 6, flowers bright golden yellow. stamens 10, pods 35-40 cm or more long, cylindric,

Description: Deciduous tree (2n = 24,26,28) 8-10 m tall, drooping branches, smooth, thick, grey bark. Leaves stipulate, petiolate, pulvinous leaf base, compound, large, paripinnate, dark green, ovate-oblong, acute. Flowers in drooping racemes, bright yellow in colour, bracteate, pedicellate, sepals 5, green, odd sepal anterior, petals 5, yellow, obovate, clawed, unequal, stamens 10, 3 long curved, 4 small also curved, 3 short, straight and staminodes, style and stigma simple, ovary curved. Fruit brown cylindrical pod with many seeds.

Phenological Data: Fls: Mar.- Apr, Frs: May. - July

Distribution: Throughout India, Pakistan, Myanmar, Sri Lanka, Thailand, Philippines, Vietnam

Origin\Native: Southern Asia

Ecology: Full sun on well-drained soil; it is drought and salt tolerant,

Category of threat: Common

Special Characteristics: Bark yield dye

Economic Importance: Ornamental flowering tree

Horticultural Value: Planted in gardens and parks, avenue, road side for its beautiful golden yellow flowers

Medicinal Value: Roots are useful in fever, heart diseases and as a laxative. The young leaves are used to cure ringworm

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical and sub tropical environment

Agricultural Value: Cultivated for ornamental purposes

Uses: Wood ash is used as a mordant in dyeing. The pulp of the pod is used in Bengal to flavor native tobacco.

Fig. 71: *Cassia renigera* a. Habit, b. Flowers, c. Fruit

Fig. 72: *Cassia javanica* a. Flowering twig, b. Flower

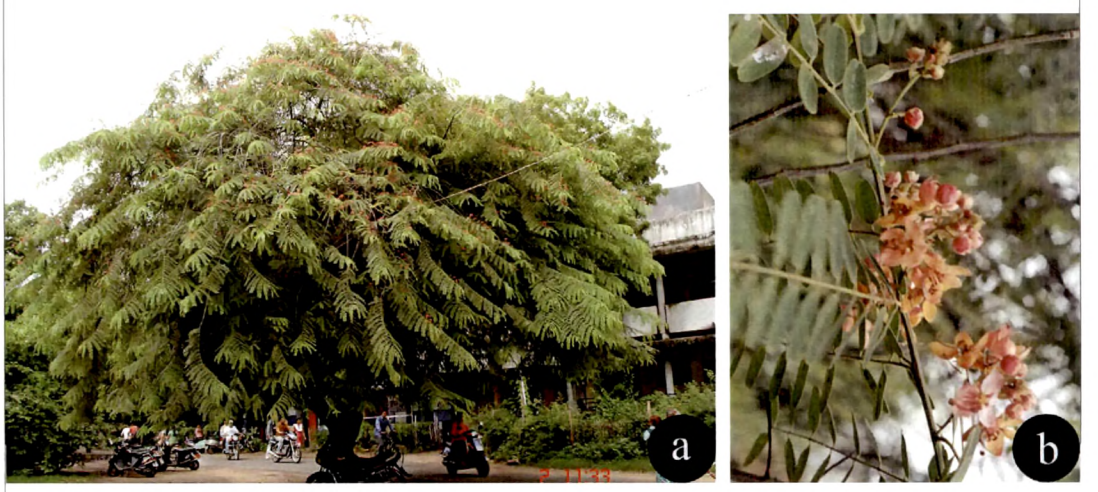


Fig. 73: *Cassia roxburghii* a. Habit, b. Flowers

Localities in Gujarat: Throughout in deciduous forests; also planted along roads and in gardens (Shah, 1978).

***Cassia Javanica* L.** Sp. Pl. 379. 1753; Baker in Hook. f. Fl. Brit. India 2: 267. 1878; Sanjappa, Legumes of India 16. 1991; Moorthy in Singh et al. Fl. Maharashtra St. Dicot. 1: 799. 2000.

Local Name: Cassia, **English Name:** Apple- blossom cassia

Identification Characters: leaves pinnate, petals 6, stamens 10, 3-5 stamens sterile, pods 30 cm or more long, cylindric, flowers red or pink, filaments swollen in the middle

Description: Deciduous tree 7.5-10 m tall trees, with grey or greyish-brown, nearly smooth bark. Semilunar; elliptic-oblong, softly sparsely hairy. Pods dark-brown, glabrous, and pendent

Phenological Data: Fls: Mar.- June, Frs: July. – Aug

Origin\Native: Java

Ecology: Full Sun, Average Water Needs

Category of threat: Common

Economic Importance: ornamental tree

Method for Propagation: Seeds.

Uses: The wood is used as fuel. It is also planted as ornamental tree in the garden and roadside plantation

***Cassia renigera* Wall. ex. Benth** in Trans. Linn. Soc. 27: 618. 1871; Baker in Hook. f. Fl. Brit. India 2: 262. 1878; Sanjappa, Legumes of India 20. 1991; Moorty in Singh et al. Fl. Maharashtra St. Dicot. 1: 2000.

Local Name: Pink cassia, **English Name:** Pink cassia

Identification Characters: pink flowers on leafless branches, yellow filaments swollen in middle

Description: Deciduous tree, 6-8 m tall with paripinnate leaves that are softly pubescent having small leaflets. There is a conspicuous reniform bract at the base of the leaf. The horizontally spreading branches of the tree support clustered pink flowers. Fruits are long cylindrical pods, with light brown seeds

Phenological Data: Fls: June. - July, Frs: July. – Sep

Category of threat: Common

Economic Importance: ornamental tree

Horticultural Value: planted in gardens and parks

Method for Propagation: Seeds.

Uses: As a decorative tree planted in the garden

***Cassia roxburghii* DC.** Prodr. 2: 489. 1825; Sanjappa, Legumes of India 20. 1991; Naik, Fl. Marathwada 1: 333. 1998. *C. Marginata* Roxb Fl. Ini. 2: 338. 1832; Baker in Hook f Fl. Brit. India 2: 262. 1878; Moorthy in Singh et al. Fl. Maharashtra St. Dicot. 1 : 800. 2000

Local Name: Cassia, **English Name:** The Burmese pink cassia

Identification Characters: leaves pinnate, petals 6, stamens 10, 3-5 stamens sterile, pods 30 cm or more long, cylindric, flowers red or pink, filaments not swollen in the middle

Description: Deciduous tree, 4-8 m tall trees, with grey or yellowish-brown, smooth bark, featherlike

pinnately compound leaves opposite or subopposite, oblong, at length nearly glabrous. Flowers pink or red, in terminal racemes, conspicuous yellow stamens are characteristically swollen at their middles, Pendent, seldom subtorulose, dark-brown, glabrous, reticulate. Fruit is cylindrical and indehiscent Seeds lenticular, compressed, smooth, glabrous, pale-yellowish-brown

Phenological Data: Fls: May- Jul, Frs: Aug- Sep

Distribution: Throughout India, Pakistan, Burma, Bangladesh, Myanmar

Origin\Native: Burma, Sri Lanka and southern India

Ecology: prefers partial shade or partial sun to full sun; soil should be dry, full sun or partial shade, well-drained soils

Category of threat: Common

Economic Importance: ornamental tree

Horticultural Value: planted in gardens and parks

Method for Propagation: Seeds.

Suitable Environmental Conditions:

Uses: An ornamental tree

Cassia siamea Lam. Encycl. 1 : 648. 1785; Baker in Hook. f. Fl. Brit. India 2 : 264. 1878; Cooke. Fl. Pres. Bombay 1 ; 454. 1958 (Repr.). Shah, Fl. Guj. 1:272; 1978, Sanj Leg. India 20. 1991. *Senna sumatrana* Roxb. Fl. Ind. 2 : 254. 1832. *S. siamea* (Lam.) Irwin & Barneby Mem. N. Y. Bot. Gard. 35 ; 98. 1982. Singh, et al Fl. Maha. Dicot. 1: 800. 2000.

Local Name: Kasod, **English Name:** Cassia

Identification Characters: leaves pinnate, petals 6, fertile stamens 6-7, pods not more than 30 cm long, narrowly linear or lanceolate.

Description: Evergreen tree, 4-10 m tall trees, with light-blackish-brown, rough, longitudinally fissured bark, straight trunk, crown usually dense and rounded. Paripinnate, composed of 4-12 pairs of leaflets; Coriaceous, stipule minute, subulate and caducous; leaflet ovately oblong, ovate-oblong or elliptic-oblong, minutely petiolate, finely pubescent on lower surface, base rounded; apex often rounded or emarginate, flowers pale-yellow, in terminal, branched racemes, long peduncle. Bracts are obovate, with long acute apex. Sepals 5, small orbicular, unequal, thick, hairy on the outside, 2 outer ones shorter than 3 inner ones. Petals 5, yellow, broadly obovate, short clawed. Stamens 10, unequal, 2 long 5 short and 3 reduced. Ovary finely pubescent; with glabrous style. Pods numerous, long, narrow, flat, dark brown, strap shaped, stipitate, terete to compressed, dehiscent, with septae between the numerous seeds, stoutly beaked. Seeds flat, dark-brown, smooth, glabrous.

Phenological Data: Fls. and Frs: Throughout the year

Distribution: throughout the tropics

Origin\Native: Burma

Ecology: Full sunlight, deep, well-drained, loamy or sandy loam fertile soils

Category of threat: Common

Economic Importance: ornamental flowering tree

Horticultural Value: planted along roadside for its abundant yellow flowers, as a live fence around food crops

Medicinal Value: leaves as a laxative

Method for Propagation: Seeds.

Suitable Environmental Conditions: various types of forests at low altitudes

Agricultural Value: Cultivated for ornamental purposes

Uses: An excellent roadside tree

Localities in Gujarat: Planted along roads and in gardens (Shah, 1978).

DELONIX Raf.

1. Flowers creamy-yellow to pale yellow, pods 15-25 cm long ..... D. *elata*

1. Flowers scarlet or reddish orange, pods 30-40 cm long ..... D. *regia*

Delonix elata (L.) Gamble, fl. Pres. Madras 1: 396. 1919 [(1 : 280. 1957 (Repr.) Shah, Fl. Guj. 1:274; 1978,]; Sanj. Leg. India 27. 1991. *Poiniciana elata* L. Cent. Pl. 2 : 16. 1756; Baker in Hook, f. Fl. Brit. India 3: 260. 1878; Cooke, Fl. Pres. Bombay 1: 441. 1958 (Repr.). Singh, et al Fl. Maha. Dicot. 1: 802. 2000.

Local Name : Sandesra.

Description: Trees, bark ash – coloured. Leaves abruptly opposite; leaflets subsessile, linear – oblong, base rounded, apex usually apiculate. Flowers yellow on finely pubescent stout pedicels in terminal. Few flowered, cymbiform racemes. Pods attenuated at both ends, reticulately veined.

Phenological data : Fls . - Frs. : June – December.

Distribution in Gujarat : Surat, Bharuch, Rajpipla, Panchmahals, North Gujarat, Saurashtra; wild or cultivated (Shah, 1978).

Delonix regia (Bojer ex Hook.) Rafin., Fl. Tellur 2: 92. 1836; Sanj. Leg. India 27. 1991. Poinciana regia Boj. in Hook. Bot. Mag. 56 : 5, t. 2884. 1829; Baker in Hook. f. Fl. Brit. India 2 : 260. 1878; Cooke, Fl. Pres. Bombay 1 : 442. 1958. Repr. Shah, Fl. Guj. 1:275; 1978. Singh, et al Fl. Maha. Dicot. 1: 803. 2000.

Local Name: Gulmohor, **English Name:** Gold mohur, Peacock tree

Identification Characters: plants unarmed, leaves bipinnate; flowers in racemes or panicles, sepals valvate, flowers scarlet, reddish-orange, pods flat, 30-40 cm long.

Description: Deciduous tree (2n = 24, 26). 7-12 m tall, grey to pale-brown bark, umbrella shaped crown, horizontally spreading branches. Leaves large stipulate, petiolate, compound, alternate, bipinnate, feathery, oblong, glabrous. Flowers large showy, terminal, simple or branched racemes, orange-red, crowded at the end of branches, sepal 5, fleshy, green on outside and red inside, petal 5, clawed, spoon shaped, crinkled, four petals bright orange while the fifth is larger and variegated, stamens 10, filaments bright red, anthers yellow, ovary monocarpellary, style green. Fruit broadly linear, woody, dark-brown or reddish-brown, flat, beaked. Seeds oblong, glabrous, smooth, white or creamy-white mottled brown.

Phenological Data: Fls: Apr.-Aug. Frs: Aug.- Oct

Distribution: Through our India, Australia, Caribbean, Hawaii, Florida, Arizona

Origin\Native: (Malagasy Republic) Madagascar

Ecology: Full sun, drought tolerant, moderate water

Category of threat: Common

Fig. 74: *Delonix regia,* a. Habit, b. Flower, c. Fruit

Fig. 75: *Parkinsonia aculeata* a. Habit, b. Flower, c. Fruits

Fig. 76: *Peltophorum pterocarpum* a. Habit, b. Flower, c. Fruits

Fig. 77: *Tamarindus indica* a. Habit, b. Flower, c. Fruits

Special Characteristics: Bright petals sweet in taste

Economic Importance: ornamental flowering tree

Horticultural Value: Planted for colorful flowers along the road side, avenue, parks and gardens, spectacular shade tree

Medicinal Value:

Method for Propagation: cuttings, Seeds.

Suitable Environmental Conditions: tropical or near-tropical frost free climate

Agricultural Value: Cultivated for ornamental purpose

Uses: Flowers and buds often used as potherb, petals are edible. The wood is source of fuel in rural areas.

Localities in Gujarat: Planted in gardens and along roadsides

HARDWICKIA Roxb.

Hardwickia binata Roxb., Pl. Cor. 3: 6, t. 209. 1819; Baker in Hook. f. Fl. Brit. India. 2: 270. 1878; Cooke, Fl. Pres. Bombay 1: 456, 1958 (Repr.). Shah, Fl. Guj. 1:275; 1978, Sanj. Leg. India 29. 1991. Singh, et al Fl. Maha. Dicot. 1: 792. 2000.

Local Name : Anjan.

Description: Trees, tall. Leaflets pair, subsessile, obliquely ovate. Flowers yellowish-green, in axillary and terminal panicles. Pods strap-shaped, veined, narrowed at both ends. Seeds solitary.

Phenological Data: Fls. – Frs. : Aug. – Jan.

Distribution in Gujarat : Saurashtra and Bulsar, rare (Shah, 1978).

PARKINSONIA L.

Parkinsonia aculeata L. Sp. Pl. 375. 1753; Baker in Hook. f. Fl. Brit. India. 2: 260. 1878; Cooke, Fl. Pres. Bombay 1: 442, 1958 (Repr.). Shah, Fl. Guj. 1:275; 1978,Sanj. Leg. India 33. 1991. Singh, et al Fl. Maha. Dicot. 1: 804. 2000.

Local Name: Ram Baval, **English Name:** Horse bean tree, Jerusalem thorn

Identification Characters: plants armed leaves bipinnate; flowers in racemes or panicles, sepals valvate, flowers bright yellow, pods turgid, moniliform.

Description: Deciduous tree (2n = 28) A large shrub or a small trees, 3-6 m tall, with smooth bark. Leaves alternate, compound, bipinnate; leaflets minute, ovate or oblanceolate, glabrous, rounded tip. The flowers are terminal or axillary racemes, fragrant, bright yellow, sepals 5, cleft shaped, petals 5, yellow, the upper petal with long claw, stamens 10, orange, filaments pilose at base, ovary monocarpellary superior, small stigma, numerous ovules on marginal placenta. Fruits long, linear, reticulate, glabrous. Seeds ellipsoidal-oblong, smooth, dark-brown.

Phenological Data: Fls: Nov. Frs: Dec. – Jan

Distribution: California, Arizona, and Florida, the West Indies, Australia

Origin\Native: South West America, Mexico

Ecology: full sun, reflected heat, extremely heat resistant, drought resistant, little to moderate water, adapted to any soil

Category of threat: Common

Special Characteristics: flowers are fragrant

Economic Importance: Ornamental tree

Horticultural Value: Planted in parks and gardens, roadside, hedges,

Medicinal Value: The bark, lead, flowers used as febrifuge

Method for Propagation: Seeds, cutting.

Suitable Environmental Conditions: dry and hot climate

Agricultural Value: cultivated for ornamental purposes

Uses: Wood is used as fuel, pulp is used in paper. The leaves used as fodder. The plant can be used as windbreaks.

Localities in Gujarat: Planted as a hedge at many places; also an escape

PELTOPHORUM (Vogel.) Benth.

Peltophorum pterocarpum (DC.) Baker ex K. Heyne in Nutt. Pl. Ned. Ind. ed. 2, 2: 755. 1927; Sanj. Leg. India 33. 1991. *Inga pterocarpa* DC. Prodr. 2 : 441. 1825. *Peltophorum ferrugenium* (Decne.) Benth. Fl. Austral 2 : 279. 1864; Baker in Hook. f. Fl. Brit India 2 : 257. 1878. *P. roxburghii* (G. Don) Degener, Fl. How. Fam. 1696. 1938; Blatt. et al. Some Beaut. Indian Trees109. 1954. Shah, Fl. Guj. 1:276; 1978, Singh, et al Fl. Maha. Dicot. 1: 804. 2000.

Local Name: Tamrafali, **English Name:** Copper pod tree

Identification Characters: leaves bipinnate, flowers racemes or panicles, sepals imbricate, pods winged

Description: Evergreen tree (2n = 28). 5-16 m tall, younger parts rusty-brown or Greyish-tomentose, smooth grey bark, vase, round, spreading crown, Leaves large, feathery, alternate, compound, bipinnate, paripinnate, leaflets 5-10, opposite, oblong, glabrous, dark green. Flowers bright-yellow, terminal and axillary reddish-brown panicles, fragrant, rusty tomentose, calyx cup shaped, petals 5, yellow, crinkled, rounded, stamens 10, unequal in size, ornage red anthers, filaments with silky hairs, ovary monocarpellary, slender style, peltate stigma. Fruit flat, lanceolate, dark-brown, woody.. Seeds obovate-oblong, compressed, smooth, and glabrous

Phenological Data: Fls. and Frs: Throughout the year

Distribution: throughout India

Origin\Native: Ceylon, Andaman, Malaya and North Australia

Ecology: semi-shade, Needs moist, but well-drained soil, clay; sand; loam; alkaline; acidic

Category of threat: Common

Special Characteristics: flowers are fragrant

Economic Importance: ornamental tree

Horticultural Value: Planted in gardens, avenue, roadside for its beautiful flowers and fruits

Medicinal Value: Seeds act as purgative

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical environment

Agricultural Value: cultivated for ornamental purposes

Uses: Seeds eaten raw or roasted. The bark yields brown dye which is used in batik cloth

Localities in Gujarat: Planted in gardens and along roads (Shah, 1978).

SARACA

Saraca asoca **(Roxb.) de Willd** in Blumea 15: 393. 1968; Sanjappa, Legumes of India 35. 1991; Moorthy in Singh et al. Fl. Maharashtra St. Dicot. 1: 793. 2000.

Jonesia asoca Roxb. In Asiat Res. 4: 365. 1795; Wight, Ic. T. 206. 1839. Saraca indica auct non L. (1753); Baker in Hook f Fl. Brit. India 2: 271. 1878; Cooke, fl. Pres. Bombay 1: 456. 1958 (Repr.)

Local Name: Ashok, **English Name:** Ashoka tree and Sorrow less tree

Identification Characters: leaves pinnate, petals 0, fertile stamens 10. leaflet pairs 4-6, calyx tube long, ovary stalked, many ovulate, pods 4-8 seeded.

Description: Evergreen tree (2n = 24). 5-7 m tall, with dark-brown to black, rough bark, dense crown. Leaves alternate, compound, paripinnate, Leaflets dark green, glossy, oblong-lanccolate, glabrous, petiolulate, acute apex. Flowers yellow or reddish-yellow, in corymbs, fragrant, bracteate, bracts are bright orange-red colored, showy, petals absent, calyx tube with four lobes, stamens 6-8, filaments long ornage, anthers purple, style curved. Fruits linear-oblong, flat, glabrous, coriaceous, veined. Seeds ellipsoid-oblong compressed, brown, smooth glabrous

Phenological Data: Fls: Jan. – May, Frs: Aug. – Sep

Distribution: throughout India and Sri Lanka

Origin\Native: Tropical Asia: India, Sri Lanka, Myanmar, Malaysia

Ecology: semi shade, porous and moist soils

Category of threat: Common

Economic Importance: ornamental tree

Horticultural Value: Planted in parks and gardens

Medicinal Value: Diuretic, tonic, cooling, aphrodisiac and the dried fruits are used in cases of spermatorrhoea, phosphaturia, diseases of genito-urinary tract such as dysuria, gonorrhea, chronic cystitis, calculus affections, urinary disorders, incontinence of urine, gout and impotence also in uterine disorders after parturition. The bark contains tannin, catechol, sterol and organic calcium compounds. The seeds are strengthening and the ash of plant is good for external application in rheumarthritis

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical environments

Agricultural Value: cultivated for its ornamental and medicinal values

Uses: Timber yielding plant. Wood is useful for house building and ploughing. The tree is associated with mythological beliefs. The tree is sacred in Hindus, Buddhishts, Jain. The tree gets a mention in the Ramayana as the *Ashoka Vatika* (garden of Ashoka trees) where Hanuman first meets Sita. The Hindu married women worship the tree. Lord Buddha was born under this tree in Lumbini. Also Lord Mahavira renounced the world under the Ashoka tree in Vaishali.

TAMARINDUS L.

Tamarindus indica L. Sp. Pl. 34. 1753; Baker in Hook. f. Fl. Brit. India. 2: 273. 1878; Cooke, Fl. Pres. Bombay 1: 457, 1958 (Repr.). Shah, Fl. Guj. 1:278; 1978,Snaj. Leg. India 36. 1991. Singh, et al Fl. Maha. Dicot. 1: 794. 2000.

Local Name: Amli, **English Name:** Tamarind, **Sanskrit Name :** Amlika, Chincha.

Identification Characters: leaves pinnate, petal 3, fertile stamens 3

Description: Evergreen tree (2n = 24). A large, 10-15 m tall; bark dark-grey or reddish-black, rough, longitudinally fissured, drooping branches, dome shaped crown. Leaves stipulate, alternate, compound, bipinnate, paripinnate, leaflets 10-20 pair, linear-oblong, subcoriaceous, glabrous, sessile. Flowers fragrant, yellow, with purple streaks, bracteate, bracts boat shaped yellow, falls when flower opens, sepals, creamy

white, reflexed, tubular, petals 5, unequal in size, upper 3 veined in red, wrinkled, lower 2 are smaller, stamens 6, fertile stamens 3 alternate with 3 staminodes, filaments united, anthers versatile, oblique pistil. Fruit somewhat falcate, linear-oblong, with rough, fibrous, grey epicarp, sweet-sour in taste. Seeds dark-chocolate-brown, polished, smooth, glabrous, rhomboidal truncate at base

Phenological Data: Fls: Aug.- Dec, Frs: Jan.- Apr

Distribution: throughout India, Sri Lanka, Myanmar, East Indies

Origin\Native: Africa

Ecology: deep alluvial soil to rocky land and porous, drought resistant, full sun / light shade, regular watering

Category of threat: Common

Economic Importance: ornamental tree

Horticultural Value: planted in parks and gardens, avenue, along roadside

Medicinal Value: gastric and/or digestion problems, The fruit pulp is rich in tartaric - and citric acids, high amount of vitamin C and sugar, cathartic, astringent, febrifuge, antiseptic, refrigerant

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical environments

Agricultural Value: cultivated for fruits

Uses: The timber is hard so used to make rice pounders. Pulp forms favorable constituent of *curries*. Leaves are used as vegetable, medicinally several parts are used. The fruit pulp is used to make *chutney, curries* and *sambhar*.

Localities in Gujarat: Throughout, planted or self-sown, rarely wild in dense forests

MIMOSACEAE

Herbs, shrubs, trees or lianas; leaves compound, bipinnate, stipules modified into spines; inflorescence heads or spikes; flowers regular, bisexual, bracteates; sepals 5 , united, petals 5, united or free, stamens many, free, carpel 1, marginal placenta; fruit legume or lomentum, seeds nonendospermic.

1. Stamens indefinite
    2. filaments free to the base ..... *Acacia*
    2. filaments more or less connate at base
        3. pods coiled ..... *Pithecellobium*
        3. pods not coiled
            4. flowers white or creamy, pods flat, not septate between seeds ..... *Albizia*
            4. flowers rosy-pink, pods fleshy, septate between seeds ..... *Samanea*

1. stamens definite
    5. anthers gland-tipped
        6. inflorescence bi coloured ..... *Dichrostachys*

Fig. 78: *Acacia auriculiformis* a. Inflorescence, b. Fruit

Fig. 79: *Acacia catechu* a. Inflorescence, b. Fruits

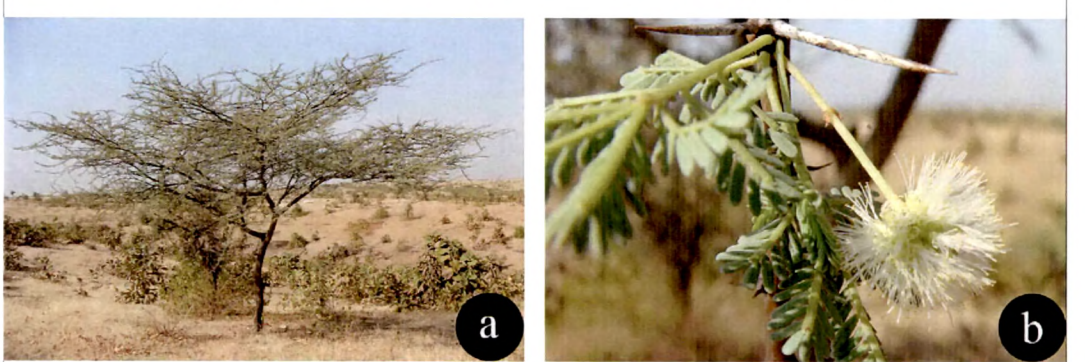


Fig. 80: *Acacia planifrons* a. Habit, b. Inflorescence

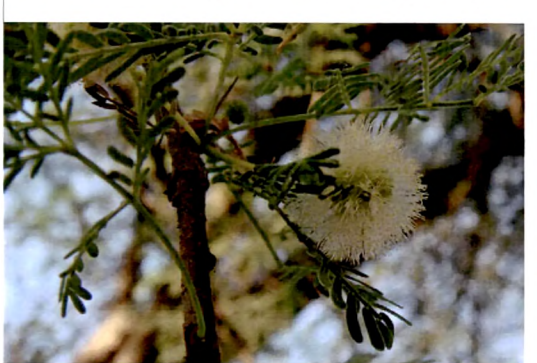


Fig. 81: *Acacia ferruginea*

Fig. 82: *Acacia polycantha*

6. inflorescence no bicoloured

7. flowers in globose heads, large trees ..... *Parkia*

7. flowers in elongated spikes

8. armed small trees ..... *Prosopis*

8. unarmed trees, seeds bright red ..... *Adenanthera*

5. anthers not gland-tipped ..... *Leucaena*

ACACIA Mill.

1. flowers in elongated spikes

2. petioles modified into phyllodes ..... A. *auriculiformis*

2. petioles not as above

3. spitular spines three-nate ..... A. *senegal*

3. stipular spines paired

4. Pinnae more than 4 pairs, pods beaked..... A. *catechu*

4. pinnae more than 4 pairs, pods not beaked

5. corolla pale yellow ..... A. *ferruginea*

5. corolla white ..... A. *chundra*

1. flowers in globose heads

6. pinnae two pairs ..... A. *eburnea*

6. pinnae more than two pairs

7. branches marked with grey or pale brown dots ..... A. *farnesiana*

7. branches not as above

8. bark blackish-grey to brown, pods constricted between seeds ..... A. *nilotica* ssp *indica*

8. bark yellowish, pods not constricted between seeds ..... A. *leucophloea*

Acacia auriculiformis A. Cunn. Ex. Bth. In Hook. London J. Bot. 1 : 377. 1842; Sen & Naskar in Bull. Bot. Surv. India 7 : 31. 1958; Sanj. Legumes of India 45. 1991. Singh, et al Fl. Maha. Dicot. 1: 824. 2000.

Local Name: Australian Baval, **English Name:** Australian wattle

Identification Characters: tree with phyllodes, true leaves are absent, stamens indefinite, free, flowers in spikes, pods twisted.

Description: Evergreen tree (2n = 26). 3-5 m tall handsome tree with phyllodes, true leaves are absent, rough bark, drooping branches, true leaves present at seedling stage, the thick sickle shaped leaf like structure are

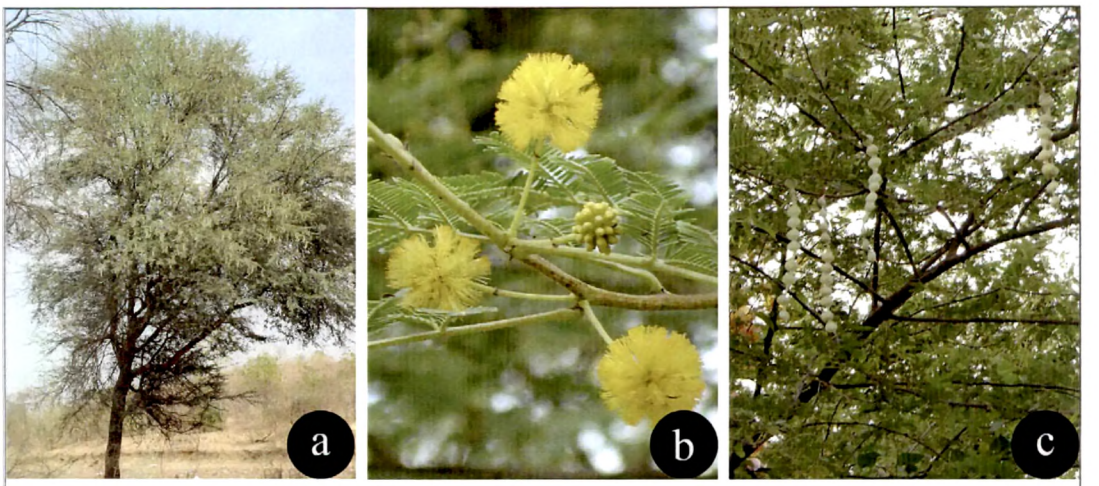


Fig. 83: *Acacia nilotica* ssp. *indica* a. Habit, b. Inflorescence, c. Fruits

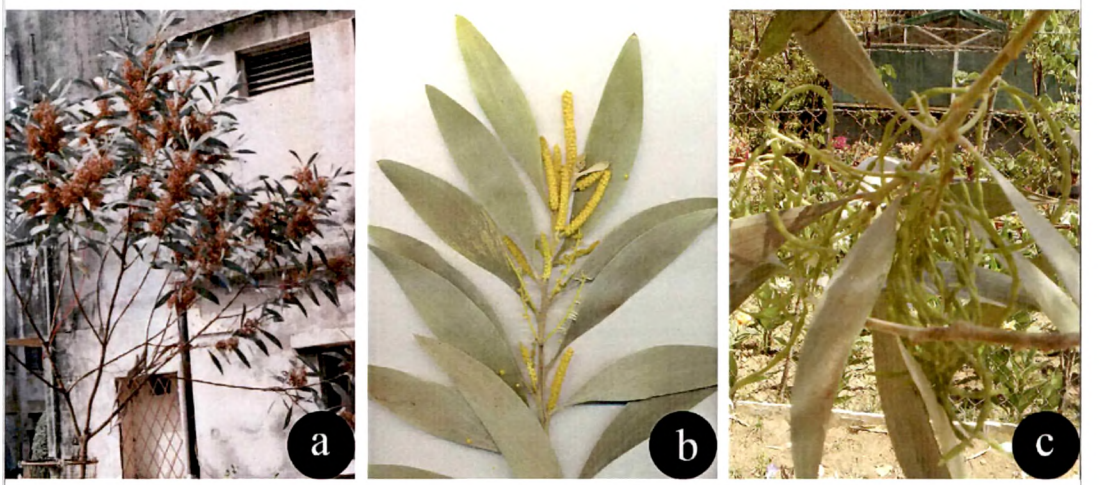


Fig. 84: *Acacia mangium* a. Habit, b. Flowering twig, c. Fruits

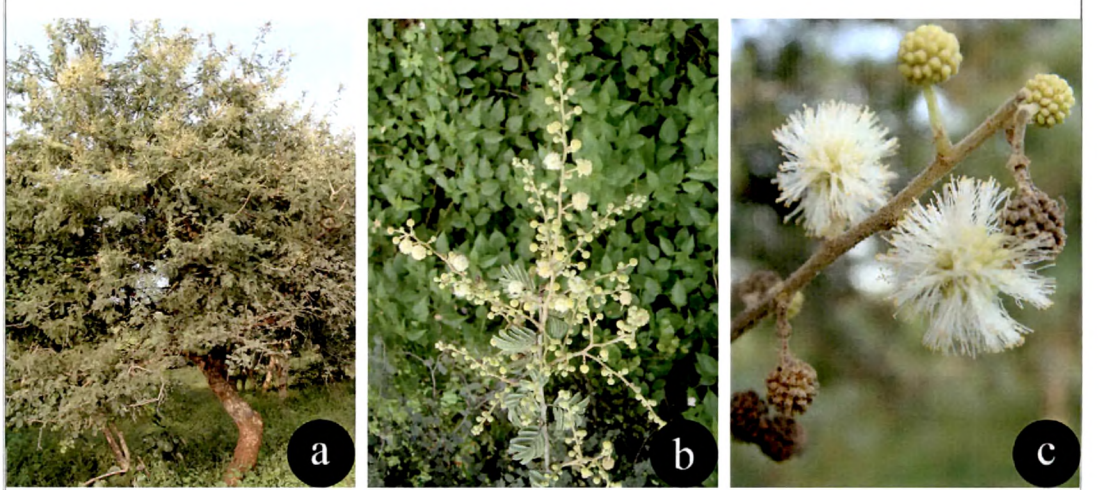


Fig. 85: *Acacia leucophloea* a. Habit, b. Flowering twig, c. Inflorescence

expanded petioles, which are coriaceous, falcate –lanceolate, glossy, narrow ant end, with prominent 4-6 parallel veins, confluent at end. Flowers yellow, small, in axillary spikes, fragrant, sepals 5, united; petals 5, united; stamens many, free; ovary superior, monocarpellary, style curved. Fruit legume, twisted green pods, turns brown when ripe, dehiscent. Seeds black, shining

Phenological Data: Fls. and Frs: Sep- Apr

Distribution: Fiji, India, Indonesia, Java, Malaysia, Niger, Nigeria, Philippines, Tanzania, Thailand, the Soloman Islands, Uganda, and Zanzibar

Origin\Native: Tropical Australia

Ecology: full light, Grows best in humid, deep, medium-textured, alluvial soils; also grows in a wide variety of soils: sandy or clay texture, salty soils. Tolerates heat, and drought. It is intolerant to shade.

Category of threat: Common

Special Characteristics: Sickle shaped leaflets

Economic Importance: ornamental tree

Horticultural Value: shade tree, planted in gardens, avenue tree

Method for Propagation: Seeds.

Suitable Environmental Conditions: Subtropical Moist to Wet through Tropical Dry to Wet Forest, tropical, frost-free, humid or sub-humid climate

Agricultural Value: cultivated for social forestry plantation

Uses: Used in the soap industry and also used in lac cultivation, as fuel wood.

Localities in Gujarat: Planted in road side and garden (Shah, 1978).

Acacia catechu (L.f.) Willd. Sp. Pl. 4 : 1078. 1806; Baker in Hook. f. Fl. Brit. India 2; 295. 1876; Cooke. Fl. Pres. Bombay 1 : 476. 1958 (Repr.). Shah, Fl. Guj. 1:281; 1978, Sanj. Legumes of india 38. 1991. *Mimosa catechu* L. f. Suppl. Pl. 439. 1781. *Acacia polyacantha* Willd. Sp. Pl. 4 ; 1079. 1806; Brenan in Kew Bull. 1956 : 195. 1957. *A. suma* (Roxb.) Buch – Ham. Ex,. Voigt, Hort. Subur. Calc. 260. 1845. Baker in Hook. f. op. Cit. 294; Cooke. Op. Cit. Singh, et al Fl. Maha. Dicot. 1: 808. 2000.

Local Name: Khair, **English Name:** Black cutch

Identification Characters: armed trees, bark dark brown, pinnae 20 – 30 pairs, stamens indefinite, free, flowers in spikes, creamy white; pods flat, seldom rugid or torulose,

Description: Deciduous tree (2n = 26). 6-13 m tall, armed trees, with light-black, rough bark, branchlets with a pair of short hooked spines which are intra-stipular, compressed, brown in colour. Leaves petiolate, compound, bipinnate, pinnae 20-30 paired with each having 40-50 pairs of leaflets, leaflets are glabrous, imbricating, linear-oblong. Flowers in axillary spikes, creamy-white, fragrant. Fruit lanceolate, glabrous, pale- to dark –brown, reticulate, apiculate pod. Seeds ellipsoid-oblong, smooth, glabrous, brown.

Phenological Data: Fls: Feb. – Apr, Frs: Apr.- June.

Distribution: India, foothills of Himalaya

Origin\Native: India, Pakistan and Myanmar

Ecology: soils with porous alluvium consisting of sand and shingle suits it best, dry, warm climate, moist soil

Category of threat: Common

Special Characteristics: the bark yields dye

Economic Importance: ornamental tree

Horticultural Value: planted along road side

Fig. 86: *Acacia catechu* a. Leaves, b. Spines

Fig. 87: *Acacia leucophloea* a. Leaves, b. Spines

Fig. 88: *Acacia nilotica* ssp. *indica* a. Leaves, b. Spines

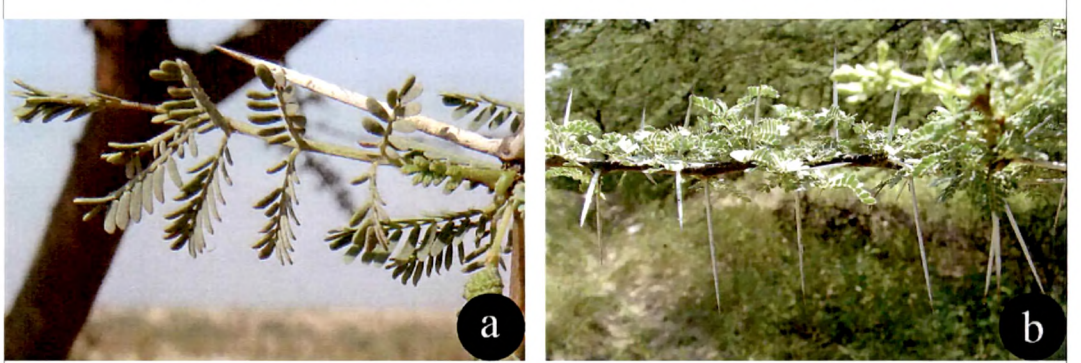


Fig. 89: *Acacia planifrons* a. Leaves, b. Spines

Medicinal Value: The bark is used as an astringent, for cough, sour throat, ulceration, eczema and diarrhea, the '*katha*' is said to help in digestion of food.

Method for Propagation: Seeds.

Suitable Environmental Conditions: dry deciduous forests

Agricultural Value: cultivated for ornamental and medicinal purposes

Uses: The wood is strong and hard is used for making cases, box, agricultural implements and furniture. It makes excellent charcoal and '*Katha*' is also obtained from this plant which is used in '*Paan*'. The dye is used in tanning cloth to give original *Khakhi* colour, also used in dying fishing net, sails of ship.

Localities in Gujarat: Throughout, in deciduous forests, common; sparingly seen in scrub forests (Shah, 1978).

Acacia chundra (Roxb. ex Rottl.) Willd. Sp. Pl. 4:1078. 1806; Sanjappa, Legumes of India 5. 1991; Londhe in Singh et al. Fl. Maharashtra St. Dicot. 1:808. 2000. *Mimosa chundra* Roxb. Ex Rottl., Ges. Naturf. Fr. Ber., Mag. Neue. Schr. 4:207. 1803. *Acacia sundra* (Roxb.) DC. Prodr. 2:458. 1825; Baker in Hook. f. Fl. Brit. India 2:295. 1878; Cooke, Fl. Pres. Bombay 1:477. 1958 (Repr.). *Acacia catechu* (Roxb. Ex Rottl.) Willd. Var. sundra (DC.) Prain in J.Asiat. Soc. Bengal 66:508. 1898.

Local Name: Lal Khair

Identification Characters: Armed trees, bark dark brown, pinnae 20 – 30 pairs, stamens indefinite, free, flowers in spikes; pods flat

Description: Deciduous, small, armed trees, with light-black, rough bark. Leaves petiolate, compound, bipinnate, pinnae 20-30 paired, leaflets are glabrous, imbricating, linear-oblong. Flowers in axillary spikes. Fruit lanceolate, glabrous,brown, reticulate, apiculate pod. Seeds ellipsoid-oblong, smooth, glabrous, brown.

Phenological Data: Fls - Frs: Aug. - Feb.

Distribution: India, foothills of Himalaya

Origin\Native: India, Pakistan and Myanmar

Localities in Gujarat: Throughout, in deciduous forests, common; sparingly seen in scrub forests (Shah, 1978).

Ecology: Soils with porous alluvium consisting of sand and shingle suits it best, dry, warm climate, moist soil

Category of threat: Common

Economic Importance: Ornamental tree

Horticultural Value: Planted along road side

Method for Propagation: Seeds.

Suitable Environmental Conditions: Dry deciduous forests

Uses: The wood is strong and hard is used for making cases, box, agricultural implements and furniture.

Acacia ferruginea DC. Prodr 2 : 458. 1825; Baker in Hook. f. Fl. Brit. India 2 : 295. 1878;Cooke. Fl. Pres. Bombay 1; 477. 1958 (Repr.). Shah, Fl. Guj. 1:282; 1978, Sanj. Legumes of india 39, 40. 1991. Singh, et al Fl. Maha. Dicot. 1: 811. 2000.

Local Name : Babarkhair, **Sanskrit Name :** Somasara.

Description : Trees, rough, rusty brown. Leaves bipinnate, leaflets linear oblong. Flowers creamy – white, sessile, densely arranged in spikes. Pods brown, reticulately veined, beaked.

Phenological data: Fls. – Frs.: May - October.

Localities in Gujarat: Dangs, Vyara, Songadh, Panchmahals, North Gujarat (Modasa), Saurashtra and Kachchh; not common (Shah, 1978).

Acacia leucophloea (Roxb.) Willd. Sp. Pl. 4 ; 1083. 1806; Baker in Hook. f. Fl. Brit. India 2; 294. 1878; Cooke. Fl. Pres. Bombay 1 : 475. 1958 (Rerp.). Shah, Fl. Guj. 1:283; 1978,Sanj. Legumes of India 41. 1991. *Mimosa leucophloea* Roxb. Pl. Cor 2 27, .t. 150. 1800. Singh, et al Fl. Maha. Dicot. 1: 811. 2000.

Local Name: Hermobaval, **Sanskrit Name:** Arimed, Irimed, Sveta-barbura, Vitkhadir.

Identification Characters: bark blackish- brown and rough, stamens indefinite, free, flowers in heads in terminal panicles, creamy to pale yellow; pods flat,

Description: Deciduous tree, 5-7 m tall trees, with Greyish-white and smooth bark in younger parts and blackish-brown and rough bark excorticating in irregular scales in older, Trunk stout, Leaves bipinnate, linear-oblong, bipinnately compound, with 4-13 pairs of pinnae, each with 5-30 pairs of leaflets, feathery green foliage, Spines 2-5 mm long, at the base of leaves. Heads creamy-to pale-yellow, terminal panicles, flat, linear-oblong, yellowish-brown, tomentose, Flowers conspicuous, light-yellow to cream in colour, in pendunculate aggregated in terminal or axillary panicles, 5-merous.

Phenological Data: Fls: May. – July, Frs: June-Nov

Distribution: Throughout India, Bangladesh, Indonesia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam

Origin\Native: Java

Localities in Gujarat: Throughout in plains (Shah, 1978).

Ecology: Stands drought well, Growing well on alluvial or infertile soils, dry-forests, savannas, bush woodlands, and desert ecosystems

Category of threat: Common

Special Characteristics: Bark yields tannin

Economic Importance: Ornamental tree

Horticultural Value: Planted along roadside, in aforestation programmes, good coppice

Medicinal Value: Bark rich in tannins. It is bitter and acrid and is used in treating diseases of the blood. Bark is boiled with red earth and applied locally on the body to treat heart pain. Also used in curing inflammation, bronchitis and as native medicine in leprotic conditions. Tannins used in preserving hides and skins.

Method for Propagation: Seeds, root suckers

Suitable Environmental Conditions: tropical and subtropical climate

Agricultural Value: Cultivated for tannin

Uses: The wood is used in the making of boat, agricultural implements and also used as fuel. shade for livestock and as a source of dry-season fodder

Acacia nilotica (L.) Willd. ex Del. Desir. Egypte Hist. Nat. 3: 79. 1813. *Mimosa nilotica* L. SP. Pl. 521. 1753. ssp. *astringens* (Schum. & Thonn.) Roberty in Candollea 11 : 150. 1948; Ali in Nasir & Ali, Fl. W. Pak. 36: 12. 1973; Sank. Legumes of India 41. 1991. *Mimosa astringens* Schum. & Thonn. Beskr. Guin. Pl. 327. 1827. *Acacia nilotica* ssp. *indica* var. *vediana* (T. Cooke) Vajrav. & Kamble in J. Bombay Nat. Hist. Soc. 79: 708. (1982) 1983; Naik, Fl. Marathwada, 1 : 345. 1998. *A. arabica* (Lam.) Willd. Var. *vediana* T. Cooke, Fl. Pres. Bombay 1 : 444. 1903. [1 :

473. 1958 (Repr.)]. Shah, Fl. Guj. 1:283; 1978. Singh, et al Fl. Maha. Dicot. 1: 812. 2000.

Local Name: Deshi Baval, **English Name:** Black babool , **Sanskrit Name:** Babbula, Barburha, Abhal.

Identification Characters: armed tree, bark blackish- brown and longitudinally fissured, stamens indefinite, free, flowers in axillary heads, pale yellow; pods torulose,

Description: Evergreen tree (2n = 44, 52, 104). 3-8 m tall, straight or crooked, armed, spreading crown, dark-blackish-brown, irregularly, longitudinally fissured bark. Paired, slender, straight spines grow from a single base and sometimes curve backwards, are up to 80 mm long and whitish but often reddish brown in colour. Leaves petiolate, compound, bipinnate; pinnae 3-6 pairs, glandular; each pinna with 10-20 pairs of leaflets, leaflets are minute, linear-oblong, opposite, glabrous. Flowers in globose heads, yellow, each flower has 5 fused sepals, petals 5, fused, yellow, tubular, ovary monocarpellary, superior, style long, stigma simple. Fruits moniliform pod, solitary, linear-oblong, glaucous-green, jointed, joints nearly orbicular, compressed, and minutely hairy. Seeds brownish-black, oblong, compressed, smooth, glabrous.

Phenological Data: Fls: July. - Oct, Frs: Aug.- Dec

Distribution: Drier parts of Asia, Africa

Localities in Gujarat: Throughout in plains, more common in arid or semi-arid regions (Shah, 1978).

Origin\Native: Tropical Africa, India and Pakistan

Ecology: full sun, drought tolerant, sensitive to frost, can grow in dry plains, wastelands, but is tolerant of grazing, drought, fire and salinity.

Category of threat: Common

Special Characteristics: black longitudinal fissured bark, yields gum

Economic Importance: Ornamental tree

Horticultural Value: planted along roadside, farm boundaries, as windbreaks, as an avenue

Medicinal Value: The gum is used medicinally, Astringent bark used for diarrhea, dysentery, and leprosy, coughs, gargle, toothache, ophthalmia, and syphilitic ulcers.

Method for Propagation: Seeds.

Suitable Environmental Conditions: hot and dry climate, semi-arid areas

Agricultural Value: cultivated for gum, ornamental purposes

Uses: Wood is hard & durable. Pods are eaten by livestock. Gum exuding from wound is collected as NTFP. Used in cultivation of Lac.

Acacia senegal (L.) Willd. Sp. Pl. 4:1077. 1806; Fl. Brit. India. 2:295; C 1:478; WI 1:19; S & J 22, *Mimosa sengal* L. Sp. Pl. 521. 1753. Shah, Fl. Guj. 1:285; 1978.

Local Name: Goradio Baval, **English Name:** Gum Arabic

Identification Characters: armed tree, spines ternate, bark ash coloured, leaves 2-5 cm long, rachis pubescent, pinnae 3 – 5 pairs, stamens indefinite, free, flowers in spikes, creamy-white; pods flat.

Description: Deciduous tree (2n=26) 2-7 m tall, armed trees, bark rough, brown or blackish, scaly, branches have many thorns, sharp and in two pairs, prickles present below the nodes, Leaves stipulate, petiolate, bipinnate, leaf-axis with 2 glands, pinnae 6–20 pairs; pale glaucous-green, apex obtuse to subacute; flowers in spikes normally produced with the leaves; calyx bell-shaped, glabrous, deeply toothed; corolla white to yellowish, fragrant, sessile; pod straight or slightly curved, strap-shaped, light brown or Grey, papery or woody, firm, indehiscent, glabrous, seeds greenish-brown linear, glabrous, 5-6

Phenological Data: Fls: Aug.-Oct, Frs: Oct. – Dec

Distribution: India, Nigeria, and Pakistan, tropical Africa

Origin\Native: Sub-Saharan Africa as well as Oman, Pakistan, and northwestern India

Localities in Gujarat: Bulsar, Vyara, Surat, Panchmahals, mahi ravines. Tuwa, north Gujarat, Saurashtra and Kutch; frequent in arid and semiarid regions (Shah, 1978)

Ecology: tolerance to alkali, drought, fire, high pH, poor soil, sand, slope, and wind.

Category of threat: Common

Special Characteristics: gummy exudation

Economic Importance: Ornamental tree

Horticultural Value: Plants useful for afforestation of arid tracts, soil reclamation, and windbreaks, provides shade and shelter

Medicinal Value: The Gum is used as medicinally, as demulcent for inflammations of the throat or stomach, treat diarrhea, dysentery, coughs, throat irritation, and fevers

Method for Propagation: Seeds.

Suitable Environmental Conditions: dry and hot environment

Agricultural Value: cultivated for gum

Uses: The wood is used for making furniture. It produces gum arabic, which is used as a food additive, in crafts, and as a cosmetic. Used in preparations of inks, pottery pigments, water-colors, wax polishes, and liquid gum; used as a binding agent.

ADENANTHERA

***Adenanthera pavonina* L.** Sp. Pl. 384. 1753; Baker in hook f Fl. Brit. India 2: 287. 1878; Cooke, Fl. Pres. Bombay 1: 466. 1958 (Repr.); Sanj. Legumes of India 54. 1991.

Local Name: Ratanjali, Ratanguj, **English Name:** Red bead tree and Coral pea

Identification Characters: unarmed trees, flowers in spikes, stamens definite, 4-10; pods long falcate, strap shaped, compressed, somewhat swollen above seeds, leathery, valves twisted after dehiscence, seeds lenticular-globose, bright to deep red shining.

Description: Deciduous tree (2n = 24). 7-15 m tall trees, rough, brown bark. Leaves compound, bipinnate, pinnae 4-6, opposite, each pinna with 12-20 dark green, alternate, elliptic-oblong, glabrous leaflets with entire margin and obtuse apex. Flowers yellow, subsessile, terminal and axillary racemes, fragrant, campanulate calyx, petals 5, yellow, united at base, stamens 10, free, sessile pistil, ovary curved. Fruit long, curved pod, dark-brown or blackish-brown, pod curled up when dry. Seeds are attractive, shining and scarlet in colour with a uniform weight.

Phenological Data: Fls: May-Aug, Frs: Aug.- Oct

Distribution: tropical eastern Asia, West Indies and various parts of South America.

Origin\Native China and Malaysia

Ecology: moist soil, full sun

Category of threat: Common

Economic Importance: ornamental tree

Horticultural Value: planted along roadside, in gardens and parks

Method for Propagation: Seeds and cuttings

Suitable Environmental Conditions: moist climate

Agricultural Value: cultivated for ornamental purposes

Uses: The seed is used for making jewellery. The wood is used for making furniture. It is also used as a substitute for true red sandalwood.

ALBIZZIA Durazz.

1. pinnae 2-4 pairs, leaflets more than 1 cm long
    2. Bark black, pinnae 2-3 pairs,flowers stalked ..... A. *lebbeck*
    2. Bark grey, pinnae 2-6 pairs,flowers sessile
        3. calyx and rachis pubescent..... A. *odoratissima*
        3. calyx and rachis glabrous..... A. *procera*

1. pinnae 6-20 pairs, leaflets not more than 1 cm long ..... A. *amara*

***Albizia amara* (Roxb.) Boivin.** Encycl. 19, siecl 2: 34. 1834; Baker in Hook f fFl. Brit. India 2: 301. 1878; Cooke, Fl. Pres. Bombay 1: 483. 1958 (Repr.); Sanj. Legumes of India 54. 1991. Mimosa amara Roxb. Pl. Cor. 1: 40, t. 122. 1799.

Local Name: Albizia, Munja, **English Name:** bitter albizia

Identification Characters: unarmed trees, pinnae 6-20 pairs, leaflets or more than 1 cm long; flowers greenish-white, stamens indefinite, flowers always in globose heads,

Description: Deciduous tree 6-8 m tall trees, with light blackish brown, rough scaly furrowed bark, lacks thorns. Leaves pinnately compound, with 15-24 pairs of small, linear leaflets, on 6-15 pairs of pinnae. Flowers pedicelled, creamy-white to yellow, fragrant, in 12-20 globose heads, clustered at the nodes of short lateral branches. They develop when the tree is almost leafless. Fruits are oblong pods, light brown, puberulous, thin, and 6-8 seeded; Seeds nearly spherical or slightly cuneate, smooth, glabrous.

Phenological Data: Fls: Mar. – May, Frs: Aug.-Jan.

Distribution: India, Africa, Ghana, Indonesia

Origin\Native: Botswana, Eritrea, Ethiopia, India, Kenya, South Africa, Sri Lanka, Sudan, Tanzania, Zambia, Zimbabwe

Ecology: light-demander, is intolerant of shade, very hardy and shows marked resistance to drought.

Category of threat: Common

Special Characteristics: tree yields a gum

Economic Importance: Ornamental tree

Horticultural Value: good species for afforestation of degraded hilly areas in dry and semi-arid tracts, avenue tree

Medicinal Value: fruits are said to cure malaria and coughs, It is alleged that the seeds are poisonous, gum used against ulcers

Method for Propagation: Seeds.

Suitable Environmental Conditions: wooded grassland and scrub, on rocky slopes

Agricultural Value: cultivated for afforestation progammes and ornamental purposes.

Uses: The wood is used for making handles, agricultural implements and also used for making furniture. The leaves are used for washing the hair. Leaves are used as an adulterant for tea. The leaves make excellent fodder. The branches are suited to both firewood and charcoal.

Fig. 94: *Albizia lebbeck* a. Habit, b. Inflorescence, c. Fruits

Fig. 95: *Leucaena latisiliqua* a. Habit, b. Inflorescence, c. Fruits

Fig. 96: *Pithecellobium dulce* a. Habit, b. Inflorescence, c. Fruit

Fig. 97: *Prosopis juliflora* a. Habit, b. Inflorescence, c. Fruits

Albizzia lebbeck (L.) Benth. in Hook. Lond. J. Bot. 3: 87. 1844; p.p. ('leddek') & in Trans. Linn Soc. 30: 562. 1875 p.p. Balker in Hook. f. Fl. Brit. India 2:298. 1878; Cooke, Fl. Pres. Bombay 1: 481. 1958 (Repr.). Shah, Fl. Guj. 1:287; 1978, Sanj. Legumes of India 56. 1991. *Mimosa lebbeck* L. Sp Pl. 516. 1753. Singh, et al Fl. Maha. Dicot. 1: 816. 2000.

Local Name: Siris, **English Name:** Indian walnut and Parrot tree, **Sanskrit Name :** Sirish, Shirisha, Mrudu-pushpa, Suktaru.

Identification Characters: unarmed trees, bark black, pinnae 2-3 (-4) pairs, leaflets more than 1 cm long, flowers greenish-white, stamens indefinite, flowers always in globose heads, flowers staled, in 3.5-5.5 cm broad head, calyx 0.3-0.4 cm long, pods 15-30 x 3-5.2 cm

Description: Deciduous tree (2n = 26). 8-20 m tall trees, with light-blackish-brown, rough bark, symmetrical branches. Leaves alternate, compound, bipinnate, pinnae in 2-5 pairs, folding at night, a large gland is present in the centre of leaf stalk and at the base of the uppermost pinnae, Flowers greenish-white, highly scented with sweet smell, in large globose heads, axillary at the end of branches; shortly pedicillate, sepal 5, fused, bell-shaped, toothed; stamens much longer than the petals, silky, filaments fused at the tip, anthers exerted, style filiform, stigma capitate, ovule many. Fruit large pod, thin, flat, pale straw-colored when mature, dehiscent. Seeds small, pale brown, ellipsoid.

Phenological Data: Fls: Apr. – May, Frs: June. - Aug

Distribution: India, Egypt, America, Myanmar, Pakistan, Sri Lanka, China, Australia, Madagascar

Origin\Native: Tropical Asia and Africa

Ecology: requires a reliable wet season, full sun, well drained soils; can grow in shallow soil, drought and soil salinity tolerant, withstand grass fires and night frosts.

Category of threat: Common

Economic Importance: Ornamental

Horticultural Value: fast-growing shade tree, avenue tree, Recommended for reforestation and firewood plantations. Planted for shade in gardens and along roadsides. Its spreading canopy is used in tea, cardamom and coffee plantations for shade.

Medicinal Value: Bark extracts have anti-inflammatory effects

Method for Propagation: Seeds.

Suitable Environmental Conditions: wet-dry tropics

Agricultural Value: cultivated for reforestation and firewood plantations, ornamental purposes

Uses: The wood is used for making boat, toys and furniture. The bark is used in the tanning and dyeing industry. Young leaves are fed to livestock.

Localities in Gujarat: Throughout in deciduous forests, sparingly seen in scrub forests; not common; also planted as an avenue tree (Shah, 1978).

Albizzia odoratissima (L. f.) Benth. in Hook. Lond. J. Bot. 3: 88. 1844; Baker in Hook. f. Fl. Brit. India. 2: 299. 1878; Cooke, Fl. Pres. Bombay 1: 482, 1958 (Repr.). Shah, Fl. Guj. 1:288; 1978,Sanj. Legumes of India 57. 1991. *Mimosa odoratissima* L. f., Suppl. 437. 1781. *Albizia odortissima* var. *mollis* Bth. Ex Baker in Hook. f. op. cit. Singh, et al Fl. Maha. Dicot. 1: 817. 2000.

Local Name : Dholo Sirish, **Sanskrit Name :** Krishna-shirisha.

Description : Trees, leaflets obliquely oblong, apex rounded, base obliquely rounded. Pods flat, stalked.

Phenological data: Fls. – Frs.: May - December.

Localities in Gujarat: In deciduous forests, occasional, sparingly seen in scrub forests (Shah, 1978).

DICHROSTACHYS (DC.) Wight & Arn.

Dichrostachys cinerea var. ***indica*** Brenen & Brummit in Bot. Soc. Borter 39 : 111. 1935; Sanj. Legumes of India 65. 1991. *D. cinerea* (L.) Wight & Arn. Proder. 271. 1834; Baker in Hook. f. Fl. Brit. India 2 : 288. 1878; Cooke. Fl. Pres. Bombay 1 : 468. 1958 (Repr.). Shah, Fl. Guj. 1:288; 1978. Singh, et al Fl. Maha. Dicot. 1: 819. 2000.

Local Name : Madish.

Description : Trees. Leaves bipinnate; leaflets narrowly linear – oblong, appressed hairy beneath. Upper flowers yellow, lower red or pink. Pods flat, twisted.

Phenological data: Fls. – Frs.: August – December.

Localities in Gujarat: Throughout, in arid and semi-arid zones (Shah, 1978).

LEUCAENA Benth.

Leucaena leucocephala (Lamk.) De. Wit. In Taxon 10:54. 1961; S & J 22. *Mimosa glauca* L. Sp. Pl. (ed. 2) 1504. 1763 non L. 1753. *Mimosa leucocephala* Lam. Encycl. Meth. Bot. 1:12 1783. Leucocephala Bth. In HK, Lond. Journ. Bot. 4:416. 1842; Fl. Brit. India. 2:290; C 1:469; WI 6:77. f. 34. Shah, Fl. Guj. 1:289; 1978.

Local Name: Pardesi Baval, Subaval, **English Name:** white lead tree

Identification Characters: bark whitish-pale brown, flowers in axillary heads, white; pods smooth, shiny green.

Description: Evergreen tree, 3-8 m tall, straight, whitish-brown bark. Leaves petiolate, compound, bipinnate; pinnae 4-8 pairs, glandular; each pinna with 10-20 pairs of leaflets, leaflets linear-oblong, opposite, glabrous. Flowers in globose heads, white. Fruits pod, linear-oblong, glaucous, green, shiny. Seeds brownish-black, oblong, compressed, smooth, glabrous.

Phenological Data: Fls: May – Nov.; Frs: May – Feb.

Distribution: Drier parts of Asia, Africa

Origin\Native: Tropical Africa, India and Pakistan

Ecology: full sun, drought tolerant, sensitive to frost, can grow in dry plains, wastelands, but is tolerant of grazing, drought, fire and salinity.

Category of threat: Common

Special Characteristics: black longitudinal fissured bark, yields gum

Economic Importance: Ornamental tree

Horticultural Value: planted along roadside, farm boundaries, as windbreaks, as an avenue tree

Medicinal Value: The gum is used medicinally, astringent bark used for diarrhea, dysentery, and leprosy, coughs, gargle, toothache, ophthalmia, and syphilitic ulcers.

Method for Propagation: Seeds.

Suitable Environmental Conditions: hot and dry climate, semi-arid areas

Agricultural Value: cultivated for gum, ornamental purposes

Uses: Wood is hard & durable. Pods are eaten by livestock. Gum exuding from wound is collected as NTFP.

Fig. 98: *Albizia amara* a. Leaves, b. Inflorescence , c. Fruits

Fig. 99: *Dichrostachys cinerea* a. Leaves, b. Flower, c. Spines

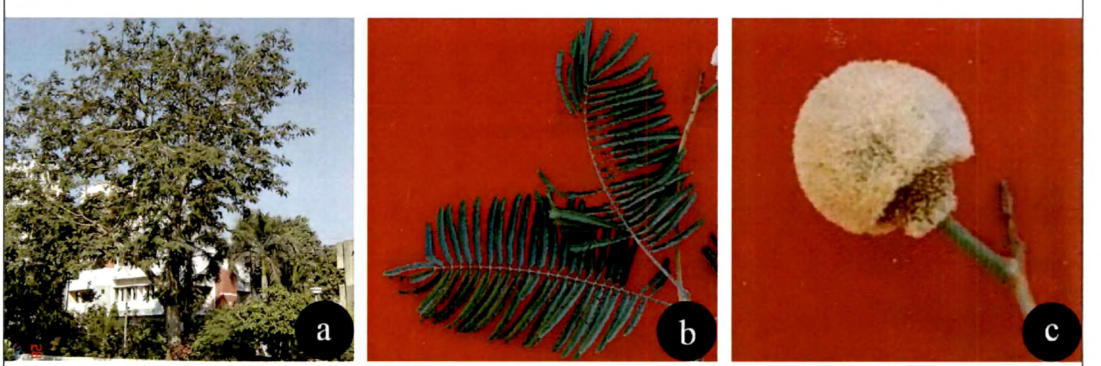


Fig. 100: *Parkia biglandulosa* a. Habit, b. Leaves, c. Inflorescence

Fig. 101: *Samanea saman* a. Habit, b. Leaves, c. Inflorescence

Used in cultivation of Lac.

Localities in Gujarat : Planted at some places, seldom an escape; native of America (Shah, 1978).

***Parkia biglandulosa* W. & A.** Prodr. 279. 1834; Baker in Hook f Fl. Brit. India 2: 289. 1878; Cooke, Fl. Pres. Bombay 1: 486. 1958 (Repr.); Sanj. Legumes of India 70. 1991.

Local Name: Chandu fal, **English Name:** African Locust

Identification Characters: large ball like inflorescence

Description: Deciduous tree 3-7 m tall unarmed trees, leaves evenly bipinnate, leaflets numerous and small. Flowers in white, dense, long peduncled obovoid heads. Pods large, flat, star shaped, coriaceous

Phenological Data: Fls: Jan- Mar, Frs: Mar.- Apr

Distribution: Throughout India, Africa, America

Origin\Native: Africa.

Ecology: moist, well drained soil, full sun

Category of threat: Common

Special Characteristics: flowers are scented

Economic Importance: Ornamental

Horticultural Value: planted in gardens for its beautiful foliage and ball like flowers

Method for Propagation: Seeds.

Suitable Environmental Conditions: Arid/tropic climate

Agricultural Value: cultivated for social forestry plantation, ornamental purposes.

Uses: Used as a social forestry plantation

PITHECELLOBIUM Mart.

Pithecellobium dulce (Roxb.) Bth. In Hook. London J. Bot. 3: 199. 1844 ('Pithecolobium'); Baker in Hook. f. FI. Brit. India 2 : 302. 1878; Cooke, FI. Pres. Bombnay 1 ; 485. 1958 (Repr.). Shah, Fl. Guj. 1:291; 1978, Sanj. Legumes of India 71. 1991. *Mimosa dulcis* Roxb. PI. Cor. 1 : 67, t. 99. 1798. Singh, et al Fl. Maha. Dicot. 1: 828. 2000.

Local Name: Gorasamli and Vilayti Amli, **English Name:** Pithecellobium and Manila tamarind

Identification Characters: armed trees; pinna 1-paired; flowers in heads, dirty-white or greenish–white, stamens indefinite, monadelphous; pods falcate, often spirally twisted.

Description: Deciduous tree (2n = 26). An armed tree, 5-10 m tall; bark greyish-black, rough, longitudinally fissured, spines short, straight, sharp arise at eh base of the leaves. Leaves compound, bipinnate; leaflets opposite, oblique, pale green, ovate-oblong, coriaceous, glabrous. Flowers small, greenish-white, in dense globular, axillary heads at the end of branchlets. Fruit is torulose, spirally twisted pod. Seeds black, polished, compressed, broadly ovate, covered by red or dirty-green aril.

Phenological Data: Fls. and Frs: Sep.- Apr

Distribution: Caribbean, Southern Florida, and tropical Asia.

Origin\Native: South America.

Ecology: Full Sun, drought tolerant, resistant to fire, tolerate drought, heat, poor soil, salt, sand, and shade

Category of threat: Common

Special Characteristics:

Economic Importance: Ornamental fruit tree

Horticultural Value: planted along roadside, boundaries, avenue tree, gardens

Medicinal Value: astringent, dysentery, dyspepsia, earache, leprosy, peptic ulcers, sores, toothache,

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical Desert (along water courses) to Moist through Subtropical Desert to Moist Forest Life Zones,

Agricultural Value: cultivated for ornamental purposes

Uses: Leaves are used as cattle fodder, fruit is edible. Timber is used in construction, in making agricultural implements.

Localities in Gujarat: Throughout, in hedges, along railway lines and roadsides; native of Mexico (Shah, 1978).

PROSOPIS L.

1. pods cylindric, torulose ..... P. *cineraria*

1. pods compressed, straight ..... P. *juliflora*

Prosopis cineraria (L.) Druce in Rep. Bot Soc. Exch. Cl. Brit. Is. 1913: 3. 422. 1914; Burkart in J. Arnold Arbor 57: 450. 1976; Sanj Legumes of India 71. 1991. *Mimosa cineraria* L. Sp. Pl. Ed. 2, 2: 1500. 1763 ('cinerea') *Prosopis spicigera* L. Mant. 68. 1767; Baker in Hook f. Fl. Brit. India 2: 288. 1878; Cooke Fl. Pres Bombay 1: 467, 1958 (Repr.). Shah, Fl. Guj. 1:292; 1978. Singh, et al Fl. Maha. Dicot. 1: 823. 2000.

Local Name: Khijado, **English Name:** Khejri tree, **Sanskrit Name:** Shami, Agnigarbha.

Identification Characters: armed trees, with compact branches, branches rough not dark green; leaflets 7-12 pairs, pinnae 1-2 pairs; stamens definite, 4-10, flowers in spikes; pods 5-20 cm long, cylindric

Description: evergreen armed tree, 5-10m tall; rough, yellowish or Greyish-brown bark; slender branches armed with conical thorns, prickles internodal, scattered, straight, somewhat acroscopic, conical with broad bases. Leaves bipinnate; appressed-hairy, glabrous or puberulous, petiolate; leaflets 7–14, ovate, straight to subfalcate, without nerves, mucronate, Greyish when dry; stipules foliaceous, deciduous. Racemes axillary, pendent, spiciform, long, several together, subpaniculate; peduncle with amplexicaul bract (or 2 bracts united), caducous and leaving an oblique scar, bractlets ovate, sessile, caducous; pedicellate, flowers yellow, glabrous; calyx truncate, corolla glabrous, the petals rolled back in age, pistil glabrous. Fruit slender, elongate, subcylindric-torulose, glabrous; pericarp thin, brittle; endocarp segments thin, longitudinal, little developed. Seeds ovate, 10–15, brown, shining, wrinkled.

Phenological Data: Fls: Apr. – June, Frs: June. – Oct.

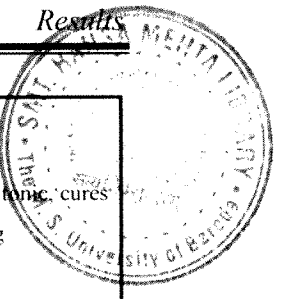
Distribution: Rajasthan, Haryana, Punjab, Gujarat, Western Uttar Pradesh, Maharashtra, West Pakistan, Afghanistan and Iran.

Origin\Native: Africa.

Ecology: grows on a variety of soils, drought tolerant, frost resistant

Category of threat: Common

Special Characteristics: yields gum



Economic Importance: Ornamental

Horticultural Value: agro forestry management, planted as fencing purposes.

Medicinal Value: The bark of the tree is dry, acrid, bitter with a sharp taste; cooling anathematic; tonic, cures leprosy, dysentery, bronchitis, asthma, leucoderma, piles and tremors of the muscles, scorpion sting

Method for Propagation: Seeds.

Suitable Environmental Conditions: dry and arid regions

Agricultural Value: cultivated for ornamental purposes, afforestation programmes

Uses: It is mainly used in the fuel wood, wood is used for house-building, chiefly as rafters, posts scantlings, doors and windows, tool-handles, fodder tree

Localities in Gujarat: Throughout in plains quite frequent in scrub forests (Shah, 1978).

Prosopis juliflora (Swartz) DC Prodr. 2 : 447. 1825; Burkart in J. Arnold Arbor. 57. 499. 1976; Sanj. Legumes of India 72. 1991. *Mimosa juliflora* swartz, Prodr. 85. 1788. Shah, Fl. Guj. 1:293; 1978, Singh, et al Fl. Maha. Dicot. 1: 824. 2000.

Local Name: Gando Baval, **English Name:** Mesquite

Identification Characters: armed trees, pendent, seldom scandent, dark green, smooth branches; leaflets 10-20 pairs, pinnae 1-2 pairs; stamens definite, 4-10, flowers in spikes; pods 5-20 cm long, compressed

Description: Deciduous tree ($2n$ = 28, 52, 56, 112) 5-6 m tall, armed, small trees; bark thick, brown or blackish, shallowly fissured; leaves compound, bipinnate; pinnae 4-6 cm long, sessile, oblong, glabrous, commonly more than 9 pairs, the leaflets mostly 5–10 mm long, linear-oblong, glabrous, often hairy, commonly rounded at the apex; stipular spines. Flowers greenish-yellow, axillary, pendent spikes, slightly curved, sweet-scented; corolla deeply lobate. Pods several-seeded, strongly compressed when young, thick at maturity, more or less constricted between the seeds, 10–25 cm long, brown or yellowish, 10–30-seeded. Seed compressed and oval or elliptic, 2.5–7 mm long, brown.

Phenological Data: Fls: Jan- Mar, Frs: Mar.- Apr

Distribution: Australia, Dominican Republic, India, Iraq, and Venezuela.

Origin\Native: Mexico

Ecology: Fast-growing, drought resistant

Category of threat: Common

Special Characteristics: Bark, rich in tannin

Economic Importance: Ornamental

Horticultural Value: most promising agro forestry options for problematic and saline soils. Planted in hedges, boundaries, roadside

Medicinal Value: remedy for catarrh, colds, diarrhea, dysentery, excrescences, eyes, flu, head cold, hoarseness, inflammation, itch, measles, pinkeye, stomachache, sore throat, and wounds

Method for Propagation: Seeds, root suckers

Suitable Environmental Conditions: Tropical Thorn to Dry through Subtropical Thorn to Dry Forest Life Zones

Agricultural Value: cultivated for ornamental purposes

Uses: Generally used as a fencing purpose. The wood is used for fuel, parquet floors, furniture, and turnery items, pilings, The gum forms an adhesive mucilage, used as an emulsifying agent.

Localities in Gujarat: Throughout, planted along coastal region for soil reclamation; now naturalized in many parts; native of Mexico and Central America (Shah, 1978).

SAMANEA (Benth.) Merr.

Samanea saman (Jacq.) Merr.in Journ. Wash. Acad. Sci. 6 : 46. 1916; Sanj. Legumes of India 72. 1991. *Mimosa saman* Jacq. Frag. Bot. 15, t. 9. 1800. *Pithecolobium saman* (Willd) Bth. In Hook. Lond. Journ. Bot. 3 : 199. 1844; Cooke. Fl. Pres. Bombay 1 : 485. 1958 (Repr.). Shah, Fl. Guj. 1:293; 1978, Singh, et al Fl. Maha. Dicot. 1: 828. 2000.

Local Name: Ratosarasdo, **English Name:** Rain tree and Monkey pod

Identification Characters: unarmed trees, flowers rosy - pink, stamens indefinite, flowers always in globose heads.

Description: Deciduous tree (2n = 26). 10-15 m tall trees, with light-black or blackish-brown, irregularly fissured bark, large symmetrical crown. Leaves alternate, compound, bipinnate, Pinnae 5-8 pairs, opposite, leaflets 4-8 pairs, opposite, sessile, bright green, oblique, obtuse, pulvinus leaf base, elliptic-rhomboid or obovate-oblong, glabrous above, pubescent beneath, flowers axillary or terminal, globose head, long peduncle; each flower has calyx tube, corolla yellow, tubular; stamens numerous, long, in two color, upper half is pink and lower half is white, exerted. Fruit is flat, straight pod, black, pendent, somewhat pulpy, septate between seeds.

Phenological Data: Fls. and Frs: Jan.- Sep

Distribution: India, Ghana, America, Puerto Rico, West Indies, Brazil

Origin\Native: Tropical America and West Indies.

Ecology: Full sun / light shade; rich well drained soil; acidic to slightly alkaline, tolerate drought, poor soils, water logging and weeds

Category of threat: Common

Economic Importance: Ornamental

Horticultural Value: Planted as an avenue tree, shade tree, in parks and gardens, roadside.

Medicinal Value: colds, diarrhea, headache, intestinal ailments, and stomachache, leaf infusion is used as a laxative

Method for Propagation: Seeds and Cuttings

Suitable Environmental Conditions: Subtropical to Tropical, Very Dry to Moist Forests

Agricultural Value: cultivated for ornamental purposes

Uses: The pods fed to cows are believed to increase the quantity of milk.

Localities in Gujarat: Planted along roads and in gardens; native of tropical America (Shah, 1978).

COMBRETACEAE

Trees, leaves simple, alternate or opposite, inflorescence spikes, racemes or panicles, flowers regular, bisexual, sepals and petals 4-5, stamens definite, ovary inferior, fruit drupe or samara.

1. flowers in globose heads ..... *Anogeissus*

1. flowers in spike, racemes or panicles ..... *Terminalia*

ANOGEISSUS (DC.) Guil. & Perr.

1.calyx cup completely pubescent outside ..... A. *sericea*

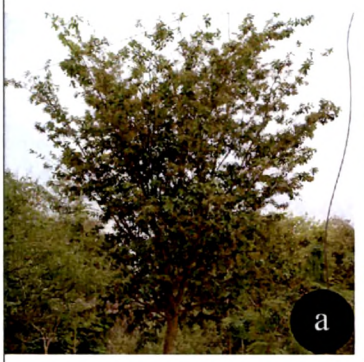
Fig. 102: *Anogeissus latifolia* a. Twig, b. Flowers

Fig. 103: *Anogeissus sericea*

Fig. 104: *Terminalia bellirica* a. Flowering twig, b. Fruits

Fig. 105 : *Terminalia chebula*

Fig. 106: *Terminalia catappa* a. Habit, b. Inflorescence, c. Fruits



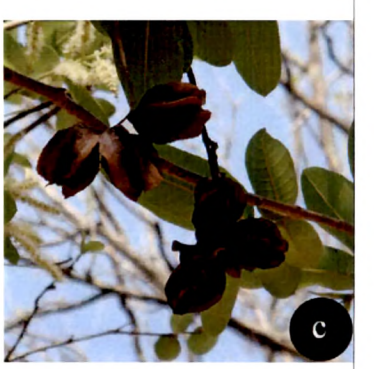


Fig. 107: *Terminalia elliptica* a. Habit, b. Inflorescence, c. Fruits

1. calyx cup glabrous of pubescent at the base only

    2. leaf apex obtuse, wings of fruit entire ..... A. *latifolia*

    2. leaf apex acute or acuminate, wings of fruit uneven at apex ... A. *acuminata*

Anogeissus latifolia (Roxb. ex DC.) Wall. ex Guill. & Perr. Fl. Seneg. Tent. 1: 280. 1832; C.B.Cl. in Hook. f. Fl. Brit. India 2: 450. 1878; Cooke, Fl. Pres. Bombay 1: 512. 1958 (Repr.). Shah, Fl. Guj. 1:297; 1978, Scott in Kew Bull. 33: 560. 1979; Gan. & T. Chakrab. in J. Econ. Tax. Bot. 21. 288. 1997; *Conocarpus latifolia* Roxb. ex DC. Prodr. 3:17. 1828. Singh, et al Fl. Maha. Dicot. 2: 18. 2000.

Local Name : Dhavdo, **Sanskrit Name:** Dhav, Dhava, Pisach-vriksha.

Description : Deciduous trees, high. Leaves ovate to oblong-elliptic, apex obtuse. Flowers sessile, in dense heads; calyx pubescent, teeth triangular. Fruits with persistent calyx stalk, wings entire, beaked, clustered.

Phenological data: Fls. – Frs.: March - September.

Localities in Gujarat: Throughout in deciduous forests, common; in scrub forests not frequent in later habitat (Shah, 1978).

Anogeissus sericea **Brandis** in Ind, For. 25:287. 1899; Scott in Kew Bull. 33: 558. 1979. *A. latifolia* (Roxb. ex DC.) Wall ex Guill. & Perr. var. *parviflora* Clarke in Hook f Fl. Brit. India 2:450. 1878.

Local Name: Dhao, **English Name:** Anogeissus

Identification Characters: branches drooping or spreading, suppressed–hairy, at least beneath, membranous, inflorescence a globose head,; beak of fruit as long as or longer than its nucleus,

Description: Large deciduous erect trees, with whitish-brown, fissured bark, branches drooping or spreading, ultimate branches appressed-pubescent; Leaves elliptic or oblong, shortly petiolate, leaves 1.2-6 x 1-4 cm. Heads yellow, axillary, petals absent, calyx caduceus. Fruits golden-brown, broadly trapezoidal

Phenological Data: Fls. and Frs: Jan.- May

Distribution: Throughout India, Africa

Origin\Native: Tropical Africa, Arabia, India and S. E. Asia.

Ecology: Full sun / light shade; well drained soil

Category of threat: Common

Economic Importance: Ornamental

Horticultural Value: Planted as an avenue tree, in parks and gardens, roadside.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Subtropical to Tropical, Very Dry to Moist Forests

Agricultural Value: cultivated for ornamental purposes

Uses: Stem yields toughest timber in the world. Useful in making handles of heavy striking tools such as axes.

TERMINALIA L.

1. drupes winged, spikes panicled

    2. drupes equally 3-winged, rusty puberulous ..... T. *paniculata*

    2. drupes equally 5-winged, glabrous

3. wings of fruits hard, lines on wings curved upwards ..... T. *cuneata*

3. wings of fruits papery, lines on wings straight ..... T. *elliptica*

1. drupes not winged, spikes simple

4. leaves clustered at apices of branches

5. leaves obovate, fruit 2-ridged when dry ..... T. *catappa*

5. leaves broadly elliptic, fruits faintly 5-ridged ..... T. *bellirica*

4. leaves not clustered at apices of branches ..... T. *chebula*

Terminalia bellirica (Gaertn.) Roxb. Pl. Cor. 2:54, t. 198. 1805. ('bellerica'), C.B.Cl. in Hook f. Fl. Bit. India 2:445. 1878; Cooke, Fl. Pres. Bombay 1: 508. 1958 (Repr.). Shah, Fl. Guj. 1:300 1978, Gang. & T. Chakrab. in J. Econ. Tax. Bot. 21: 338. 1997. *Myrobalanus bellirica* Gaertn. Fruct. 2: 90, t. 97. 1791. *Terminalia bellirica* var. *laurinoides* C.B.Cl. in Hook f. op. cit.

Local Name: Behda, **English Name:** Belleric Myrobalan, **Sanskrit Name:** Bhivitak, Vibhitak, Karshaphala, Kalidrum, Bahiva.

Identification Characters: erect trees; leaves alternate, seldom subopposite, elliptic, elliptic-obovate, cuneate at base, crowded at the ends of branches, inflorescence simple spikes, petals absent, calyx caduceus; fruits not winged, ellipsoid-oblong or nearly globose, not compressed minutely pubescent.

Description: Deciduous tree (2n = 26, 48). 15-20 m tall trees; bark ash-coloured or Greyish-brown, longitudinally fissured, scaly; horizontal branches. Leaves simple, alternate, large, leathery, clustered at the end of branches, broad, elliptic-oblong, long petiole. Flowers small, creamy-white or pale-yellow, in axillary spikes, at the end of branches, male and bisexual flowers occur on same tree. Fruit drupe, 5-angled, leathery, ovoid-ellipsoid, single seeded.

Phenological Data: Fls: Jan.-May. Frs: Apr. - July

Distribution: Southeast Asia: Java, Sumatra, Indonesia, Thailand, Malaysia, Bangladesh, India, Myanmar, Sri Lanka

Origin\Native: Malaya.

Ecology: grows well in poor soil, moist soil, light shade, intolerant to frost.

Category of threat: Common

Economic Importance: Ornamental

Horticultural Value: avenue tree, shade tree, planted along roadside, in gardens and parks

Medicinal Value: used in medicine as a constituent of *trifala churna* extracts of fruits possesses antibacterial properties

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical climate

Agricultural Value: cultivated for medicinal purposes

Uses: Fruits are eaten by wild animals, a good fodder for cattle.

Localities in Gujarat: Throughout in deciduous forests; occasional (Shah, 1978).

Terminalia catappa L. Syst. Nat. ed. 2: 674. 1767; C.B.Cl. in Hook. f. Fl. Brit. India 2: 444. 1878; Cooke, Fl. Pres. Bombay 1: 511. 1958 (Repr.). Shah, Fl. Guj. 1:301;

1978, Gang. & T. Chakrab. in J. Econ. Tax. Bot. 21: 343, f. 18 B. 1997.

Local Name: Deshi Badam , **English Name:** Almond tree

Identification Characters: erect trees; leaves alternate seldom suboppostie, crowded at the end of branches, obovte, cordate at base; inflorescence simple spikes, petals absent, calyx caduceus; fruit ellipsoidal, slightly compressed from above, glabrous; fruit not winged

Description: Deciduous tree (2n = 24). 5-7 m tall; bark blackish-brown, longitudinally fissured, horizontal whorls of branches. Leaves simple, clustered at the end of branches, coriaceous, glabrous, large obovate, wide at the tip and narrow at the base, shiny, blunt a the tip, leaves that turn pink-red to red - yellow before falling. Flowers small, creamy-white or pale-yellow, fragrant, star shaped, sessile, in axillary, solitary or fascicled spikes; male and female flowers on same tree, sepal 5, toothed; petals absent; stamens 10, in two whorls (5+5); filaments long, anthers yellow, exerted; ovary, bicarpellary, style short, stigma simple. Fruit drupe, ovoid, indehiscent, pointed at tip, green, hard.

Phenological Data: Fls. and Frs: Throughout the year

Distribution: Throughout India, Ghana, South America, South East Asia

Origin\Native: Malaysia, Andaman

Ecology: Full sun, moist, well drained soil salt and drought tolerant

Category of threat: Common

Special Characteristics: bark and leaves yield black pigment; also contain tannin

Economic Importance: ornamental tree

Horticultural Value: Planted in gardens, house

Medicinal Value: Fruits are used in leprosy, headaches; Leaves, bark and fruits: dysentery, rheumatism, Juice of leaves: scabies, skin diseases, leprosy

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical environments

Agricultural Value: cultivated for ornamental purposes.

Uses: Planted in the gardens for its beautiful symmetrical branches. Fruits are edible.

Localities in Gujarat: Planted in gardens and near houses (Shah, 1978).

Terminalia chebula Retz. Obs. Bot. 5: 31. 1788; C.B.Cl. in Hook. f. Fl. Brit. India 2: 446. 1878; Cooke, Fl. Pres. Bombay 1: 509. 1958 (Repr.). Shah, Fl. Guj. 1:301; 1978,Gang & T. Charab. in J. Econ. Tax. Bot 21: 345, f. 19B. 1997. *T. chebula* var. *tomentella* (Kurz) C.B.Cl. in Hook. f. op. cit.; Almeida, Fl. Mah. 2: 254. 1998.

Local Name: Harde, **English Name:** Chebulic myrobalan

Identification Characters: erect trees; leaves opposite, rarely suboppostie or alternate but not crowded at ends of branches; inflorescence panicle, petals absent, calyx caduceus; fruit not winged

Description: Deciduous tree (2n = 14, 24, 28). 9-20 m tall trees; bark dark-brown, longitudinally fissured, excorticating into small woody scales. Leaves simple, alternate, ovate-oblong or elliptic-oblong, silky pubescent when young, at length glabrous, acute tip. Flowers creamy-white or pale-yellow, in terminal panicles, bracteate, sessile, sepal 5 toothed, campanulate, woolly, petals absent, stamens 10, in two whorls, (5+5), inserted, ovary inferior, adnate to the calyx tube. Fruit drupe, ellipsoid or ellipsoid-obovate, glabrous, 5-ribbed, single seeded.

Phenological Data: Fls: Mar.-May, Frs: June.- Aug

Distribution: Throughout India, sub Himalayan tract, Sri Lanka, Myanmar

Origin\Native: Malaysia.

Ecology: full sun, drought resistant

Category of threat: Common

Economic Importance: ornamental tree

Horticultural Value: planted in gardens

Medicinal Value: the fruit is one of the main components to *'Triphala'*, used as laxative, Astringent, Purgative, Stomachache, the seed is also used medicinally

Method for Propagation: Seeds.

Suitable Environmental Conditions: dry deciduous forests, tropical environment

Agricultural Value: cultivated for medicinal purposes

Uses: It is used for making furniture and agricultural implements. The fruits are used in dyeing industry.

Localities in Gujarat: Dangs, Vyara, Bansda, Rajpipla and Saurashtra (Girnar); occasional at Dangs; rare in other places (Shah, 1978).

Terminalia cuneata Roth, Nov. Pl. Sp. 379. 1821; Gang. & T. Chakrab. in J. Econ. Tax. Bot. 16: 556. 1922 & Ibid. 21: 349. f. 20. B. 1997. *T. arjuna* (Roxb.ex DC.) Wight & Arn. Prodr. 314. 1834; C.B.Cl. in Hook. f. Fl. Brit. India 2: 447. 1878; Cooke, Fl. Pres. Bombay 1: 1958 (Repr.). Shah, Fl. Guj. 1:300; 1978, *T. arjuna* var. *angustifolia* (Roxb). C.B.Cl in Hook. f. op. cit.; Cooke, op. cit.

Local Name: Arjun sadad, **English Name:** White murdah, **Sanskrit Name:** Arjun, Arjuna.

Identification Characters: erect trees; bark smooth, pale to sandy-brown or grey; inflorescence panicles, petals absent, calyx caduceus; fruit winged, veins of wings curved upwards

Description: Deciduous tree (2n = 24, 26), 15-25 m tall trees, with bark excorticating into large, thin flakes, bark grey, smooth, drooping branches. Leaves simple, opposite, elliptic-oblong, coriaceous, glabrous, cordate at base, obtuse apex, crenulate margin, glandular petiole. Flowers small, white or creamy-yellow, in terminal or axillary pendulous panicles, sepal, 5, cleft shaped, hairy, lobed; petals absent; stamens 10, attached with calyx tube, exerted, ovary inferior, syncarpous, bicarpellary, style short, stigma simple. Fruit drupe, fibrous, woody, glabrous, oblong or ovoid-oblong with 5 hard wings, striated with numerous curved veins. Seeds hard linear, glabrous.

Phenological Data: Fls: May-Nov, Frs: Aug.- Dec

Distribution: throughout India, Myanmar, Sri Lanka

Origin\Native: India.

Ecology: , sensitive to frost and drought, grows well along bank of streams, rivers, ravines, dry water courses, on fertile alluvial loam, can stand water logging.

Category of threat: Common

Special Characteristics: bark is important medicine in Ayurveda

Economic Importance: ornamental tree

Horticultural Value: for reclamation of saline, alkaline soils and deep ravines, for agro and social forestry, shade tree, avenue tree, planted along roadside, gardens

Medicinal Value: every part of the plant can be used in medicine, The bark is used for the good tonic for heart disease, other uses are tonic, anathematic, and useful in fractures, ulcers, heart diseases, biliousness, urinary discharges, asthma, tumors, leucoderma, anemia

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical to sub tropical climate

Agricultural Value: cultivated for medicinal and ornamental purposes

Uses: The wood is used for making bullock carts, ploughs, and cart wheels.

Localities in Gujarat: Rajpipla, Panchmahals, North Gujarat (Balaram-Ambaji) and Saurashtra; not frequent (Shah, 1978).

Terminalia elliptica Willd. Sp. Pl. 4:969. 1806; Gang. & T. Chakrab. in J. Econ. Tax. Bot. 16: 601. 1992 & Ibid. 21: 351, f. 21 A. 1997. *T. alata* Roth, Nov. SP. Pl. 379. 1821. *T. crenulata* Roth, Nov. Sp. Pl. 380. 1821. *T.coriacea* (Roxb) Wight & Arn. Prodr. 315. 1834 non Rottl. ex Spr. 1807. *T.tomentosa* (Roxb.ex DC.) Woght & Arn. Prodr. 314. 1834 non Mart. 1829; C.B.Cl. in Hook. f. Fl. Brit. India 2: 447. 1878; Cooke, Fl. Pres. Bombay 1: 510. 1958 (Repr.). Shah, Fl. Guj. 1:301; 1978, *T. tomentosa* var. *crenulata* (Roth) C.B.Cl. in Hook. f. op. cit. 448. *T. tomentosa* var. *coriacea* (Roxb). C.B.Cl. in Hook. f. op. cit.

Local Name: Sadad, **Sanskrit Name:** Saradru, Parthkakurth.

Identification Characters: erect trees; bark rough, pale to ash coloured or Greyish-black, often tessellately fissured; inflorescence paniculate cyme, petals absent, calyx caduceus; fruit winged, veins of wings horizontal.

Description: Deciduous tree 15-20 m tall trees, with bark excorticating in rectangular flakes, dark Greyish-brown. Leaves simple, sub opposite, petiolate, coriaceous, elliptic-lanceolate or elliptic-oblong, tomentose beneath, obtuse, glandular petiole. Flowers white or pale-creamy-yellow, terminal and axillary paniculate spikes Fruit drupe, large, 5-winged, oblong, coriaceous, reddish brown.

Phenological Data: Fls: Feb.-May, Frs: May.- Aug

Distribution: India, Bhutan, Myanmar

Origin\Native: India

Ecology: Full sun, well drained soil, drought tolerant

Category of threat: Common

Economic Importance: ornamental tree

Horticultural Value: planted in gardens, avenues tree

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical environments

Agricultural Value: cultivated for ornamental purposes.

Uses: It is used in the making of furniture. The fruit is used for tanning industry. The wood is used for fuel.

Localities in Gujarat: In deciduous forests, common (Shah, 1978).

MYRTACEAE

Trees or shrubs; leaves simple, opposite, gland dotted; inflorescence solitary or cymes; flowers regular, bisexual, calyx united, corolla free, stamens many, free, ovary inferior syncarpous; fruit berry or drupe.

1. fruits dry, loculicidally splitting above
    2. petals not calyptrate, flowers in proliferous spikes ..... *Callistemon*
    2. petals calyptrate, flowers not in spikes ..... *Eucalyptus*

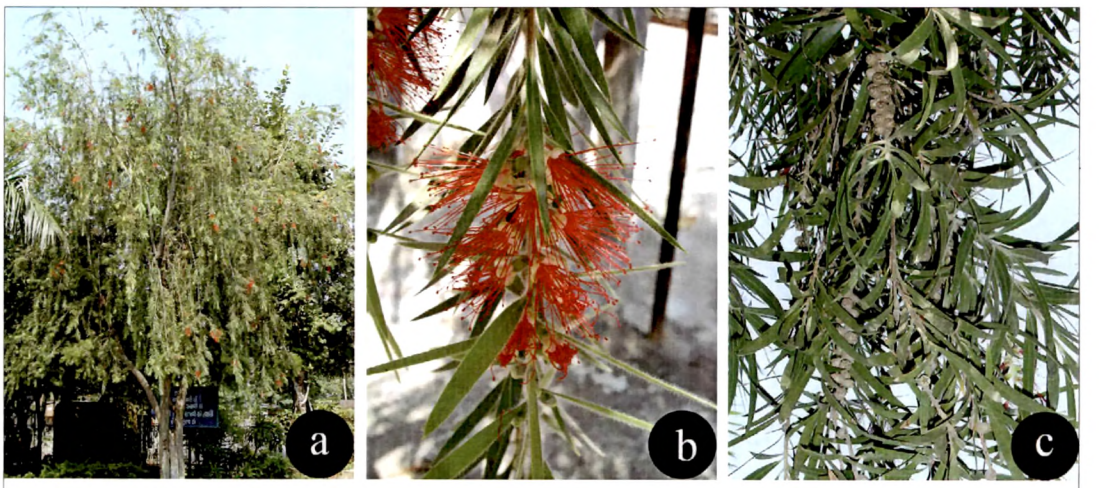


Fig. 108: *Callistemon citrinus* a. Habit, b. Flowers, c. Fruits

Fig. 109: *Eucalyptus globulus* a. Habit, b. Leaves, c. Flower

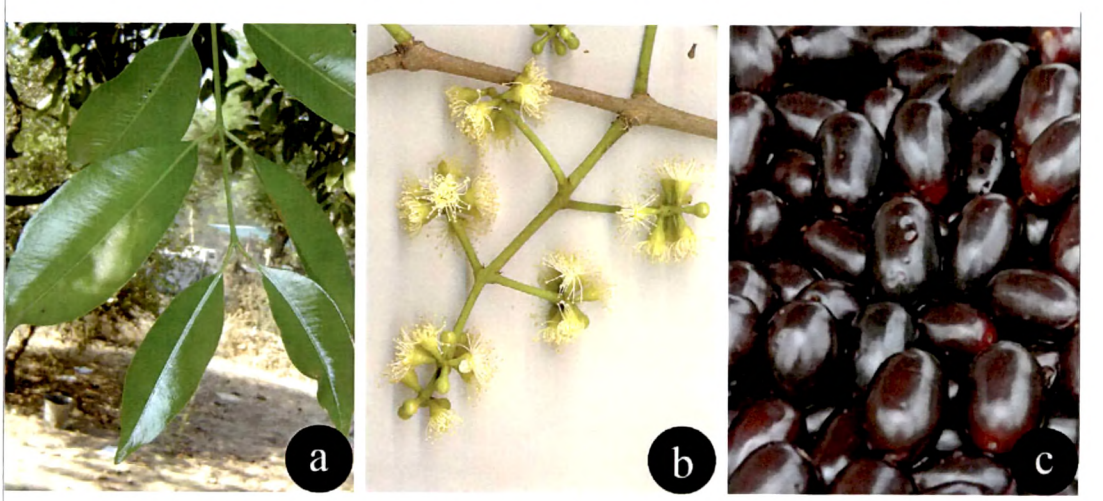


Fig. 110: *Syzygium cumini* a. Leaves, b. Flowers, c. Fruits

1. fruit baccate

3. ovary more than two celled ..... *Psidium*

3. ovary two celled ..... *Syzygium*

CALLISTEMON

***Callistemon citrinus* (Curtis) Skeels** in U. S. Dept. of Agric. Bur. Pl. Ind. Bull. 282:49. 1913; Kulkarni in Singh et al Fl. Maharashtra St. Dicot. 2: 16. 2001. *Metrosideros citrina* Curits, Bot. Mag. t. 260. 1794.

Local Name: Bottle brush, **English Name:** Bottle brush

Description: Evergreen tree (2n = 22). 4-5 m tall, dark grey rough bark, deep ridges, with pendulous branches. Leaves simple, alternate, shortly petiolate, linear-lanceolate, gland dotted, thick, leathery, clustered at the end of twigs, light green, Flowers in terminal drooping spikes, scarlet flowers appear in bottle brush like tufts, reddish in colour, showy, sepals 5, toothed, green; petals 5, very minute, green, fall early; stamens free, numerous, crimson-red, anthers yellow, exerted, ovary syncarpous, inferior, style and stigma simple. Fruit small capsule,

Phenological Data: Fls: & Frs.: Feb.- July

Distribution: Throughout India

Origin\Native: Australia

Ecology: moderate light, well drained soil

Category of threat: Common

Economic Importance: ornamental tree

Horticultural Value: Planted in parks and gardens, avenues, house for its graceful flowers and foliage

Medicinal Value: Leaf extract is used in inflammation

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical and sub tropical environments

Agricultural Value: cultivated for ornamental purposes

Uses: The wood is very hard and heavy and used for making toys, shoe heels and decorative carvings.

EUCALYPTUS L. Herit.

Eucalyptus globulus Labill. Voy. Rech. Perouse 1:153. t. 13, 1799; Bailey Man. Cult. Pl. 727. 1949 2nd ed.); Ashton in Dassan. Fosb. Rev. Handb. Fl. Ceylon 2:460.1981. Shah, Fl. Guj. 1:302; 1978, Singh, et al Fl. Maha. Dicot. 2: 18. 2000.

Local Name: Nilgiri, **English Name:** Tasmanian blue gum tree, **Sanskrit Name :** Tailpatra.

Identification Characters: leaves alternate, seldom opposite or subopposite in young parts, calyx and corolla lobes joined, operculate

Description: Evergreen tree (2n = 20, 22, 28). 15-20 m tall, with smooth silvery trunk. Leaves simple, alternate to sub opposite, oblong- ovate, slightly falcate, and unequal at base. Flowers solitary, white, shortly pedicellate, calyx fused, pyramidal in shape, petals 4, united, stamens numerous, free. Fruit capsule, angular

Phenological Data: Fls: Mar. – May, Frs: May.- Aug

Distribution: India, Philippines, Australia, Indonesia

Origin\Native: Australia and Tasmania.

Ecology: Tree grows best in marshy areas

Category of threat: Common

Special Characteristics: fragrant leaves

Economic Importance: ornamental tree

Horticultural Value: used for afforestation, planted along roadside, gardens

Medicinal Value: Oil is extracted from its leaves and young twigs which is important as antiseptic. The essential oil is very widely used medicinally.

Method for Propagation: Seeds.

Agricultural Value: cultivated for essential oil and ornamental purposes

Uses: The wood is used as fuel, essential oil extracted form leaves and branches is used in perfumes

Localities in Gujarat: Throughout, under plantation in forests; also in gardens (Patel, 1984).

PSIDIUM L.

Psidium guajava L. Sp. Pl. 470. 1753; Duthie in Hook. f. Fl. Brit. India 2: 468. 1878; Cooke, Fl. Pres. Bombay 1:529. 1958 Repr.). Shah, Fl. Guj. 1:302; 1978. Singh, et al Fl. Maha. Dicot. 2: 8. 2000.

Local Name: Jamphal, **English Name:** Guava, **Sanskrit Name:** Perukam, Mruduphalam, Drudhbijam.

Identification Characters: leaves opposite, seldom alternate, calyx and corolla lobes free, flowers more than 1 cm across, 1-3, on axillary penduncle, ovary 4-5 celled.

Description: Evergreen tree 2-4 m tall, large shrubs or small trees; bark Greyish-black, rough, longitudinally fissured, peeling off in irregular flakes. Leaves oblong or elliptic-oblong or obovate, coriaceous, entre, softly hairy beneath. Flowers white or creamy-white. Fruit pyriform, fleshy, dark green or sulphur-yellow with white or rosy-purple pulp. Seeds minute, ellipsoidal, smooth, hard, pale-brown.

Phenological Data: Fls. and Frs: Nearly all round the year

Distribution: India

Origin\Native: Brazil

Ecology: moderate light, well drained soil

Category of threat: Common

Economic Importance: ornamental tree

Horticultural Value: planted in gardens, house

Medicinal Value: Fruits are one of the richest sources of vitamin C. Fruit is used in cough, acidity loose motions.

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical environments

Agricultural Value: cultivated for edible fruits

Uses: leaves & bark contain tannin which use for tanning leather, fruits are edible

SYZYGIUM R. Br. ex Gaertn.

1. calyx tube turbinate

    2. branchlets tetragonous ..... S. *rubicundum*

    2. branchlets terete ..... S. *cumini*

1. calyx tube funnel shaped ..... S. *heyneanum*

Syzygium cumini (L.) Skeels, U.S.D.A. Bur. Pl. Industr. Bull. 248: 25. 1912. *Myrtus cumini* L. SP. Pl. 471. 1753. *Eugenia jambolana* Lam. Encycl. 3:198. 1789; Duthie in Hook. F. Fl. Brit. India 2: 499. 1879; Cooke, Fl. Pres. Bombay 1:523. 1958 (Repr.). Shah, Fl. Guj. 1:303; 1978. Singh, et al Fl. Maha. Dicot. 2: 10. 2000.

Local Name: Jambu, **English Name:** Jambolana tree, Gum tree, **Sanskrit Name :** Jambu.

Identification Characters: leaves opposite, seldom alternate, 3.5-9.5 cm broad; calyx and corolla lobes free, flowers not more than 1 cm across, inflorescence cymes from axils of fallen leaves, ovary 2 celled.

Description: Evergreen tree (2n = 44, 46) 10-15 m tall trees, with ashy-brown, smooth bark. Leaves petiolate, simple, opposite, elliptic-oblong or elliptic-lanceolate, glabrous, shiny, gland dotted, acuminate, aromatic. Flowers small, pale-greenish-white, fragrant, in trichotomous panicles, in the place of fallen leaves; sepal 5, united, toothed; petal 5, united, stamens numerous, white, ovary bicarpellary, inferior. Fruit berry, ovate or oblong, glabrous, shining, bright to dark-purple. Seeds ellipsoidal-oblong, white or pinkish, glabrous, smooth.

Phenological Data: Fls. and Frs: Dec. - May

Distribution: India, Myanmar, Indonesia

Origin\Native: Indo-china and Australia

Ecology: can grow in damp places, along streams, drought resistant, sensitive to frost

Category of threat: Common

Economic Importance: ornamental tree

Horticultural Value: planted in parks and gardens, avenue, shade tree

Medicinal Value: Seed powder is used as a medicine. The bark decoction is used in dysentery, fruit is good astringent, carminative, stomachic.

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical environments

Agricultural Value: cultivated for fruits

Uses: Fruits are enjoyed by monkeys, squirrels, birds and other wild animals. Fruits are edible

Localities in Gujarat: In forests occasional; planted along roads and in gardens self-sown in waste places (Shah, 1978).

Syzygium heyneanum Duthie) Wall. ex Gamble, Fl. Pres. Madras 482. 1919 [1:341. 1967. Repr.)]. *Eugenia heyneana* Duthie in Hook. f. Fl. Brit. India 2: 500. 1879; Cooke, Fl. Pres. Bombay 1: 524. 1958. Repr.). Shah, Fl. Guj. 1:303; 1978. Singh, et al Fl. Maha. Dicot. 2: 11. 2000.

Local Name : Jaljambu.

Description : shrubs or small tress, Leaves elliptic-lanceolate or oblanceolate, subcoriaceous, apex acute, base tapering. Flowers white in small heads. In trichotomous cymes on old stem or in axils of fallen leaves, subsessile; calyx obscurely lobed; petals orbicular, calyptrate. Berries ovoid to ellipsoid, reddish-brown when ripe.

Phenological data: Fls. – Frs.: February - June.

Localities in Gujarat: In riverbeds or ravines at Rajpipla, Panchmahals and North Gujarat; not common (Shah, 1978).

Syzygium rubicandum Wight & Arn. Prodr. 330. 1834; Gamble, FL. Pres. Madra 1: 339. 1967 (Repr.). Shah, Fl. Guj. 1:303; 1978, *Eugenia rubicunda* Wight, Ic. T. 538. 1842; Duthie in Hook. f. Fl. Brit. India. 2: 495. 1878; Cooke, Fl. Pres. Bombay 1: 521. 1958 (Repr.). *E. lissophylla* (Thw). Duthie in Hook. f. op. cit. 488. Singh, et al Fl. Maha. Dicot. 2: 15. 2000.

Local Name : Vanjambu.

Description : Trees, high. Leaves variable, ovate or elliptic-lanceolate, shining above, pale beneath, pellucid dotted, apex acuminate, base narrowed. Flowers pinkish-white, in terminal or axillary cymes; petals calyptrate. Berries globose, black.

Phenological data: Fls. – Frs.: March - June.

Localities in Gujarat : Planted in gardens.

LECYTHIDACEAE

Trees or shrubs; leaves simple, alternate, inflorescence solitary or racemes; flowers regular, bisexual, pentamerous; stamens many free; fruits drupe

1. Inflorescence terminal spikes, petals 4, stamens many free, exserted, fruit wall smooth ..... *Careya*

1. Inflorescence long racemes, cauliflorus, petal 6, stamens fused in two unequal bundles, forming a hood over ovary, fruit wall rough ..... *Couroupita*

CAREYA Roxb.

Careya arborea **Roxb.** Pl Corom. 3: 14, t. 218. 1819; Cl. in Hook. f Fl. Brit. India 2: 511, 1879; Cooke, Fl. Pres. Bombay 1: 528. 1958 (Repr.); Pradhan in Singh et al. Fl. Maharashtra St. Dicot. 2: 22. 2001.

Local Name: Kumbhi

Description: Deciduous tree, 10-12 m tall tree, Leaves sessile, broadly ovate, crenate-denticulate, flowers sessile, on thick rachis, petals white, stamens slightly longer than petals, fruits green.

Phenological Data: Fls - Frs: Mar. – Apr.,

Distribution: America, Asia

Localities in Gujarat: In forests of Baria, Chhotaudepur

Origin\Native: S. E. America

Ecology: Moderate light, moist soil

Category of threat: Common

Special Characteristics: Flowers are scented

Economic Importance: Ornamental tree

Horticultural Value: Planted in parks and gardens

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical to subtropical climate

Agricultural Value: Cultivated for ornamental purpose

Uses: Used in gardens and landscapes

Fig. 111: *Psidium guajava* a. Flower, b. Fruits

Fig. 112 : *Careya arborea*

Fig. 113 : *Couroupita guianensis* a. Habit, b. Flower, c. Fruits

Fig. 114: *Lagerstroemia indica* a. Habit, b. Flower, c. Fruiting twig

COUROUPITA Abul.

Couroupita guianensis Abul. Pl. Gui. 2: 708, t. 282. 1775; Bailey, Man. Cult. Pl. 722. 1949. Singh, et al Fl. Maha. Dicot. 2: 23. 2000.

Local Name: Shiv- Lingi, Tope gola **English Name:** Cannonball tree

Description: Deciduous tree (2n = 36). 8- 12 m tall tree, straight trunk, brown, rough bark. Leaves simple, alternate, clustered at the end of branches, obovate- lanceolate, large, entire, acute. Flowers large, waxy, pink and white, fleshy, borne on the main stem, calyx united, top shaped, petals 6, unequal, concave, pinkish white; stamens numerous, in two series, sterile stamens surrounds ovary, fertile stamens united for form a raised structure. Fruit large berry, globular, brown, hard, fleshy, resembling a cannon ball. Seeds many.

Phenological Data: Fls: Mar. - July, Frs: May. - Sep

Distribution: India, America

Origin\Native: French Guiana, Tropical America and West Indies

Ecology: Moderate light, moist soil

Category of threat: Common

Special Characteristics: Flowers are highly scented

Economic Importance: Ornamental tree

Horticultural Value: Planted in parks, gardens, roadside

Medicinal Value: The bark is used in the treatment of skin disease of livestock.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical to subtropical climate

Agricultural Value: Cultivated for ornamental purpose

Uses: The flowers are worship to Lord Shiva.

Localities in Gujarat: In forests of Bulsar, Dangs, Vansda and Vyara; not common (Sabnis, 1967).

LYTHRACEAE

Trees often with square stems; leaves simple, entire, opposite or whorled; inflorescence solitary, panicles or racemes; flowers regular, bisexual, small, tetramerous, sepals 4-6 united into a tube, persistent, petal 4-6, free, crumpled in bud with crisp margin; fruit capsule.

1. wild plants, leaves usually glaucous beneath, flowers white, creamy white, calyx tube smooth

    2. calyx tube with a ring inside, calyx lobes adnate ..... L. parviflora

    2. calyx tube without an inner ring, calyx lobes free and reflexed ..... L. microcarpa

1. cultivated plants, leaves not glaucous beneath, flowers white, voilet or reddish purple, calyx tube smooth or ribbed

    3. 2-5 m tall tree, calyx tube smooth ..... L. indica

    3. 9-15 m tall tree, calyx tube ribbed ..... L. speciosa

Laterstroemia indica L. Syst. Nat. ed. 10:1076. 1759; Cl in Hook. f. Fl. Brit. India 2:575. 1879; Cooke, Fl. Pres. Bombay 1:546. 1958 (Repr.); Diwakar in Singh et al. Fl. Maharashtra St. Dicot. 2:39. 2001.

Local Name: Taman, **English Name:** Queen's tree, Pride of India

Identification Characters:, leaves not black-dotted or glaucous beneath, flowers not zygomorphic, hexamerous, stamens numerous; capsule regularly dehiscent.

Description: cultivated plants, deciduous (2n = 44, 48, 50), 5-7 m tall tree; smooth, grey bark. Leaves simple, opposite, petiolate, large, oblong-elliptic, acute apex. Flowers showy, in terminal panicles, purple to mauve in colour, more than 1.5 cm across, calyx tube smooth or ribbed, sepals 6, united, persistent, petals 6, crinkled, papery, stamens numerous, reddish, ovary raised on cup shaped structure. Fruits capsule, woody, with persistent calyx, green, black when ripe. Seeds winged near the apex

Phenological Data: Fls: Apr. – June, Frs: Nov.- Jan

Distribution: India, China, Myanmar, Sri Lanka, Australia

Origin\Native: India and Malaya

Ecology: moist soil, moderate light, humid climate

Category of threat: Common

Special Characteristics: bark is fibrous

Economic Importance: ornamental tree

Horticultural Value: planted in avenues, parks and garden for its beautiful showy long lasting flowers

Medicinal Value: The bark and leaves are purgative. Seeds are narcotic; some parts are used in the treatment of diabetes.

Method for Propagation: Seeds.

Suitable Environmental Conditions: warm and moist climate

Agricultural Value: cultivated for ornamental purpose

Uses: Wood is used in construction of boats. The bark yields rough fibers. Flowers are very attractive so tree is planted in garden as a shade tree.

PUNICACEAE

Small trees; leaves simple, alternate or opposite; inflorescence axillary solitary or terminal solitary; flowers bisexual, pentamerous, sepals and petals 5-8, stamens many, free; fruit berry, seeds many fleshy.

PUNICA L.

Punica granatum L. Sp. Pl. 472. 1753; C. B. Cl. In Hook. f. Fl. Brit. India 2: 581. 1879. Shah, Fl. Guj. 1:312; 1978, Singh, et al Fl. Maha. Dicot. 2: 42. 2000.

Local Name: Dadam, **English Name:** Pomegranate, **Sanskrit Name :** Dadim, Karak, Lohitpushpak.

Identification Characters: flowers bright red or vermillion red, solitary, fruit berry, woody orugh rind, seeds obtusely angular, white, pink or red juice.

Description: Deciduous small tree, with cinnamon-brown bark, slender drooping branches. Leaves simple, opposite, oblong-lanceolate or oblong-elliptic, glabrous, subsessile. Flowers bright-red or vermilion red, solitary or in cymes, persistent calyx, orange-red trumpet shaped flowers with ruffled petals; red calyx having

Fig. 115: *Lagerstroemia parviflora* a. Flowers, b. Fruits

Fig. 116: *Punica granatum* a. Flower, b. Fruits

Fig. 117: *Carica papaya* a. Habit, b. Female flower, c. Male flower, d. Fruits

5 to 8 fleshy, pointed sepals forming a vase from which emerge the 3 to 7 crinkled, red, white or variegated petals enclosing the numerous stamens. Fruit is reddish-brown, globose, with woody, rough rind. Seeds obtusely angular, white, encased in a juicy, acidic pink or red pulp thick, tubular, the fruit has a tough, leathery skin or rind, the interior is separated by membranous walls and white spongy tissue (rag) into compartments packed with transparent sacs filled with tart, flavorful, fleshy, juicy, red, pink or whitish pulp (the aril), parietal placentation.

Phenological Data: Fls: May. – June, Frs: July-Dec

Distribution: Asia, Europe, America, Africa

Origin\Native: Central Asia

Ecology: Full sun, can grow on sandy, acidic, alkaline soils, low humidity

Category of threat: Common

Economic Importance: Ornamental fruit tree

Horticultural Value: Planted in garden

Medicinal Value: Juice used to treat jaundice and diarrhea, the fruit pulp and the seed, rich source of vitamin C, folic acid and antioxidants and used in stomachache

Method for Propagation: Cutting and air layering

Suitable Environmental Conditions: mild-temperate to subtropical sandy or rocky scrublands, hot, dry climate,

Agricultural Value: cultivated for fruits

Uses: The seed is edible. It is also used in the tanning and dyeing industry. Beverages and wine are also made from the juicy seeds

Localities in Gujarat: Cultivated, probably a native of Persia, Afghanistan and Baluchistan (Shah, 1978).

CARICACEAE

Trees with milky sap, dioecious or monoecious; leaves simple, alternate, palmately lobed; inflorescence racemes or axillary fascicled; flowers regular, unisexual or bisexual, sepals 5, united, petals 5, free, stamens 10 in two whorls, carpels 5, united; fruits berry.

CARICA L.

Carica papaya L. Sp. Pl. 1036. 1753; Cooke, Fl. Pres. Bombay 1: 557. 1958 (Repr.). Shah, Fl. Guj. 1:315; 1978, Bailey Man. Cult. Pl. 692, f. 137. 1949. Singh, et al Fl. Maha. Dicot. 2: 18. 2000.

Local Name: Papayu, **English Name:** Papaya, **Sanskrit Name:** Arundkarkati, Arundchirbat.

Identification Characters: corky bark, variously lobed leaves, 25-50 cm broad and as much as long

Description: Evergreen, soft-wooded, dioecious or monoecious tree, 2-5 m tall with greenish-white, corky bark, unbranched trunk succulent and soft wooded, ringed with prominent scars from previous leaf stems and contains an acrid milky latex sap. The leaves are deeply incised and deeply palmately 7-lobed lobed, spirally arranged leaves, variously lobed. Male and female parts exist in different trees, Male flowers are thin and borne on short stalks; female flowers are wide and borne directly on the trunk. Flowers white or creamy-white, panicled, fascicled. Fruit variable in size, smooth-skinned, green - yellow, seeds spherical, blackish-brown, microscopically reticulate. The flesh of the ripe papaya fruit is yellow, fibreless, sweet

Phenological Data: Fls. And Frs: Throughout the year

Distribution: India, Pakistan, Sri Lanka, Thailand, Indonesia and the Philippines, South Africa, America

Origin\Native: Tropical America

Ecology: full sun, fertile, well-drained soil, tolerate drought, high pH, insects, laterites, mycobacteria, slope, and virus, does not tolerate shade, water logging, or strong winds,

Category of threat: Common

Special Characteristics: Lobed leaves

Economic Importance: Fruits are edible

Horticultural Value: planted in farms and in front of houses

Medicinal Value: fruits, leaves, and latex are used medicinally, Extracts of pulp and seeds showed bacteriostatic properties, Bactericide, Corns and boils, stomachic, vermifuge, juice is used for warts, cancers, tumors, corns, and indurations of the skin. Flowers have been used for jaundice. Latex used in psoriasis, ringworm

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical climate, Warm Temperate Dry to Moist through Tropical Very Dry to Wet Forest Life Zones

Agricultural Value: Cultivated for fruits

Uses: Fruit is edible. It is also planted as a fruit tree in the garden, milky juice is extracted, dried and used as chewing gum, medicine (digestion problems), toothpaste, young leaves, shoots, and fruits cooked as a vegetable

Localities in Gujarat: Cultivated, native of tropical America (Shah, 1978).

ALANGIACEAE

Trees; leaves simple, alternate; inflorescence axillary or fascicled cyme; flowers regular, bisexual, sepals 4-10, valvate, united, petals 4-10, free, valvate, stamens many free, carpels 2-3, syncarpous; fruit globose berry.

ALANGIUM Lamk.

Alangium salvifolium (L. f.) Wangerin, in Engl. Pflanzenr. 41:9, f. 2A-E. 1910. Mukerjee in Bull. Bot. Surv. India 10:330. 1968; Matthew in Nayer et al. Fasc. Fl. India 19: 4. 1988. *Grewia salvifolia* L. f. Suppl. 409. 1781. *Alangium lamarkit* Thw. Enum. 133. 1859; C.B.Cl. in Hook. f. Fl. Brit. India 2:741. 1879; Cooke, Fl. Pres. Bombay 2:1. 1958 (Repr.). Shah, Fl. Guj. 1:347; 1978, Singh, et al Fl. Maha. Dicot. 2: 114. 2000.

Local Name: Ankol, **English Name:** Sage-leaf Alangium, **Sanskrit Name:** Ankola, Ankolak, Dirghakilak, Pitsar, Tamraphala.

Identification Characters: thorny tree, ash colored rough bark, flowers greenish white.

Description: Deciduous tree 3-10 m tall, thorny trees, with ash-coloured, rough and faintly fissured bark, elliptic-oblong, elliptic-lanceolate or oblong-lanceolate, greenish-white, fascicled, axillary or on old wood, ovoid, ellipsoid or nearly globose, glabrous, smooth, violet to deep-purple.

Phenological Data: Fls: Feb.-Apr, Frs: May. – July.

Distribution: Western Africa, Madagascar, Southern Asia, Philippines and tropical Australia, and the Pacific

Fig. 118: *Alangium salvifolium* a. Twig, b. Flower

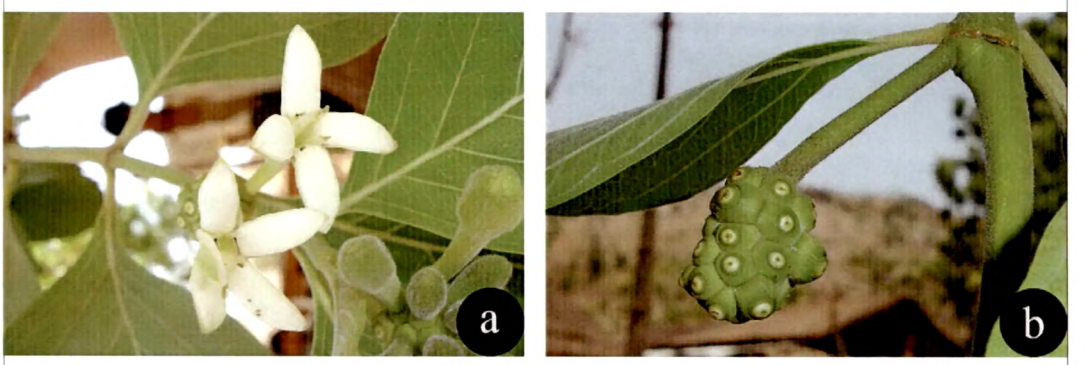


Fig. 119: *Morinda pubescens* a. Flower, b. Fruit

Fig. 120: *Gardenia resinifera* a. Habit, b. Flower

Fig. 121: *Meyna laxiflora*

Fig. 122 : *Hymenodictyon orixense*

Islands

Ecology: full sun

Category of threat: Common

Special Characteristics: salver shaped leaves

Economic Importance: fruits are edible

Horticultural Value: planted in gardens and roadside

Medicinal Value: roots are acrid, diuretic, astringent and antidote for several poisons, fruits in treating burning sensation and hemorrhages, decoction of bark is given in blood pressure.

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical

Agricultural Value: cultivated for medicinal and ornamental usage

Uses: The wood is used for making furniture. The bark is used in the dyeing industry.

Localities in Gujarat: Throughout; common (Shah, 1978).

RUBIACEAE

Trees, armed or armed; leaves simple, opposite, stipulate, stipules interpetiolar or intrapetiolar; inflorescence solitary, corymbs, panicles or cymes; flowers regular, bisexual, bracteates, tetramerous or pentamerous, sepals 4-5, united, calyx tube adnate to ovary, petals 4-5, united funnel-shaped, tubular or salver shaped, stamens 4-5 epipetalous, carpels 2-5, syncarpous, axile placentation; fruit capsule, berry, drupe.

1. ovules more than 2, usually numerous in each cell
    2. flowers crowded in dense globose heads
        3. corolla lobes imbricate, flowers bracteolate, seeds not winged, stigma fusiform ..... *Neolamarkia*
        3. corolla lobes valvate, flowers bracteolate
            4. calyx limb 5 lobed; stigma clavate ..... *Haldina*
            4. calyx truncate, stigma mitriform ..... *Mitragyna*
    2. flowers not in dense heads
        5. fruit capsular, corolla lobes valvate, seeds winged ..... *Hymenodictyon*
        5. fruit berries, corolla lobes twisted, inflorescence twisted
            6. ovary two celled, seeds numerous
                7. flowers in many flowered cymes, corolla lobes acute ..... *Benkara*
                7. flower 1-3, corolla lobes obtuse or orbicular
                    8. leaves 20-25 cm long, berries ovoid ..... *Tamilnadia*

8. leaves upto 8 cm long, berries globose
..... *Catunaregum*

6. ovary 1-celled

9. unarmed small trees ..... *Gardenia*

9. armed trees ..... *Ceriscoides*

1. ovules solitary in each cell, leaves with stiples

10 radical superior, ovary 3-5 celled ..... *Meyna*

10 radical inferior

11. corolla lobes twisted

12. bracts coriaceous; style 2-fid ..... *Ixora*

12. bracts membranous, style entire ..... *Pavetta*

11. corolla lobes valvate

13. calyx tube confluent ..... *Morinda*

13. calyx tube not as above, style branches 3-9, fruit a capsule
..... *Spermadictyon*

NEOLAMARCKIA Bosser

***Neolamarckia cadamba* (Roxb.) Bosser** in Bull. Mus. Natn. Hist. nat. Paris, 6, sect. b, Adansonia 3:247. 1984. *Nauclea cadamba* Roxb. Fl. Ind. 2: 121. 1824. *Anthocephalus chinensis* (Lam.) A. Rich. Ex Walp. Rep. 2: 491. 1843; Ridsd in Blumea 24:334. 1970. *A. cadamba* (Roxb.) Miq. Fl. Ind. Bat. 2:135. 1856; Hook f Fl. Brit. India 3:23. 1880. *A. indicus* A. Rich. in Mem. Soc. Hist. Nat. Paris 5:238. 1834; Cooke, Fl. Pres. Bombay 2:6. 1958 (Repr.)

Local Name: Dholo- Kadam, Kadam, **English Name:** Kadam tree, **Sanskrit Name:** Kadambh.

Identification Characters: Interpetiolar stipules, scented flowers, flowers in solitary terminal head.

Description: Evergreen tree (2n = 44). 6-9 m tall large deciduous tree, smooth, grey, fissured bark; leaves simple, opposite, dark green, interpetiolar stipules, oblong- lanceolate, prominent lateral veins, acute-acuminate tips. Flowers numerous, in solitary terminal ball-like cymose heads, greenish- yellow, fragrant, on flashy receptacle, each flower has 5 sepals, 5 petals, partially fused to form funnel shaped tube, 5 stamens, inferior ovary, style long, stigma white, the ovaries are separate, 4-celled; fruit round, fleshy, orange coloured composed of angular capsules, seeds small, not winged.

Phenological Data: Fls: Sep.- Nov, Frs: Nov.- Jan.

Distribution: Sub-Himalayan tracts form Nepal to Arunachal Pradesh, Bangladesh, Bhutan, Assam, Andamans and Nicobars, Western Ghats.

Origin\Native: India, China, Ceylon, Sumatra and Borneo.

Ecology: Very light demanding, well drained soil

Category of threat: Common

Special Characteristics: Scented flowers

Economic Importance: Ornamental

Horticultural Value: Grown in parks and gardens

Medicinal Value: Decoction of leaves used to clear throats, bark is used as a tonic

Method for Propagation: Seeds.

Suitable Environmental Conditions: Warm environments

Agricultural Value: Cultivated for ornamental purposes

Uses: Flowers are used in worship. Essential oil obtained from flower used in perfumery. Tree is very important for waste land management. Wood used for making boxes, beams, boards, for paper pulp

Localities in Gujarat: Throughout; planted in gardens as water conservation tree (Pandya, 1995).

GARDENIA J. Ellis.

1. plants armed, flowers dimorphic ..... G. *turgida var turgida*

1. plants unarmed, flowers not dimorphic ..... G. *resinifera*

Gardenia resinifera Roth, Nov. Pl. Sp. 150. 1821. G. lucida Roxb. Fl. Ind. 2: 553. 1824; Hook. f. Fl. Brit. India. 3: 115. 1880; Cooke, Fl. Pres. Bombay 2: 30. 1958 (Repr.). Shah, Fl. Guj. 1:351; 1978. Singh, et al Fl. Maha. Dicot. 2: 126. 2000.

Local Name: Dikamali, **English Name:** Dikamali, **Sanskrit Name:** Nadihingu.

Identification Characters: armed trees, leaves sessile, borne along branches, ovary one celled, ovules on parietal placentas, ovules more than 2 in each cell

Description: Evergreen tree (2n = 22). A small evergreen tree or large shrub, spreading branches, smooth, grey bark; Leaves simple, opposite, crowded, thick , coriaceous, entire, elliptic-ovate, acuminate, lanceolate with intrapetiolar stipules. Flowers white, solitary very fragrant, waxy, corolla white, corolla tube is greenish, anthers yellow; fruit berry, fleshy, with 6 ribs, ovoid, seeds many.

Phenological Data: Fls: June.- July, Frs: Aug.

Distribution: Throughout India.

Origin\Native: China, Japan.

Ecology: Fast growing, needs shade.

Category of threat: Common.

Special Characteristics: Highly fragrant flowers, emitted fragrance at night.

Economic Importance: Ornamental.

Horticultural Value: Planted in parks, gardens and home for showy, scented flowers.

Medicinal Value: Remarkable gum- resin is obtained from the wood, a product of medicinal importance.

Method for Propagation: Eye cutting.

Agricultural Value: Cultivated for highly scented flowers.

Localities in Gujarat: Some times planted in gardens, but wild in Dangs and Central Gujarat (Shah, 1978).

Uses: Flowers used in worship, fruit pulp yields yellow dye, essential oil from flower is used in perfumery.

HALDINIA Ridsd.

Haldinia cordifolia (Roxb) Ridsd. in Blumea 24: 361. 1978. *Nauclea cordifolia* Roxb. Pl. Cor. 1: 40, t. 53. 1796. *Adina cordifolia* (Roxb.) Hook. f. ex Brandis, For. Fl. 263, t. 33. 1874; Hook f. Fl. Brit. India 3: 24. 1880; Cooke, Fl. Pres. Bombay 2: 7.

1958 (Repr.). Shah, Fl. Guj. 1:349; 1978. Singh, et al Fl. Maha. Dicot. 2: 127. 2000.

Local Name: Haldu, Haldavan, **English Name:** Yellow Teak

Identification Characters: Unarmed plants, flowers in globose heads, flowers yellow, ovules more than two in each cell, fruit a capsule, calyx limb 5-lobed, stigma clavate, leaves distinctly cordate at base.

Description: Deciduous tree, 8-20 m tall, with grey or light black, longitudinally fissured bark, horizontal branches, leaves 2-26 x 1.5-25.5 cm, opposite, broadly ovate to sub-orbicular (heart shaped), appressed-pubescent beneath, acuminate, with hairy interpetiolar stipules. Flowers in yellow rounded axillary heads, in 1.5-2 cm across, with long peduncle, highly fragrant. Flower consists of 5 angled sepals forming calyx tube, corolla 5 lobed, hairy, stamens-5 club shaped, style long, bicarpellary inferior ovary, Capsule 0.4-0.6 cm long obconical, pubescent. Seeds about 6 in each coccus, oblong, brown, minutely hairy, winged.

Phenological Data: Fls: Feb.-Apr, Frs: May. – July.

Distribution: Himalaya (Kumaun to Sikkim), India, Ceylon, Indo-China.

Origin\Native: southern Asia, from India east to southern China and Vietnam.

Ecology: Well drained soil, low light

Category of threat: Common

Special Characteristics: Numerous flowers in globose heads, highly fragrant.

Economic Importance: Ornamental tree

Horticultural Value: Planted in parks and gardens

Medicinal Value: The bark and leaves are purgative. The bark yields rough fibers. The juice of the bark of the tree is used to treat sores. Seeds are narcotic; some parts are used in the treatment of diabetes. The yellow dye of the wood is considered to be antiseptic.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical environment

Agricultural Value: Cultivated for ornamental purposes

Uses: The wood is used for making furniture, in construction of boats and canoes. The bark is used in the dyeing industry

Localities in Gujarat: Throughout (except Kutch), in deciduous forests (Shah, 1978).

HYMENODICTYON Wall.

Hymenodictyon orixense (Roxb.) Mabb. in Taxon 31:66. 1982; Deb. in J. Econ. Tax. Bot. 13: 679. f. 3. 1989. *Cinchona orixensis* Roxb. Bot. Descr. Swietenia 21. 1793 & Med. Facts Obs. 6: 152. 1795. *Hymenodictyon excelsum* (Roxb.) Wall. in Roxb. Fl. Ind. 2:149. 1824; Hook. f. Fl. Brit. India 3:35. 1880; Cooke, Fl. Pres. Bombay 2:9. 1958 (Repr.). Shah, Fl. Guj. 1:352; 1978. Singh, et al Fl. Maha. Dicot. 2: 138. 2000.

Description: Trees, tall; bark grey, smooth. Leaves crowded at ends of branchlets, broadly elliptic-oblong or elliptic-lanceolate, apex abruptly acuminate, attenuate at base into long petiole, pubescent on both surfaces. Inflorescence pendulous; flowers greenish, fragrant, pedicelled in fascicles or umbels on a thyrsoid panicle. Capsules dehiscent, brown, ellipsoid locular. Seeds winged.

Phenological data: Fls. – Frs.: April - September.

Local Name: Bhamar chal, **Sanskrit Name:** Bhringhava, Bhramarchhalli, Ugragandha.

Localities in Gujarat: In deciduous forests of Dangs, Saurashtra (Barda and Girnar) and in scrub forests in North Gujarat (Shah, 1978).

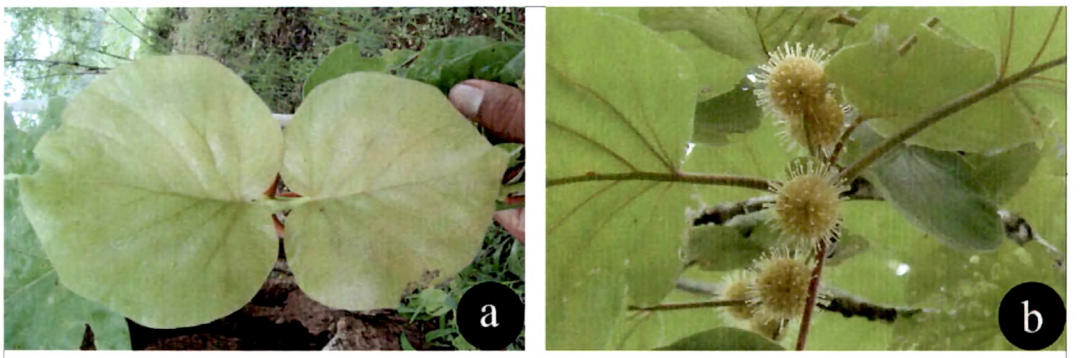


Fig. 123: *Haldina cordifolia* a. Leaves, b. Inflorescence

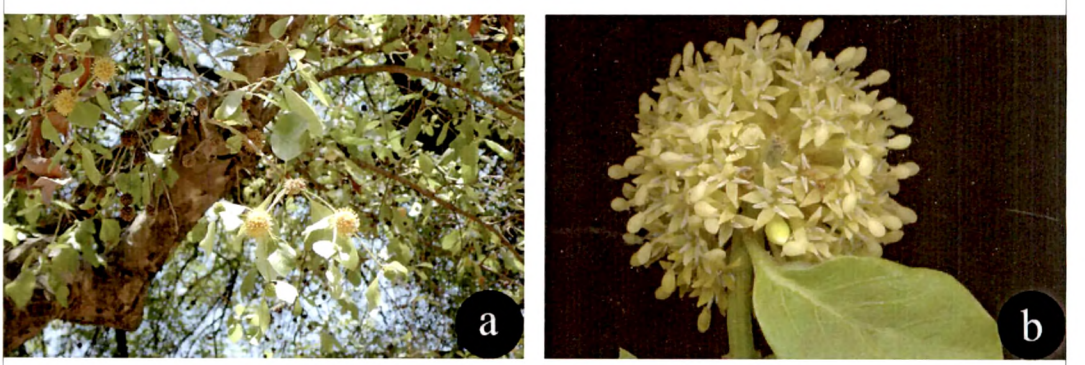


Fig. 124: *Mitragyna parvifolia* a. Leaves, b. Inflorescence

Fig. 125: *Neolamarckia cadamba* a. Leaves, b. Inflorescence

Fig. 126: *Ixora coccinea*

Fig. 127: *Ixora pavetta*

IXORA L.

1. flowers white

    2. flower buds globose ..... I. *brachiata*

    2. flower buds ellipsoid, corolla tube without white hairs at the mouth ..... I. *pavetta*

1. flowers bright scarlet ..... I. *coccinea*

Ixora brachiata Roxb. Fl. Ind. 1:391. 1820; Hook. f. Fl. Brit. India 3: 142. 1880; Cooke, Fl. Pres. Bombay. 2:39. 1958 (Repr.). Shah, Fl. Guj. 1:354; 1978. Singh, et al Fl. Maha. Dicot. 2: 139. 2000.

Local Name: Navri, **Sanskrit Name:** Nemali, Vasanti, Vanvasini.

Description: Small trees, tall; bark grey, smooth. Leaves opposite, shining, elliptic, apex obtuse, coriaceous, acute at base; petioles long. Flowers in sessile or shortly peduncled, brachiate cymes; corolla tube long, lobes oblong, tip rounded, deflexed; pedicels and peduncles pubescent. Drupes globose, reddish tinged, across, purplish-black when ripe, edible.

Phenological data: Fls. – Frs.: November - February.

Localities in Gujarat: Dangs, Panchmahals and Saurashtra; not common (Shah, 1978).

Ixora coccinea **L.** Sp. Pl. 110. 1753; Hook. f Fl. Brit. India 3: 145. 1880; Cooke, fl. Pres. Bombay. 2: 20. 1958. (Repr.) Mudaliar and Prasad in Singh et al. Fl. Maharashtra St. Dicot. 2: 140. 2000

Local Name: Ixora, **English Name:** Scarlet Ixora.

Identification Characters:

Description: Evergreen small tree (20=22), upto 5 m tall, leaves sessile, stipulate, opposite, ovate-lanceolate, amplaxicaul base, mucronate apex; flowers in dense terminal corymbose, two small leafy bracts, 4-sepals, unceolate, green, 4 lobed, petals 4, red, 4 lobed, at right angles to corolla tube, stamens 4 at top of corolla tube, ovary two celled, style short; fruit globose, hard berry, seed 2.

Phenological Data: Fls & Frs: Apr. – Sep.

Distribution: Asia, Africa, America, throughout India

Origin\Native: South western India. Asia, Africa, America.

Ecology: Full sun, well drained soil.

Category of threat: Common

Special Characteristics: Brilliant red flowers can remain open for long time.

Economic Importance: Ornamental tree.

Horticultural Value: Planted in gardens as a decorative; hedge plant.

Medicinal Value: Roots used in fever, diarrhea, dysentery, flower decoction is given in ulcers, dysentery.

Method for Propagation: Air layering.

Suitable Environmental Conditions: Tropical environments.

Agricultural Value: Cultivated for ornamental purposes

Uses: Green branches make excellent torches. Wood is a useful timber.

Ixora pavetta Andr. Bot. Rep. t. 78. 1799; Swaminathan in A. N. Henry et al. Fl. Tamilnadu Anal. 2: 11. 1987. *I. arborea* Roxb. ex. J. E. Sm. in Ress, Cyclop. 19: 5. 1811; Sant. in Rec. Bot Surv. India 16 (1); 199. 1967 (3rd Rev. ed.). *I. parviflora* Vahl, Symb. 3: 11, t. 52. 1794 non Lam. 1791; Hook. f. Fl. Brit. India 3:142. 1880; Cooke, Fl. Pres. Bombay 2:39. 1958 (Repr.). Shah, Fl. Guj. 1:353; 1978. Singh, et al Fl. Maha. Dicot. 2: 138. 2000.141

Local Name: Naveri, **English Name:** Ixora.

Identification Characters: Plants unarmed, flowers white, corolla tube 1-1.8 cm long, flower buds ellipsoidal, ovules solitary in each cell, corolla twisted, ovary 2-celled, fruit berry, style shortly exerted, 2-branched

Description: Evergreen tree. 2.5-4 m tall shrubs or small trees. Coriaceous, glabrous, elliptic-oblong or ovate-oblong, glabrous. Flowers white, fragrant, in terminal, corymbose cymes. Berries, globose, seeds brown.

Phenological Data: Fls: Feb.-Apr, Frs: Sep.

Distribution: Asia, Africa, America, throughout India.

Origin\Native: Ceylon, Burma and Nicobars.

Ecology: Full sun, well drained soil.

Category of threat: Common

Special Characteristics: White flowers, sweetly scented.

Economic Importance: Ornamental tree.

Horticultural Value: Planted in gardens.

Method for Propagation: Cuttings.

Suitable Environmental Conditions: Tropical environments.

Agricultural Value: Cultivated for ornamental purposes.

Uses: Green branches make excellent torches. Wood is a useful timber.

Localities in Gujarat: Pavagadh, north Gujarat (Modasa) and Saurashtra (Shah, 1978).

MITRYAGYANA Korth.

Mitryagyna parvilfora (Roxb.) Korth., Obs. Naucl. Ind. 19. 1839; Hook. f. Fl. Brit. India. 3: 25. 1881; Cooke, Fl. Pres. Bombay 2: 8, 1958 (Repr.). Shah, Fl. Guj. 1:355; 1978, *Nauclea parviflora* Roxb., Pl. Cor. 1: 40, t. 52. 1796; *Stephegyne parviflora* Korth., Verh. Nat. Gesch. Bot. Nederi. 161. 1840. Hook. f. Fl. Brit. India 3:25. 1880. Singh, et al Fl. Maha. Dicot. 2: 145. 2000.

Local Name: Kalam.

Identification Characters: unarmed plants, leaves distinctly cordate at base, flowers in globose heads, yellow, calyx limb entire, truncate, stigma mitriform, ovules more than two in each cell, fruit a capsule

Description: Deciduous trees, 8-15 m tall; bark grey, smooth, exfoliating in small scales. Leaves petiolate, opposite, stipulate, two interpetiolar stipules cover uppermost leaf bud, ovate, elliptic-oblong, obovate or nearly glabrous. Flowers white, turning yellow, highly scented, globose, axillary and terminal heads, sepals – 5 toothed, forming calyx tube, petals 5, stamens 5 at mouth of corolla, ovary inferior, bicarpellary, style long, stigma white mitriforms. Fruit capsules, glabrous, cuneate, distinctly ribbed. Seeds minute, brown, nearly smooth, winged.

Phenological Data: Fls: May.- June, Frs: Nov.- Dec.

Distribution: Throughout India.

Origin\Native: India

Ecology: Well drained deep soil, grow in moist areas like river banks.

Category of threat: Common

Special Characteristics: Small ball-like inflorescence.

Economic Importance: Ornamental tree.

Horticultural Value: Planted in gardens as a decorative tree, roadside.

Medicinal Value: Bark is used as febrifuge.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical environments.

Agricultural Value: Cultivated for ornamental purposes.

Uses: Wood is a useful timber for construction. Fruits are eaten by wild animals.

Localities in Gujarat: Throughout in deciduous and scrub forests; sometimes planted in gardens (Shah, 1978).

MORINDA L.

1. leaves glabrous, shining ..... M. *citrifolia*

1. leaves tomentose, not shining ..... M. *tomentosa*

Morinda citrifolia L. Sp. Pl. 76. 1753.; Hook. f. Fl. Brit. India 3: 155. 1880; Cooke, Fl. Pres. Bombay 2:42. 1958 (Repr). *M. citrifolia* var. *bracteate* Hook. op. cit, Cooke, op cit. Singh, et al Fl. Maha. Dicot. 2: 146. 2000.

Local Name: Rangari.

Description: Trees, bark smooth. Leaves elliptic-lanceolate, coriaceous, shining, acute; Flowers white, in solitary peduncled heads, usually in axil of every other pair or leaf-opposed.

Phenological data: Fls. – Frs.: August - March.

Localities in Gujarat: Throughout Gujarat except Kachchh; common in dry deciduous forests (Chavan, 1993).

Morinda pubescens J. E. Sm. In Rees, Cyclop. 24, n. 3. 1813; Verdc. in Kew Bull. 37:543. 1983. *M. tinctoria* Roxb. var. *tomentosa* (Heyne ex Roth) Hook. f. Fl. Brit India 3:156. 1880; Cooke, Fl Pres. Bombay 2:43.1958 (Repr.). Shah, Fl. Guj. 1:355; 1978. *M. tomentosa* Heyne ex Roth, Nov. Pl. Sp. 147. 1821. Singh, et al Fl. Maha. Dicot. 2: 146. 2000.

Local Name: Aledi, **English Name:** Morinda, **Sanskrit Name:** Achchhuka.

Identification Characters: plants armed, flowers in globose heads, flowers white, ovule one in each cell, fruit a syncarp.

Description: Deciduous trees, 8-15 m tall trees, with blackish-brown, rough, irregularly fissured bark. Elliptic, elliptic-oblong or obovate-oblong, tomentose. Flowers white, in fleshy, globose heads, coalescent drupes, bright-glaucous-green. Seeds oblong or obovoid, pale-to dark-brown, rough.

Phenological Data: Fls. And Frs: June. - July.

Localities: Found in the Sayaji park, Botanical garden and some of the private garden.

Origin\Native: Ceylon, Malaya, Australia and Pacific island.

Method for Propagation: Seeds.

Uses: Wood is very useful timber for local house construction and other purposes. Fruit is adored by villagers, monkeys and deers.

Distribution in Gujarat : Throughout Gujarat except Kachchh; common in dry deciduous forests (Shah, 1978).

TAMILNADIA Retz.

Tamilnadia uliginosa (Retz.) Tirveng. & Sastre in Mauritius Inst. Bull. 8 (4): 85. 1979. *Gardenia uliginosa* Retz. Obs. Bot. 2: 14. 1781. *Randia uliginosa* (Retz.) DC. Prodr. 4: 386. 1830; Hook. f. Fl. Brit. India 3: 110. 1880; Cooke, Fl. Pres. Bombay 2: 27. 1958 (Repr.). Shah, Fl. Guj. 1:361; 1978, *Xeromphis uliginosa* (Retz). Mahes. in Bull. Bot. Surv. India 3: 92. (1961) 1962; Tirveng. in Bull Mus. natn. HIst. nat. Paris, 3e, 521, Bot. 35:19. 1978. *Catunaregam uliginosa* (Retz.) Sivar. in Manilal & Sivar. Fl. Calicut 132. 1982. Singh, et al Fl. Maha. Dicot. 2: 167. 2000.

Local Name: Gangada, **Sanskrit Name:** Gangati, Pinditak, Karhat.

Description: Small trees, tall; bark reddish-brown; spines short, branches 4-angled. Leaves elliptic or oblanceolate, apex obtuse. Flowers white, across, solitary, fragrant; calyx-lobes fleshy, green; corolla lobes broadly orbicular. Berries ovoid, across, yellowish brown. Seeds compressed, closely packed in pulp.

Phenological data: Fls. – Frs.: March - April.

Localities in Gujarat: Rajpipla, Pavagadh, Panchmahals, Saurashtra and Kachchh; not common (Shah, 1978).

SAPOTACEAE

Trees or shrubs with milky juice; leaves simple, alternate, leathery; inflorescence terminal or axillary cymes; flowers regular, bisexual, tetramerous, sepals 4-8, united, petals 4-8, united, stamens 4-8 or many, epipetalous, carpels 2-8, syncarpous, ovary superior, axile placentation, fruits berry.

1. corolla lobes 18-24
    2. calyx segments 8, staminodes hairy ..... *Mimusops*
    2. calyx segments 6, staminodes glabrous ..... *Manilkara*
1. corolla lobes not more than 8
    3. staminodes present
    3. staminodes absent
        4. stamens 12-20 or more, calyx segments 4, corolla creamy white ..... *Madhuca*
        4. stamens 5 or 8, calyx segments 5-6,uni seriate, ovary 5-6 celled ..... *Chrysophyllum*

MADHUCA Buch – Ham. ex. J. F. Gmel.

Madhuca indica J. F. Gmel in. Syst. Nat. 799. 1791; Hook. f. Fl. Brit. India 3: 544. 1882; Cooke, Fl. Pres. Bombay 2: 152, 1958 (Repr.). Shah, Fl. Guj. 1: 407, 1978; Singh, et al, Fl. Maha. Dicot. 2:293. 2000; *Bassia latifolia* Roxb., Pl. Corrom. 1: 20. t. 19. 1795; *Madhuca latifolia* (Roxb.) Macbr. in Contr. Gray Herb. Harv. Univ. N. S. 53: 17. 1918; *Bassia longifolia* J. Koenig. in L. Mant. Pl. App. 563. 1771.

Local Name: Mahudo, **English Name:** Mowrabutter tree, **Sanskrit Name:** Madhuka, Vanprastha, Madhustil, Madhustrav, Gudpushpa.

Identification Characters: leaves crowded at ends of branches, flowers at ends of leafless braches, calyx lobes 4-5; stamens 12 or more in two whorls, all fertile.

Description: Deciduous tree (2n = 22, 24). 10-15 m tall; bark black, Greyish-black or ash-colored, longitudinally fissured; leaves clustered at end of branches, leathery, elliptic-oblong, narrow at ends, acuminate; Flowers small, creamy-white, in dense axillary fascicles, sepals 4, lobed, red, pubescent, fleshy, sweetly scented, petals 8-9 lobed, stamens 20-25, filaments short, style long curved; fruit ovoid, fleshy, yellow when ripe, Seeds ovoid smooth, shining, brownish-black.

Phenological Data: Fls. And Frs: Mar-June.

Distribution: Central India, Gujarat, Himalayan foot hills, upper parts of Myanmar, Deccan Peninsula, Sri Lanka

Origin\Native: southern Asia

Ecology: moist soil, full sunlight

Category of threat: Common

Special Characteristics: flowers are scented, milky juice present

Economic Importance: good shade tree, Flowers and fruits are edible.

Horticultural Value: planted along road side, farm boundaries

Medicinal Value: seed oil is used as laxative; bark and milky juice are also used medicinally

Method for Propagation: Seeds, fleshy seeds should be kept in soil till it become big enough to be planted

Suitable Environmental Conditions: deciduous forests

Agricultural Value: cultivated for plantation in forest area.

Uses: fruits are used to make cooking oil by tribal and the remains of fruits after extracting oil are used in soap industry. Flowers are used to make local beverage - dried flowers when properly soaked in water and allowed to ferment, on distillation produce native liquor. Fruit and flowers are more valued than timber.

Localities in Gujarat: Throughout in dry deciduous forests, less frequent in scrub forests (Shah, 1978).

MANILKARA Adams. nom. cons.

1. fruits yellow, when ripe, bark grey ..... M. *hexandra*

1. fruits brown when ripe, bark dark brown ..... M. *zapota*

Manilkara hexandra (Roxb.) Dubard in Ann. Mus. Col. Mars. 3:3:9. f. 2: 1915; van Royen in Blumea 7: 408. 1953. *Mimusops hexandra* Roxb. Pl. Cor. 1: 16. t. 15. 1795;C.B.Cl. in Hook. f. Fl. Brit. India 3: 549. 1882; Cooke, Fl. Pres. Bombay 2: 155. 1958 (Repr.). Shah, Fl. Guj. 1:407; 1978. Singh, et al Fl. Maha. Dicot. 2: 294. 2000.

Local Name: Rayan, **Sanskrit Name**: Rajadani.

Identification Characters: Leaves spread on branches, flowers along with leaves, trimerous, not fragrant, calyx lobes 18-24; fertile stamens 6-8 with as many staminodes, sterile stamens toothed or laciniate, not petaloid.

Description: Evergreen tree (2n = 24), 10-15 m tall trees; bark Greyish-black or blackish-brown, rough, deeply longitudinally furrowed. Leaves, leathery, crowded at the end of branches, Coriaceous, elliptic-oblong or obovate-oblong. Flowers creamy-white, axillary, ovoid or ellipsoid, in fascicles, fruit, berry, cylindrical, 1 (2) – seeded, smooth, with plenty of latex. Avoid smooth shining black.

Phenological Data: Fls: Nov. – Dec. Frs: Apr. - May.

Distribution: Throughout India, Sri Lanka, Thailand, Indo-china, Hainan

Origin\Native: Centaral India, Deccan Peninsula

Ecology: Sandstone and laterite soils

Category of threat: Common

Economic Importance: Ornamental

Horticultural Value: Planted in gardens, fruit orchards, avenues

Method for Propagation: Seeds and Cuttings.

Suitable Environmental Conditions: Temperate and tropical environments

Agricultural Value: Cultivated for fruits

Uses: Fruits are edible. Seeds yield edible oil. Wood is used in furniture, tool handles, walking sticks, rollers, agricultural implements, leaves used as cattle fodder

Localities in Gujarat: Wild or self-sown near villages, throughout in plains (Shah, 1978).

Manilkara zapota (L.) P. Royen in Blumea 7: 410. 1953; Moore & Stearn in Taxon 16: 383. 1967; Naik, FL. Osmanabad 193. 1979. *Achrus zapota* L. Sp. Pl. 2: 1190. 1753, quoad typum synonymis sloqnei & Plukenetii exclusis. *A. sapota* L. Sp. P. ed. 2: 470. 1762; C.B.Cl. in Hook. f. Fl. Brit. India 3: 534. 1882. *Manilkara achras* (Mill.) Fosb. In Taxon 13: 255. 1964. Shah, Fl. Guj. 1:408; 1978, Singh, et al Fl. Maha. Dicot. 2: 296. 2000.

Local Name: Chikoo, **English Name:** Sapota.

Identification Characters: leaves spread on branches, flowers along with leaves, trimerous, not fragrant, calyx lobes 6; fertile stamens 6-8 with as many staminodes, sterile stamens petaloid, minutely toothed.

Description: Evergreen tree. 4-5 m tall tree. Bark brown, rough, longitudinally fissured. Leaves oblong-lanceolate or elliptic-oblong, glabrous. Flowers dull-white, solitary, axillary; fruits fleshy, ovoid or ellipsoid, rusty-brown. Seeds hard, shining, black, smooth, glabrous, ellipsoid, acute.

Phenological Data: Fls. and Frs: Throughout the year.

Distribution: Throughout India

Origin\Native: S. Mexico and Guatemala.

Ecology: well draining soil Keep warm and damp with high humidity. Bright light.

Category of threat: Common

Economic Importance: Fruit tree

Horticultural Value: Planted in gardens and home

Method for Propagation: Seeds, Budding and Grafting.

Agricultural Value: Cultivated for fruits

Uses: The fruit is used as a table fruit and also in the preparation of jams. The bark yields latex which contain

ghatta – percha and tannins. The wood is also used as a commercial timber.

Localities in Gujarat: Planted in gardens and in orchards (Shah, 1978).

MIMUSOPS L.

Mimusops elengi L. Sp. Pl. 349. 1753; C. B. Cl. in. Hook. f. Fl. Brit. India 3: 548. 1882; Cooke. Fl. Pres Bombay 2: 155. 1958 (Repr.). Shah, Fl. Guj. 1:408; 1978, Oza in J. Bombay nat. Hist. Soc. 72: 601. 19775. Singh, et al Fl. Maha. Dicot. 2: 294. 2000.

Local Name: Bakul, Borsalli, **English Name:** Bullet wood tree.

Identification Characters: leaves spread on branches, star like flowers along with leaves, flowers tetramerous, fragrant, calyx lobes 8, fertile stamens 8 with as many as staminodes, sterile stamens entire, lanceolate.

Description: Evergreen tree (2n = 24). 3-10 m tall trees; bark grey or nearly light black, smooth. Leaves simple, alternate, ovate-Elliptic or elliptic-lanceolate, glabrous, dark green, glossy, undulate margin, acuminate. Flowers small, white, fragrant, axillary, in fascicles, calyx in two series, 6-8 sepals, corolla in 2-3 series, petals 20-24, stamens 6-8, alternate with 6-8 staminodes, fruit is fleshy, berry, yellow, smooth, ellipsoid, 2-seeded.

Phenological Data Fls: Mar. – July. Frs: Feb.-June

Distribution: In the tropics of the Old World from Hawaii to Australia and New Caledonia, Deccan Peninsula to Andaman's

Origin\Native: West Indian Peninsula, Myanmar, Sri Lanka

Ecology: Well drained soil, low light

Category of threat: Common

Special Characteristics: Pyramidal crown of dense dark green foliage, flowers highly scented

Economic Importance: Ornamental

Horticultural Value: Planted in parks and gardens, avenue and shade tree

Medicinal Value: Fruit is used in dysentery and diarrhea,

Method for Propagation: Seeds and Cuttings.

Suitable Environmental Conditions: Tropical environments

Agricultural Value: Planted for fruits and ornamental purposes

Uses: Ripe fruit is edible. Oil from flowers is used in perfumery industry. Seed used in cooking and as a luminant. Wood being very strong is used in house and bridge construction.

Localities in Gujarat: Planted in gardens and along roads (Shah, 1978).

EBENACEAE

Trees, monoecious or dioecious; leaves simple, alternate, entire, coriaceous; inflorescence axillary solitary or cymes; flowers regular unisexual, hypogynous, sepals 3-7, united, persistent, petals 3-7, united, coriaceous, stamens 3-7, epipetalous, carpels 2; fruits berry.

1. stamens up to 16

    2. leaves subopposite and alternate, corolla of female flowers tubular,

Fig. 128: *Nyctanthes arbor-tristis* a. Flower, b. Fruits

Fig. 129: *Salvadora persica* a. Flowers, b. Fruits

Fig. 130: *Diospyros melanoxylon* a. Dried leaves used for 'Bidi' making, b. Fruits

Fig. 131: *Schrebera swietenioides*

Fig. 132: *Jacquinia ruscifolia*

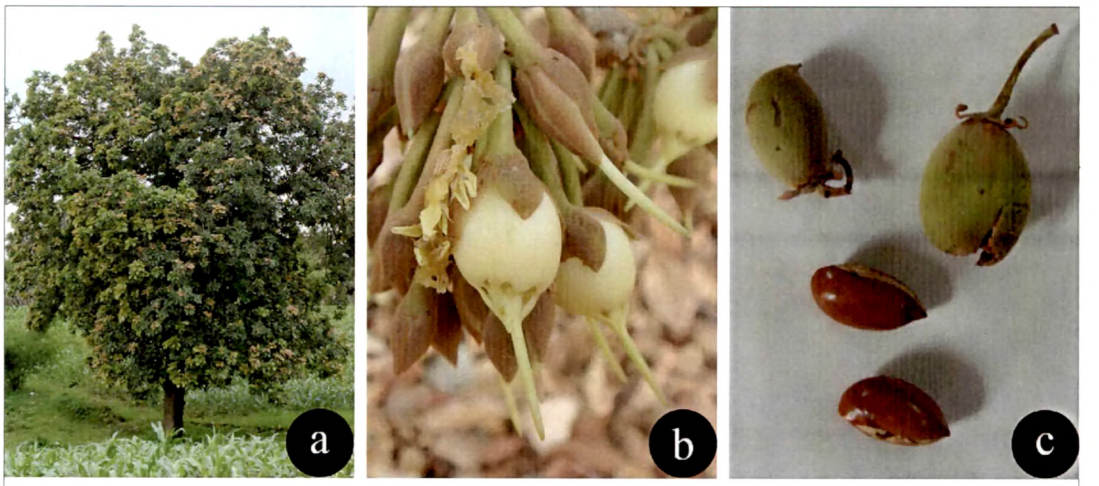


Fig. 133: *Madhuca indica* a. Habit, b. Flowers, c. Fruits

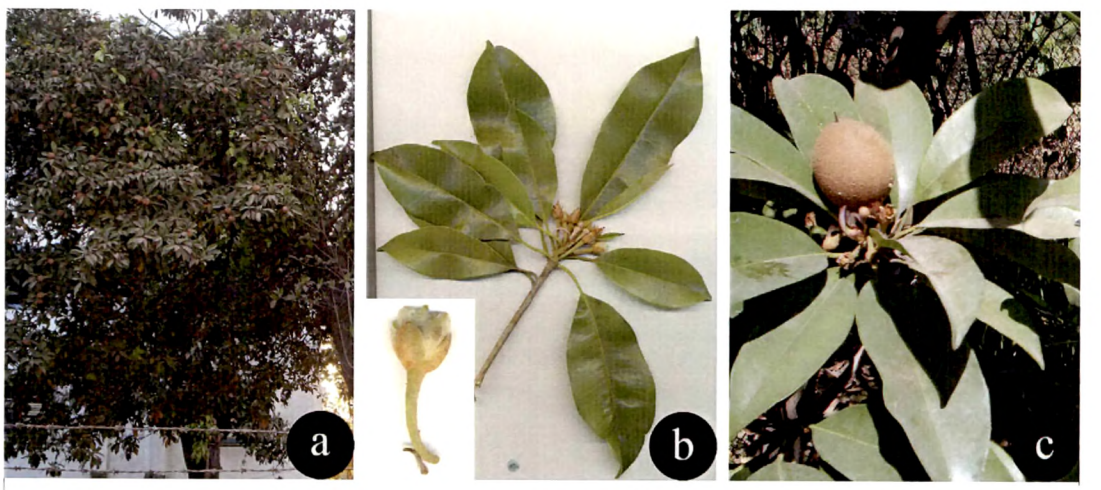


Fig. 134: *Manilkara zapota* a. Habit, b. Twig, c. Fruit

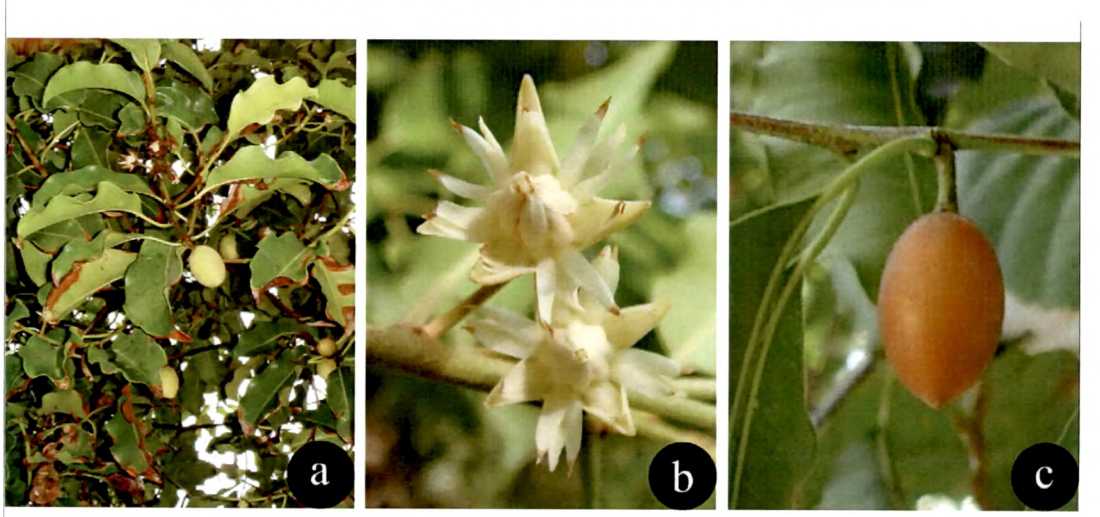


Fig. 136: *Mimusops elengi* a. Twig, b. Flowers, c. Fruit

albumen of seeds ruminate ..... D. *melanoxylon*

2. leaves always alternate, corolla of female flowers urceolate or campanulate, albumen of seeds not ruminate

3. male calyx glabrous inside, staminodes 7-9 ..... D. *chloroxylon*

3. male calyx pubescent inside, staminodes 12 ..... D. *cordifolia*

1. stamens more than 16, corolla glabrous outside ..... D. *malabarica*

DIOSPYROS L.

Diospyros cordifolia **Roxb.** Pl. Cor. 1:38, t. 50. 1795; C. B. Cl. in Hook. f. Fl. Brit. India 3: 555. 1882; Cooke, Fl. Pres. Bombay 2: 165. 1958 (Repr.)

Local Name: Goindu, **English Name:** Mountain persimmon.

Identification Characters: leaves alternate, corolla of male flowers campanulate, calyx of male flowers glabrous outside, staminodes 4, bark grey or light-black, nearly smooth.

Description: Deciduous tree. 6-12 m tall, large tree, with irregular branches, armed trees. Broadly ovate-oblong or elliptic, nearly glabrous. Flowers greenish-white, axillary, males few, in cymes.

Phenological Data: Fls: Mar. Frs: Apr.

Distribution: throughout India

Origin\Native: Subtropical and Ceylon.

Ecology: demands light

Category of threat: Common

Special Characteristics: bark is yellowish grey

Method for Propagation: Seeds.

Suitable Environmental Conditions: Dry deciduous forests

Uses: Yield valuable wood ebony. The yellowish Grey, soft but durable wood is also used for making agricultural implements and cases.

Diospyros malabarica **(Desr) Kostel** Allg. Med. – Pharm. Fl. 3:1099. 1834; Panigrahi and Murti in Bangladesh J. Bot. 10(1):36. 1981. *Garcinia malabarica* Desr in Lam. Encycl 3: 701. 1792. *Diospyros embryopteris* Pers Syn. Pl. 2:624. 1807, p.p.; C.B. Clarke in Hook f Fl. Brit. India 3:556. 1882, p.p. *excl syn Embryopetris peregrine* Gaertn., 1788. *D. peregrine* Guerke in Engl. & Prantl, Nat. Pflanzenfam 4(1):164. 1891, p.p. majore excl. ref. Gaertn. 1788.

Local Name: Temburi, **English Name:** Wild mangosteen, Indian Persimmon

Description: Evergreen tree (2n = 30), 5-7 m tall straight tree, dense round crown, unisexual and dioecious i.e. male and female flowers on separate trees. Male plant is large tree whereas female plant is medium sized. Leaves dark green, alternate, distichous, linear lanceolate, leathery, obtuse, young leaves are red in colour; male flowers white, scented, smaller than female flowers, in small clusters, axillary, cymes, calyx cup shaped, lobed, petals white, lobed, ovoid, numerous stamens in pairs on corolla tube anthers hairy, linear; female flowers are axillary, shortly stalked, solitary, drooping, larger than male flowers, sepals 4, cordate, petals 4, jointed to form a tube, hairy staminodes present, ovary hairy; fruit berry, spherical, leathery rind contain up to 8 seeds.

Phenological Data: Fls: May. – July, Frs: Aug. – Sep.

Distribution: Throughout India, Australia, and Malaysia

Origin\Native: Subtropical and India.

Ecology: Moist places, sensitive to frost and drought, soil rich in loam

Category of threat: Common

Special Characteristics: Bark is very dark, black, smooth

Economic Importance: Ornamental

Horticultural Value: grown as an ornamental and shade tree for parks and open spaces.

Medicinal Value: bark is described in the Nighantas as a good application to boils and tumors, and the juice of the fresh bark as useful in bilious fever. The fruit when unripe is said to be cold. light, and astringent, and when ripe beneficial in blood diseases, gonorrhea and leprosy.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Moist environments

Agricultural Value: Cultivated for ornamental purposes and fruits

Uses: Ripe fruits are edible. The wood is used in carving and cabinet making. Gum derived from unripe fruit used in India to paint bottoms of boat as preservative. Bark yields tannin.

Diospyros melanoxylon Roxb Pl. Cor 1: 36. t. 46. 1795; C.B.Cl. in Hook. f. Fl. Brit. India 3: 564. 1882; Cooke, Fl. Pres. Bombay 2: 159, 1958 (Repr.). Shah, Fl. Guj. 1:409; 1978. Singh, et al Fl. Maha. Dicot. 2: 301. 2000.

Local Name: Tendu, Timru, **English Name:** Ebony Persimmon, **Sanskrit Name:** Tinduk, Kalskandha, Asithsarak, Shitisarak, Dirghapatraka.

Description: Deciduous tree, medium-sized, up to 25 m, Leaves opposite or alternate and coriaceous, up to 35 cm long, tomentose on both sides when young, becoming glabrous above when fully grown. Male flowers are mauve in colour, tetramerous to sextamerous, sessile or nearly sessile in short peduncles, mostly 3-flowered. Female flowers mauve, mostly extra-axillary or sometimes solitary, axillary generally 2, opposite each other, larger than the male flowers. Fruits olive green, ovoid or globose 3-4 cm across; 1 to 8-seeded berries. Pulp yellow, soft and sweet. Seeds compressed, oblong, shiny, often banded.

Phenological Data: Fls - Frs: Apr. – June.

Distribution: Island of Sri Lanka and the southern Indian coastal regions, southern part of the West Ghats Mountains in Kerala and Tamil Nadu states

Origin\Native: India, Pakistan.

Ecology: demands light; it is drought and frost hardy but sensitive to water logging.

Category of threat: Common

Special Characteristics: The bark is pelicanor blue -black in colour, exfoliating in rectangular scales

Medicinal Value: The seeds can be intoxicating; they have been prescribed in India as a cure for mental disorders, nervous breakdowns and palpitations of the heart. The fruits have a cooling and an astringent effect. Dried flowers are reportedly useful in urinary, skin and blood diseases. The bark is astringent; its decoction is used in diarrhea.

Method for Propagation: Seeds, Root suckers

Suitable Environmental Conditions: Dry deciduous forests

Agricultural Value: Cultivated for leaves to make *'Bidis'*.

Uses: The main source of production of *bidi* leaves to make tobacco cigarettes, Wood is hard, whitish-pink, tough, fairly durable and used for building, shoulder poles, mine props and shafts of carriages.

Localities in Gujarat: Throughout, frequent in deciduous forests (Shah, 1978).

OLEACEAE

Trees or shrubs; leaves simple or compound, opposite or alternate; inflorescence trichotomous cymes, axillary or terminal; flowers regular, bisexual or unisexual, calyx 4 or 9, united, petals 4 or 9, united, stamens 2, epipetalous, carpels 2 syncarpous, axile placenta; fruit capsule, nut, drupe or berry.

1. leaves simple, rough; corolla tube orange; bark rough; fruit flat ..... *Nyctanthes*
1. leaves compound, corolla tube white, bark smooth; fruit pyriform ..... *Schrebera*

NYCTANTHES L.

Nyctanthes arbor – tristis L. Sp. Pl. 6. 1753; C. B. Cl. In Hook. f. Fl. Brit. India 3; 603. 1882; Cooke, Fl. Pres. Bombay 2 ; 176. 1958 (Repr.). Shah, Fl. Guj. 1:411; 1978. Singh, et al Fl. Maha. Dicot. 2: 311. 2000.

Local Name: Rat rani, Parijatak, **English Name:** Tree of sorrow/ Coral jasmine, Night Jasmine, **Sanskrit Name:** Parijata, Sephalika, Ragpushpi.

Identification Characters: bark pale-blackish-brown, rough, leaves simple, rough, corolla tube orange, fruit a capsule, flat

Description: Deciduous tree (2n = 44, 46). 5-7 m tall, drooping branches, roughly hairy, bark thick, brown, rough; The leaves simple, opposite, large, broad ovate and very scabrid to the touch, dentate or toothed, rounded base, acuminate apex; The flowers are white, fragrant, in clusters, axillary or terminal, trichotomous cymes, bloom during night and fall of in the morning forming a large carpet of its white scented flowers below the tree, sepal 5, campanulate, corolla salver shaped, petals 5-7, white, corolla tube bright orange, stamens 2, sessile, included, ovary globular, ovules 2, fruit capsule, green, obcordate, flat, bilobed; seed round.

Phenological Data: Fls: July. – Sep, Frs: Sep.- Nov.

Distribution: Throughout India

Origin\Native: India.

Ecology: grow in any soil, warm and humid places

Category of threat: Common

Special Characteristics: fragrant flowers

Economic Importance: Ornamental

Horticultural Value: Planted in parks and gardens, religious places

Medicinal Value: leaves used medicinally

Method for Propagation: Seeds and cuttings.

Suitable Environmental Conditions: tropical environments

Agricultural Value: cultivated for ornamental purposes

Uses: The tree planted as an ornamental tree planted near the temple. The flowers offer to lord Shiva. The flower (Red corolla tube) is also used in the dyeing industry.

Localities in Gujarat: Wild in Rajpipla, Panchmahals, Mahi ravines and North Gujarat; also cultivated; common (Shah, 1978).

SCHREBERA Roxb. nom. Coms.

Schrebera swietenioides Roxb. Pl. Cor. 2:1, t. 101. 1799; C.B.Cl. in Hook. f. Fl. Brit. India 3: 604. 1882; Cooke, Fl. Pres. Bombay 2: 177. 1958 (Repr.). Shah, Fl. Guj. 1:412; 1978. Singh, et al Fl. Maha. Dicot. 2: 312. 2000.

Local Name: Nakhati.

Description: Trees tall. Leaves imparipinnate; leaflets ovate, acute to acuminate at apex, oblique at base. Flowers yellowish-brown, many, in cymes. Capsules obovoid, pendulous, clothed with scabrous specks. Seeds each cell, winged.

Phenological data: Fls. – Frs.: April - June.

Localities in Gujarat: Dang, Vyara, Rajpipla, Chhotaudepur, Pavagadh, Panchmahals, Saurashtra ; rare (Shah,1978).

SALVADORACEAE

Small trees or shrubs; leaves simple, opposite or alternate, leathery; inflorescence panicles; flowers regular bisexual, tetramerous, small, sepal 4, united, imbricate, petal 4, united, valvate or imbricate, stamens 4, epipetalous, carpels 2, syncarpous, ovary superior, basal placenta; fruit drupe or berry.

1. leaves broadly ovate to ovate-lanceolate ..... S. *persica*
1. leaves linear-oblong to linear-lanceolate ..... S. *oleoides*

Salvadora persica **L.** in Kew Bull. 19: 150. 1964. S. wightiana Planch ex Thw. Enum. Pl. Zeyl. 190. 1860. S. persica sensu Roxb. Fl. Ind. 1: 389. 1837 non L. 1753; C. B. Cl. in Hook f Fl. Brit. India 3: 619. 1882; Cooke, Fl. Pres. Bombay 2:182. 1958 (Repr.)

Local Name: Piludi, **English Name:** Toothbrush tree

Identification Characters: unarmed tree, leaves broadly ovate to ovate – lanceolate, flowers bisexual, petals united, ovary 1-celled.

Description: Evergreen tree. 2.5-4 m tall, with straight or crooked trunk and dull grey to Greyish-white or Greyish-brown bark, leaves glabrous, fleshy. Flowers greenish-yellow, in axillary and terminal, 4-20 cm long panicles. Fruits Spherical, fleshy, pink to deep-purples. The root bark is light brown and the inner surfaces are white, odour is like cress and taste is warm and pungent.

Phenological Data: Fls: Mar.- Apr, Frs: May.- Nov.

Distribution: Throughout India, West Pakistan, Iran

Ecology: drought resistant

Category of threat: Common

Economic Importance: Ornamental fruit tree

Horticultural Value: planted in gardens

Medicinal Value: The roots are prepared as a salve and rubbed on the face for headaches. They are used for general body pain, gonorrhea, back pains, chest diseases, and stomach aches. Latex from the bark is used for treating sores. Seeds are used as a tonic and seed oil is used on the skin for rheumatism. twigs are used as

tooth brush to relieve toothache and gum disease, and the leaves are used as a mouthwash and for tooth and gum problems.

Method for Propagation: Seeds.

Uses: The twigs are used as tooth brush. The wood is used as firewood. The leaf is eaten by animals. It is worshiped by Muslim.

APOCYNACEAE

Trees, shrubs or climbers with milky juice; leaves simple, opposite, verticillate or alternate; inflorescence solitary or cymes; flowers regular, bisexual, pentamerous, bracts and bracteoles present, sepals 5, united, imbricate, petals 5, united, contorted, corona present sometimes, stamens 5, epipetalous, free, carpels 2, syncarpous; fruit pair of follicles or berry or drupe.

1. leaves alternate
    2. leaves upto 15 cm long, ovules 2 in each locule, fruit a drupe .. *Cascabella*
    2. leaves more than 20 cm long, ovules more than 2 in each locule, fruit a follicle ..... *Plumeria*

1. leaves whorled, fruit a follicle ..... *Alstonia*

1. leaves opposite, fruit a follicle
    3. throat without corona, stamens inserted near the base of corolla tube, anthers included, free from stigma, follicles not connate .. *Holarrhena*
    3. throat with corona, stamens inserted at the top of corolla tube, anthers exerted, adnate to stigma, follicles connate ..... *Wrightia*

***Alstonia scholaris* (L.) R. Br.** Mem. Wern. Nat. Hist. Soc. 1: 76. 1811; Hook f Fl. Brit. India 3:642. 1882; Cooke, fl. Pres. Bombay 2: 194. 1958 (Repr.); Markgraf in Blumea 22:23. (1974) 1975. Ehites scholaris L. Mant. Pl. 53. 1767.

Local Name: Saptparni, **English Name:** Devil's tree.

Identification Characters:

Description: Evergreen tree (2n = 44). 4- 7 m tall, with whorled branches, leaves 4-7 in a whorl. Bark rough, dark grey; leaves 5-7, crown at the end of branches, obovate, smooth, leathery, glabrous, dark green, Flowers greenish- white, small, sweet scented, produce intense sweet smell like cardamom (*Elaichi*), in umbel cyme, sepal 5, petals 5, white, salver shaped, hairy, ovate, stamens 5, inserted; bicarpellary, apocarpous pistil. Fruit a pair of follicles, green, linear, long, hanging down; seeds oblong, flat.

Phenological Data: Fls: Nov.-Feb, Frs: Jan. - Feb.

Distribution: native to tropical and subtropical Africa, Central America, southeast Asia, Polynesia and New South Wales, Queensland and North Australia,

Origin\Native: Ceylon, Tropical Africa and Australia.

Ecology: moist soils,

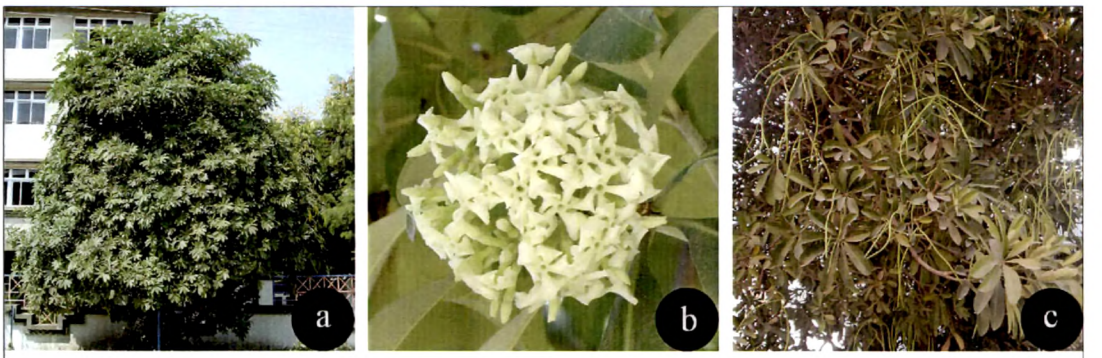


Fig. 136: *Alstonia scholaris* a. Habit, b. Flowers, c. Fruits

Fig. 137: *Cascabella thevetia* a. Habit, b. Flowers, c. Fruits

Fig. 138: *Strychnos nux-vomica* a. Twig, b. Fruits, c. Seeds

Fig. 139: *Cordia dichotoma*

Fig. 140: *Cordia sebestena*

Fig. 141: *Ehretia laevis*

Category of threat: Common

Special Characteristics: laticiferous tree

Economic Importance: Ornamental foliage tree

Horticultural Value: Avenue tree, mostly grown in parks and gardens for its spectacular habit and dark foliage

Medicinal Value: bark used in diarrhea, dysentery, fever, milky latex used to cure sore, pyorrhea, wounds

Method for Propagation: Seeds and Cuttings.

Suitable Environmental Conditions: warm climate,

Agricultural Value: cultivated for ornamental purposes

Uses: Its wood is too soft and is used in making pencil, boxes, and matchbox. Bark is used in medicine as a bitter astringent in treatment of fever and dysentery.

HOLARRHENA R. Br.

Holarrhena pubescens (Buch – Ham.) Wall. ex G. Don, Gen. Syst. 4 : 78. 1837; Panigr. in Taxon 36: 466. 1987. *Echites pubescens* Buch. Ham. In Trans. Linn. Soc. London 13: 521. 1821. *Holarrhena antidysenterica* (Roth) Wall. ex A. DC. in DC. Prodr. 8: 413. 1844; Hook. f. Fl. Brit. India 3: 644. 1882; Cooke, Fl. Pres. Bombay 2: 195. 1958 (Repr.). Shah, Fl. Guj. 1:417; 1978. Singh, *et al* Fl. Maha. Dicot. 2: 322. 2000.

Local Name: Kadvo Indrajav, Kado **English Name**: Easter tree, Ivory tree

Identification Characters: leaves opposite or alternate, corolla slaver shaped, without coronary scales, anthers included; follicles linear-cylindric; many seeded, seeds comose at apex

Description: Deciduous tree (2n = 22), 3-6 m tall; laticiferous, bark light-blackish-brown, irregularly fissured. Leaves opposite, broadly ovate or elliptic, nearly glabrous at length, wedge shaped. Flowers white, in terminal cymes, corymbose, fragrant, sepals 5; petals 5, white, joined to form a slender tube; stamens 5 within corolla tube; bicarpellary apocarpous ovary. Fruits cylindric follicles, dark-green, studded with white or brown specks; seeds linear-oblong, compressed, brown, faintly ribbed, pubescent, pale-silky-brown, comose.

Phenological Data: Fls: Mar.-June, Frs: July. – Oct.

Distribution: Dry forests of India

Origin\Native: India

Localities in Gujarat: common in deciduous forests, also in scrub forests, Chhotaudepur, Dahod, Panchmahal districts.

Ecology: moist places, good forest tree

Category of threat: Common

Special Characteristics: laticiferous, wood is white, soft

Economic Importance: ornamental, Medicinal tree

Horticultural Value: plated in parks and garden for its beautiful scented flowers and foliage

Medicinal Value: the bark is used in dysentery and other gastric disorders, flowers are used to improve appetite. Seeds are cooling agent, appetizing and astringent to the bowels.

Method for Propagation: Seeds.

Suitable Environmental Conditions: dry and wet environment

Agricultural Value: cultivated for ornamental and medicinal purposes

Uses: The fruit is used as vegetables by tribal people. Flowers are used to decorate church. Leaves are used as

Fig. 142: *Holarrhena pubescens* a. Habit, b. Flowers, c. Fruits

Fig. 143: *Wrightia arborea* a. Leaves, b. Flower, c. Fruits

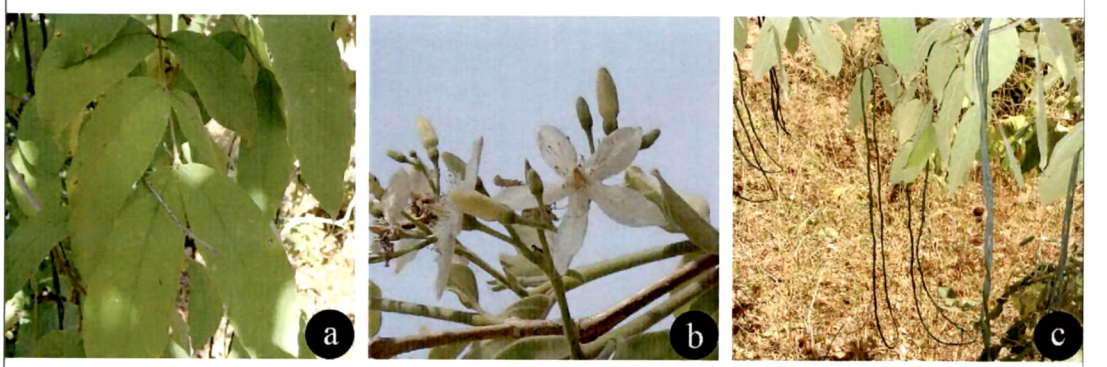


Fig. 144: *Wrightia tinctoria* a. Leaves, b. Flowers, c. Fruits

Fig. 145: *Plumeria alba*

Fig. 146: *Plumeria rubra*

fodder to cattle. The wood is used to make forks, spoons, toys, furniture, frames. The tree is used for afforestation in poor soils

PLUMERIA L.

1. leaves obtuse, without marginal nerves, inflorescence long than leaf .... P. *alba*

1. leaves acute to acuminate, with marginal nerves, inflorescence shorter than leaf ..... P. *rubra*

Plumeria alba L. Sp. Pl. 210. 1753; Bailey, Man. Cult. Pl. (ed. 2) 1949; Naik, Fl. Marathwada 1: 533. 1998. Singh, et al Fl. Maha. Dicot. 2: 332. 2000.

Description: Small trees, with milky latex. Leaves alternate, crowned at ends of branches, oblanceolate, glabrous above, pubescent beneath. Flowers cream – coloured, fragrant, in terminal, peduncled corymbs; calyx with suborbicular sepals; corolla lobes oblanceolate.

Phenological data: Fls. – Frs.: May – September.

Localities in Gujarat: Planted in garden as ornamental (Shah, 1978).

Plumeria rubra L. Sp. Pl. 209. 1753; Woodson in Ann. Missouri Bot. Gard. 25 : 297. 1938. *P. acutifolia* Poir. In Lam. Encycl. Suppl. 2 : 667. 1812. C. B. Cl. In Hook. f. Fl. Brit. India 2 : 641. 1882; Cooke, Fl. Pres. Bombay 2 : 205. 1958 (Repr.). Shah, Fl. Guj. 1:418; 1978, Bailey, Man. Cult. Pl. (ed. 2) 810. 1949. Singh, et al Fl. Maha. Dicot. 2: 332. 2000.

Local Name: Champo, **English Name:** Frangipani tree.

Identification Characters: corolla slaver-shaped, white with yellow eye occasionally rose-coloured without or completely reddish-purple; fruit a pair of follicles.

Description: Deciduous tree (2n = 36). 5-10 m tall, with plenty of milky juice. soft wooded plant, bark light greenish or dirty-grey, artistic branches, leaves alternate, obovate to oblanceolate, crowded at the end of branches; sepal eglandular within, flowers fragrant, waxy, in clusters, terminal, compound cyme, sepal 5; corolla slaver-shaped, white with yellow eye occasionally rose-coloured without or completely reddish-purple; stamens 5, included, bicarpellary apocarpous ovary; Fruits not seen.

Phenological Data: Fls.: Throughout the year.

Distribution: India, Sri Lanka, South East Asia

Origin\Native: Mexico.

Ecology: well drained soil, full sunlight or light shade

Category of threat: Common

Special Characteristics: flowers are highly fragrant

Economic Importance: ornamental flowering tree

Horticultural Value: Planted in parks and garden for its beautiful flowers, also plated near temples

Medicinal Value: The sap is employed with sandalwood oil and camphor to cure itch. Leaves are used to reduce swellings. Bark is an asthmatic. Seeds are antidotes for snake bites.

Method for Propagation: Cuttings.

Suitable Environmental Conditions: tropical and temperate regions

Agricultural Value: cultivated for ornamental purposes

Uses: flowers are used for worship by Hindus. Different varieties of *Plumeria rubra* is grown with flower of different colors like yellow, orange, red, dark pink.

Localities in Gujarat: Ornamental; native of tropical America (Shah, 1978).

CASCABELLA

***Cascabella thevetia* (L) Lippold** in Fedds Repert. 91. 1980. *Cerbera thevetia* L. Sp. Pl. 203. 1753. *Thevetia peruviana* (Pers.) Merr. In Philip. J. Sci. Bot. 9: 130 1914; Bailey, Man. Cult. Pl. (ed. 2) 809. 1949. *T. Neriifolia* Juss. ex Steud. Nom 2: 680. 1841; Cooke, Fl. Pres. Bombay 2: 207. 1958 (Repr.)

Local Name: Pilikaren, **English Name:** Yellow oleander

Identification Characters: bark light-black or ash-colored, leaves alternate, linear-lanceolate, calyx glandular within, corolla infundibuliform, fruit a drupe.

Description: Evergreen (2n = 18, 20). small trees. Bark smooth, greyish brown, poisonous latex. Leaves simple, alternate, exstipulate, glabrous, sessile or sub sessile, crowded spirally at the end of branches. Flowers pale-to bright yellow, in axillary, few-flowered cymes, ellipsoid-oblong, obscurely 4-angled, glabrous.

Phenological Data: Fls. and Frs.: Throughout the year.

Distribution: Mexico, West Indies, India

Origin\Native: Tropical America.

Ecology: well drained soil, full sunlight or light shade

Category of threat: Common

Special Characteristics (Bark, Odor): milky latex present

Economic Importance: ornamental tree

Horticultural Value: planted in parks, gardens and home for its fragrant flower and beautiful foliage

Medicinal Value: Latex is used in medicine as it contains cardiac glycosides.

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical and temperate regions

Agricultural Value: cultivated for ornamental purposes

Uses: Flowers are used in worship.

Localities in Gujarat: Planted at some place as ornamental (Shah, 1978).

WRIGHTIA R. Br.

1. leaves tomentose on both sides, follicles connate throughout ..... W. *arborea*

1. leaves glabrous, follicles connate at the tip only ..... W. *tinctoria*

Wrightia arborea (Dennst.) Mabb. in Taxon 26: 533. 1977. *Periploca arborea* Dennst. Schluss. 13, 23 & 25. 1818 in Forts. Allg. Teutsch. Gaerten.-Mag. 3: 32, 41, 83. 1818. *Wrightia tomentosa* (Roxb) R. & S. Veg. ed. Nov. 4: 414. 1819; Hook. f. Fl. Brit. India 3: 653. 1882; Cooke, Fl. Pres. Bombay 2: 199. 1958 (Repr.). Shah, Fl. Guj. 1:420; 1978, Ngan in Ann. Missouri Bot. Gard. 52: 148. 1965. Singh, et al Fl. Maha. Dicot. 2: 327. 2000.

Local Name: Kalo indrajav, **English Name:** Wrightia.

Identification Characters: leaves opposite, corolla salver-shaped with coronary scales around the mouth of corolla, anther exerted, seeds comose at lower end

Description: Deciduous tree. 6-12 m tall trees, with yellowish-grey or ash-coloured bark. Leaves elliptic-oblong or ovate-oblong. Flowers creamy-white, in terminal, tomentose, paniculate cymes. Fruits stout, cylindric. Seeds narrowly linear-oblong, with coma much longer than seeds.

Phenological Data: Fls. and Frs: Jul.- Oct.

Distribution: temperate and tropical regions, China, Yunnan, Indian Subcontinent: India; Nepal; Sri Lanka; Indo-China: Laos; Myanmar; Thailand; Vietnam; Malaysia

Origin\Native: Burma and Ceylon.

Localities in Gujarat: Dangs, Rajpipla, Pavagadh, Chhotaudepur, Sabarkantha forests, Gandhinagar forests

Ecology: full sun

Category of threat: Not common

Special Characteristics: milky latex present

Economic Importance: ornamental, medicinal tree

Horticultural Value: occasionally planted in gardens

Medicinal Value: Medicinal oil is extracted from the seeds.

Method for Propagation: Seeds.

Suitable Environmental Conditions: temperate and tropical environment

Agricultural Value: cultivated for ornamental purposes

Uses: Latex when dipped into milk sets into curd within five minutes.

Wrightia tinctoria R. Br., in Mem. Wern. Nat. Soc. 1: 74. 1811; Hook. f. Fl. Brit. India 3: 653. 1882; Cooke, Fl. Pres. Bombay 2: 200, 1958 (Repr.). Shah, Fl. Guj. 1:420; 1978, Ngan in Ann. Missouri Bot. Gard. 52: 143. 1965. Singh, et al Fl. Maha. Dicot. 2: 327. 2000.

Local Name: Kudi, Dudhlo, **English Name:** Wrightia.

Identification Characters: leaves opposite, almost glabrous; corolla salver-shaped, coronary scales around the mouth of corolla, coronary scales fimbriate, anther exerted; follicles 2, 30-65 cm long, slender, smooth, olivaceous-green, not grooved at junction of carpels, free except at tips; seeds comose at lower end

Description: Deciduous tree (2n = 20, 22). 5-10 m tall, with milky latex and light-greyish-black, rough, longitudinally fissured bark. Leaves simple, opposite, glabrous, elliptic-lanceolate or elliptic-oblong, acuminate. Flowers creamy-white, fragrant, in terminal, paniculate cymes; sepal 5, petal 5, joined to form corolla tube, corona is present at the throat of corolla; stamens 5, anthers connate, adhering to stigma, bicarpellary syncarpous ovary. Fruit two follicles, linear-cylindric, glabrous, green, usually joined at base. Seeds brown, glabrous, longitudinally striate, short beaked, bearing coma much longer than seed.

Phenological Data: Fls. and Frs: Mar.- Oct.

Distribution: deciduous forests of India

Origin\Native: Burma and Ceylon.

Ecology: moderate light

Category of threat: Common

Special Characteristics: milky latex present

Economic Importance: ornamental, medicinal tree

Horticultural Value: occasionally planted in gardens

Medicinal Value: the bark is sometimes used as an alternative of *Holarrhena antidysenterica* bark.

Method for Propagation: Seeds.

Suitable Environmental Conditions: tropical environment

Agricultural Value: cultivated for medicinal purposes

Uses: Wood is used for construction and furniture. Leaves yield a kind of indigo dye.

Localities in Gujarat: In deciduous forets; common; very rarely in scrub forests (Shah, 1978).

LOGANIACEAE

Herbs, shrubs or trees; leaves simple, opposite or alternate, stipulate; inflorescence cymes; flowers, regular, bisexual, bracteates, tetra or pentamerous, sepals 4-5, united, petals 4-5, united, stamens 4-5 or many, epipetalous, carpels 2, syncarpous, ovary syncarpous, placentation axile or parietal; fruit capsule, berry or drupe.

STRYCHNOS L.

1. fruits orange-red, many seeded ..... S. *nux-vomica*

1. fruits black, 1-2 seeded ..... S. *potatorum*

***Strychnos nux-vomica* L.** Sp. Pl. 189. 1753; C. B. Cl. in Hook f Fl. Brit. India 4: 90. 1883; Cooke, Fl. Pres. Bombay 2: 250. 1958 (Repr.); Leenh. In Steenis, fl. Males. 1, 6: 349. 1962.

Local Name: Zerkachlo, **English Name:** Nux vomica tree, Strychine tree.

Identification Characters: style 1, fruit not mitriform

Description: Evergreen tree. 9-12 m tall evergreen tree. Bark smooth whitish. Leaves opposite, broad-elliptic, shining. Flowers in cymose clusters, greenish white, slightly downy. Fruit globose, slightly rugose, greenish at first and yellow to orange when ripe. Seeds embedded in a white pulp, numerous, flat, grey, shining, nearly circular.

Phenological Data: Fls: Feb. – March, Frs: Apr. - June.

Origin\Native: South East Asia

Special Characteristics: wood is extremely bitter

Medicinal Value: used in herbal medicines

Method for Propagation: Seeds.

Uses: The wood of the tree is resistant to termites. Seeds are used medicinally. It is a major source of the highly poisonous alkaloid strychnine, derived from the seeds inside the tree's round, green to orange fruit. However, the tree's bark also contains poisonous compounds, including brucine. In homeopathy it is one of the most commonly prescribed remedies.

Strychnos potatorum L. f. Suppl. 148. 1782; C. B. Cl. In Hook. f. Fl. Brit. India 4 : 90. 1883; Cooke, Fl. Pres. Bombay 2 : 251. 1958 (Repr.). Shah, Fl. Guj. 1:435; 1978. Singh, et al Fl. Maha. Dicot. 2: 392. 2000.

Description: Trees, Leaves ovate or elliptic shining. Flowers white, axillary cymes globose, yellow.
Phenological data: Fls. – Frs.: June – January.
Localities in Gujarat: Forests of Lunawada and north Gujarat, rare (Shah, 1978).

EHRETIACEAE

Trees or shrubs, often hairy; leaves simple, opposite or alternate sessile; inflorescence scorpioid cymes, axillary or terminal; flowers regular, bisexual, tetra or pentamerous, calyx 5, free or united, petals 5, united, funnel shaped, imbricate or contorted, stamens 4-8, epipetalous, carpels 2, united, axile placenta; fruit drupe.

1. style dichotomously twice branched ..... *Cordia*
1. style once divided, fruit with 1-4 kernels ..... *Ehretia*

CORDIA L.

1. flowers white
    2. leaves alternate, 3-5 nerved at the base
        3. filaments hairy at the base
            4. calyx not ribbed
                5. leaves tomentose beneath ..... C. *wallichii*
                5. leaves not tomentose beneath ..... C. *dichotoma*
            4. calyx ribbed, leaves ovate–cordate, densely tomentose beneath ..... C. *macleodii*
        3. filaments glabrous
            6. leaves not less than 8 cm long ..... C. *domestica*
            6. leaves less than 8 cm long ..... C. *monoica*
    2. leaves opposite or subopposite, pinnately veined ..... C. *gharaf*
1. flowers orange-red ..... C. *sebestena*

Cordia dichotoma Forster. f. Prodr 18. 1786; Sant. In Rec. Bot. Surv. Ind. 16: 163. 1967 (3rd. Rev. ed.); Kazmi in J. Arnold Arbor. 51:141.1970. *C. oblique* Willd. Phytogr. 4. t. 4. 1794; C. B. Cl. In Hook. f. Fl. Brit. India 4: 137. 1883, excl. var. *C. myxa* auct. Plur. Non. L. 1753; C. B. Cl. In Hook. f. op. cit. 136; Cooke, Fl. Pres. Bombay 2: 265. 1958 (Repr.). Shah, Fl. Guj. 1:444; 1978. Singh, et al Fl. Maha. Dicot. 2: 417. 2000.

Local Name: Gunda, **English Name:** Cordia, Indian Cherry
Identification Characters: leaves alternate, not tomentose beneath, 3-5 nerved from the base, flowers in terminal and axillary, dichotomous cymes, styles 2 or if style one bifid at times each styler branch forked,

calyx persistent, accrescent in fruit, flowers more than 1 cm broad; drupe 1.5-2 cm across, endocarp 4-1 seeded,

Description: Deciduous tree (2n = 42). 9-13.5 m tall trees, with ash-coloured or blackish-brown, rough bark, leaves broadly ovate, elliptic-oblong or sub orbicular, coriaceous, glabrous, flowers creamy-yellow or nearly white, in axillary and terminal cymes. Ripe fruits ovoid or rounded, glabrous, mucilaginous, bright-yellow with pinkish tinge.

Phenological Data: Fls: Feb.-June. Frs: Jul.- Oct.

Distribution: Throughout India, Ceylon, Egypt, China, Philippines, and Tropical Australia.

Origin\Native: Tropical Asia and Australia

Ecology: steady, warm temperatures and moist, well-drained soil.

Category of threat: Common

Special Characteristics: bark with vertical wrinkles

Economic Importance: Ornamental

Horticultural Value: planted along roadside

Medicinal Value: fruit pulp used to cure cough

Method for Propagation: Seeds.

Suitable Environmental Conditions: semi arid zones

Uses: ripe Fruits are eaten raw, green; fruit eaten as vegetable, pickled. Bark yields a strong fiber made into local rope. Wood is used making furniture. Leaves eaten as a vegetable.

Localities in Gujarat: Throughout except Kachchh (Shah, 1978).

Cordia gharaf (Forssk.) Ehrenb & Asch. In Bitszung. Bericht Ges. Naturf. Fl. Berl. 46. 1879; ant. & Wagh in Bull. BOt. Surv., India 5: 106. (1963) 1964; Kazmi in J. Arnold Arbor. 51: 140. 1970. *Cornus gharaf* Forssk. Fl. Aeg-Arab. 94. 1775. *Cordia rothii* R. & S. Syst. Veg. 4: 798. 1819; C. B. Cl. In Hook. f. Fl. Brit. India 4: 138. 1888; Cooke, Fl. Pres. Bombay 2: 268. 1958 (Repr.). Shah, Fl. Guj. 1:445; 1978. Singh, et al Fl. Maha. Dicot. 2: 419. 2000.

Local Name: Liar Gundi, **English Name:**

Identification Characters: leaves opposite to subopposite, oblanceolate-oblong, upper surface with white disc, pinnately veined, leaves 4-10.5 x 1.2-2.6 cm; flowers in terminal and axillary cymes, dichotomous cymes, flowers more than 1 cm broad, styles 2 or if style one bifid at times each styler branch forked, calyx persistent, accrescent in fruit; drupe 1.5-2 cm across, endocarp 4-1 seeded,

Description: Deciduous tree 5-8 m tall trees, with grey or pale-brown, longitudinally fissured bark. Oblanceolate-oblong, Flowers white, latex, in terminal and axillary cymes, drupes ovoid-oblong, apiculate, reddish-yellow or orange, mucilaginous

Phenological Data: Fls: Apr.-Aug, Frs: July.- Nov.

Method for Propagation: Seeds.

Uses: Fruits are edible. The wood is used for fuel.

Localities in Gujarat: Throughout in plains; not common (Shah, 1978).

Cordia monoica Roxb. Pl. Cor. 1:43. t. 58. t. 58. 1795; FBI 4:137; C 2:267; S & J 33. Shah, Fl. Guj. 1:446; 1978.

Descrption: Trees. Leaves ovate or ovate-elliptic. Flowers white, in terminal, tomentose, paniculate cymes.

Phenological data: Fls. – Frs.: August - September.

Localities in Gujarat: Saurashtra and Kutch, in hedges, often planted in gardens (Shah, 1978).

***Cordia sebestena* Linn.** Sp. Pl. 190. 1753; Kulkarni in Singh et al Fl. Maharashtra St. Dicot. 2: 436. 2001

English Name: Geiger tree. Scarlet Cordia

Identification Characters: Leaves large and rough like sand paper

Description: Deciduous tree, 4-5 m tall. Leaves large and rough like sand paper. Flowers orange, bell shaped, terminal and axillary, dichotomous cymes, styles 2 or if style one bifid at times each styler branch forked, calyx persistent. Fruit a berry, endocarp 4-1 seeded.

Phenological Data: Fls. and Frs: Jan. - June.

Distribution: Throughout India

Origin\Native: Tropical America.

Category of threat: Common

Economic Importance: Ornamental

Horticultural Value: planted in gardens and along roadside

Method for Propagation: Seeds and Layering.

Uses: Planted as ornamental for its scarlet orange flowers. Seeds are edible.

EHRETIA P. Browne.

1. leaves hairy beneath ..... E. aspera

1. leaves glabrous beneath ..... E. laevis

Ehretia laevis Roxb. Pl. Cor. 1: 42. t. 55. 1795; & Fl. Ind. 2:341. 1824; C. B. Cl. in Hook. f. Fl. Brit. India 4:141. 1883; Cooke, Fl. Pres. Bombay 2:269. 1958 (Repr.). Shah, Fl. Guj. 1:447; 1978, Kazmi in J. Arnold Arbor. 51:147. 1970. Singh, et al Fl. Maha. Dicot. 2: 424. 2000.

Local Name: Dantrango, **English Name:** Heliotrope tree

Identification Characters: leaves glabrous beneath; flowers in terminal and axillary, dichotomous cymes, flowers 0.3-0.8 cm across

Description: Deciduous tree (2n = 26). 5-12 m tall, with grey or Greyish-brown, smooth bark. Leaves obovate-oblong or elliptic-oblong, coriaceous, glabrous. Flowers white, in terminal and axillary cymes, calyx hairy, sepal 5; corolla campanulate; stamens 5, exerted, style forded, ovary 2-4 chambered. Fruit drupe, orange when ripe, later turn dark-brown or nearly black, subglobose, reticulately veined, 4-lobed, sweet pulp.

Phenological Data: Fls. and Frs: Jan. - June.

Distribution: Throughout India, Iran, China, Polynesia, Australia

Localities in Gujarat: Chhotaudepur forests, Sabarkantha, Vijaynagar forests

Origin\Native: Ceylon, Persia, China and Australia.

Category of threat: Not common

Special Characteristics: Bark is yellowish brown

Economic Importance: Ornamental

Horticultural Value: Planted in parks and gardens for its beautiful flowers, planted along roadsides, in avenues

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical and sub tropical environment, deciduous and rain forests

Uses: Wood is useful for making furniture. The fruit and soft inner bark are mixed with flour and eaten in times of scarcity.

BIGNONIACEAE

Trees, shrubs or climbers; leaves mostly compound, opposite or alternate; inflorescence cymose; flowers irregular, bisexual, showy, bracteates, calyx 5, united, campanulate, petals 5, united, funnel or bell shaped 2- lipped, imbricate, stamens 4, didynamous, epipetalous, carpels 2, syncarpous, ovary superior, axile placenta; fruit capsule.

1. leaves simple ..... *Tecomella*

1. leaves compound

2. leaves 2-3 pinnate

3. flowers orange or yellow or maroon, capsule flat ..... *Oroxylum*

3. flowers white with pink or yellow tinge, capsule linear cylindric ..... *Radermachera*

3. flowers blue -violet, fruit ellipsoid ..... *Jacaranda*

3. flowers creamy yellow, fruit linear flat ..... *Millingtonia*

2. leaves 1 – pinnate

4. calyx spathaceous

5. flowers white ..... *Dolichandrone*

5. flowers orange red or scarlet ..... *Spathodea*

4. calyx not spathaceous

6. inflorescence drooping, corolla bilabiate

7. corolla pale yellow ..... *Stereospermum*

7. corolla deep reddish purple ..... *Kigelia*

6. inflorescence erect, corolla not bilabiate,

8. capsule linear flat

9. corolla creame coloured ... *Heterophragma*

9. corolla yellow coloured ..... *Tecoma*

8. capsule twisted, corolla deep brownish yellow ..... *Haplophragma*

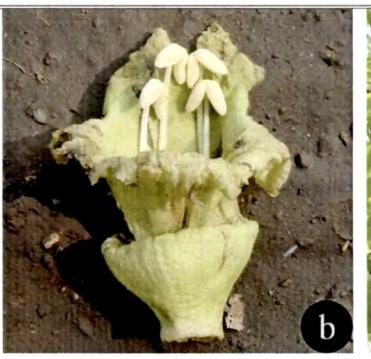


Fig. 147: *Crescentia cujete* a. Leaves, b. Flower, c. Fruits

Fig. 148: *Dolichandrone falcata*

Fig. 149 : *Haplophragma adenophyllum* a. Flower, b. Fruits

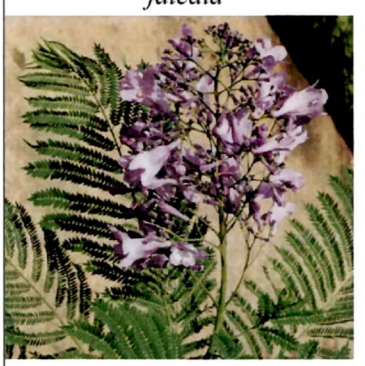
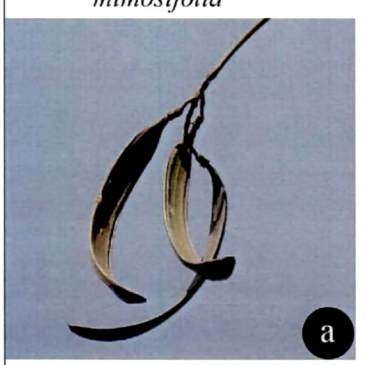


Fig. 150: *Jacaranda mimosifolia*

Fig. 151: *Kigelia africana* a. Inflorescence, b. Flowers and Fruits



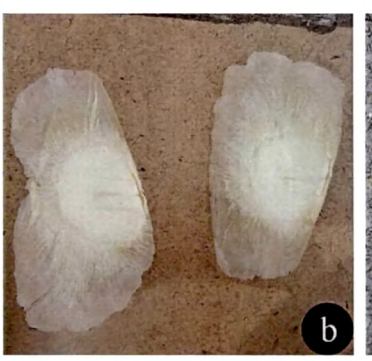


Fig. 152: *Oroxylum indicum* a. Fruits, b. Seeds

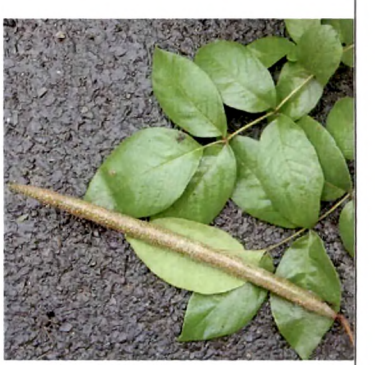


Fig. 153: *Stereospermum chelenoides*

2. leaves palmately 5 – foliolate, corolla yellow or rosy pink ..... *Tabebuia*

2. leaves clustered on branches at intervals, flowers cauliflorous, corolla yellow or yellowish to reddish purple ..... *Crescentia*

CRESCENTIA

1. corolla yellow ..... C. *alata*

1. corolla yellowish-green to reddish purple ..... C. *cujete*

***Crescentia cujete* L.** Sp. Pl. 626. 1723; Bailey, Man. Cult. Pl. 904. 1949; Cooke, fl. Pres. Bombay 2: 411. 1958 (Repr.); Naik, Fl. Marathwada 2: 643. 1998.

Local Name: Kadvi tumbi, **English Name:** Calabash tree.

Identification Characters: cauliflorous i.e. flowers born on old stem

Description: Evergreen tree (2n = 40). 4-5 m tall handsome tree with wide spreading branches, rough bark. Leaves simple, alternate, sessile to sub sessile, crowded at tip, dark green, broadly lanceolate leaves, rounded apex. Flowers solitary on the branches or main trunk, yellow with red- purple veins, pollinated by Bat, calyx 2 lobed, corolla 5, forms narrow tube at base and inflated above forming 5 toothed lobes, stamens 4, epipetalous, ovary one celled, bicarpellary, stigma bifid. Fruit is large, hard, smooth, globose, green capsule, 18-20 inch. Seeds numerous, wingless, embedded in pulp.

Phenological Data: Fls: Aug.- Oct, Frs: Oct.

Distribution: tropical and subtropical countries

Origin\Native: Tropical America, West Indies

Ecology: Full sun to light shade, can't tolerate frost, Moderate to abundant water, drought resistant, salt tolerant

Category of threat: Common

Economic Importance: Ornamental

Horticultural Value: Planted in gardens as a curiosity

Medicinal Value: pulp used in domestic medicine, laxative, and astringent

Method for Propagation: Seeds.

Suitable Environmental Conditions: Very humid, warm climate

Uses: Seeds are edible, shell of fruit used for drinking cups, young fruits used as pickles.

DOLICHANDRONE

1. capsule slightly compressed, specked ..... D. *atrovirens*

1. capsule much compressed, not speckled ..... D. *falcata*

***Dolichandrone atrovirens* (Heyne ex Roth) Sprague** in Kew Bull. 1919:304. 1919; Prasanna in Singh et al. Fl. Maharashtra St. Dicot. 2: 574. 2001. *Bignonia atrovirens* Heyne ex Roth, Nov Pl. Sp. 284. 1821. *Dolichandrone crispa* Seem in J. Bot. 8: 379. 1870 excl. syn.; Cl. in Hook f Fl. Brit. India 4: 381. 1884; Cooke, Fl. Pres. Bombay 2: 403. 1958 (Repr.)

Local Name: Padad

Identification Characters: Flowers white, Capsules subterete

Description: Small trees, young stems and branches velvety pubescent; leaflets elliptic-ovate, acuminate. Flowers frangrant, in terminal, in corymbose racemes, corolla white with crisped, undulate margins; capsule subterete; seeds broadly winged.

Phenological Data: Fls - Frs: Mar. - June

Distribution: India, Tropical Asia

Origin\Native: Asia

Ecology: Full sun to light shade, Moderate to abundant water

Category of threat: Common

Economic Importance: Ornamental

Horticultural Value: Planted in gardens as a curiosity

Method for Propagation: Seeds.

Suitable Environmental Conditions: Very humid, warm climate, common in hilly forests

Uses: Wood is used in the making of furniture. It is also planted in the roadside plantation.

Dolichandrone falcata (Wall ex DC.) Seem. In J.Bot. 8.381. 1870; Cl in Hook. f. Fl. Brit. India 4:380. 1884; Cooke, Fl. Pres. Bombay 2:404. 1958 (Repr.); Prasanna in Singh et al. Fl. Maharashtra St. Dicot. 2:574. 2001. *Spathodea falcata* Wall. Ex DC. Prodr. 9:206. 1845.

Local Name: Matar sing

Identification Characters: Flowers white, pods large and twisted

Description: Medium size deciduous tree with dense foliage. Leaves opposite, compound, simple pinnate, leaflets orbicular to obovate, usually 5-9, imparipinnate. Flowers in terminal, few flowered racemes, corolla white with crisped, undulate margins, highly scented. Flowers bloom in the evening & fall down in the morning. Capsules falcately curved. Seeds winged at two ends.

Phenological Data: Fls - Frs: Mar. - June

Distribution: India, Tropical Asia

Origin\Native: Asia

Ecology: Full sun to light shade, Moderate to abundant water

Category of threat: Common

Economic Importance: Ornamental

Horticultural Value: Planted in gardens as a curiosity

Medicinal Value: Leaves used in steam bath to relieve muscular pain, backaches etc

Method for Propagation: Seeds.

Suitable Environmental Conditions: Very humid, warm climate, common in hilly forests

Uses: Wood is used in the making of furniture. It is also planted in the roadside plantation.

HAPLOPHRAGMA L. & E. nivulea Roxb.

Haplophragma adenophyllum (Wall.) P. Dop. in Bull. Soc. Bot. France 72: 890. 1925. *Bignonia adenophylla* Wall. Cat. 6502, 1832 nom. nud.; P. Dop, l.c. 72:889. 1925. *Heterophragma adenophyllum* (DC.) Seem. Ex Benth. in Benth. & Hook. f. Gen. Pl. 2: 1047. 1876; C. B. Cl. in Hook f. Fl. Brit. India 4: 381. 1884; Cooke, Fl.

Pres. Bombay 2: 410. 1958 (Repr.). Shah, Fl. Guj. 1:518; 1978, Singh, et al Fl. Maha. Dicot. 2: 581. 2000.

English Name: Trumpet tree

Identification Characters: leaves 1-pinnate, calyx not spathaceous, flowers deep-brownish-yellow, in terminal, erect panicles; fruit dehiscent, capsule cylindric, twisted

Description: Evergreen tree (2n = 40). 10-15 m tall. Braches short forming dense crown, bark rough brownish white, longitudinally fissured. Leaves large, opposite, compound, imparipinnate, long petiole, leaflets broadly elliptic, subcoriaceous, and glabrous above entire margin, acute apex. Inflorescence covered with reddish brown hairs. Flowers large, yellow, woody, in terminal panicles, campanulate, tomentose, 5 lobed, stamens included in corolla tube, ovary 4 celled. Fruit capsule, mostly curved or twisted, cylindric, pubescent. Seeds numerous, compressed, winged.

Phenological Data: Fls: June. - Sep, Frs: Nov.- Jan.

Distribution: Throughout India, tropical and sub tropical parts of world

Origin\Native: Burma and Andamans.

Ecology: full sun, well drained soil

Category of threat: Common

Special Characteristics: Twisted fruits

Economic Importance: Ornamental

Horticultural Value: Planted in parks and gardens, along roadside

Method for Propagation: Seeds.

Suitable Environmental Conditions: Warm, humid and dry climate

Uses: Wood is used in the making of furniture. It is also planted in the roadside plantation.

Localities in Gujarat: Planted in gardens (Shah, 1978).

HETEROPHRAGMA

***Heterophragma quadriloculare* (Roxb.) K. Schum.** in Engl. and Prantl., Pflanzenf. 4 (3b): 243. 1895; Sant. in Rec. Bot. Surv. Ind. 16(1): 191. 1967 (3rd Rev. ed.) Bignonia quadrilocularis Roxb. Pl. Cor. 2: 24 t 145. 1800. Heterophragma roxburghii A. DC. in DC. Prodr. 9:210. 1845; C.B.Cl. in Hook f Fl. Brit. India 4: 381. 1884; Cooke, Fl. Pres. Pres. Bombay 2:404. 1958 (Repr).

Local Name: Waras.

Identification Characters: leaves compound, 1-pinnate, corolla not spathaceous, corolla tube inflated, flowers white or with a rosy tinge, capsule linear, flat

Description: Deciduous tree, soft-wooden, 6-15 m tall, with Greyish-white, scaly bark, or subsessile, subcoriaceous, elliptic-oblong or ovate-elliptic, glabrescent. Flowers terminal, fulvous-tomentose panicles, glabrous.

Phenological Data: Fls: Jan-April, Frs: May. - July.

Distribution: Endemic to southern India

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical

Uses: The wood is used in making of furniture, wooden cases, box, and toys.

JACARANDA Juss.

***Jacaranda mimosifolia* D. Don.** in Bot. Reg. 8 t 631 1822 *J. Ovalifolia* R. Br. In Curtis, Bot. Mag. 49 t 2327. 1822.

Local Name: Jacaranda, **English Name:** Jakaranda

Identification Characters: leaves 2-3 pinnate, flowers blue, 2.5-3.4 x 1.8-2.5 cm, fruit ellipsoid or nearly orbicular

Description: Deciduous tree (2n = 36, 66). 6-15 m tall trees. Leaves 10-30 cm long, pinnae 9-14, leaflet 14-24 pairs, elliptic-oblong or rhomboid-oblong, glabrous. Flowers blue, terminal, pyramidal panicles.

Phenological Data: Fls: Mar-May, Frs: June.- Aug.

Origin\Native: Brazil and North Argentina.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical climates

Uses: The wood is useful for fuel. The tree is also planted in the garden for its beautiful flowers.

KIGELIA

***Kigelia africana* (Lam.) Bth.** in Hook. Niger Fl. 463. 1849. *Bignonia africana* Lam. Encycl. 1: 424. 1785. *Kigelia pinnata* (Jacq.) DC. Prodr. 9: 247. 1845; Cooke, Fl. Pres. Bombay 2: 411. 1958 (Repr.)

English Name: Sausage tree.

Identification Characters: leaves 1-pinnate, calyx not spathaceous, flowers deep-reddish-purple, in pendulous, racemes, fruit indehiscent berry

Description: Evergreen tree (2n = 40). 8-15 m tall, with soft, smooth, creamy-white or pale-brown bark. Leaves imparipinnate leaflets, subcoriaceous, elliptic-oblong or obovate-oblong, glabrous or thinly pubescent. Flowers long, pendent racemes. Fruit pale-brown.

Phenological Data: Fls: Mar- July, Frs: Jan.

Origin\Native: Abyssinia

Method for Propagation: Seeds.

Uses: Bark used for dysentery. Fruits also used as purgative. Wood is used for timber.

MILLINGTONIA L. f.

Millingtonia hortensis L. f. Suppl. Pl. 291. 1781; C.B.Cl. in Hook. f. Fl. Brit. Ind. 4: 377. 1884; Cooke, Fl. Pres. Bombay 2: 409. 1958 Repr,. Shah, Fl. Guj. 1:520; 1978. Singh, et al Fl. Maha. Dicot. 2: 582. 2000.

Local Name: Deshi Buch, **English Name:** Indian cork tree.

Identification Characters: leaves 2-3 pinnate, flowers creamy-yellow, 5.5-7 x 1-1.5 cm, fruit linear, flat, acute at both ends.

Description: Deciduous tree 5-10 m tall trees with yellowish-brown, rough, corky bark. Leaves ovate, ovate-rhomboid or ovate-lanceolate, glabrous. Flowers fragrant, pendent, panicles at ends of branches.

Phenological Data: Fls: Oct. – Dec, Frs: Jan. – Mar.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical

Uses: The wood is used for match box and furniture. Also planted as roadside plantation as an ornamental tree.

Localities in Gujarat: Planted in gardens and along roadsides (Shah, 1978).

OROXYLUM Venten.

Oroxylum indicum (L.) Vent. Dec. Gen. Nov. 8. 1808; C.B.Cl. in Hook. f. Fl. Brit. India 4: 378. 1884; Cooke, Fl. Pres. Bombay 2: 401, 1958 (Repr.). Shah, Fl. Guj. 1:520; 1978, *Bignonia indica* L. Sp. Pl. 625. 1753. Singh, et al Fl. Maha. Dicot. 2: 575. 2000.

Local Name: Tetu, **Sanskrit Name:** Shyonak, Shyonaka, Shuknas, Dirghavrunt, Tintuk, Kadvadag.

Description: Trees, tall. Leaflets ovate or ovate-elliptic, apex acuminate, base rounded or cordate. Inflorescences of numerous flowered racemes long, pubescent. Flowers long yellowish-purple. Capsules flat, tapering at both ends. Seeds including wings.

Phenological data: Fls. – Frs.: June - December.

Localities in Gujarat: In deciduous forests of Dangs, Vyara, Rajpipla and Panchmahals (Shah, 1978).

SPATHODEA P. Beauv.

Spathodea campanulata P. Beauv. Fl. Oware Benin 1: 47, t. 27. 1806; Bailey, Mam. Cult. Pl. 907. 1949; Cooke. Fl. Pres. Bombay 2: 410. 1958 (Repr.). Shah, Fl. Guj. 1:521; 1978, Singh, et al Fl. Maha. Dicot. 2: 584. 2000.

Local Name: Spathodia, **English Name:** Fountain tree.

Identification Characters: leaves 1-pinnate, calyx spathaceous, leathery, flowers orange-red or scarlet.

Description: Evergreen tree (2n = 26, 36, 38). 10-18 m tall, with Greyish-brown, rough bark. Leaves sessile or subsessile, pubescent beneath. Flowers compact, terminal racemes.

Phenological Data: Fls: Feb.-May, Frs: May. - July.

Distribution: Throughout India

Origin\Native: Ceylon, Uganda and northern part of Congo basin.

Ecology: Full sun, need water

Category of threat: Common

Special Characteristics: Bright red bird like flowers

Economic Importance: Planted along road side

Horticultural Value: Cultivated for plantation

Method for Propagation: Seeds, roots, sackers and cuttings.

Suitable Environmental Conditions: Tropical

Uses: Wood is used for making furniture; liquor is obtained from the fruits. Tree useful for shade.

Localities in Gujarat: Planted in gardens and along roads; native of Tropical Africa (Shah, 1978).

STEROSPERMUM Cham.

1. leaves and inflorescence viscid pubescent with capitate-glandular hairs, corolla dull purple with yellow streaks inside, capsules 3-ribbed ..... S. *chelonoides*

1. leaves and inflorescence glabrous or puberulous, never viscid pubescent, corolla yellow with red streaks inside, capsules 4-ribbed ..... S. *colais*

***Stereospermum chelonoides* (L f) DC.** Bibl Univ. Geneve II, 17:125. 1838 and Prodr. 9: 210. 1845. p.p.; Londhe in Singh et al. Fl. Maharashtra St. Dicot. 2: 577. 2001. *Bignonia chelonoides* L. f Suppl. 282. 1781, p.p. *B. suaveolens* Roxb. Fl. Ind. 3:104. 1832. *Stereospermum suaveolens* (Roxb.) DC. Prodr. 9:211. 1845; Cl. in Hook f Fl. Brit. India 4: 382. 1884; Cooke, Fl. Pres. Bombay 2:405. 1958 (Repr.)

Local Name: Parul

Description: Trees deciduous, Leaves opposite or rarely in whorls of 3, 1-pinnate; leaflets 3-4 pairs with an odd one, flowers fragrant, in large trichotomous cymes. Corolla dull purple, stamens 4. Seeds winged on both ends.

Phenological data: Fls. – Frs.: February – September.

Localities in Gujarat: Rajpipla and Saurashtra; rare (Chavan,1993).

Medicinal uses: Root and bark used as tonic.

Uses: Wood is used for making furniture and making char-coal. Tree useful for shade.

Stereospermum colais (Dillwyn) Mabberley in Taxon 27:553. 1978. *Bignonia colais* Dillwyn Rev. Hortus malab. 28. 1839. *Dipterosperma personatum* Hassk. In Flora 25 (2) beibl. 1:28. 1842. *Stereospermum chelonoides* DC. Bibl. Prodr. Univ. Geneve II. 17: 124. 1838, p.p. quoad ref Rheede, t. 26 & DC. Prodr. 9:210. 1845; C.B. Clarke in Hook. F., Fl. Brit. India 4: 382. 1884. *S. personatum* Chatterjee in bull. Bot. Soc. Bengal 2: 70. 1948. *S. tetragonum* DC. Prodr. 9:210. 1845.

Local Name: Padad.

Description: Trees deciduous, 10-20 m high; bark Greyish black. Leaves leaflets 3-6 pairs. Oblong, elliptic-oblong or lanceolate-oblong, caudate-acuminate at apex, cuneate at base, entire, glabrous. Flowers drooping panicles; peduncles long. Calyx purple, glabrous or pubescent. Corolla pale yellow with red streaks; lobes crisped. Capsules 4 angled, curved or spirally twisted.

Phenological data: Fls. – Frs.: February – September.

Localities in Gujarat: Rajpipla and Sauraashtra; rare (Chavan,1993).

Uses: Wood is used for making furniture. Tree useful for shade.

TABEBUIA

1. flowers yellow ..... T. *argentea*

1. flowers white ..... T. *pallida*

1. flowers rosy, pinkish white ..... T. *pentaphylla*

Tabebuia argentea (Bur. & Schum.) Britt. in Sc. Surv. Porto Rico & Virgin Isl. 6:197. 1925; Londhe in Singh et al. Fl. Maharashtra St. Dicot. 2:584. 2001. *Tecoma argentea* Bur. & Schum. in Mart. Fl. Bras. 8(2):332. 1845.

English Name: White cedar.

Description: Deciduous tree 4-5 m tall medium sized, Leaves 3-5 foliate giving silvery appearance. Flowers large, bright yellow in colour.

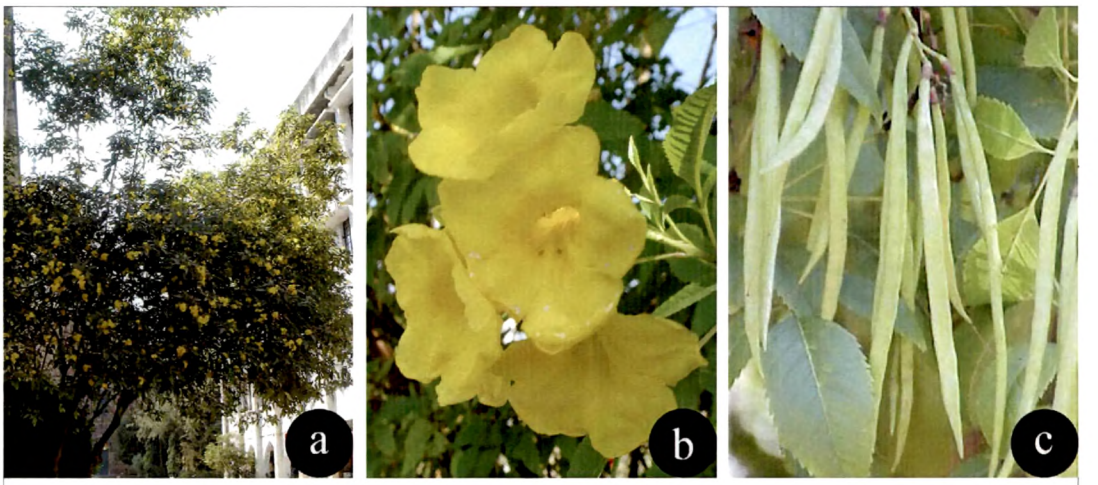


Fig. 154: *Tecoma stans* a. Habit, b. Flowers, c. Fruits

Fig. 155: *Tabebuia argentea,* a. Habit, b. Flowers

Fig. 156: *Tabebuia pentaphylla*

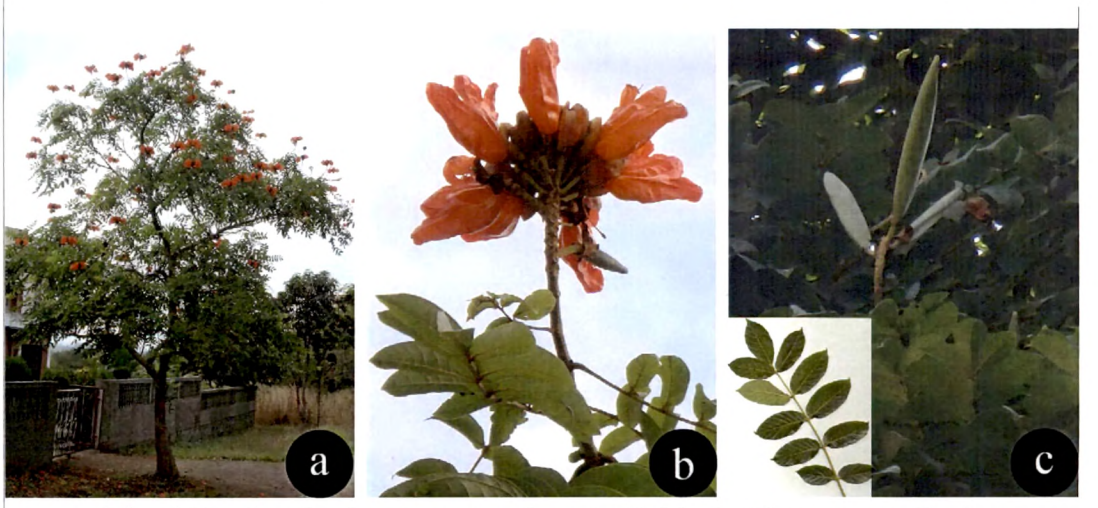


Fig. 157: *Spathodea campanulata* a. Habit, b. Flowers, c. Fruits

Phenological Data: Fls: Feb.- Mar, Frs: Mar.- Apr.

Origin\Native: Mexico to N. Argentina

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical

Uses: Wood is used for making of furniture. Trees are also used for roadside plantation.

***Tabebuia rosea* (Bertol.) DC.** Prodr. 9; 215. 1845. Tecoma rosea Bertol. Fl. Guatimal. 25. 1840.

Local Name: Tabebuia, **English Name:** Rosy trumpet tree.

Identification Characters: Bell shaped white flowers, didynamous anthers

Description: Deciduous tree 10- 15 m tall. Leaflets usually 5-7, elliptic to oblong- obovate, glossy green. Flowers whitish pink in colour, large.

Phenological Data: Fls: May. - July, Frs: Aug.- Sep.

Distribution: Through out India

Origin\Native: Mexico and West Indies.

Ecology: Full sun, moist soil

Category of threat: Common

Special Characteristics: Attractive fragrant bell shaped pinkish white flowers

Economic Importance: Ornamental flower tree

Horticultural Value: Planted in garden and along roadside for its graceful flowers

Method for Propagation: Cuttings and air layering.

Suitable Environmental Conditions: Tropical environments

Agricultural Value: Cultivated for ornamental purposes

Uses: Wood is used for furniture, planted as an ornamental tree.

TECOMA juss.

Tecoma stans (Linn.) H. B. & K. Nov. Gen. Sp. 3 : 144. 1819. *Bignonia stans* L. Sp. Pl. Ed. 2 : 871. 1763. *Stenolobium stans* Seems. In Ann. Mac. Nat. Hist. 10: 30. 1862; Cooke. Fl. Pres. Bombay 2 : 410. 1950 (Repr.). Shah, Fl. Guj. 1:522; 1978, Singh, et al Fl. Maha. Dicot. 2: 585. 2000.

Local Name: Tecoma, **English Name:** Yellow Bells

Identification Characters: Leaves imparipinnate; flowers golden-yellow, bell shaped; fruit dehiscent, capsule narrowly linear, flat.

Description: Deciduous tree (2n = 40). 1.5-4 m tall, corky light brown bark. Leaves compound, large, opposite, imparipinnate, ovate-lanceolate or ovate-oblong, serrate margin, glabrous. Flowers bright-yellow, in terminal erect panicles, fragrant, bell shaped; sepal 5, green, pubescent, corolla bell shaped, corolla lobes 5, rounded, stamens 4, didynamous, included. Fruit long capsule pale to dark-brown, beaked. Seeds are winged.

Phenological Data: Fls. And Frs: Throughout the year.

Distribution: Throughout India

Origin\Native: Florida, Mexico, Texas, Argentina, West Indies

Ecology: Full sun to light shade, low water requirements

Category of threat: Common

Special Characteristics: Attractive fragrant bell shaped yellow flowers

Economic Importance: Ornamental flower tree

Horticultural Value: Planted in garden and along roadside for its graceful yellow flowers

Medicinal Value: Roots are diuretic, tonic

Method for Propagation: Seeds.

Suitable Environmental Conditions: Tropical environments

Agricultural Value: Cultivated for ornamental purposes

Uses: Wood is used for fuel. The tree is used as an ornamental tree.

Localities in Gujarat: Planted in gardens.

TECOMELLA Seem.

Tecomella undulata (Sm.) Seem. In Ann. Mag. Nat. Hist. 3, 10: 30. 1862; Cooke. FI. Pres. Bombay 2 : 408. 1958 (Repr.). Shah, Fl. Guj. 1:523; 1978, *Bignonia undulate* Sm. Exot. Bot. 1:35. 1805. *Tecoma undulate* G. don. Gen. Syst. 4: 223. 1837; C. B. Cl. In Hook. f. FI. Brit. India 4: 378. 1884. Singh, et al Fl. Maha. Dicot. 2: 586. 2000.

Local Name: Ragat Rohido, **English Name:** Tecomella.

Identification Characters: Leaves simple, flowers reddish yellow or orange yellow.

Description: Deciduous tree, 5-7 m tall small trees, drooping branches, Greyish-brown, glabrous bark. Leaves light green, narrowly oblong, glabrous, undulate margins. Flowers reddish-yellow or orange-yellow, few, in corymbose racemes, bell shaped. Capsule flat, slightly curved, linear-oblong, and glabrous.

Phenological Data: Fls: Mar.-Apr, Frs: May.

Distribution: Arabia, southern Pakistan. In Pakistan it is found in Baluchistan and Sind. in Thar Desert regions of northwest and western India up to an elevation of 1200 meters: Maharashtra, Gujarat, Rajasthan, Punjab and Haryana.

Origin\Native: Northwest of Western India, Baluchistan and Arabia.

Ecology: Drained loamy to sandy loam soil, light demander

Category of threat: Common

Special Characteristics: Bell shaped orange-red flower

Economic Importance: Ornamental flower tree, medicinal plant

Horticultural Value: Planted in gardens, home for its graceful flowers

Medicinal Value: Seeds are used against abscess. Bark is used in curing urinary disorders, enlargement of spleen, gonorrhea, leucoderma and liver diseases.

Method for Propagation: Seeds and cuttings.

Suitable Environmental Conditions: Dry climate

Agricultural Value: Cultivated for ornamental and medicinal purposes

Uses: Its wood is strong, tough and durable taking a beautiful polish. Wood is used for furniture making, carving, and agricultural implements, used as a source of timber. The tree plays an important role as a soil binder by spreading a network of lateral roots on the top surface of the soil. It acts as a windbreak and helps in stabilizing shifting sand dunes. It is considered as the home of birds and provides shelter for other desert wildlife.

Localities in Gujarat: Rajpipla, north Gujarat, Saurastra and Kutch; rare (Shah, 1978).

VERBENACEAE

Herbs, shrubs trees or climbers; leaves simple or compound, opposite, alternate or whorled; inflorescence cymes or racemes; flowers irregular, bisexual, bracteates, sepals 4-5, united, valvate, petals 4-5, united tubular, 2-lipped, stamens 4, didynamous, epipetalous, carpels 2, syncarpous, ovary superior, axile placenta; fruit berry, drupe or carcerule.

1. leaves compound ..... *Vitex*

1. leaves simple

    2. corolla bilipped, stamens didynamous ..... *Clerodendrum*

    2. corolla regular, stamens equal

        3. flowers c 3.5 cm long ..... *Gmelina*

        3. flowers c 0.5 cm long

            4. inflorescence axillary ..... *Callicarpa*

            4. inflorescence terminal, branches stellately tomentose ..... *Tectona*

Gmelina arborea Roxb. Pl. Corom. 3:42. t. 246. 1815; Cl. in Hook. f. Fl. Brit. India 4:581.1885; Cooke, Fl. Pres. Bombay 2:504.1958 (Repr.); Prasanna in Singh et al. Fl. Maharashtra St. Dicot. 2:692. 2001.

Local Name: Sevan, Sivan, **English Name:** Malay- Bushbeech, white teak

Identification Characters: Unarmed; leaves simple; flowers in erect panicles, corolla distinctly 2-lipped, calyx not persistent

Description: Deciduous tree (2n = 36, 38). fast growing 8-18 m tall trees, with Greyish-yellow, smooth bark. Leaves broadly ovate, fulvous-tomentose beneath. Flowers yellow, terminal panicles. Drupes oblong, glabrous, smooth. Yellow or orange when ripe. Seeds ellipsoid-oblong, brown, glabrous, and smooth.

Phenological Data: Fls: Feb.- Mar, Frs: Apr.-May

Distribution: Throughout India, Myanmar, Thailand, Laos, Cambodia, Vietnam.

Origin\Native: India, Ceylon and Malaya.

Ecology: Prefers full sun; soil should be moist, tolerant to drought

Category of threat: Common

Special Characteristics: Smooth whitish grey (ashy) corky bark, warty with lenticular tubercles exfoliating in regular patches when old.

Economic Importance: Ornamental, shade tree

Horticultural Value: Planted as garden and avenue tree.

Medicinal Value: The root and bark used in stomachache, galactagogue laxative and anathematic; improve appetite, fevers, *'tridosha'* and urinary discharge. Leaf paste is applied to relieve headache, juice is used in ulcers. Flowers are astringent, useful in blood diseases. According to Ayurveda fruit is used as cooling, diuretic tonic, aphrodisiac, useful in anemia, *'vata'*, leprosy, ulcers.

Method for Propagation: Seeds, cutting, grafting, budding

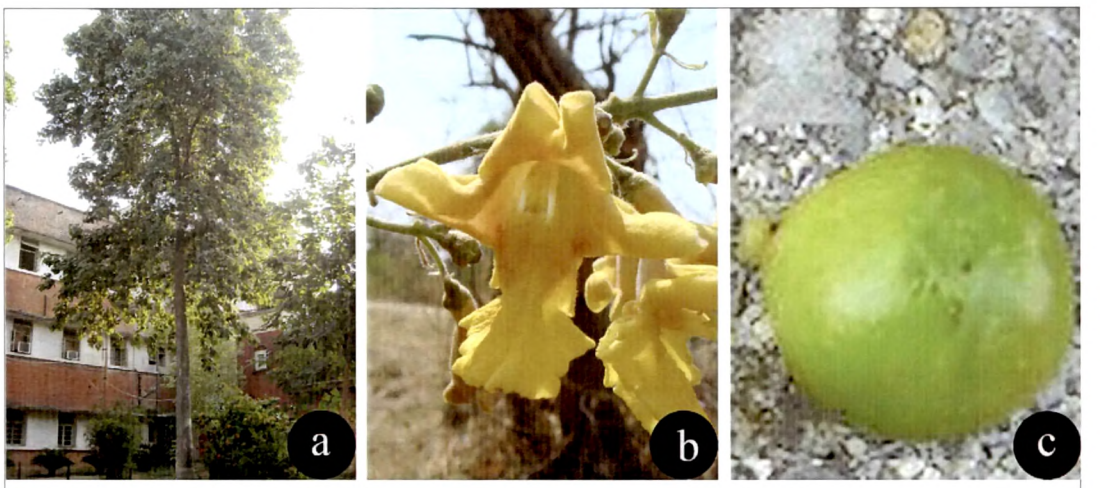


Fig. 158: *Gmelina arborea* a. Habit, b. Flower, c. Fruit

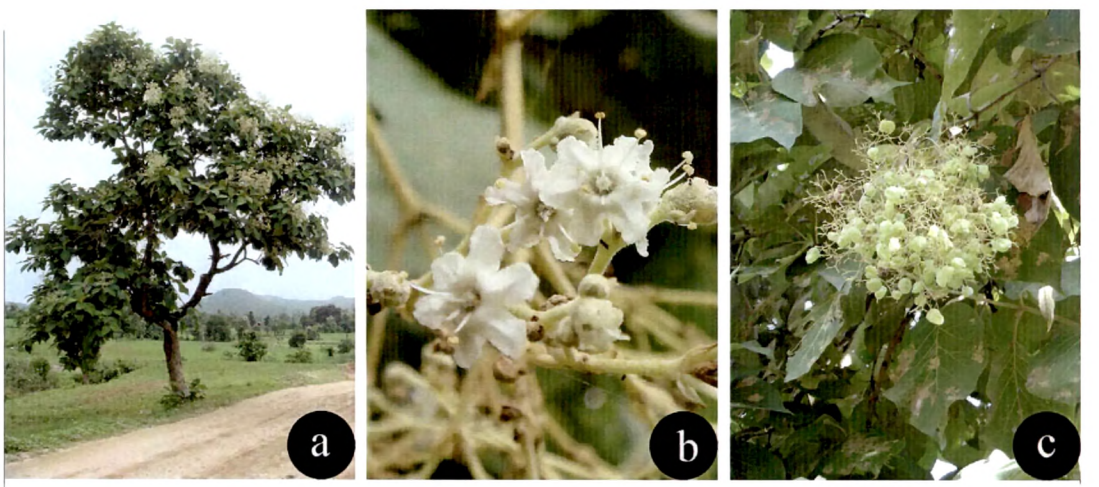


Fig. 159: *Tectona grandis* a. Habit, b. Flowers, c. Fruits

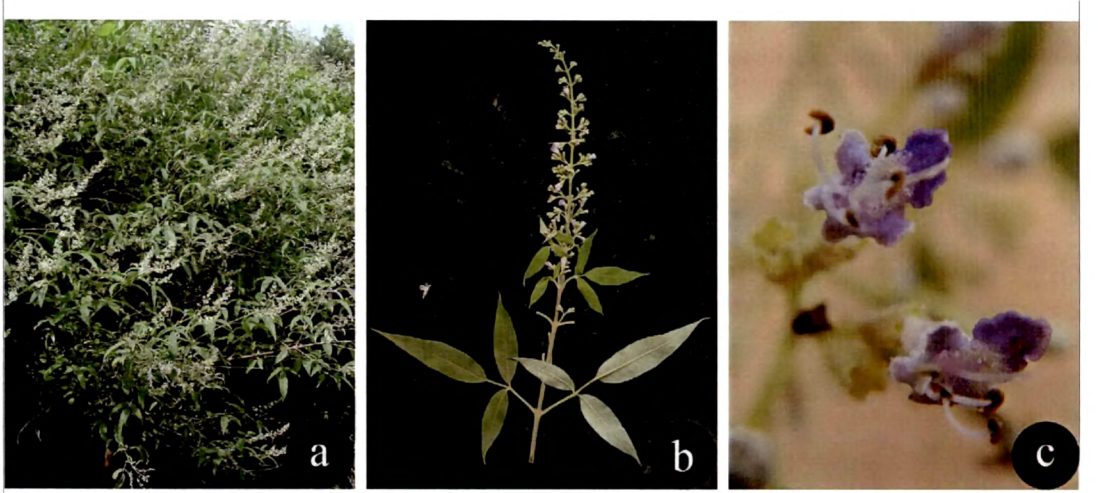


Fig. 160: *Vitex negundo* a. Habit, b. Twig, c. Flowers

Suitable Environmental Conditions: Tropical very dry to wet forests

Agricultural Value: Cultivated for timber

Uses: Fruits are eaten by the tribal people. It is also used for timber wood, used in constructions, furniture, carriages, sports, musical instruments and artificial limbs, foliage is considered good for cattle

Tectona grandis L.f. Suppl. 151. 1781; Cl in Hook. f. Fl. Brit. India 4:570.1885; Cooke, Fl. Pres. Bombay 2:503.1958 (Repr.); Prasanna in Singh et al. Fl. Maharashtra St. Dicot. 2:696. 2001.

Local Name: Saag, **English Name:** Teak

Identification Characters: Large trees, straight trunks broad and coarse leaves

Description: Deciduous tree (2n = 24, 36). Straight trunk and pale-brown, rough bark. Leaves coriaceous, rough, and stellately tomentose. Flowers white or pale-blue, in terminal panicles. Drupes subglobose, somewhat 4-lobes, stellately hairy. Seeds ellipsoid-oblong, glabrous, reticulate.

Phenological Data: Fls: June. – Aug., Frs: Nov. – Jan.

Distribution: India, Burma, Thailand, Indonesia, Java, Tropical Africa and Latin America.

Origin\Native: South-East Asia

Ecology: Prefers full sun; soil should be moist

Category of threat: Common

Economic Importance: Timber wood, ornamental

Horticultural Value: Planted in forests, along the boundary walls of factories, big compounds and parks,

Medicinal Value: Wood is acrid, cooling, laxative, useful in treatment of piles, leucoderma and dysentery. Flowers are acrid, bitter and dry and useful in bronchitis, biliousness, urinary discharges etc. According to Unani system of medicine, the oil from flower is hair promoter and useful in scabies. Wood is used for headache, burning sensation and pain and liver related troubles.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Deciduous forests, does not grown in rain forests

Agricultural Value: Cultivated for its timber and plantation in forests

Uses: This is one of the best high grade timbers, wood is used for making furniture, railway compartment, box, cabinet work. The leaves are used in dyeing industry. Leaves yield dye, which is used for dyeing cotton and wool.

Vitex negundo **L.** Sp. Pl. 638. 1753; C.B.Cl. i Hook f Fl. Brit. India 4:583. 1885; Cooke, Fl. Pres. Bombay 2: 508.1958 (Repr.). *V. trifolia* Grah. Cat. Bombay Pl. 155. 1839 non L.

Local Name: Nagod, Nirgundi, **English Name:** Chaste Tree, Vitex

Identification Characters: Leaves compound, 3-5 foliolate, leaflets petioluled, lanceolate or ovate.

Description: Deciduous tree up to 5 m tall, with light-blackish-brown, longitudinally fissured bark. Leaves aromatic, compound, opposite, digitate, 3 to 5-foliolate. Leaflets narrowly elliptical to ovate-lanceolate, minutely pubescent or glabrous above, densely grey tomentose below, inflorescence cymes arranged in panicles, terminal or axillary in the upper leaf axils, hairy; flowers white or blue or bluish-purple; calyx united, 5-toothed; corolla pale blue to violet; villous inside; campanulate, small, 5-dentate, upper lip bi-lobed; lower one tri-lobed; middle lobe of lower lip large, obovate; stamens 4. Fruits drupes, dark-purple to almost black, glabrous, globose.

Phenological Data: Fls. and Frs: Throughout the year.

Distribution: Eastern Africa and Madagascar to Iran, Afghanistan, Pakistan, India, Sri Lanka, Myanmar, Indochina, China, Japan, Taiwan, Thailand, throughout the Malaysian region, east to the Palau Islands, the Carolina Island and the Mariana Islands.

Origin\Native: Southern Europe through Asia

Ecology: Need bright sunlight, heat tolerant, can grow on any kind of soil, water logging should be avoided.

Category of threat: Common

Special Characteristics: Trifoliate leaves with peculiar odour

Economic Importance: Ornamental and hedge plant, medicinal plant

Horticultural Value: Planted in gardens, house

Medicinal Value: The leaves are anti-parasitical, alterative, aromatic, vermifuge, pain reliever. Root can be used as tonic, febrifuge, expectorant, diuretic. Dried fruit is vermifuge.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Humid climate, mixed open forest

Agricultural Value: Widely cultivated, not only for its medicinal properties but also as ornamental and hedge plants

Uses: Wood is used for fuel.

LAURACEAE

Trees or shrubs with aromatic bark; leaves simple or absent, alternate or opposite; inflorescence panicles, racemes, spikes or umbels; flowers regular, bisexual or unisexual, parianth of 4 tepals 6, small, free, stamens 3 in whorls of 3 each, carpels 1, unilocular superior ovary, placentation basal; fruit berry or drupe.

***Cinnamomum camphora* (L.) T. Nees and Eberm.** Handb. Med. Pharm. Bot. 2: 430. 1836; Hook f in Fl. Brit. India 5:134. 1886; Gamble Fl. Pres. Madras 2:858. 1957 (Repr.); N.P. Singh, Fl. E. Karnataka 2:548. 1988. *Laurus cmaphora* L. Sp. Pl. 369. 1753.

Local Name: Kapur, **English Name:** Camphor

Identification Characters: Leaves have a glossy, waxy appearance and smell of camphor when crushed by hand.

Description: Evergreen tree, up to 20-30 meters tall. (2n = 24). Leaves have a glossy, waxy appearance and smell of camphor when crushed by hand. The inconspicuous tiny cream colored flowers are borne in the spring on branching 3 in (7.6 cm) flower stalks. Masses of small white flowers. It produces clusters of black berry-like fruit around one centimeter in diameter. Each leaf has three distinct yellowish veins the outer margins of the leaves tend to be somewhat wavy and turn upward. The new foliage starts out a rusty burgundy color, but the leaves soon turn dark green on the upper sides and paler green underneath. New branches emerging from the shallowly fissured Greyish brown trunk are smooth and green. Camphor oil (present in all tissues mostly in wood) has a strong penetrating fragrance, a pungent bitter flavor, and feels cool on the skin like menthol, though it also has irritating qualities as well as a numbing effect.

Phenological Data: Fls: Mar.-Apr., Frs.: Aug. – Nov.

Distribution: Peninsular India, Taiwan, southern Japan, southeast China and Indochina

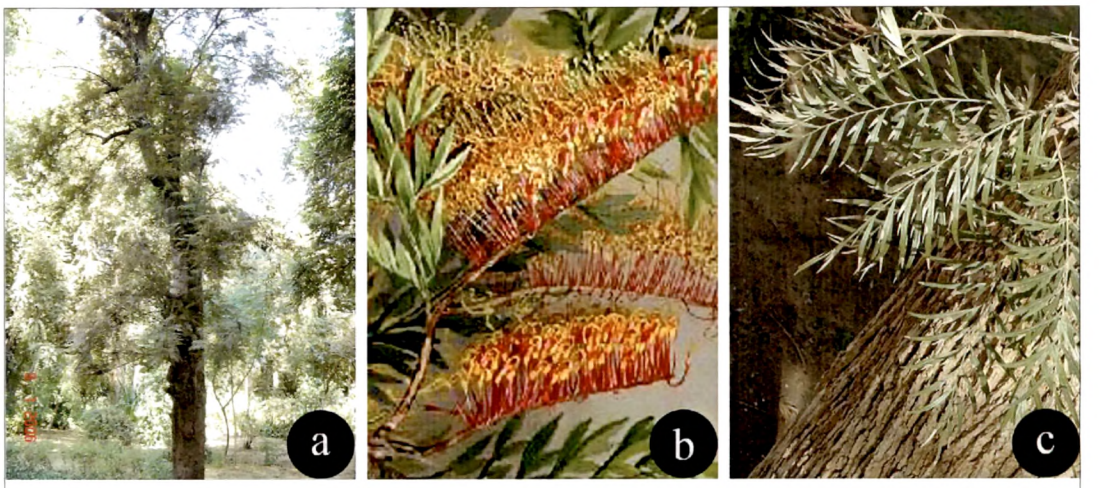


Fig. 161: *Grevillea robusta* a. Habit, b. Leaves, c. Inflorescence

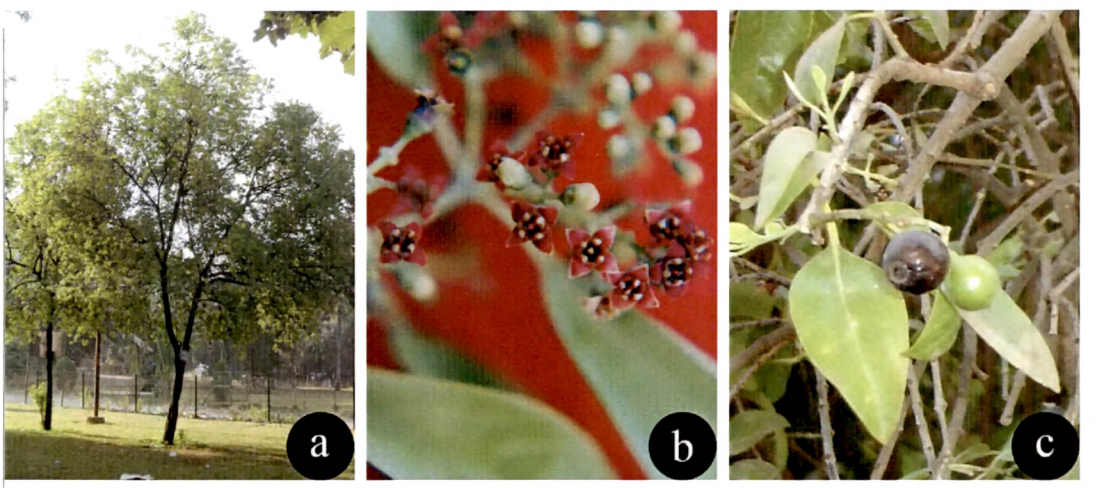


Fig. 162: *Santalum album,* a. Habit, b. Flowers, c. Fruits

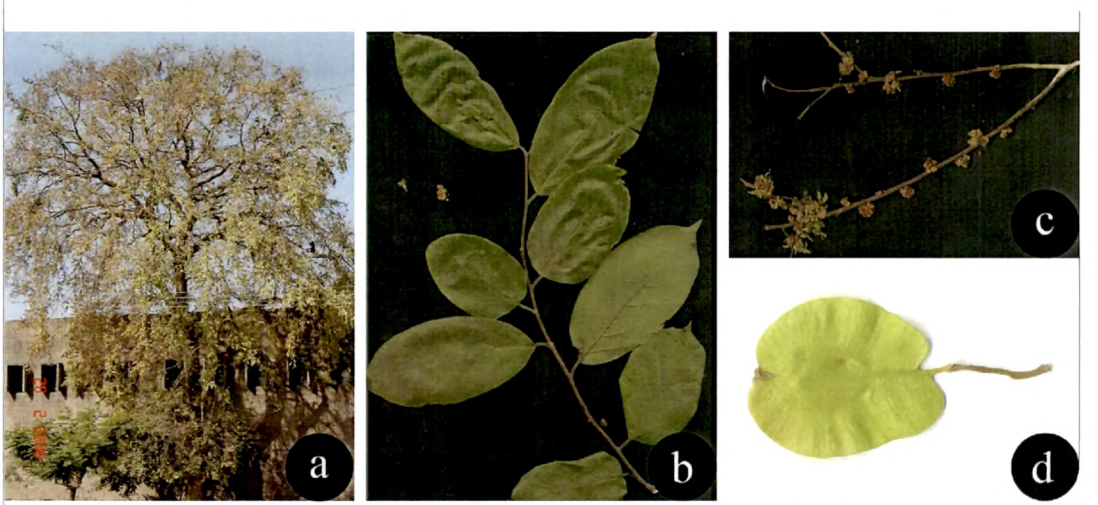


Fig. 163: *Holoptelea integrifolia* a. Habit, b. Leaves, c. Inflorescence, d. Fruit

Origin\Native: Japan, China, Taiwan and northern Vietnam

Ecology: Fertile sandy soil, full sun or partial shade.

Category of threat: Common

Special Characteristics: Pleasant aromatic scent

Economic Importance: Ornamental and shade tree

Horticultural Value: Planted in parks and gardens

Medicinal Value: To treat ailments like parasitic infections, toothaches, antiseptics, diarrhea, inflammation, itching, and nervous conditions, internally used to cure cold, chills

Method for Propagation: Seeds. Camphor seed does not remain viable for long and should be planted in the greenhouse as soon as it ripens.

Suitable Environmental Conditions: Temperate, introduced in tropical to subtropical environment also.

Agricultural Value: Planted for the fragrant wood, cultivated for camphor and timber production

Uses: Used in perfumes and also used in medicines. It is worship by Hindus. essential oils; fiber; wood house pest control, planted as a shade tree, screen, or windbreak, used in furniture, chests and book cases as it has insect repellant qualities.

PROTEACEAE

Mostly trees; leaves simple, entire, alternate; inflorescence spikes, heads or racemes; flowers regular or irregular, bisexual, tetramerous, tepals 4, tubular, valvate, stamens 4, opposite to perianth lobes, carpel 1, ovary superior, placentation parietal; fruits samara, achenes, follicles or drupes.

Grevillea robusta A. Cunn. ex R. Br. Suppl. Prodr. Fl.Nov. 24. 1830; Londhe in Singh et al. Fl. Maharashtra St. Dicot. 2:834. 2001.

Local Name: Silver oak, **English Name:** Silver oak.

Identification Characters: leaves deeply pinnatisect, softly pubescent silky white beneath

Description: Evergreen tree, (2n = 20), 12-18 m tall trees with grey to Greyish-brown bark. Leaves deeply pinnatisect, segments linear, entire or pinnatifid, softly pubescent beneath, dark green delicately dented bipinnatifid leaves Flowers orange-red, showy. fruiting on dark brown leathery dehiscent follicles, about 2 cm long, with one or two flat, winged seeds

Phenological Data: Fls: Mar.-May, Frs: Not seen.

Origin\Native: Eastern coastal Australia

Distribution: Tropical countries, Australia, planted in India

Localities in Gujarat: Planted in gardens, the Maharaja Sayajirao Botanical garden

Ecology: Prefers full sun; tolerant of light shade, well drained soil, peaty soil with acidic pH

Category of threat: Common

Special Characteristics: Much straight trunk, fern like leaves

Economic Importance: Ornamental, decorative

Horticultural Value: Houseplant, also grown along roadside, avenues, in gardens

Method for Propagation: Seeds, cuttings

Suitable Environmental Conditions: Warm-temperate and semitropical climates

Agricultural Value: Cultivated for ornamental value and shade giving value in tea gardens and coffee estates,

timber wood

Uses: The wood is used for making furniture. It is grown as a decorative tree in garden. It is used as a wind break tree and planted as roadside plantation. Leaves are important source of honey, bark yields tannins and gums.

SANTALACEAE

Trees often with semiparasitic on roots; leaves simple, opposite or alternate; inflorescence racemes, heads or spikes; flowers regular, small, bisexual, epigynous, tepals 4 or 5, valvate or imbricate, stamens 4 or 5, opposite to perianth, carpels 3-5, syncarpous, ovary inferior, placenta basal.

Santalum album L. Sp. Pl. 349. 1753; Hook. f. Fl. Brit. India 5:231.1886; Cooke, Fl. Pres. Bombay 3:49.1958 (Repr.); Godbole & Lakshmi. in Singh et al. Fl. Maharashtra St. Dicot. 2:850. 2001.

Local Name: Chandan, **English Name:** Sandalwood.

Identification Characters: Deeply longitudinally fissured, light-blackish-brown, rough bark, fragrant wood, drooping branches.

Description: Evergreen tree (2n = 10). 5-8 m tall trees, semiparasitic, with deeply longitudinally fissured, light-blackish-brown, rough bark. Leaves elliptic, glabrous. Flower brownish-purple, inodorous glabrous, when ripe deep purple.

Phenological Data: Fls: Sep.- Nov, Frs: Nov.- Jan.

Distribution: China, India (Karnataka; Tamil Nadu), Indonesia (Lesser Sunda Is.), Philippines

Origin\Native: Peninsular India.

Ecology: Well drained loamy soil, rich in humus, ample sunshine

Category of threat: Endangered

Special Characteristics: Fragrant wood

Economic Importance: Timber, wood used in cosmetics

Horticultural Value: Can be grown in garden

Medicinal Value: Sandalwood essential oil was popular in medicine up to 1920-1930, mostly as urogenital (internal) and skin (external) antiseptic. Its main component santalol (~90%) has antimicrobial property. Today it is used in aromatherapy. Medicine against chronic bronchitis

Method for Propagation: Seeds. Should be sown near to a suitable host such as Lantana, strychnine plant

Suitable Environmental Conditions: Moderate climate, sandalwood is a hemi-parasitic plant which is widely scattered in dry deciduous forests.

Agricultural Value: Grown for its scented heart wood and oil

Uses: Sandalwood essential oil is an important raw material in perfumery industry, soaps, and face cream, powders industry. Wood is ideal for carving. It is also used for worship, used for incense, aromatherapy, and fine woodworking.

EUPHORBIACEAE

Herbs, shrubs or trees, often with milky juice; leaves simple, alternate or opposite,

entire or deeply lobed, stipulate; inflorescence cymes, spike or cyathium; flowers regular, unisexual, bracteates, tepals 5, valvate or imbricate, stamens 1 or 5, free or united, carpels 3, syncarpous, ovary superior, placentation axile; fruit capsule, regma or drupes.

1. flowers in cyathia inflorescence, stamens 1 ..... *Euphorbia*
1. flowers not in cyathia inflorescence
    2. leaves coriaceous, petals present in both sexes ..... *Bridelia*
    2. petals absent in both sexes
        3. Cocci weakly spinous or with two rows of spinules on back of each coccus ..... *Ricinus*
        3. Fruit nor echinate or spinules absent
            4. Leaves resinous-glandular beneath, fruit covered with red resinous powder .....*Mallotus*
            4. Leaves and fruit not as above
                5. Plant dioecious
                    6. Male flowers in clusters, female subsolitary, style much dilated ..... *Drypetes*
                    6. Male flowers in racemes, female solitary or racemose, style not dilated
                        7. Leaves alternate ..... *Antidesma*
                        7. Leaves opposite ..... *Trewia*
                5. Plant monoecious
                    8. Fruit fleshy, indehiscent
                        9. Flowers in axillary fascicles, drupes not angled ..... *Emblica*
                        9. Flowers in pendulous spikes, drupes angled ..... *Cicca*
                    8. Fruit fleshy but at length dry, dehiscent, flowers in erect spikes ..... *Sapium*
    9. ovary with 1 ovule in each locule, leaves usually peltate ..... *Macaranga*
    9. ovary with 2 ovules in each locule, leaves upto 3 cm long ..... *Breynia*

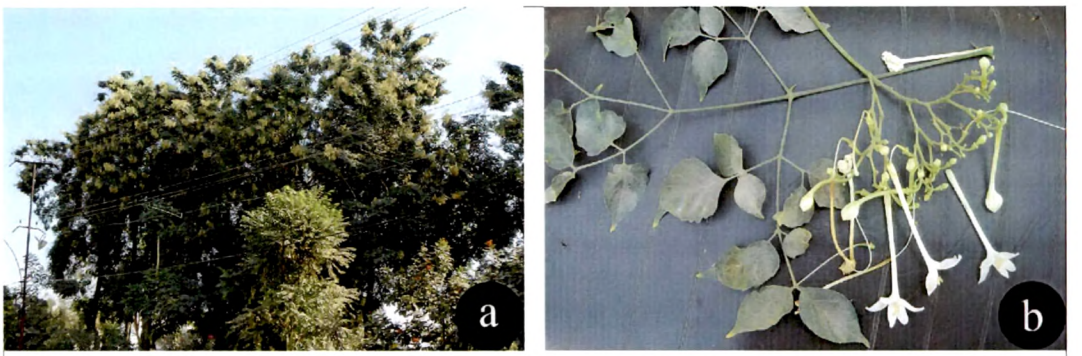


Fig. 164: *Millingtonia hortensis* a. Habit, b. Flowering twig

Fig. 165 : *Drypetes roxburghii* a. Habit, b. Flowering twig

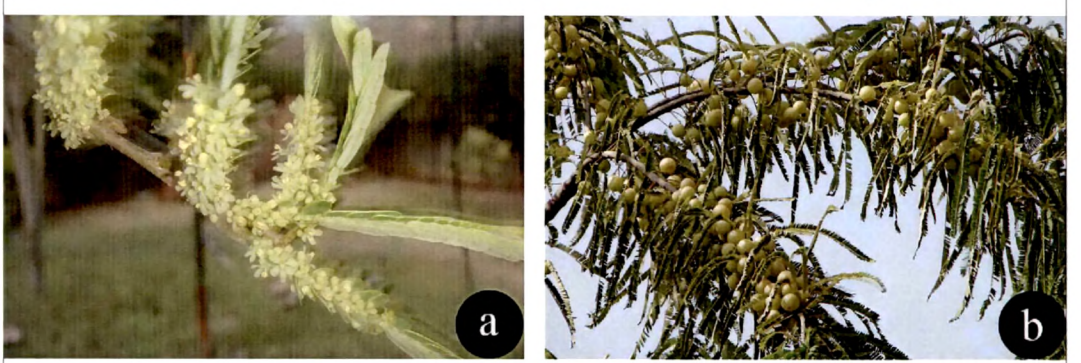


Fig. 166: *Emblica officinalis* a. Flowers, b. Fruits

Fig. 167: *Euphorbia ligularia* a. Habit, b. Fruits

DRYPETES

Drypetes roxburghii (Wall.) Hurus. J. Fasc. Sci. Univ. Tokyo Sect. 3, Bot.6.337. 1954; Londhe in Singh et al. Fl. Maharashtra St. Dicot. 2:872. 2001. *Putranjiva roxburghii* Wall. Tent. Fl. Nepal 61. 1828; Hook. f. Fl. Brit. India 5: 336.1887; Cooke, Fl. Pres. Bombay 3: 86.1958 (Repr.)

Local Name: Putranjivi, **English Name:** Putranjiva, Indian Amulet tree

Identification Characters: Dioecious plants, male flowers in clusters, female solitary, style much dilated, petals absent

Description: Evergreen tree (2n = 14, 40). 8-15 m tall with drooping branches. Leaves are leathery with wavy margins, alternate, simple, stipulate, petiolate, elliptic oblong, oblique base and acute tip. Flowers are long and inconspicuous, apetalous, unisexual. Tree is either dioecious or monoecious. Male flowers are dense in axillary clusters, 3-5 sepals, 3 stamens, female flowers are solitary in leaf axils, small caduceus sepals, 3-celled hairy ovary. Fruit is an egg- shaped, 3-lobed, tomentose.

Phenological Data: Fls: Nov.- Dec, Frs: May.

Distribution: W. Nepal, Bangladesh, India, Indo-China, Myanmar, Sri Lanka, Thailand.

Origin\Native: Asia-Tropical - Indian Subcontinent: India; Sri Lanka, Indo-China: Myanmar

Ecology: Preferring alluvial soils along the rivers, sensitive to drought and frost

Category of threat: Common

Special Characteristics: Bark is smooth corky, dark grey

Economic Importance: Ornamental

Horticultural Value: Planted in gardens

Medicinal Value: Leaves are used medicinally in the treatment of colds.

Method for Propagation: Seeds, stem cutting

Suitable Environmental Conditions: Tropical environment

Agricultural Value: Cultivated as a good avenue tree

Uses: Oil from the seeds is sometimes used for burning. Leaves used for fodder. Wood is shiny, hard and durable used for tools and structural purposes.

EMBLICA

Emblica officinalis Gaertn. Fruct. 2:122. 1791; Londhe in Singh et al. Fl. Maharashtra St. Dicot. 2:873. 2001. *Phyllanthus emblica* L. Sp. Pl. 982. 1753; Hook. f. Fl. Brit. India 5: 289.1887; Cooke, Fl. Pres. Bombay 3: 81.1958 (Repr.).

Local Name: Ambla, **English Name:** Indian Gooseberry.

Identification Characters: Monoecious plants, extremely light and feathery foliage, flowers in axillary fascicles, petals absent; fruit fleshy, indehiscent, drupes not angled

Description: Deciduous tree (2n = 98- 104), 8-15 m tall, with yellowish-to Greyish-brown, smooth bark, exfoliating into scales. Leaves subsessile, narrowly linear-lanceolate or linear-oblong, glabrous. Flowers greenish-to creamy-yellow, minute, numerous, male and female flowers grow on the same branch lets, fruit is fleshy berry, globose, pale-yellowish-green, smooth, with 6 faint vertical lines. Seeds gonous

Phenological Data: Fls: Mar.-Apr, Frs: May. – Sep.

Distribution: Mixed deciduous forests of India, central and southern India, Pakistan, Bangladesh, Sri Lanka, Malaysia, southern China and the Mascarene Islands.

Origin\Native: Tropical India, Ceylon and China.

Ecology: Grows well on alkaline waste land, requires deep soil ranging from sandy loam to clay, light or heavy; good drainage is essential.

Category of threat: Common

Special Characteristics: Greenish grey, exfoliating bark

Economic Importance: Fruit tree

Horticultural Value: Planted in public parks, gardens and squares

Medicinal Value: Fruit being one the three constituents of the well known Indian formulation *'Triphala'* is astringent, coolant, diuretic, laxative, used in treatment of enlarged liver, piles, stomach ailments.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Dry subtropical

Agricultural Value: Cultivated for fruits

Uses: Fruits are edible and very rich in Vitamin C. Fruits, bark and leaves are used in tanning and dyeing, fruits used for hair shampoo. In India fruits are much used in pickles, preserves, chutneys and jellies.

EUPHORBIA

1. armed plants, branches terete or angular, not winged
    2. branches distinctly angular ..... E. *ligularia*
    2. branches not as above ..... E. *nivulia*
1. armed plants, branches and branchlets 3 – winged ..... E. *antiquorum*

Euphorbia antiquorum L. Sp. Pl. 450. 1753; Hook. f. Fl. Brit. India 5: 255.1887; Cooke, Fl. Pres. Bombay 3: 57.1958 (Repr.); Londhe in Singh et al. Fl. Maharashtra St. Dicot. 2:876. 2001.

Local Name: Tridharo thor

Identification Characters: terete branches, 3-5 winged

Description: much branched small trees, terete branches, cyathia 3-nate forming short peduncled cymes in the sinuses, style distinct, 2-fid, stamens red, fruits trigonous.

Phenological Data: Fls - Frs: Nov. – Jan.

Distribution: Sri Lanka, India

Ecology: In rocky places, in full sun

Category of threat: Common

Special Characteristics: Stipular spines

Economic Importance: Ornamental

Horticultural Value: Planted in gardens as hedge plant

Suitable Environmental Conditions: tropical

Euphorbia nivulia Buch.-Ham. in Trans. Linn. Soc. 14:286. 1825; Hook. f. Fl. Brit. India 5: 255.1887; Londhe in Singh et al. Fl. Maharashtra St. Dicot. 2:882. 2001.

Local Name: Thor

Identification Characters: whorled branches

Description: small trees, spines short, paired, leaves alternate, subsucculent, obovate, obtuse, cyathia paried,

male florets bracteolate, female florets pendulous, capsules with 4 angular seeds,

Phenological Data: Fls - Frs: Dec. – Apr.

Distribution: Thoroughout India

Ecology: In rocky places, in full sun

Category of threat: Common

Special Characteristics: subsucculent leaves

Economic Importance: Ornamental

Horticultural Value: Planted in gardens as hedge plant

Suitable Environmental Conditions: tropical

SAPIUM

Sapium insigne Benth. Var. Malabaricum (Wight). Hook. f. Fl. Brit. India 5: 472.1888; Londhe in Singh et al. Fl. Maharashtra St. Dicot. 2:902. 2001. *Falconeria malabarica* Wight, Ic.t. 1866. 1852. *Sapium insigne* sensu Cooke, Fl. Pres. Bombay 3: 121.1958 (Repr.) non Trim 1885.

Local Name: Sherod, **English Name:** Sapium.

Identification Characters: Monoecious plants, flowers erect spikes, petals absent; fruit fleshy but at length dry, dehiscent

Description: Deciduous tree, 7.5-10.5 m tall, with plenty of latex and ash-coloured, longitudinally fissured bark. Leaves crowded at ends of branches, elliptic-lanceolate or oblong-lanceolate, glabrous. Flowers appearing after leaf fall, erect spikes. Capsule globose or ovoid, flesh. Seeds ovoid, smooth, somewhat compressed.

Phenological Data: Fls: Mar. – Apr, Frs: May. - Aug.

Distribution: Sri Lanka, India, Nepal, Bhutan, Laos, Vietnam, and China

Origin\Native: Tropical and Subtropical.

Ecology: In rocky places, in full sun. Soil: limestone, granite bedrock.

Category of threat: Common

Special Characteristics: Longitudinally fissured bark

Economic Importance: Ornamental

Horticultural Value: Planted in gardens

Method for Propagation: Seeds.

Agricultural Value: Cultivated for ornamental purposes

Uses: Fruit is used for manufacture of soaps. Seed oil is used in paints and varnishes.

TREWIA

1. female flowers 1 or 3 together, style glabrous, fruits indehiscent ..... T. *nudiflora*

1. female flowers more than 3, in racemes, style papillose, fruits deshiscent

.... T. *polycarpa*

Trewia polycarpa Benth. In Benth & Hook.f. Gen. Pl. 3:318. 1880; Hook. f. Fl. Brit. India 5: 424.1887; Cooke, Fl. Pres. Bombay 3: 112.1958 (Repr.); Londhe in Singh et al. Fl. Maharashtra St. Dicot. 2:906. 2001.

Local Name: Petari

Description: Deciduous tree, 5-7 m tall, with grey smooth bark, leaves ovate densely wooly when young, male racemes long pendulous at end of branches, female flowers solitary, axillary, fruit broad ellipsoid.

Phenological Data: Fls: Dec. – Feb., Frs: Mar. - July.

Distribution: Endemic to India,

Origin\Native: India

Localities in Gujarat: Dangs and Rajpipla forests

Ecology: Tropical, warm climate.

Category of threat: Common

ULMACEAE

Trees or shrubs; leaves simple, alternate, obliquely based; inflorescence solitary, cymes or axillary fascicled; flowers irregular, bisexual or unisexual, small, tepals 4-8, united, stamens 4-8, free, carpels 2, syncarpous, ovary superior, unilocular, placentation basal; fruit samara, drupe.

1. fruit samara, leaves pinnately veined and deciduous ..... *Holoptelea*

1. fruit drupe, leaves palmately veined and not deciduous ..... *Trema*

HOLOPTELEA

Holoptelea integrifolia (Roxb.) Planch. in Ann. Sci. Nat. Bot. ser. 3,10:259. 1848; Hook. f. Fl. Brit. India 5: 481.1888; Cooke, Fl. Pres. Bombay 3: 127.1958 (Repr.); Londhe in Singh et al. Fl. Maharashtra St. Dicot. 2:911. 2001. *Ulmus integrifolia* Roxb. Pl. Corom. 1:56.t. 78. 1795.

Local Name: Kanjo, Audo, Papri, **English Name:** Indian - elm

Identification Characters: Leaves elliptic, dark-green or both sides; flowers clustered on leafless branches; fruit samara

Description: Deciduous tree, 5-16 m tall, with Greyish-white or ash-coloured, smooth bark, exfoliating into small scales. Leaves coriaceous. Flowers minute, greenish-yellow. Fruit winged, flat, broadly oblong or orbicular, deeply notched at apex. Seeds ovate or ovate-oblong.

Phenological Data: Fls: Dec.-Feb, Frs: Mar.- May.

Distribution: Throughout the plains of India

Origin\Native: Ceylon and China.

Ecology: Full sun

Category of threat: Common

Special Characteristics: Winged fruit

Economic Importance: ornamental

Horticultural Value: Planted in gardens and along roadside

Method for Propagation: Seeds.
Suitable Environmental Conditions: Tropical
Agricultural Value: Cultivated for ornamental purposes
Uses: Wood is used for timber and also used in construction. Seed are eaten by Monkey.

TREMA

1. branchlets scabridly hairy ..... T. *politoria*

1. branchlets villous-tomentose or appressed pubescent ..... T. *orientalis*

Trema orientalis (L.) Bl. in Mus.Bot.Lugd.Bat. 2:61. 1856; Hook. f. Fl. Brit. India 5: 484.1888; Cooke, Fl. Pres. Bombay 3: 129.1958 (Repr.); Londhe in Singh et al. Fl. Maharashtra St. Dicot. 2:911. 2001. *Celtis orientalis* L. Sp. Pl. 1044. 1753.

Local Name: Kargol, Vanjli
Description: Evergreen tree, with rough ash colored bark, leaves serreted, flowers greenish yellow or creamy white, axillary, drupes ovoid or globose, smooth, purple to black when ripe.
Phenological Data: Fls: Sept. - Dec., Frs: Nov. - Mar.
Distribution: Inida, Sri Lanka, Malayasia
Localities in Gujarat: throughout in deciduous forests, South Gujarat and Sabarkantha forests
Ecology: Tropical, warm climate.
Category of threat: Not common
Uses: used in charcoal, gunpowder, match boxes, stem fibre is used in making ropes.

URTICACEAE

Mostly herbs, shrubs or small tree; leaves simple, alternate or opposite, stipulate; inflorescence axillary cymes; flowers regular, unisexual, small, monoecious or dioecious, tepals 3-5, persistent, green, stamens 4-5, carpels 1, ovary superior, placentation basal; fruit achene.

BOEHMERIA

Boehmeria macrophylla Hornem. Hort.Bot.Hafn. 2:890. 1815; Jadhav in Singh et al. Fl. Maharashtra St. Dicot. 2:915. 2001. *B. scabrella* (Roxb.) Gaud. in Frey Voy. 500. 1826; Cooke, Fl. Pres. Bombay 3: 135.1958 (Repr.). *B. platyphylla* D. Don var. *Scabrella* Wedd. Mon.Utric. 265. 1856; Hook. f. Fl. Brit. India 5: 578.1888.

MORACEAE

Trees or shrubs with latex; leaves simple, alternate, stipulate, caducous or deciduous; inflorescence hypanthodium or catkin; flowers regular unisexual, monoecious, tepals

2-6, free or united, stamens 1-6, carpels 2, syncarpous, ovary superior, style bifid, placentation basal; fruit syconus or sorosis.

1. flowers in syconia i.e. crowded inside of fleshy receptacles ..... *Ficus*
1. flowers exposed
    2. stamens 1, ovary embedded, seeds large ..... *Artocarpus*
    2. stamens 4, ovary not embedded, seeds small
        3. female flowers solitary ..... *Streblus*
        3. female flowers in heads or spikes
            4. leaves usually glabrous, perianth fleshy in fruit, style 2-fid ..... *Morus*
            4. leaves pubescent beneath, perianth not fleshy in fruit, style not divided ..... *Broussonetia*

ARTOCARPUS J. R. & J. G. A. Forst. (nom. cons.)

***Artocarpus heterophyllus* Lamk.** Encycl. 3: 210. 1789 (*'heterophylla'*); Jarrett in J. Arnold Arbor. 40:334. 1959; Corner in Dassan. & Fosb. Rev. Handb. Fl. Ceylon 3.217 f 2. 1981. *A. integrifolia* sensu Gamble, Fl. Madras Pres. 1369. 1928 [3: 957.1967 (Repr.)] non L. f 1781]; Hook. f Fl. Brit. India 5: 541. 1888; Cooke, Fl. Pres. Bombay 3:158. 1958 (Repr.); Talb. For. Fl. Bombay Pres. Sind 2: 526. 1911.

Local Name: Fanas, **English Name:** Jack fruit.

Identification Characters: Flowers crowded on the outside of oblong or irregularly globose, large receptacles.

Description: Evergreen tree (2n = 56), up to 10-15 m tall, short trunk, with deep shiny green elliptic to obovate leaves. Bark dark brown, rough, on blazing gives milky juice; leaves simple, alternate, stipulate, coriaceous, monoecious tree, male and female inflorescences on the same tree. Male receptacles are stout, cylindrical, borne along the upright branches, 2 small wedge-shaped hairy perianth, one stamen. Female flowers are clustered on shortly stoked, ovoid-oblong receptacles, developing from the main trunk and older branches, single carpel. The strongly scented multiple fruit is one of the largest of tree borne fruits and is borne on the main trunk and branches of the tree. Fruit is green, yellow when ripe, sticky and having latex; seeds smooth, ovoid, kidney shaped.

Phenological Data: Fls: Jan. – Mar, Frs: July. – Aug.

Distribution: Eastern and western Ghats, Kerala, Assam, Sri Lanka, Myanmar, Bangladesh, Pakistan

Origin\Native: Southern parts of India, rainforests of the Western Ghats

Ecology: Fully open light, deep-rich soil, cannot stand drought

Category of threat: Common

Special Characteristics: Trunk, branches, and leaves contain a gummy latex.

Economic Importance: Fruit tree

Horticultural Value: Planted in gardens

Medicinal Value: Seeds tonic, cooling and nutritious, latex promotes healing of abscesses, snakebite and

glandular swellings, is a remedy for skin diseases and asthma.

Method for Propagation: Seeds, stem cutting

Suitable Environmental Conditions: Moist tropical

Agricultural Value: Cultivated for fruits, The jackfruit bears fruit three years after planting.

Uses: Fruit is edible, unripe fruits are pickled; seeds are rich in starch and eaten after roasting or boiling. Wood is used for furniture, doors, windows, musical instruments. Bark used for tanning, the heartwood yields yellow dye.

FICUS

1. receptacles pedunculate
    2. male flowers with one stamen ..... F. *hispida*
    2. male flowers with two stamens ..... F. *racemosa*
1. receptacles paired
    3. lateral nerves prominent beneath ..... F. *nervosa*
    3. lateral nerves not prominent beneath ..... F. *virens*
    4. Leaves membranous or subcoriaceous, petioles jointed at the blades
        5. leaves caudate – acuminate
            6. leaves slightly narrowed to petiole, receptacles not depressed at apex ..... F. *rumphii*
            6. leaves round to truncate, receptacles depressed at apex ..... F. *religiosa*
        5. leaves cordate, apices shortly caudate, acuminate ..... F. *arnottiana*
    4. Leaves coriaceous or subcoriaceous, petioles never jointed at the blades
        7. leaves tomentose
            8. leaves obtuse, receptacles globose ..... F. *benghalensis*
            8. leaves shortly acuminate, receptacles oblong or obovate ..... F. *drupacea*
        7. leaves glabrous
            9. lateral and secondary nerves close, fine and parallel ... F. *microcarpa*
            9. lateral and secondary nerves not close and parallel ... F. *amplissima*
        7. leaves lobbed, cordate, 3-5 nerved, dentate ..... F. *carrica*

Fig. 168: *Artocarpus heterophyllus*

Fig. 169: *Ficus benjamina*

Fig. 170: *Ficus carica*

Fig. 171: *Ficus elastica*

Fig. 172: *Ficus racemosa*

Fig. 173: *Ficus religiosa*

Fig. 174: *Ficus rumphii*

Fig. 175: *Streblus asper*

Ficus benghalensis L. Sp. Pl. 1059. 1753; Hook. f. Fl. Brit. India 5: 499.1888; Cooke, Fl. Pres. Bombay 3: 145.1958 (Repr.); Lakshmi & Venkanna in Singh et al. Fl. Maharashtra St. Dicot. 2:934. 2001.

Local Name: Vad, **English Name:** Banyan

Identification Characters: Leaves obtuse, tomentose beneath when young; receptacles globose, sessile or very shortly pedunculate, flowers crowded on the inside of fleshy receptacles of which mouth is closed by bracts

Description: Evergreen tree (2n = 26). 12-18 m tall, large , laticiferous, spreading branches, sending down to the ground numerous aerial roots which afterwards thickened to form 'trunks or pillars', straight trunk and grey to Greyish-brown. Leaves alternate, coriaceous, broadly ovate, ovate-oblong or elliptic, rounded tips. Receptacles axillary, geminate, deep-orange-red, puberulous, occurring in pairs in the leaf axils. Achenes reddish-brown, ovoid, glabrous. Banyan begins its life as an epiphyte developing on other trees starting from seeds dropped by birds in a fork, hollow or crotches.

Phenological Data: Receptacles: Apr. – Oct.

Distribution: Throughout India, East Asian countries

Origin\Native: India, Sri Lanka and Pakistan

Ecology: Moderately bright light, drought tolerant, soil that is well drained but kept moderately moist

Category of threat: Common

Special Characteristics: Produce adventitious roots (prop roots) from the branches.

Economic Importance: Ornamental foliage tree

Horticultural Value: House and office plant, planted as a shade tree, also planted at roadside

Medicinal Value: Bark is used diarrhea and dysentery, latex is used in rheumatism.

Method for Propagation: Seeds, cutting, grafting and layering.

Suitable Environmental Conditions: Tropical and subtropical climate

Agricultural Value: Cultivated for ornamental value

Uses: People worship this tree often planted around temples and is considered sacred by both Hindus and Buddhists. Wood is durable. Bark yields coarse fiber. Vadodara gives its name by this tree.

Ficus benjamina L. var. ***nuda*** (Miq.) Barrett, Amer. Midl. Naturalist 45:127. 1951; Lakshmi & Venkanna in Singh et al. Fl. Maharashtra St. Dicot. 2:946. 2001. *Urostigma nudum* Miq. In Hook. Lond.J.Bot. 6:584. 1847.

Local Name: Pimpri, **English Name:** Ficus, Java fig

Identification Characters: Flowers crowded on the inside of fleshy receptacles of which mouth is closed by bracts

Description: Evergreen tree (2n = 26). 8- 12 m tall large graceful tree with slender drooping branches, smooth Greyish bark, aerial roots develop from branches, simple, small, glabrous, light green, leaves with acuminate apex. Receptacles or fig are in pairs, axillary and sessile, smooth, blood- red when ripe.

Phenological Data: Receptacles: Oct.- Dec.

Distribution: Different parts of India, Myanmar, Sri Lanka, Andaman.

Origin\Native: Southeast Asia south to northern Australia.

Ecology: Moist soil, Sun to Partial Shade

Category of threat: Common

Special Characteristics: Prop roots

Economic Importance: Ornamental, shade tree

Horticultural Value: Planted along roadsides, in gardens, highways, large avenues, commonly used for "indoor" bonsai

Medicinal Value: Leaf decoction with oil to reduce ulcers

Method for Propagation: Seeds, single eye cutting and root cutting.

Suitable Environmental Conditions: Humid climate

Agricultural Value: Cultivated for ornamental purposes

Uses: Bark is used in rope making, wood is used to make match boxes

Ficus carica L. Sp. Pl. 1059. 1753; Cooke, Fl. Pres. Bombay 3: 155.1958 (Repr.); Lakshmi & Venkanna in Singh et al. Fl. Maharashtra St. Dicot. 2:947. 2001.

Local Name: Anjir, **English Name:** Common fig

Identification Characters: Leaves lobed

Description: Trees, 5-10 m tall, deciduous, branches pubescent; leaves broadly ovate, thick cordate at base, 3-5 lobed, hairy on both surfaces. Receptacles pyriform, on axil of leaves, greenish purple when ripe, hairy outside; achenes ovoid, brown.

Phenological Data: Receptacles: Mar. - May

Distribution: Throughout India, Iran, Australia, America, South Africa

Origin\Native: Syria and Palestine, Southwest Asia

Ecology: Moist soil, Sun to Partial Shade

Category of threat: Common

Special Characteristics: Leaves lobed

Economic Importance: Fruit tree

Method for Propagation: Seeds, single eye cutting and root cutting.

Suitable Environmental Conditions: Humid warm climate

Agricultural Value: Cultivated for fruits

Uses: Figs can be eaten fresh or dried, and used in jam-making. Most commercial production is in dried or otherwise processed forms, since the ripe fruit does not transport well, and once picked does not keep well.

Ficus elastica Roxb. Fl. Ind. 3:541. 1832; Hook.f. Fl. Brit. India 5:508.1888; Cooke, Fl. Pres. Bombay 3:159.1958 (Repr.); Lakshmi & Venkanna in Singh et al. Fl. Maharashtra St. Dicot. 2:947. 2001.

Local Name: Rubber plant, **English Name:** Indian rubber plant

Identification Characters: Flowers crowded on the inside of fleshy receptacles of which mouth is closed by bracts

Description: Evergreen tree (2n= 26,39), large tree, starts its life as an epiphyte, eventually stands on its own, grow upto 31 m , smooth scurfy, reddish brown bark, spreading branches, aerial roots are produced from the leader branches, leaves are shortly stalked, alternate, simple with entire margin, thick and leathery, dark green, glossy, oblong-elliptic, acuminate apex, figs or receptacles sessile, occurring in pairs in leaf axils

Phenological Data: Receptacles: Aug. – Oct.

Distribution: Eastern Himalaya, Nepal, Sikkim, Bhutan, Arunachal Pradesh, Assam

Origin\Native: South East Asia (India and Malaysia)

Ecology: Salt tolerant, shade tolerant

Category of threat: Common

Special Characteristics: Yield a milky white latex

Economic Importance: Ornamental foliage plant

Horticultural Value: Planted in gardens, house, indoors

Method for Propagation: Seeds, Stem cutting, Air layering

Suitable Environmental Conditions: Warm an d humid climate

Agricultural Value: Cultivated for ornamental purposes

Uses: Yield a milky white latex which has been used in some cases to make rubber, leaves and stems and even wood 'bleed' white sticky sap when broken or damaged from which rubber can be made

Ficus hispida L.f. Suppl. Pl. 442. 1781; Hook. f. Fl. Brit. India 5:522.1888; Cooke, Fl. Pres. Bombay 3: 154.1958 (Repr.); Lakshmi & Venkanna in Singh et al. Fl. Maharashtra St. Dicot. 2:937. 2001.

Local Name: Dhedh umardo, **English Name:** Ficus.

Identification Characters: Receptacles pedunculate, clustered, all axillary or on branches and stems near base, flowers crowded on the inside of fleshy receptacles of which mouth is closed by bracts

Description: Evergreen tree Bushy shrubs or small trees, 3-7 m tall. Leaves ovate, obovate or obovate-oblong, coriaceous, hispid-tomentose beneath. Receptacles greenish-yellow, obovoid or almost spherical tomentose, densely on thickened margins, subsessile, mostly extra-axillary on leafless branches or on main trunk near the ground. Achenes straw-coloured or pale-to dark reddish-brown, ovoid, glabrous, minutely tubercled.

Phenological Data: Receptacles: Throughout the year.

Distribution: Throughout India.

Origin\Native: Ceylon, Burma and China.

Ecology: Salt tolerant, shade tolerant

Category of threat: Common

Special Characteristics: Yield a milky white latex

Economic Importance: Ornamental foliage plant

Horticultural Value: Planted in gardens

Suitable Environmental Conditions: Warm and humid climate

Agricultural Value: Cultivated for ornamental purposes

Method for Propagation: Seeds and root cutting.

Uses: Wood is used for fuel.

Ficus benghalensis var. krishnae **(C. DC.) Corner** in GArd. Bull. Singpore 21: 14. 1965 & in Dassan & Fosb. Rev. Handb. Fl. Ceylon 3: 253. 1981. *F. krishnae* C. DC. in Bot. Mag. t 8092. 1906; Naik, Fl. Marathwada 2: 811. 1998.

Local Name: Krishna vad, **English Name:** Krishna's Butter Cup

Identification Characters: flowers crowded on the inside of fleshy receptacles of which mouth is closed by bracts

Description: Evergreen tree (2n = 26). 4 -7 tall trees, with folded leaves joined at the base which appears like containers of ice- cream. Leaves are long petoiled, green.

Phenological Data: Receptacles: May - June

Distribution: Throughout India and Pakistan

Origin\Native: India.

Ecology: Salt tolerant, shade tolerant

Category of threat: Not common

Special Characteristics: Unique folded leaves

Economic Importance: Ornamental

Horticultural Value: Planted in parks and gardens

Method for Propagation: Layering and cutting

Suitable Environmental Conditions: Tropical

Agricultural Value: Cultivated for ornamental purpose

Uses: Planted for religious purposes with the leaves of which Lord Krishna used to store butter and also to collect dew drops for the thirsty Hindu Gods

Ficus racemosa L. Sp. Pl. 1060. 1753; Lakshmi & Venkanna in Singh et al. Fl. Maharashtra St. Dicot. 2:939. 2001. *F. glomerata* Roxb. Pl. Corom. 2:13.t. 1.23. 1798; Hook. f. Fl. Brit. India 5:535.1888; Cooke, Fl. Pres. Bombay 3: 154.1958 (Repr.).

Local Name: Umaro, **English Name:** Cluster fig

Identification Characters: receptacles pedunculate, in clusters on old trunks or on special branches; flowers crowded on the inside of fleshy receptacles of which mouth is closed by bracts

Description: Evergreen tree (2n = 26). 10-15 m tall, large spreading, laticiferous, no aerial roots, with Greyish or blackish-brown, rough, shallowly fissured bark. Leaves simple, alternate, petiolate, ovate to ovate-oblong or elliptic-lanceolate, entire, pointed at apex, glabrous at length. Receptacles ovoid, subglobose or subturbinate, red, tomentose. Achenes reddish-brown, obovoid, minutely tuberculate.

Phenological Data: Receptacles: Throughout the year.

Distribution: Throughout India and Sri Lanka

Origin\Native: India, Ceylon.

Ecology: Full sun, shade tolerant

Category of threat: Common

Special Characteristics: Viscid gum is produced from bark

Economic Importance: ornamental

Horticultural Value: Shade tree for coffee plantation

Medicinal Value: The bark is given to cattle suffering from rinder-pest, applied to stop bleeding, used as a wet dressing for wounds

Method for Propagation: Seeds and stem cutting

Uses: Fruits are eaten by wild animals. Wood is also important for timber. Dye can be made from bark, good host of Indian lac insects

Ficus religiosa L. Sp. Pl. 1059. 1753; Hook.f. Fl. Brit. India 5:513.1888; Cooke, Fl. Pres. Bombay 3:149.1958 (Repr.); Lakshmi & Venkanna in Singh et al. Fl. Maharashtra St. Dicot. 2:940. 2001.

Local Name: Piplo, **English Name:** Peepal

Identification Characters: leaf apices caudate-acuminate or long acuminate, base of leaves cordate, apical tail up to half as long as main part of blade; flowers crowded on the inside of fleshy receptacles of which

Fig. 176: *Ficus benghalensis,* a. Habit b. Receptacles

Fig. 177: *Ficus benghalensis var. krishnae* a. Habit, b. Leaf

Fig. 178: *Ficus hispida* a. Habit, b. Leaves

Fig. 179: *Morus alba* a. Inflorescence, b. Fruits

mouth is closed by bracts

Description: semi-evergreen tree (2n = 26). 10-16 m tall, large spreading tree, begins life as an epiphyte, with grey or Greyish-black, rough bark. No aerial roots, Leaves deep shining above and pale below, glabrous, subcoriaceous, and ovate to ovate rhomboid, heart shaped, narrowed to the apex in to a long tail like tip i.e. acuminate apex. Receptacles spherical, reddish-purple, axillary or on leafless branches, geminate or clustered towards ends of branches. Tree is considered sacred by Hindus and Buddhists, destruction of tree is considered a sin, the name 'Sacred Fig' was given to it. Siddhartha Gautama is referred to have been sitting underneath a Bo Tree when he was enlightened (Bodhi), or "awakened" (Buddha). Today Sadhus still meditate below this tree.

Phenological Data: Receptacles: Oct. - May.

Distribution: throughout Himalaya from Pakistan through India to Bhutan, Nepal and Myanmar

Origin\Native: India and Myanmar

Ecology: Full sun

Category of threat: Common

Special Characteristics: with grey or Greyish-black, milky latex in all parts

Economic Importance: shade tree

Horticultural Value: plantation near temples

Method for Propagation: Seeds and cutting.

Suitable Environmental Conditions: Tropical

Agricultural Value: Cultivated for sacred purpose

Uses: People planted near the temple and worship it, wood is used as a fuel.

Morus alba L. Sp. Pl. 489. 1753; Hook.f. Fl. Brit. India 5:492.1888; Cooke, Fl. Pres. Bombay 3:159.1958 (Repr.); Lakshmi & Venkanna in Singh et al. Fl. Maharashtra St. Dicot. 2:948. 2001.

Local Name: Shetur, **English Name:** White mulberry.

Identification Characters: flowers not crowded inside or on receptacle, male and female flowers spicate or female in ovoid heads

Description: Deciduous tree (2n = 28). 2.5-6 m tall tree, with grey or Greyish-yellow, smooth bark. Leaves alternate, simple, deciduous stipules, broadly ovate, cordate, nearly glabrous, serrate, entire or lobed, acuminate tip. Inflorescence axillary Spikes, pendulous, flowers very small unisexual, the male growing in cylindrical catkins with stalk, the females in subglobose catkins, female flowers are much crowded, perianth in two whorls, bicarpellary syncarpous ovary, short style, bifurcated stigmas; multiple fruits- sorosis, consisting of many minute achenial fruits light- to deep-violet or purple. Achenes brown, glabrous.

Phenological Data: Fls: July-Dec, Frs: Aug. – Dec.

Distribution: Tropical regions of India

Origin\Native: China

Ecology: Tolerant of drought, urban and seaside conditions full sun prune in winter prefers moist, well-drained fertile soil pH adaptable

Category of threat: Common

Special Characteristics: Sweet fruits

Economic Importance: cultivated for fruits

Horticultural Value: Grown road side an d avenues

Medicinal Value: Fruits are laxatives, used to purify blood, or sore throats

Method for Propagation: seeds, cuttings.

Suitable Environmental Conditions: Moist, tropical

Agricultural Value: Cultivated for fruits, agro forestry purposes, leaves are the preferred feedstock for silkworm

Uses: Fruit is edible. The bark is used for making paper. The leaves are used for feeding silkworms. The wood is used for making sports goods.

Streblus asper Lour. Fl. Cochinch. 2:615. 1790; Hook.f. Fl. Brit. India 5:489.1888; Cooke, Fl. Pres. Bombay 3:141.1958 (Repr.); Lakshmi & Venkanna in Singh et al. Fl. Maharashtra St. Dicot. 2:944. 2001.

Local Name: Kharoti, **English Name:** Sandpaper tree.

Identification Characters: flowers not crowded inside or on receptacle, female flowers solitary, male flowers few, in capitate or subcapitate clusters.

Description: Evergreen tree (2n = 26) 5-8 m tall, often with crooked trunk and rough, light-Greyish-brown, slightly irregularly fissured bark. Leaves coriaceous, simple, alternate, scabrous on both sides, with raise dots, irregularly dentate margin, elliptic or obovate, subsessile, shortly acuminate at apex, tapering at base. Flowers inconspicuous, dioecious, axillary, males in pedunculate head, female solitary. Drupes pysiform or ellipsoid, orange or reddish-yellow.

Phenological Data Fls. and Frs: Nov.- Apr.

Distribution: well distributed in sub-Himalayan tracts from Himachal Pradesh West Bengal , Assam and Tripura

Origin\Native: India, Ceylon, Malaya and China.

Ecology: heat, drought ad flood tolerant

Category of threat: Common

Special Characteristics: sandpaper like leaves, latex

Economic Importance: ornamental

Horticultural Value: planted in gardens and shrubberies

Medicinal Value: twigs used to cure pyorrhea, a poultice of roots is applied to ulcers, inflamed swelling and bois, latex has astringent, antiseptic properties

Method for Propagation: Seeds

Suitable Environmental Conditions: tropical

Agricultural Value: cultivated for roadside plantation

Uses: Leaves soaked in water are than used as sand paper. Wood is excellent fuel and also used in the timber industry.

CASUARINACEAE

Trees or shrubs with jointed braches, xerophytic plants; leaves small scale like whorled; inflorescence male in catkin, female in heads; flowers small, regular, unisexual, bracts and bracteoles present, tepals absent, stamens 1 in main flower, carpel 1, ovary superior, placentation parietal, fruit winged nut.

CASUARINA L. ex Adans.

***Casuarina equisetifolia* L.** Amoen. Acad. 4: 143. 1759; Hook f Fl. Brit. India 5: 598. 1888; Cooke, Fl. Pres. Bombay 3: 161. 1958 (Repr.); Friis in Taxon 29:499. 1980.

Local Name: Sharu, **English Name**: Beef- wood tree.

Identification Characters: leaves reduced to scales

Description: Evergreen tree (2n = 18). 10-12 m tall, with brown to blackish-brown; branches slender, glaucous - to dark-green. Leaves reduced to scales, in whorls of 6-8. male spikes terminal. Female fascicles globose or ovoid at ends of lateral branches. Nuts winged, minute, crowded into a woody cone.

Phenological Data: Fls. and Frs: Throughout the year.

Distribution: Throughout India, Myanmar, Philippines, Africa, Sumatra, New Caledonia, Borneo

Origin\Native: Malaya archipelago, Australia and Pacific.

Ecology: Grow well in sandy loams, alkaline and brackish soils

Category of threat: Common

Special Characteristics: Scaly leaves

Economic Importance: Ornamental

Horticultural Value: Planted in parks and gardens

Method for Propagation: Seeds

Suitable Environmental Conditions: Tropical environment

Agricultural Value: Cultivated for ornamental purposes

Uses: Wood is hard and used in the making of furniture. It is one of the best fuel woods. The timber is used for beams. Bark is used in tanning.

MUSACEAE

Perennial plants with rhizomes and pseudostems; leaves simple, large, petiolate, radical or cauline, distichous or spirally arranged; inflorescence spadix; flowers irregular, unisexual or bisexual, monoecious, tepals 6, in two whorls, stamens 5 fertile and one rudimentary, carpels 3, syncarpous, ovary inferior, placentation axile; fruit berry or capsule.

1. plants cultivated, stoloniferous ..... *Musa*

1. plants wild, not stoloniferous ..... *Ensete*

Musa paradisiaca L. Sp. Pl. 1043. 1753; Cooke, Fl. Pres. Bombay 3:249.1958 (Repr.); Lakshmi in Singh et al. Fl. Maharashtra St. Monocot. 89. 1996. *M. cliffortiana* L. Sp. Pl. 1043. 1753 in syn. *M. sapientum* L. var. *paradisiaca* Baker in Ann. Bot. 7:213. 1893 and Hook.f. Fl. Brit. India 6:262.1892.

Local Name: Kela, **English Name:** Banana tree

Identification Characters: leaf bases overlap to form false stem which gives an appearance of tree to the plant

Description: 4-8 m tall, leaves oblong, green; inflorescence a terminal pendulous spike; flowers unisexual, in 2 rows under each bract; fruit oblong, trigonous, ripens yellow, pulp sweet, edible; seeds irregularly globose, black.

Phenological Data: Fls. - Frs: Throughout the year

Distribution: Asia, America and Africa

Origin\Native: India and Southern Asia

Ecology: Full sun / light shade, moist soil, containing rich compost.

Category of threat: Common

Special Characteristics: the fruit is sweet in taste

Economic Importance: Fruit tree

Horticultural Value: Planted in the house

Medicinal Value: the fruit is rich in potassium, vitamins B-6 and C, also high in dietary fiber

Method for Propagation: Rhizomes

Suitable Environmental Conditions: warm and damp climate

Agricultural Value: Cultivated for fruits

Uses: The unripe fruit of banana, rich in starch, is cooked as food or dried and ground into flour. The fruit of the plantain (cooking banana) is larger, coarser and less sweet than the kinds that are eaten raw. On ripening of the fruit, the starch turns into sugar. The fruits are an excellent provider of energy and a healthy addition to the diet. After removing the skin, the unripe fruit can be sliced (1 or 2 mm thick) and deep fried in boiling oil, to produce chips.

STRELITZIACEAE

Palm like plant, leaves spread fanlike in one plane, leaves similar to Banana plant, vein parallel, persistent leafbase forms pseudostem; flowers white in spike, bract boad shaped, tepals 6, white, in two whorls, stamens 5, ovary 3-celled, inferior, syncarpous, necteriferous; fruit oblong.

Ravenala madagascariensis J.F. Gmel. Syst. 567. 1791; Baker in Hook.f. Fl. Brit. India 6:198. 1890; Cooke, Fl. Pres. Bombay 3:250. 1958 (Repr.); Lakshmi in Sharma et al. Fl. Maharashtra St. Monocot. 90. 1996; Naik, Fl. Marathwada 2:837. 1998.

Local Name: Traveler's palm, **English Name:** Traveler's tree.

Identification Characters: Flattened fan-like mass of foliage, broad, boat-shaped leaf base which can hold 1-2 liter rain water.

Description: Evergreen tree (2n = 22). Trunk palm like, 15-20 m tall, topped by leathery, banana like leaves arranged like a fan on long petioles. Cup shaped leaf bases.

Phenological Data: Fls. and Frs: July. - Aug.

Distribution: Southern parts on India

Origin\Native: Madagascar.

Ecology: Low, warm and humid climate

Category of threat: Common

Special Characteristics: Hold healthy drinking water at the base of the leaf

Economic Importance: Ornamental

Horticultural Value: Planted in front of the house, at the entrance of the building, in the middle or corner of the lawn

Medicinal Value: Seed oil is antiseptic.

Method for Propagation: Suckers.

Suitable Environmental Conditions: Low, warm and humid climate

Agricultural Value: Cultivated for its ornamental uses

Uses: The cup shape of leaf base holds drinking water for thirsty travelers, leaves are used and a packing material and roofing.

ARECACEAE

Trees or shrubs, generally unbranched stem, prickly; leaves compound, large, pinnate or palmate; inflorescence simple or compound spadix; flowers regular, unisexual, small, monoecious or dioecious, bracteates, tepals 6, in two whorls, sepaloid, persistent, leathery, imbricate, stamens 6 in two or three series, carpels 3, syncarpous or apocarpous, ovary superior; fruits berries or drupes.

1. Leaves palmate, simple
    2. trunk dichotomously branched ..... *Hyphaene*
    2. trunk unbranched ..... *Borassus*
1. Leaves pinnately compound
    3. leaves bipinnate, inflorescence much branched spadix ..... *Caryota*
    3. leaves simple pinnate, inflorescence not as above
        4. trunk covered with persistent leaf bases ..... *Phoenix*
        4. trunk not as above
            5. trunk smooth, bark Grey-ash in lower half and green in upper half ..... *Roystonea*
            5. trunk with annular marks, bark through out pale to sandy brown ..... *Cocos*

Fig. 180: *Borassus flabellifer*

Fig. 181: *Cocos nucifera*

Fig. 182: *Elaeis guineensis*

Fig. 183: *Caryota urens*

Borassus flabellifer **L.** Sp. Pl. 1187. 1753: Becc. & Hook. f in Hook f Fl. Brit. India 6: 482. 1892; Cooke, Fl. Pres. Bombay 3:321. 1958 (Repr.ed.); Blatt. Palms Brit. Ind. & Ceyl. 174. tt. 38 & 39. 1978 (Repr. ed)

Local Name: Tad, **English Name:** The Palmyra palm, Fan palm

Identification Characters: Unarmed tree, leaves palmate, simple, trunk unbranched

Description: Evergreen tree (2n = 36). 10-16 m tall, with straight trunk; bark with annular scars. Leaves in a terminal crown, plicate, fan-shaped, and coriaceous. Male spadix cylindric, much branched, female simple; male flowers minute, creamy-white.

Phenological Data: Fls: Feb. - Apr, Frs: May. - June.

Distribution: Eastern costal area, Bengal Bihar and South India

Origin\Native: Tropical Africa, India and Malayan peninsula.

Ecology: It can withstand high salinity, alkalinity, poor drainage, flooding on account of seawater ingress, swampy conditions, aridity; efficient user of solar energy.

Category of threat: Common

Special Characteristics: Large fan shaped leaves

Economic Importance: Ornamental

Horticultural Value: Planted in gardens as an ornamental

Medicinal Value: The bark decoction with salt is used as a mouth wash, sap from flower stalk is a tonic diuretic, stimulant, laxative, *taady* is good for general health.

Method for Propagation: Seeds.

Suitable Environmental Conditions: Dry environments, coastal areas

Agricultural Value: Cultivated for *Neero* and fibers

Uses: Leaves are used for thatching for preparing mats and some tribal equipment. The plants are tapped for *'taady'* called as *Neero* which is refreshing and nourishing drink. Fruits are edible. In ancient times the leaves have been used as writing material.

Caryota urens L. Sp. Pl. 1189. 1753; Beck. & Hook.f. in Hook.f. Fl. Brit. India 6:422. 1892; Cooke, Fl. Pres. Bombay 3:315. 1958 (Repr.); Lakshmi in Sharma et al. Fl. Maharashtra St. Monocot. 1:189. 1996.

Local Name: Shivjata, **English Name:** Indian Sago palm, Fish tail palm.

Identification Characters: Unarmed tree, bark brown to sandy brown, leaves bipinnate, leaflets truncately irregularly toothed as apex, inflorescence much branched spadix, branches drooping.

Description: Evergreen tree (2n = 32). 5-10 m tall trees; trunk straight, transversely annulated. Leaves in terminal crown; leaflets glabrous, broadly obovate, irregularly truncate at apex. Flowers monoecious, compound spadix with drooping branches.

Phenological Data: Fls. and Frs: Throughout the year.

Distribution: Orissa, Assam and peninsular India.

Origin\Native: India, Sub- Himalayan track, Nepal, Burma, Malaya and Ceylon.

Ecology: Average soil, good drainage

Category of threat: Common

Special Characteristics: Leaf segments are shaped like the tail of a fish, flowering branches resembling like docked horse-tail.

Economic Importance: Ornamental

Horticultural Value: planted as an ornamental tree.

Method for Propagation: Seeds and offsets.

Suitable Environmental Conditions: Dry or semi dry climate

Agricultural Value: Cultivated for ornamental uses

Uses: Fibers are obtained from leaf sheaths. They are used in stuffing for making very strong ropes, bow strings.

***Elaeis guineensis* Jacq.** Select. Am. 280, t 172. 1763; Blatt. Palms Brit. Ind. & Ceyl. 488, t 95. 1978 (Repr. ed.)

Local Name: Oil palm, **English Name:** Oil palm

Description: Graceful palm resembling the Coconut palm (*Cocos nucifera*), an erect stem, 25-30 m tall, ringed, but spines are lacking. Leaves are pinnate, 4-5 m long, bearing 50-60 lanceolate pointed segments, petiole, up to 1 m long, marginally spiny and toothed. Its flowers, unisexual on monoecious plants are clustered in short inflorescences borne among the leaves; they form thick and closely packed groups. Fruits fleshy, 2-3 cm long, oblong-ovoid in shape, reddish, crowded together in large clusters.

Distribution: Kenya, Tanzania, Uganda, Zaire, Benin, Nigeria, Senegal, Sierra Leone, Togo, Malawi, Madagascar, widely cultivated in tropics

Origin\Native: West Africa

Ecology: Requires adequate light and soil moisture, Prefers volcanic soils, coastal alluvial and acidic sands

Category of threat: Common

Economic Importance: Ornamental

Horticultural Value: Planted in garden

Medicinal Value: Diuretic, vulnerary, used for cancer, headaches, and rheumatism.

Method for Propagation: Seeds

Suitable Environmental Conditions: Subtropical Dry (without frost) through Tropical Dry to Wet Forest

Agricultural Value: Cultivated for the oil products obtained from its fruit and seed

Uses: The fruit yields two kinds of oil: palm oil from the fleshy covering and palm kernel oil from the nut. Fruits and seeds yield a valuable vegetable oil, also used for cosmetic and trade purposes. The 'palm kernel oil' is extracted from the seeds, the oil is used in the making of soaps and cosmetics or as a machinery lubricant.

Phoenix sylvestris (L.) Roxb.Fl.Ind.3:787. 1832; Becc. & Hook.f. in Hook.f. Fl. Brit. India 6:425. 1892; Cooke, Fl. Pres. Bombay 3:311. 1958 (Repr.); Lakshmi in Sharma et al. Fl. Maharashtra St. Monocot. 195. 1996. *Elate sylvestris* L. Sp. Pl. 1189. 1753.

Local Name: Khajuri, **English Name:** Wild date palm

Identification Characters: Unarmed tree, leaves simply pinnate, trunk covered with persistent leaf bases.

Description: Evergreen tree (2n = 28, 36). 8-15 m tall trees, trunk straight or crooked. Leaves compound; leaflets linear-lanceolate, conduplicate, coriaceous, glabrous. Flowers sessile, minute, spicate on primary branches of compound spadix. Fruit berry, ellipsoid-oblong, orange-colured.

Phenological Data: Fls: Jan.-Mar, Frs: Apr. - July.

Distribution: Throughout India

Origin\Native: West Asia and North Africa

Ecology: Normal soil, Full sun, tolerant of most soil conditions, but would prefer a quick draining soil, High Drought Tolerance

Category of threat: Common

Special Characteristics: Cluster of foliage at the terminal end of the tree. Blue-green canopy of 100 leaves, 9-12 feet long. Robust trunk, with diamond shaped leaf scars.

Economic Importance: Ornamental

Horticultural Value: The tree is planted as an ornamental tree.

Medicinal Value: The date is good laxative and is also consumed to overcome respiratory disorders.

Method for Propagation: Seeds

Suitable Environmental Conditions: Hot and dry climate

Agricultural Value: Cultivated for fruits

Uses: The fruits are edible. The leaves are used for making fans, basket.

Areca catechu L. Sp.Pl. 1189. 1753; Becc. & Hook.f. in Hook.f. Fl. Brit. India 6:405. 1892; Cooke, Fl. Pres. Bombay 3:319. 1958 (Repr.); Lakshmi in Sharma et al. Fl. Maharashtra St. Monocot. 198. 1996.

Local Name: Sopari, **English Name:** Betel tree, Areca nut

Identification Characters: seeds have alkaloids which when chewed is intoxicating and peculiar taste

Description: Trunk straight, solitary, 12-30 m high, leaves compound, leaflets numerous, spathes double, compressed. Spadix branched, bearing male and female flowers. Male flowers numerous, sessile, female flowers solitary, sessile. Fruits smooth, orange or scarlet, perianth persistent.

Phenological Data: Fls - Frs: Throughout the year

Distribution: thorough out India, Taiwan, Malaysia

Origin\Native: East Indies

Ecology: Normal soil, Full sun, tolerant of most soil conditions, High Drought Tolerance

Category of threat: Common

Special Characteristics: they are hot and acrid when chewed.

Economic Importance: Ornamental

Horticultural Value: The tree is planted as an ornamental tree.

Medicinal Value: it is aromatic and astringent and is said to intoxicate when first taken.

Method for Propagation: Seeds

Suitable Environmental Conditions: Hot and dry climate

Agricultural Value: Cultivated for nut

Uses: The fruits are edible, used as an interior landscaping, the nut is popular for chewing throughout some Asian countries such as Taiwan, Vietnam, Philippines, Malaysia, and India, the seeds are cut into narrow pieces and rolled inside Betel Pepper leaf, rubbed over with lime and chewed by the natives. They stain the lips and teeth red.

Cocos nucifera L. Sp. Pl. 1188. 1753; Becc. & Hook.f. in Hook.f. Fl. Brit. India 6:482. 1892; Cooke, Fl. Pres. Bombay 3:322. 1958 (Repr.); Lakshmi in Sharma et al. Fl. Maharashtra St. Monocot. 189. 1996.

Local Name: Nariel, **English Name:** Coconut palm.

Identification Characters: Unarmed tree, bark through out pale to sandy brown; trunk with annular marks, covered at least in basal parts with fibrous sheaths; leaves simply pinnate,

Description: Evergreen tree (2n = 32). Trees, 8-15 m tall with straight or slightly bent trunk, basal part covered with massive rootlets. Leaves pinnate; leaflets, coriaceous, linear-lanceolate, equidistant. Spadix androgynous, at length drooping. Drupes fibrous, 3-gonous, obovoid or subglobose.

Phenological Data: Fls. and Frs: Throughout the year.

Distribution: Tropical and sub-tropical countries like India and Sri Lanka, Philippines, Indonesia, Vietnam, Mexico, Malaysia

Origin\Native: Cocos Island and North- Andaman.

Ecology: Requires plenty of sunlight, an average temperature between 27-32^{0}C, well distributed rain falls.

Category of threat: Common

Special Characteristics: Scars of fallen dried leaves over the trunk

Economic Importance: Ornamental and fruit tree.

Horticultural Value: Fine decorative garden tree

Medicinal Value: Coconut milk is used as nutritive.

Method for Propagation: Seeds

Suitable Environmental Conditions: Hot and dry to very dry climate

Agricultural Value: Cultivated for its fruit, coconut oil, fibers

Uses: Whole plant is used for food, shelter and clothing. Fibrous husk of fruit is used for ropes. The coconut milk is used as a culture medium. Leaves are used as thatching material for making mats and huts. Fruit is also used for worship. The solid endosperm is edible called as 'Copra'. The coconut oil, extracted from the 'Copra' is used for cooking and in the manufacture of margarine and soaps. The oil is also used in cooking.

Hyphaene dichotoma **(White.) Furtado.** in Gard. Bull. Singpore 25:209.1970. *Borassus dichotoma* White in Grah. Cat. Bombay Pl. 226. 1839. *Hyphaene indica* Becc. in Agri. Colon. 2:173. 1908; Blatt. Palms Brit. India & Ceyl. 157, t 33-34, f 24. 1978. (Repr. ed)

Local Name: Ravan Tad, **English Name:** Indian doum palm.

Identification Characters: unarmed tree, leaves palmate, simple, trunk dichotomously branched

Description: Evergreen tree 8-10 m tall trees, with straight, dark-black, annulated trunk, sometimes trunk covered with persistent leaf bases. Leaves flabellate, multifid, about 1 m broad, long petiolate.

Phenological Data: Fls: Jan.- Mar. Frs: May. - Aug.

Distribution: India (Gujarat; Maharashtra) (Endemic to India), restricted to the coastal areas of Gujarat and Maharashtra between the latitudes of 18° and 23°.

Origin\Native: Diu, Surat and along the Western coast.

Ecology: moist soil

Category of threat: Threatened

Fig. 184 : *Ravenala madagascariensis*

Fig. 185: *Hyphaene dichotoma*

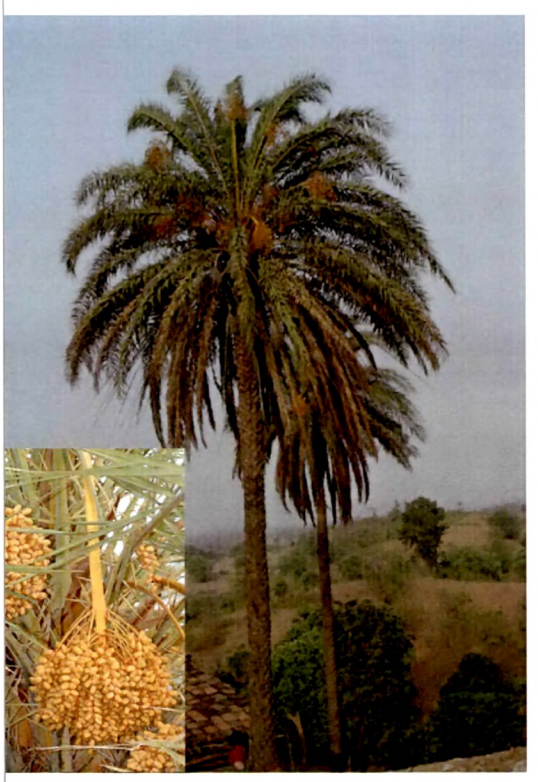


Fig. 186: *Phoenix sylvestris*

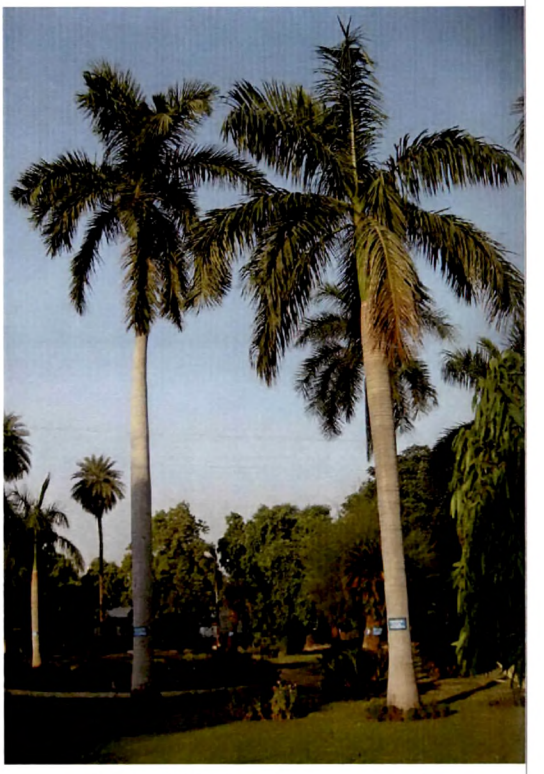


Fig. 187: *Roystonea regia*

Special Characteristics: dichotomously branched trunk

Economic Importance: ornamental

Horticultural Value: planted in gardens, houses, along roadside

Method for Propagation: Seeds

Suitable Environmental Conditions: sub tropical

Agricultural Value: cultivated for onramental purposes

Uses: Leaves are used in making of mats and also used as a fodder. Trunk used as beams, rafters and also used as firewood, fibrous fruit mesocarp & unripe kernel are eaten.

***Livistonia chinensis* R. Br.** Prodr. 268. 1810; Becc. & Hook f in Hook f Fl. Brit. India 6: 434. 1892; Cooke, Fl. Pres. Bombay 3: 320. 1958 (Repr. ed)

Local Name: Chinese palm, **English Name:** Chinese Fan palm

Description: Solitary fan palm, canopy of 30-50 leaves; Leaves Costa palmate, divided to 2/3 into 60-100 deeply split segments that are pendant in their lower half, olive-green in color. Inflorescence 6' long, produced from among the leaves, Fruits Greyish-blue. 1/2 - 1" long

Origin\Native: China and parts of Japan,

Ecology: Tolerant of many soils, High drought tolerance, Frost tolerant till -4°C.

Category of threat: Common

Economic Importance: Ornamental

Horticultural Value: Popular palm in the landscape

Method for Propagation: Seed

Uses: planted in gardens and houses.

Roystonea regia (H.B.&K.) Cook in Bull. Torrey Bot. Cl. 531. 1901; Naik, Fl. Marathwada 2:888. 1998. *Oreodoxa regia* H.B.&K. Nov.Gen. & Sp. 1:305. 1815; Cooke, Fl. Pres. Bombay 3:321. 1958 (Repr.); Blatt. Palms Brit. Ind. Ceyl. 396. t. 73. 1978; Lakshmi in Sharma et al. Fl. Maharashtra St. Monocot. 189. 1996.

Local Name: Bottle palm, **English Name:** Bottle palm.

Identification Characters: Unarmed tree, leaves simply pinnate, trunk smooth, bark grey ash coloured in lower half, green in upper part.

Description: Evergreen tree (2n = 36, 38). 6-8 m tall trees; trunk straight, smooth more or less swollen in middle. Leaves pinnate, in terminal crown; leaflets linear, glabrous. Flowers not seen.

Phenological Data: Fls. and Frs: Not seen.

Distribution: Tropical zones of world.

Origin\Native: Cuba and the West Indies

Ecology: Deep nutrient rich soil

Category of threat: Common

Special Characteristics: Grey trunk with rings

Economic Importance: Ornamental

Horticultural Value: Decorative, planted in avenues

Method for Propagation: Seeds and offsets.

Suitable Environmental Conditions: Tropical

Agricultural Value: Cultivated for ornamental uses

Uses: Leaves are used as thatching material for making mats. Timber is used for building,

***Sabal palmetto* (Watter) Lodd. ex R. & S.** Syst. Veg. 7 (2):1487. 1830; Blatt. Palms Brit. Ind. & Ceyl. 141, t 31. 1978 (Repr. ed) *Corypha palmetto* Walter, Fl. Carol. 119. 1788.

English Name: Cabbage palm

Description: tan-Grey, unbranched trunk, and large crown with fanlike leaves. Leaf bases, also known as boots, tend to slough off the tree as they dry, giving the trunk a smooth appearance. Leaves are palmate with no spines, each with a prominent midrib. Flowers are cream colored and droop in clusters from the crown. Fruits are black and fleshy with a single seed.

Phenological Data: Fls.: Apr – Aug. Frs.: Sep. – Dec.

Distribution: North Carolina, Florida, Cuba and the Bahamas.

Origin\Native: southeastern U.S.

Ecology: Highly tolerant of salt spray and inundation by brackish water, preferred soil type is calcium rich, and neutral to alkaline in nature, prefer poorly drained soils.

Category of threat: Common

Special Characteristics: Grey-brown, tough bark

Economic Importance: Ornamental

Horticultural Value: Ornamental and street tree, specimen or avenue plantings.

Method for Propagation: Seeds

Suitable Environmental Conditions: Humid subtropical to warm temperate climates

Agricultural Value: Cultivated for its tolerance of salt spray and cold

PANDANACEAE

Trees or shrubs with supported aerial stilt roots; leaves simple, leathery, spirally arranged, linear, spiny on margins and midrib, long sheathing at base; inflorescence axillary or terminal spadix spathaceous, leafy bracts, scented; flowers dioecious, unisexual, bracteate, tepals absent, stamens many, filaments free, carpels many, free, ovary superior, placentation basal or parietal.

***Panadanus odoratissimus* L. f.** Suppl. 64. 1781; Lakshmi. in Sharma et al Fl. Maharashtra St. Monocot 206. 1996. *P. tecorius* auct. Plur. Non. Soland ex Parkins., J. Voy. H. M. S. End. 46. 1773; Cooke, Fl. Pers. Bombay 3: 324. 1958 (Repr.) *P. fascicularis* Lam. Encycl. 1: 372, t 1. 1785; Hook f. Fl. Brit. India 6: 485. 1893.

Local Name: Kevdo, **English Name:** Thatch screw pine

Identification Characters: Leaves spiny on margins and mid-rib

Description: Evergreen tree (2n = 54, 60). Large shrubs or small trees, leaves linear, spiny on margins and mid-rib. Flowers dioecious; spadix of male flowers much branched, of numerous, sessile, cylindric spike; spadix of female flowers simple sessile.

Phenological Data: Fls.: Mar. – June, Frs.: May- July

Distribution: Sri Lanka, Myanmar, the Indian Peninsulas, Andaman, Nicobar, Bangladesh

Origin\Native: Burma, Andaman and Coast of Indian peninsula.

Ecology: Fertile well drained loamy soil

Category of threat: Common

Special Characteristics: Leaves are armed with spines on the margins and the midrib.

Economic Importance: Ornamental

Horticultural Value: Grown in parks and gardens for its beautiful foliage and scented flowers.

Medicinal Value: Aromatic oil (*kevda* oil) and fragrant distillation are stimulant and antispasmodic and are used in headache and rheumatism. Leaves used in leprosy, smallpox, leucoderma, syphilis and scabies.

Method for Propagation: Cuttings, Seeds, Suckers

Suitable Environmental Conditions: Moist and hot climate

Agricultural Value: Cultivated for flowers and essential oil

Uses: Oil is used in the perfumes industry. It is also used as flavoring agents. It is used as worship plant. Leaves are used in mats, hats and huts. Fruit pulp is edible.

POACEAE

Annual or perennial herbs or trees, stem erect or creeping, cylindric, jointed solid or hollow; leaves simple, alternate, entire, sheathed, ligulate, distichous, exstipulate; inflorescence paniculate, spikelets or spadix or spikes; flowers bisexual or unisexual, monoecious, small, bracts sepaloid, perianth reduced to scales or absent, stamens 3 or 6, anthers versatile, free, carpel 1, ovary superior, styles usually 2, rarely 1 or 3, basal placenta; fruit caryopsis.

1. large trees with large culm-sheathes, leaves with transverse veins, articulate on sheaths

    2. spikeletes in globose heads, pericarp fleshy or crustaceous ..... *Dendrocalamus*

    2. spikeletes in panicles, pericarp thin adnate to seed ..... *Bambusa*

BAMBUSA Schreb. (nom. Cons.)

Bambusa arundinacea (Retz.) Willd. Sp. Pl. 2:245. 1799; Sp. Pl. 2:245. 1799; Hook. f. Fl. Brit. Ind. 7:395. 1896; Blatt. & McC., Bombay Grass. 283. 1935; Cooke, Fl. Pres. Bombay 3:569. 1958 (Repr.); Lakshmi in Sharma et al. Fl. Maharashtra St. Monocot. 412. 1996. *Bambosa arundinacea* Retz. Obs. Bot. 5:24. 1788.

Fig. 188: *Casuarina equisetifolia*

Fig. 189: *Pandanus odoratissimus*

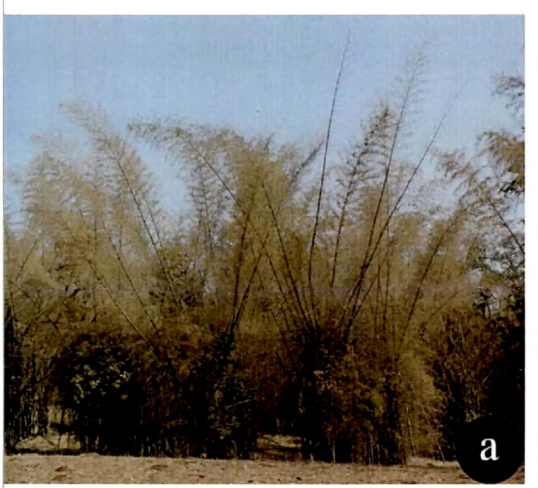


Fig. 190: *Bambusa arundinacea* a. Habit, b. Inflorescence

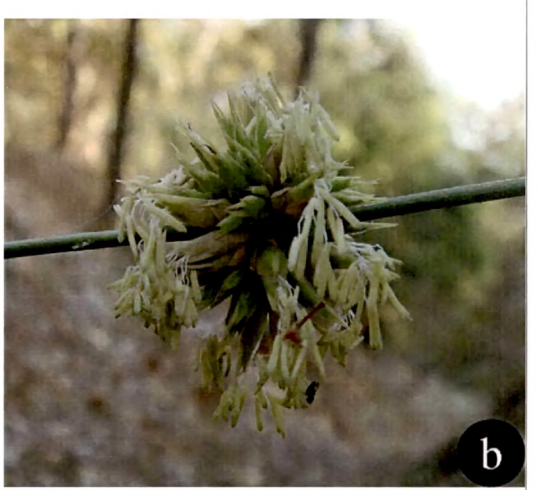


Fig. 191: *Dendrocalamus strictus* a. Leaves and inflorescence , b. Flowers

Local Name: Kanti vans, **English Name:** Bamboo

Identification Characters: Thorny, hollow stem.

Description: thorny tufted trees, 15-20 m tall, culm stout, 15-18 cm across, leaves 18-20 x 2-2.5 cm , linear to linear lanceolate, glabrous or pubescent beneath, scabrous on one or both margins, ciliate or round base, panicles sample, spikelets 1.3-2.5 x 0.4-0.5 cm glabrous, suberect, lanceolate in loose clusters

Phenological Data: flowering and fruiting once in lifetime

Distribution: Wild in most parts of tropical India and Pakistan, growing up to 1000 m altitudes in the Nilgiris and hills of southern India; north into China.

Origin\Native: S.E.Asia

Ecology: Rich to medium fertile soils, need good water supply, can tolerate temperature between 18 to 29°C.

Category of threat: Common

Horticultural Value: planted in fence

Medicinal Value: aphrodisiac, tonic is used in asthma, cough and debilitating diseases, the leaves are sweet, astringent, cooling, ophthalmic, vulnerary, constipating and febrifuge.

Method for Propagation: seeds, vegetative portions or by layering the stems and letting them root at the nodes.

Suitable Environmental Conditions: Subtropical to Tropical Very Dry to Wet

Agricultural Value: cultivated for timber and paper pulp

Uses: food for man and fodder for livestock, for building materials, for weaving and cordage, for paper pulp and for making all types of utensils. Bamboos are very important in the economy of Oriental peoples; millions are occupied in growing and producing raw bamboo, and manufacturing of bamboo products. Very young shoots are consumed as food in some parts of India and China.

Localities in Gujarat: In moist deciduous forests of Dangs (See also Blatter & McCann (1935) for locality in Gujarat).

Dendrocalamus strictus (Roxb.) Nees in Linnaea 9:476. 1834; Hook.f.Fl.Brit.Ind. 7:404. 1896; Blatt. & McC., Bombay Grass. 285. 1935; Cooke, Fl. Pres. Bombay 3:572. 1958 (Repr.); Lakshmi in Sharma et al. Fl. Maharashtra St. Monocot. 449. 1996. *Bombosa stricta* Roxb. Pl. Corom. 1:58,t.80.1795.

Local Name: Kanti vans, **English Name:** Bamboo

Identification Characters: Thorny, hollow stem.

Description: thorny tufted trees, 15-20 m tall, culm stout, 15-18 cm across, leaves 18-20 x 2-2.5 cm , linear to linear lanceolate, glabrous or pubescent beneath, scabrous on one or both margins, ciliate or round base, panicles sample, spikelets 1.3-2.5 x 0.4-0.5 cm glabrous, suberect, lanceolate in loose clusters

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Localities in Gujarat: In moist deciduous forests of Dangs

Origin\Native: S.E.Asia

Ecology: Rich to medium fertile soils, need good water supply, can tolerate temperature between 18 to 29°C.

Category of threat: Common
Horticultural Value: planed in fence
Medicinal Value: aphrodisiac, cooling, and tonic, is used in asthma, cough and debilitating diseases, the leaves are sweet, astringent, cooling, ophthalmic, vulnerary, constipating and febrifuge.
Method for Propagation: seeds, vegetative portions or by layering the stems and letting them root at the nodes.
Suitable Environmental Conditions: Subtropical to Tropical Very Dry to Wet
Agricultural Value: cultivated for timber and paper pulp
Uses: food for man and fodder for livestock, for building materials, for weaving and cordage, for paper pulp and for making all types of utensils. Bamboos are very important in the economy of Oriental peoples; millions are occupied in growing and producing raw bamboo, and manufacturing of bamboo products. Very young shoots are consumed as food in some parts of India and China.

GYMNOSPERMAE

The only living gymnosperms are from the order Cycadales, Coniferales, Ginkgoales and Gnetales. The plant body is clearly differentiated into root, stem and leaves, flower is absent, the ovule are naked,

CYCADACEAE

Cycads may be branched or unbranched, stem is stout palm like, with a crown of pinnate leaves arranged spirally round on apex, dioecious, flower is called cone consist of megasporophyll and microsporophyll, female flower is not prominent.

***Cycas circinalis* L.**

Local Name: Cycas, **English Name:** Queen sago
Identification Characters: Featherlike leaves arranged in a rosette that crowns a single trunk.
Description: A medium sized tree; suckering cycad; 5m tall; stout stunted trunk ending in a crown of crowded fan like leaves; leaves compound, pinnate, bright green, glossy, curved back wards, prominent midrib, petioles spinous.
Distribution: Endemic to India Widely spread throughout Asia, from India to the South Pacific Islands, along the seashore, in open grasslands, to dense forests.
Origin\Native: Equatorial Africa, Old World Tropics.
Ecology: Tolerant of most soils, but prefers loose sandy soils with some organic matter and light bark or leaf mulch, can take full sun and moderate shade, needs adequate moisture, well drained soil or roots will rot, warm, sunny position with plenty of water in summer, and a dry winter.
Category of threat: Near threatened
Special Characteristics: Featherlike leaves arranged in a rosette that crowns a single trunk.
Economic Importance: Ornamental

Fig. 192: *Cycas circinalis* a. Habit, b. Female cones

Fig. 193: *Cycas revoluta* a. Habit, b. Male cone

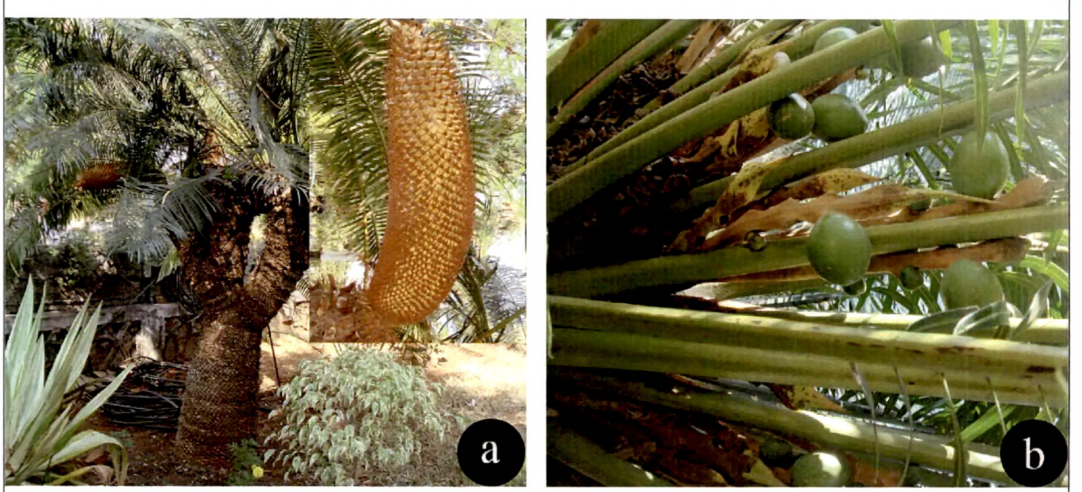


Fig. 194 : *Cycas rumphii* a. Habit, male cone, b. Female cone

Horticultural Value: Planted in gardens, as a landscape plant and bonsai

Method for Propagation: Basal offsets, seeds

Suitable Environmental Conditions: Tropics to any environment.

Agricultural Value: Cultivated as a landscape and bonsai plant

Uses: As a decorative in pots, seeds are edible

Cycas revoluta Thumb.

Local Name: Cycas, English Name: Sago palm

Description: Small tree, upto 5 m tall, highly scarred trunk, thick brown, with scars from the remnants of leaves that fall of called persistent leaf bases, leaves forms a crown on top, leaves made up of many thin linear segments with pointed ends, male and female reproductive units are separate. The female inflorescence is feather like, later forming a tightly packed seed head, closely covered by whitish miniature leaves. The male cone is pineapple shaped. Seeds are brownish-red, the shape of a flattened marble, about 30 mm (1.25 ins) across.

Phenological Data: Male and Female cone: Jan.- June

Distribution: Throughout India, warm temperate and subtropical regions

Origin\Native: Southern Japan

Ecology: Full sun or bright interior light, adapts to a wide range of temperatures from -11 to 42 ^{0}C, soil should be well drained and rich in humus.

Category of threat: Near threatened

Special Characteristics: Extremely long lived

Economic Importance: Ornamental

Horticultural Value: Planted in gardens, as a landscape plant and bonsai

Medicinal Value:

Method for Propagation: Basal offsets, seeds

Suitable Environmental Conditions: Temperate to tropical

Agricultural Value: Cultivated as a landscape and bonsai plant

Uses: Leaves used in decorations, seeds are edible, used as both indoor and outdoor plant

Cycas rumphii Miq.

Local Name: Cycas, **English Name:** Queen sago, Bread palm

Description: Tree, 10-15 m tall. Leaves compound, bright green, highly glossy, petiole glabrous, spiny; rachis consistently terminated by paired leaflets, leaflets 150-200, decurrent, narrowed, margins slightly recurved; apex acute, midrib flat above, raised below. Cataphylls narrowly triangular, soft, pilose. Pollen cones fusiform, yellow to brown. Microsporophyll lamina firm, dorsiventrally thickened, apical spine rudimentary, sharply upturned. Megasporophylls 18-32 cm long, whitish yellow, tomentose; ovules 6, glabrous; lamina lanceolate, obscurely dentate, with 12 soft lateral spines, apical spine distinct from lateral spines, Seeds flattened-ovoid, sarcotesta orange-brown.

Phenological Data: Male and Female cone: July. – Aug.

Distribution: S. Borneo, E. Indonesia, NE Java, Moluccan Islands, New Guinea, Sulawesi

Origin\Native: Eastern Asia and Pacific islands.

Ecology: Full sun or bright interior light, well drained soil.

Category of threat: Near threatened
Special Characteristics: Extremely long lived
Economic Importance: Ornamental
Horticultural Value: Planted in gardens, as a landscape plant and bonsai
Method for Propagation: Basal offsets, seeds
Suitable Environmental Conditions: Temperate to tropical
Agricultural Value: Cultivated as a landscape and bonsai plant
Uses: leaves used in decorations, used as both indoor and outdoor plant

CUPRESSACEAE

Trees or shrubs, generally resinous and aromatic, monoecious (usually dioecious in *Juniperus*). Bark fibrous and furrowed (smooth or exfoliating in plates in some *Cupressus* and *Juniperus* species). Lateral branches well developed, similar to leading shoots, twigs terete, angled, or flattened dorsiventrally, densely clothed by scale like leaves or by decurrent leaf bases; Leaves simple, usually persisting 3-5(-12) years and shed with lateral shoots (cladoptosic), alternate and spirally arranged but sometimes twisted so as to appear 2-ranked, or opposite in 4 ranks, or whorled, deltate-scalelike to linear, decurrent, sessile or petiolate; adult leaves appressed or spreading, often differing between lateral and leading shoots (twigs heterophyllous), pollen spheric, not winged. Seed cones maturing in 1-2 seasons, shed with short shoots or persisting indefinitely on long-lived axes compound, solitary, terminal; scales overlapping or abutting, fused to subtending bracts with only bract apex sometimes free; each scale-bract complex peltate, oblong or cuneate, at maturity woody or fleshy, with 1-20 erect, adaxial ovules. Seeds 1-20 per scale, not winged or with 2-3 symmetric or asymmetric wings; aril lacking; cotyledons 2-5.

Biota orientalis (L.) Endl.

Local Name: Mayurpankhi
Description: tree if 10-15 m. tall, trunk is slender and the main branches begin very low off the ground, remaining erect right from the start. Leaves are dark green and seed like small needles, cones are fleshy and ovoid with down curving hooks.
Distribution: East Asia, West China, North Korea, North East Iran.
Ecology: The plant prefers light (sandy), medium (loamy) and heavy (clay) well-drained soil, prefers acid, neutral and basic (alkaline) soils and can grow in very alkaline soil; semi-shade or no shade, requires dry or moist soil and can tolerate drought, atmospheric pollution.

Economic Importance: Ornamental

Horticultural Value: Planted in gardens

Medicinal Value: commonly used in Chinese herbalism, leaves are antibacterial, antipyretic, astringent, diuretic, emollient, expectorant, febrifuge, haemostatic, stems are used in the treatment of coughs, colds, dysentery, rheumatism and parasitic skin diseases

Uses: Seed - after removing the bitterness a source of essential oils and the seeds yield fatty oil. The wood is used for furniture, construction work and fence poles.

***Juniperus chinensis* L.**

Local Name: Juniper, English Name: Chinese Juniper

Description: 2n = 22, 33, 44 The typical form is a tree, 50-70 ft (15.2-21.3 m) tall, with an upright conical form The leaves are of two forms, juvenile needle-like leaves 5-10 mm long, and adult scale-leaves 1.5-3 mm long. Adult leaves are diamond shaped and arranged in four ranks overlapping flat on the twigs like fish scales It is largely dioecious with separate male and female plants, but some individual plants produce both sexes. Flowers are solitary, terminal on previous year's scale leaved shoots, appearing in February to April. The cones are berry-like, 7-12 mm in diameter, blue-black with a whitish waxy bloom, and contain 2-4 seeds.

Phenological Data: Female cone: Feb. – Apr.

Origin\Native: northeast Asia, in China, Mongolia, Japan, Korea and the southeast of Russia.

Ecology: acidic or alkaline soils, dry soils Full sun is best

Category of threat: Common

Economic Importance: Ornamental

Horticultural Value: for most every landscape use from tall lawn specimens to groundcovers to bonsai subjects, used in unclipped hedges and as anchors for foundation plantings

Method for Propagation: Cuttings

ZAMIACEAE

Plants perennial, evergreen, dioecious. Stems subterranean with exposed apex or aboveground, fleshy, stout, cylindric, simple or irregularly branched. Roots with small secondary roots; coral-like roots developing at base of stem at or below soil surface. Leaves pinnately compound, spirally clustered at stem apex, leathery; leaflets entire, dentate or spinose, venation dichotomous or netted; resin canals absent. Cones axillary, appearing terminal, short-peduncled or sessile, disintegrating at maturity; sporophylls densely crowded, spirally arranged. Pollen cones soon shed, generally smaller and more numerous than seed cones; sporophylls bearing many crowded, small microsporangia (pollen sacs) adaxially; pollen spheric. Seed cones persisting a year or more, 1(2) per plant, nearly globose to ovoid, tapering sharply or blunt at apex; sporophylls peltate, thickened and laterally expanded distally, bearing 2(3)

Fig. 195: *Biota orientalis*

Fig. 196: *Cupressus sempervirens*

Fig. 197: *Zamia furfuracea* a. Habit, b. Cone

Fig. 198: *Araucaria columnaris*

Fig. 199: *Pinus roxburghii*

ovules. Seeds angular, inner coat hardened, outer coat fleshy, often brightly colored; cotyledons 2.

Zamia furfuracea

English Name: Cardboard palm

Description: Tender Perennials 36-48 in. leaves 3-4 ft long, emerge from a central point forming a rosette, thick, leathery, compound, pinnate, wide oval leaflets, feel a little like cardboard when rubbed. The foliage emerges from a thick fleshy trunk that serves as a water reservoir in times of drought. Male and female reproductive structures (cones) form on separate plants. When ripe, the female cone breaks to reveal an array of tightly packed, bright red 1 in seeds.

Phenological Data: Fls. – Frs. : Oct. – Jan.

Distribution: Southeastern Veracruz, Mexico

Origin\Native: Mexico

Ecology: Neutral well drained sandy soil, bright sun to partial shade, drought tolerant.

Category of threat: Vulnerable

Economic Importance: Foliage

Horticultural Value: Common landscape plant, houseplant.

Threat: Also known as the Cardboard Sago Palm, Jamaica Sagotree and Cardboard Plant. Synonyms include *Palmifolium furfuraceum*, Kuntze. The plant's binomial name comes from the Latin *zamia*, for "pine nut", and *furfuracea*, meaning "mealy" or "scurfy".

Method for Propagation: Seeds

Suitable Environmental Conditions: Tropical and sub-tropical

Agricultural Value: Cultivated for landscape purposes

Uses: The partially exposed tuberous stem and the airy crown of leaves create a striking bonsai specimen

PODOCARPACEAE

Evergreen shrubs or trees, usually with straight trunk and more or less horizontal branches. Leaves usually spirally arranged, sometimes opposite, scale-like, needle-like, or more apart, flat and leaf-like, linear to lanceolate. Monoecious or dioecious. Pollen cones usually catkin-like; stamens numerous, close together, imbricate, each with 2 sporangia; pollen grains usually winged. Female cones maturing in one year, much reduced to a few fleshy bracts or scales, pendant, usually borne on a thin peduncle, containing a single inverted ovule. Seeds completely covered by a fleshy structure referred to as an epimatium, wingless. Epimatium and integument sometimes connate and forming a leathery testa. Cotyledons 2, with 2 parallel vascular bundles

***Podocarpus gracilior* Pilger**

English Name: Fern pine

Description: An evergreen coniferous medium-sized tree, 20-40 m tall, straight trunk; bark scaly, Grey-brown. Leaf simple, alternate, spirally arranged, lanceolate, entire margins, sharp tips, linear. Flowers

dioecious; males flowers pale yellow, erect, slender cones 1 inch long; females are very inconspicuous, occur solitary from leaf axils. Fruit drupe, round, succulent, bluish -purple, seed cones are highly modified, with a single 2 cm diameter seed with a thin fleshy coating borne on a short peduncle. The mature seed is purple. The pollen cones are solitary or in clusters of two or three on a short stem.

Distribution: Ethiopia, Kenya, Tanzania, Uganda

Origin\Native: East Africa

Ecology: Full sun, partial shade, soils any, low water needs.

Special Characteristics: Evergreen, conifer tree, Moderate to fast growth rate, 60' in height, equal spread. Round to oval, slightly dropping in shape.

Horticultural Value: Grown as a tree, hedge, screen, or espalier in subtropical regions.

Method for Propagation: Seed or cuttings.

Uses: Accent, barrier, border, espalier, fences/walls, patio tree, right of way, screen, shade, specimen, and windbreak. used for building construction, paneling, flooring and furniture.

AURAUCARIACEAE

Evergreen trees with spirally arranged, narrow or broad leaves often with parallel veins. Dioecious or monoecious. Male cones relatively large, cylindrical, with numerous sporophylls and with ±12 inverted pollen sacs; pollen grains wingless. Female cone usually borne erect, subglobose to ovoid, maturing in two years, relatively large and milky, falling upon maturity; scales one-seeded, without distinct bracts. Cotyledons 4, often fused into 2 double cotyledons.

Araucaria heterophyllus (Mol.) Koch

Local Name: Monkey puzzle tree, **English Name:** Monkey puzzle tree, Chilean Pine

Description: Large, bizarre-looking evergreen, 60-70ft. tall and forms a loose, symmetrical, see-through crown, pyramidal, with a rounded or flattish top. Leaves scale-like, dark green, stiff, sharp-pointed and densely arranged on upwardly-sweeping branches, tree dioecious, cannot tell the sex of the tree until flowering. Female cones take 2 - 3 years to mature and contain up to 200 large seeds. This species is estimated to be around 60 million years old, based upon fossil record known today.

Distribution: Australia, Europe

Origin\Native: Chile & Argentina

Ecology: well-drained, volcanic soil

Category of threat: Common

Special Characteristics: eye-catching symmetry and lovely fine textured foliage

Economic Importance: Ornamental

Horticultural Value: planted in gardens

Method for Propagation: Seeds, cuttings

Suitable Environmental Conditions: Full sun, suitable to good moisture with good drainage

Agricultural Value: Cultivate for horticultural value

Uses: used as timber, Seeds are edible, used in urban landscapes

PINACEAE

Trees, occasionally shrubs, evergreen, resinous and aromatic, monoecious; bark smooth to scaly or furrowed. Terminal branches distinct from lateral branches in having radial symmetry. Leaves simple, alternate and spirally arranged but sometimes twisted at the base so as to appear 1- or 2-ranked, or fascicled, linear to needlelike, sessile to short-petiolate; foliage leaves either borne singly (spirally) on long shoots or in tufts (fascicles) on short shoots; juvenile leaves (when present) borne on long shoots; resin canals present. Cotyledons 2-15 (-24). Seed cones maturing in 1 season (2-3 seasons in *Pinus*) and shed soon after, or long-persistent, sometimes serotinous Cone scales overlapping, free from subtending included or exerted bracts for most of length, spirally arranged, strongly flattened, at maturity relatively thin to strongly thickened and woody (in *Pinus*), with 2 inverted, adaxial ovules. Seeds two per scale, elongate terminal wing partially decurrent on seed body (wing short or rudimentary in some species of *Pinus*); aril lacking.

***Pinus longifolia* Roxb.**

Local Name: Chir, **English Name:** Pine tree

Identification Characters: The bark is red-brown, thick and deeply fissured at the base of the trunk, thinner and flaky in the upper crown. The leaves are needle-like, in fascicles of three

Description: An evergreen, 55 m tall tree with rough corky Bark dark red-brown, thick, deeply and longitudinally fissured, branches whorled up on trunk, needles light green in clusters of three, flowers are monoecious male cone cylindrical, 2 cm long, female cone larger, or short stiff stalks in clusters of 2 to 5.

Phenological Data: Fls.: Sep. – Oct. Frs. Oct. – Nov.

Distribution: East Asia , northern Pakistan, India and Nepal. Throughout the Himalayas.

Origin\Native: Himalaya

Ecology: The plant prefers light (sandy) and medium (loamy) soils, requires well-drained soil and can grow in nutritionally poor soil. The plant prefers acid, neutral and basic (alkaline) soils and can grow in very alkaline soil. It cannot grow in the shade. It requires dry or moist soil and can tolerate drought.

Category of threat: Common

Special Characteristics: Needle like leaves

Economic Importance: Ornamental tree,

Horticultural Value: Planted in parks and gardens in hot dry areas

Medicinal Value: The turpentine obtained from the resin of all pine trees is antiseptic, diuretic, rubefacient and vermifuge

Method for Propagation: Seeds

Suitable Environmental Conditions: Moist temperate climate

Agricultural Value: Widely planted for timber

Uses: The wood is used as timber, for house building, furniture, match boxes, resin form sap wood is used in the manufacture of bangles, seeds are edible

Survey:

A survey was carried out for accession the interest of lay man in database of trees of Gujarat state. The other objective to do survey before preparation of such software was to assess the awareness of general people and level of interest of experts in such exercise. A semi structured questionnaire was prepared (Appendix- 2, 3) and questions were asked to students, general people, business personnel, teachers, government officers etc. The personal details of respondants including gender, age, education, profession, residential details was collected in first segment. Second segment included general questions regarding tree, uses of tree, whether they can name any tree in their surroundings, importance of tree, biodiversity, method of cultivation of trees. In last section the questions were asked about the methods and sources they use to collect the information on trees of their interest. The questionnaire was distributed through personal meetings. About 200 people were contacted for the survey - I and around 180 people had responded positively. Out of 200 people selected for survey, 100 were of age 15 -25 years, 50 were 26-40 years and 50 were 41-60 years. Among the respondents 88 were female and 92 were female. Mostly students and elders i.e. respondents of age above 50 were very enthusiastic about such exercise and shown interest in such a database which could provide all the information regarding trees of Gujarat.

After completion of the CD-ROM the second survey was conducted to find out the efficacy of the prepared database. For survey – II, 40 people were selected from different fields i.e. academic, business, home maker and service or job. The age of the respondants was between 15 – 60 years of which 20 were male and 20 were female. As per survey – II, the percentage of useage of internet as the datasource has been increased. How ever, most of the users are from academic and industrial background and during the survey the respondants have told that the data source on the internet is getting improved. The developed software is accepatable to the each of the respondants.

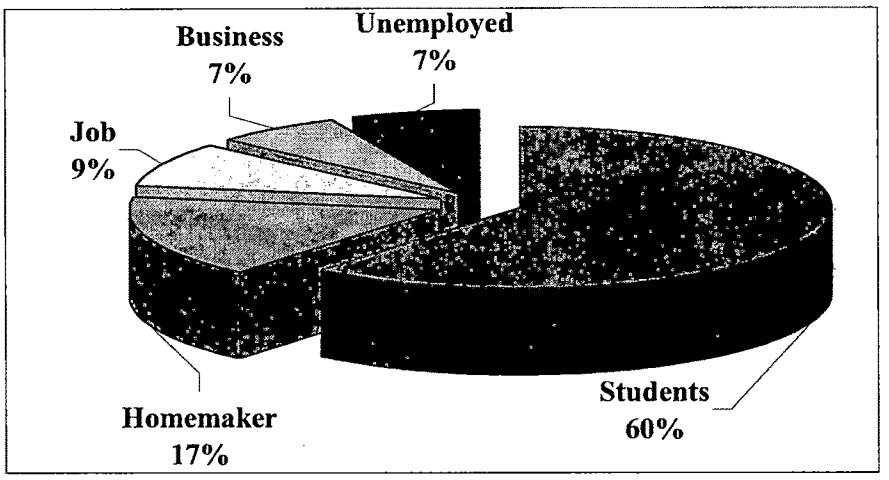


Fig - a : Profession of the respondants

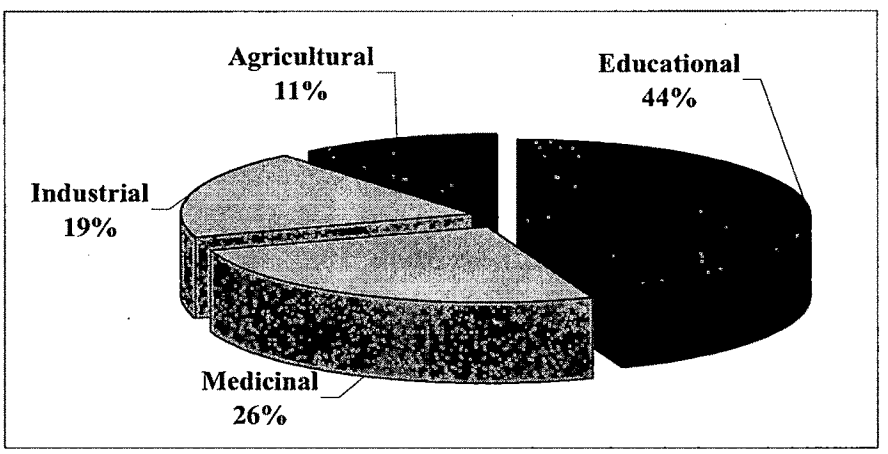


Fig - b : Percentage showing interest of people in the internet data source within different fields

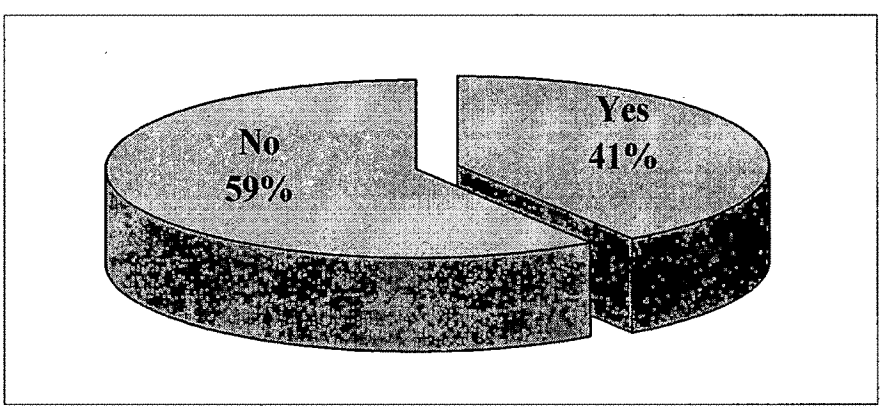


Fig - c : Response to whether the information on internet is reliable as much as in books

Survey - I

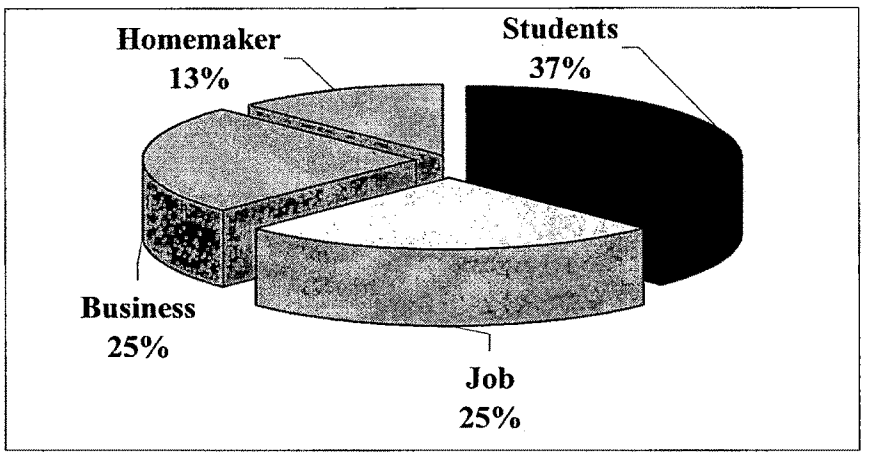


Fig - d: Profession of the respondants

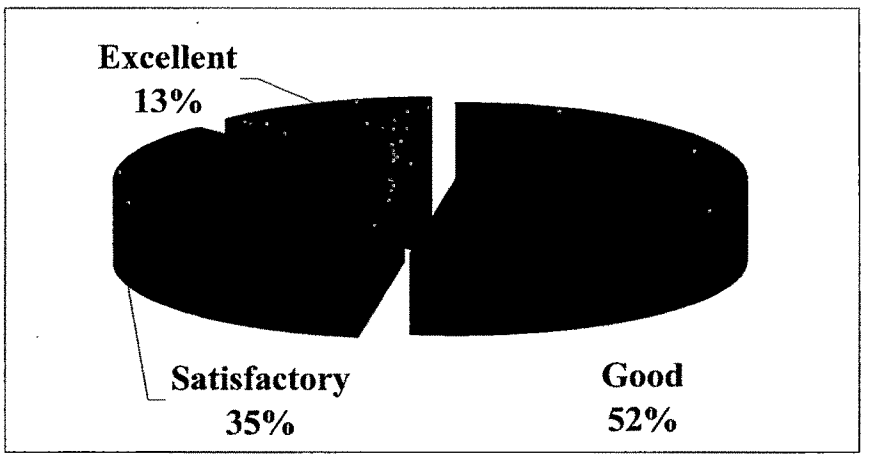


Fig - e : Response to efficaty of the prepared software as an information source

Survey - II

DISCUSSION:

Gujarat is in western region of India which is more or less elevated, higher up as compared to the flat Indo-gangatic plains. Small hill ranges constitute a part of the state which is the Aravallis in the West, the Satpuras in the South-west, the Vindhyas to the north and the Chotta Nagpur plateau in the east. The main species of the state are *Tectona grandis, Madhuca indica, Terminalia arjuna, Terminalia bellirica, Lagerstroemia indica, Adina cordifolia, Dalbergia latifolia, Firmiana colorata, Bombax ceiba, Butea monosperma, Morinda tinctoria, Anogeissus latifolia, Boswellia serreta, Diospyros melanoxylon and Dendrocalamus strictus*. Other species which are dominant in the driest area are *Acacia nilotica, Prosopis juliflora, Prosopis cineraria, Balanites aegyptiaca etc*, Mangrove like *Rhizophora mucronata* and *Brugeria gymnorrhiza* found in the deltaic regions of the state.

The public park in the state like Sayaji Baug in Vadodara and Indroda Park in Gandhinagar are very rich in tree diversity. Indroda Park has more than 180 tree species. Universities, colleges and other institutions have large number of trees. Some trees on private / public land locations seem to date back to several decades and in part define the long term association with the society. These trees have significant specification due to their characteristics/size/age etc. Such trees can be defined as VITs (Very Important Trees) as they have special / exceptional value to the community due to their enormous size / special characteristics or long term association of the species. The city must retain VITs (except when removal is mandatory for public health / safety or welfare) as they are the assets of our city. VITs with their enormous size in Vadodara have been identified as *Ficus benghalensis*, *Azadirachta indica* at D. N. Hall ground, the Maharaja Sayajirao University and at Lalbaug respectively, *Tamarindus indica* and *Mimusops elengi* in Faculty of Arts with the maximum girth among all tree species. Such huge canopy of trees speaks about the royal era of the University in the last century. Trees like *Adansonia digitata* at Ellora park; *Cassia fistula, Manilkara hexandra* and *Kigelia pinnata* at Kareli baug;

have been marked as VITs. The counting of tree of Vadodara city has been done earlier (Oza et al; 2005). The results showed that total 179 tree species were recorded belonging to 56 families. The major families are Ceasalpiniaceae, Mimosaceae, Bignoniaceae, Moraceae, Arecaceae.

Total 96,475 numbers of trees were noted form Angiosperms and 1,865 from Gymnosperm group. The trees like *Choclospermum religiosum, Sterculia urens, Strychnos nux-vomica* are found in the Botanical Garden and the Arboretum of the Maharaja Sayajirao University of Baroda and trees like *Adansonia digitata, Diospyros embryopteris, Xerompis uliginosa* found in the city area. In Sayajibaug (well known as Kamatibaug), spread in an area of 113 acres, on river Vishvamitri, total 98 tree species were listed under the project-Tree Diversity of Sayaji Park, Vadodara (Thaker et al. 1999). Similarly, Prof. Subnis (1967) has also reported 147 tree species from Baroda and its environs. Similar kind of work has been done for Delhi and Goa. In the book Trees of Delhi, the compilation covers the description and photographs of different feature of tree like habit, flowers, and fruits which can be a handy guide for trees of the city.

In the present study, the data on tree species in the Gujarat state was prepared from surveyed literature. The compilation covered families of trees, genus and species. According to present study total 383 tree species were recorded in Gujarat belonging to 225 genera and 74 families (Table - 16).

Table -16: Total number of tree species in Gujarat

Taxonomic group	Number of Family	Number of Genera	Number of Species
Dicotyledons	**63**	**200**	**349**
Polypetalae	40	118	219
Gamopetalae	12	54	81
Monochlamydae	11	28	49
Monocotyledons	**5**	**17**	**20**
Gymnospermae	**6**	**8**	**14**
Total	**74**	**225**	**383**

The tree census (2004-05) was conducted by the Gujarat State Forest Department in the non-forest area in the Gujarat state in the 24 districts out of total 25 districts, excluding Dangs. The total population of 24 districts was 504.69 lac. The total geographical non-forest area of 24 districts is 1,94,26,000 ha. The total area of non-forest region of the 24 districts is 1,76,21,329 ha. The total number of trees in the selected villages of 24 districts was 117.39 lac. Accordingly, the approximate number of trees in the non-forest region of the state is 2510.33 lac. The number of trees per hectare is 14. With in the non-forest area, the maximum number of trees per hectare is in Anand district i.e. 65 trees per hectare. And the lowest number is in Surendranagar district with 3 trees per hectare. The number of trees per head in the state seems to be only 5. *Azadirachta indica* is present in all the 24 districts. The major trees found in the state are *Azadirachta indica, Acacia nilotica ssp. indica, Citrus limon, Prosopis juliflora, Prosopis cineraria* etc. (Anonymous, 2000).

The tree enumeration by the State Forest Department has revealed that in past years *Tectona grandis* was the dominant species in Gujarat which has maintained its 1st rank in present times as well, followed by *Terminalia elliptica, Butea monosperma, Anogeissus latifolia, Lagerstroemia parviflora, Diospyros melanoxylon, Acacia catechu, Dalbergia latifolia, Lannea coromandelica* and *Madhuca indica*. This enumeration data in 2005 shows the dominance of tree species in the following order: *Tectona grandis, Lagerstroemia parviflora, Butea monosperma, Diospyros melanoxylon, Wrightia tinctoria, Anogeissus latifolia, Morinda pubescens, Terminalia elliptica* and *Miliusa tomentosa*. This indicates that previously dominated species *Terminalia elliptica* has fallen down to 8th position while *Lagerstroemia parviflora* has taken the 2nd place after *Tectona grandis*. How ever, *Butea monosperma, Diospyros melanoxylon* and *Anogeissus latifolia* are still in higher position. The trees of *Diospyros melanoxylon* are there in forests but they are not in good condition, the reason may be its value as non-wood forest produce. Its leaves are constantly harvested to make 'Bidi'. Another

dominant species is *Madhuca indica* especially in Chhotaudepur division of Vadodara District. The tribals of these forests are dependent on *Madhuca indica* income for more than 50% of their annual income. They have divided the *Madhuca indica* tree for generations and the owners take care of their trees and pass on to their children. Hence in these forests the *Madhuca indica* trees are in good stage. But the young trees of *Madhuca indica* are comparatively very less in these forests. Thus utility based *Madhuca indica* plantation ned to be promoted in these forests instead of other trees.

The species composition of Gujarat state has altered over the years. The major species like *Terminalia elliptica, Lannea coromandelica, Schleichera oleosa* has been replaced by small species like *Lagerstroemia parviflora, Acacia nilotica ssp indica, Acacia catechu, Acacia leucophloea.* This could lead the major change in the tree composition of Gujarat in future years. The reason may due to the change in rain fall pattern, soil moisture conservation, rise of demand in timber, grazing and other disturbances. At present it seems like the thorny species has taken over most of the part the state. In the non forest areas trees like *Polyalthia longifolia, Mangifera indica, Acacia nilotica ssp indica, Bauhinia variegata, Butea monosperma, Prosopis juliflora, Areca catechu, Pongamia pinnata, Cocos nucifera, Eucalyptus globulus, Ficus* spp, *Peltophorum, Cassia spp., Delonix regia* and various Palm species are dominant (Tyagi et al, 2007).

Comparative account of floral diversity of Gujarat

The state of Gujarat is situated on the west coast of India. Its boundaries are defined by Arabian Sea on the west, the State of Rajasthan the north-east, Madhya Pradesh on the east and Maharashtra on the south-east and south. On the north-western fringes it shares the international border with Pakistan. As these states share their political boundaries, their soil type, minerals, water bodies, weather etc would be almost same for all the three states. The general pattern of the plant species could also be the same in the states of Gujarat,

Maharashtra, Madhya Pradesh and Rajasthan. Therefore in the present study the tree species found in these states were compared. The tree species of Gujarat state was compared with the total number of tree species recorded in the published reports of Maharashtra, Madhya Pradesh, Rajasthan, Saurashtra and Gujarat Ecological Commission - 1996 (Table -17).

Madhya Pradesh is the heart land of India. It harbors approximately 2,400 species of height plants within an area of 4,63,452 sq km (Verma *et al,* 1993). Gujarat is on the south-west side of Madhya Pradesh. Santapau (1962) prepared a detailed study on Flora of Saurashtra Part-1 and published by Saurashtra Research Society, Rajkot. Bole and Pathak (1988) continued the studies on Flora of Saurashtra and the results of these studies were published as Part 2 and 3. Of course, Saurashtra is now a part of Gujarat state. The sea coast of the region is semi arid with heavy to low degree salinity in the soil; the western regions come under arid type, whereas the northern and eastern regions come under deciduous forest and grasslands.

Rajasthan is one of the large states of India, located on western border of the country. It occupies an area of about 3,42,274 sq km which is nearly 11 % of the total area of India. It is situated in the north-western part of India between 23^0 3' and 30^0 12' N latitude and 69^0 30' and 78^0 17' E longitude. Phytogeographically, the state of Rajasthan forms the eastern extremity of the great arid and semi-arid belt. The great Sahara desert belt passes through the western part of Rajasthan state. The western and north-eastern boundaries are marked by Pakistan. In the north and north-east, it is bounded by Punjab, Haryana and Uttar Pradesh, in the east and south-east by Madhya Pradesh and in the south-east by Gujarat state of India. The flora of Rajasthan was prepared in two volumes Shetty and Singh (1987) and published by Botanical Survey of India, Kolkatta. It includes enumeration of species of about 70 families from Rananculaceae to Asteraceae.

Maharashtra encompasses an area of 308,000 sq km and is the third largest state in India after Rajasthan and Madhya Pradesh. Maharashtra is bordered by the states of Madhya Pradesh to the north, Chhattisgarh to the east, Andhra Pradesh to the southeast, Karnataka to the south, and Goa to the southwest. The state of Gujarat lies to the northwest, with the Union territory of Dadra and Nagar Haveli sandwiched in between. The Arabian Sea makes up Maharashtra's west coast. Flora of Maharashtra state was published in two volumes with 201 angiospermic families (Singh and Karthikeyan, 2000).

Table – 17: Comparison of tree species with reference to the number of families, genera and species documented in respective floras*

Taxonomic group	Maharashtra flora [1]	Madhya Pradesh flora [2]	Rajasthan flora [3]	Gujarat flora [4]	GEC report [5]	Present compilation
	Number of Family					
Dicotyledons	**85**	**60**	**49**	**53**	**53**	**63**
Polypetalae	60	41	32	34	32	40
Gamopetalae	13	10	9	12	15	12
Monochlamydae	12	9	8	7	6	11
Monocotyledons	**4**	**6**	**4**	**4**	**3**	**5**
Gymnospermae	--	--	--	-	**1**	**6**
Total	**89**	**66**	**53**	**57**	**57**	**74**
	Number of Genus					
Dicotyledons	**343**	**200**	**137**	**145**	**127**	**200**
Polypetalae	222	115	85	84	77	118
Gamopetalae	66	52	32	41	40	54
Monochlamydae	55	33	20	20	10	28
Monocotyledons	**28**	**12**	**9**	**11**	**8**	**17**
Gymnospermae	--	--	--	-	**1**	**8**
Total	**371**	**212**	**146**	**156**	**136**	**225**
	Number of Species					
Dicotyledons	**711**	**367**	**267**	**241**	**211**	**349**
Polypetalae	472	196	169	146	139	219
Gamopetalae	119	87	54	61	58	81
Monochlamydae	120	84	44	34	14	49
Monocotyledons	**38**	**13**	**11**	**11**	**8**	**20**
Gymnospermae	--	--	--	-	**2**	**14**
Total	**749**	**380**	**278**	**252**	**221**	**383**

* 1. Singh & Karthikeyan, 2000; 2. Verma *et al*, 1993; 3. Shetty & Singh, 1987; 4. Shah, 1978; 5. Anonymous, 1996.

The enlisted tree family, genus and species were compared with the in flora of Maharashtra, Madhya Pradesh, Rajasthan and Gujarat (Table-5). Total 383 tree species were recorded in Gujarat belonging to 225 genera and 74 families in the present compilation. Earlier, total 252 tree species were recorded in Gujarat flora belonging to 156 genera and 57 families (Shah, 1978). Later on, total 221 tree species were recorded by GEC, belonging to 136 genera and 57 families (Anonymous, 1996). In comparison, total 278 tree species were recorded in flora of Rajasthan belonging to 146 genera and 53 families. In the flora of Madhya Pradesh 380 tree species were recorded in belonging to 212 genera and 66 families. Among the other adjoining state Maharashtra, total 749 tree species were recorded with 371 genera and 89 families. The distribution of tree species recorded in different states in the western India is also given in pie diagram for better understanding (Fig - f).

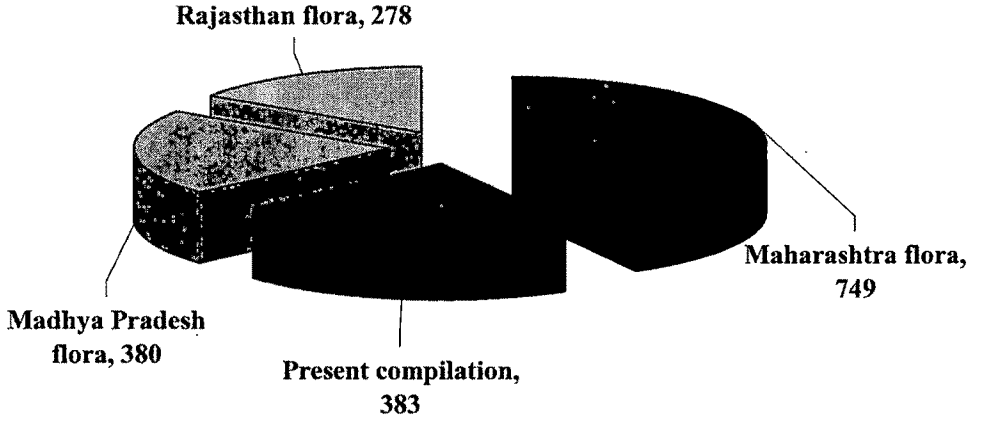


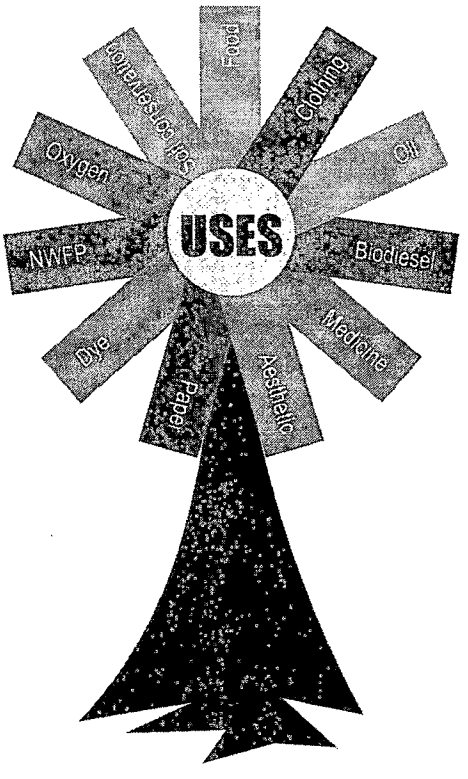
Fig. – f: Tree species recorded in different states of Western India

The maximum number of tree species were recorded in Maharashtra state. The number of species is more in Maharashtra by virtue of being part of the Western Ghats. The Western Ghats are a hilly range running parallel to the coast, at an average elevation of 1,200 meters (4,000 feet). To the west of these hills lie the Konkan coastal plains, which are 50 – 80 kilometers in width. To

the east of the Ghats lies the flat Deccan Plateau. In fact, the Western Ghats constitute one of the three watersheds of India, with many rivers being originated. To the north of the state, near the Madhya Pradesh border, lies the Satpura Range. The various sections of the Western Ghats of Maharashtra are Tamhini Ghat, Varandha Ghat and Sawantwadi Ghat with great biodiversity including tree forms. As we proceed from Maharashtra to Gujarat number of tree forms has decreased.

The number of tree species in Gujarat state has increased during these years. The number of tree species as compared to earlier reports has increased considerably the flora of Gujarat state. The maximum families with tree species recorded in Maharashtra state is 89, where as in Gujarat state it is 70 only. In Gujarat state, the maximum number of recorded tree species belonged to Papilionaceae, Caesalpiniaceae, Mimosaceae, Rubiaceae, Bignoniaceae, Moraceae. Genera like *Cassia, Acacia, Terminalia, Ficus* were noted to be more as compared to other genera. In Maharashtra state, dominant tree species are *Acacia, Cassia, Diospyros, Ficus, Eucalyptus* etc. The dominant families with maximum number of tree species are Annonaceae, Sterculiaceae, Fabaceae, Caesalpiniaceae, Mimosaceae, Myrtaceae, Rubiaceae, Bignoniaceae, Euphorbiaceae, Moraceae and Araceae. In Madhya Pradesh also the families with maximum number of tree species recorded during floral studies are Mimosaceae, Rubiaceae, Moraceae and Euphorbiaceae. While in Rajasthan the families with maximum tree species are Papilionaceae, Caesalpiniaceae, Mimosaceae and Combretaceae.

The value of tree



The value of trees in urban environment is now generally recognized not only aesthetically but also functionally as that help to make cities and towns agreeable places to live and work in. The first choice should be, therefore, to select easily propagated and readily available, medium-growing, ecologically much suitable, pest and disease resistant tree species. Such forms which require very little maintenance should be given priority. Columnar and medium-sized trees are preferred. The leaves with complex shapes and large surface area reported to be collect dust-particles more efficiently. Many trees like Neem (*Azadirachta indica*), Silk cotton (*Bombax ceiba*), Indian laburnum (*Cassia fistula* and *Cassia siamea*), Gulmohar (*Delonix regia*), Pipal (*Ficus religiosa*), Jacaranda (*Jacaranda mimosifolia*), Indian lilac (*Lagerstroemia indica*), Temple or Pagoda tree (*Plumeria rubra* and *Plumeria alba*), Java plum (*Syzygium cumini*) and several other roadside and street trees are more suitable in urban environment.

Table-18: Suitable tree species to be planted in the electric line (City area)

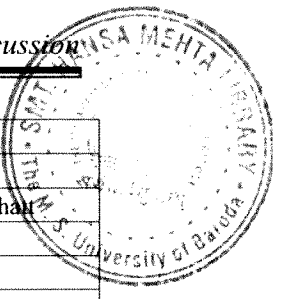
Acacia auriculiformis A Cunn *ex* Benth	*Diospyros cordifolia* Roxb
Aegle marmelos (L) Corr	*Emblica officinalis* Gaertn
Alangium salvifolium (L f) Wang	*Erythrina variegata* L
Alstonia scholaris (L) R Br	*Limonia acidissima* L
Annona reticulata L	*Gmelina arborea* Roxb
Annona squamosa L	*Grevillea robusta* A Cunn *ex* R Br
Neolamarckia cadamba (Roxb) Bosser	*Guaicum officinale* L
Averrhoa carambola L	*Holarrhena antidysenterica* L
Bauhinia variegata L	*Ixora arborea* Roxb *ex* J E Smith
Biota orientalis (L) Endl	*Jacaranda mimosifolia* D Don
Bixa orellana L	*Juniperus chinensis* L
Butea monosperma (Lamk) Taub	*Kleinhovia hospital* L
Callistemon citrinus (Curtis) Skeels	*Lagerstroemia speciosa* (L) Pers
Caryota urens L	*Manilkara zapota* (L) van Royen
Cassia fistula L	*Manilkara hexandra* (Roxb) Dubard
Cassia javanica L	*Melia azedarach* L
Cassia renigera Wall *ex* Benth	*Morinda pubescens* J E Sm
Cassia roxburghii DC	*Moringa concanensis* Nimmo
Casuarina equisetifolia L	*Moringa oleifera* Lamk
Cocos nucifera L	*Morus alba* L
Cordia dichotoma Forster	*Murraya koenigii* (L) Spr
Cordia gharaf (Forsk) Ehrenb & Asch	*Nyctanthes arbor-tristis* L.
Cordia monoica Roxb	*Plumeria rubra* L
Cordia sebestena L	*Polyalthia longifolia* (Sonn) Thw
Couroupita guianensis Aubl	*Psidium guajava* L
Crateva magna (Lour) DC	*Punica granatum* L
Cycas circinalis L	*Roystonea oleracea* (Jacq) O F Cooke
Cycas revoluta Thunb	*Salvadora persica* L
Cycas rumphii Miq	*Santalum album*
Delonix regia (Bojer *ex* Hook) Rafm	*Sapium insigne* Bth
Tabebuia argentea (Bur & Schume) Britt	*Saraca asoca* (Roxb) de Wilde
Tabebuia rosea DC	*Spathodea campanulata* P Beauv
Tamarix aphylla (L.) Karst Deutsch	*Sterculia foetida* L
Tecoma stans (L) H B &	*Wrightia arborea* (Dennst) Mabb
Tecomella undulata (Sm) Seem	*Wrightia tinctoria* R Br
Thespesia populnea L	*Wrightia arborea* (Dennst.) Mabb
Vitex negundo L	

Trees act as catalyst in nature's antipollution squad. Tree alleviate dust, cleanse the air and absorbs moisture and as they play the role of cooling agents and as a buffer against noise. Besides all these biological activities trees aid to the beauty in the city's concrete infrastructure. Above all trees are beautiful to look at and to have them around.

Table - 19 : Suitable tree species for planting along roads in the city area

Acacia auriculiformis A Cunn *ex* Benth	*Firmiana colorata* (Roxb) R Br
Adansonia digitata L	*Garcinia indica* (Thouars) Choicy

Adenanthera pavonina L	*Garcinia mangostana* L
Haldina cordifolia (Roxb) Ridsd	*Gliricidia sepium* (Jacq) Kunth *ex* Walp
Aegle marmelos (L) Corr	*Gmelina arborea* Roxb
Ailanthus excelsa Roxb	*Grevillea robusta* A Cunn *ex* R Br
Alangium salvifolium (L f) Wang	*Guaicum officinale* L
Albizia lebbeck (L) Benth	*Gauzuma ulmifolia* Lam
Albizia odoratissima (L f) Benth	*Haplophragma adenophyllum* (Wall) P Dop
Alstonia scholaris (L) R Br	*Heterophragma quadriloculare* (Roxb) K Schum
Annona reticulata L	*Holarrhena antidysenterica* L
Annona squamosa L	*Holoptelea integrifolia* (Roxb) Planch
Neolamarckia cadamba (Roxb) Bosser	*Hydnocarpus wightiana* Blume
Averrhoa carambola L	*Hyphaene dichotoma* (White) Furtado
Azadirachta indica A Juss	*Ixora arborea* Roxb *ex* J E Smith
Bauhinia purpurea L	*Jacaranda mimosifolia* D Don
Bauhinia racemosa Lamk	*Juniperus chinensis* L
Bauhinia variegata L	*Kigelia africana* (Lam) Benth
Biota orientalis (L) Endl	*Kleinhovia hospita* L
Bixa orellana L	*Lagerstroemia speciosa* (L) Pers
Boswellia serrata Roxb *ex* Colebr	*Lannea coromandelica* (Houtt) Merr
Butea monosperma (Lamk) Taub	*Limonia acidissima* L
Callistemon citrinus (Curtis) Skeels	*Madhuca indica* J f
Cassia auriculata L	*Manilkara zapota* (L) van Royen
Cassia fistula L	*Manilkara hexandra* (Roxb) Dubard
Cassia javanica L	*Melia azedarach* L
Cassia renigera Wall *ex* Benth	*Melia composita* Willd
Cassia roxburghii DC	*Mimusops elengi* L
Cassia siamea Lamk	*Mitragyna parvifolia* (Roxb) Korth
Casuarina equisetifolia L	*Morinda pubescens* J E Sm
Ceiba pentandra (Linn) Gaertn	*Moringa concanensis* Nimmo
Cocos nucifera L	*Moringa oleifera* Lamk
Cordia dichotoma Forster	*Morus alba* L
Cordia gharaf (Forsk) Ehrenb & Asch	*Murraya paniculata* (L) Jack
Cordia monoica Roxb	*Murraya koenigii* (L) Spr
Cordia sebestena L	*Nyctanthes arbor-tristis* L
Couroupita guianensis Aubl	*Ochna obtusata* DC
Crateva magna (Lour) DC	*Pandanus odoratissimus* L f
Cycas circinalis L	*Peltophorum pterocarpum* (DC) Baker *ex* K Heyne
Cycas revoluta Thunb	*Plumeria rubra* L
Cycas rumphii Miq	*Polyalthia longifolia* (Sonn) Thw
Dalbergia latifolia Roxb	*Pongamia pinnata* (L) Pierrre
Dalbergia paniculata Roxb	*Psidium guajava* L
Dalbergia sissoo Roxb	*Punica granatum* L
Delonix regia (Bojer *ex* Hook) Rafm	*Putranjiva roxburghii* Wall
Diospyros cordifolia Roxb	*Ravenala madagascariensis* J F Gmel
Ehretia laevis Roxb	*Roystonea oleracea* (Jacq) O F Cooke
Emblica officinalis Gaertn	*Salvadora persica* L
Erythrina variegata L	*Samanea saman* (Jacq) Merr
Limonia acidissima L	*Santalum album* L
Ficus benghalensis L	*Sapium insigne* Bth
Ficus benjamina L	*Saraca asoca* (Roxb) de Wilde
Ficus racemosa L	*Spathodea campanulata* P Beauv
Ficus hispida L f	*Sterculia alata* Roxb



Ficus krishnae C Dc	*Sterculia foetida* L
Ficus racemosa L	*Sterculia urens* Roxb
Ficus religiosa L	*Stereospermum personatum* (Hassk) Chai
Ficus rumphii Bl	*Streblus asper* Lour
Ficus amplissima J E Sm	*Strychnos nux-vomica* L
Swietenia macrophylla King	*Terminalia catappa* L
Syzygium cumini (L) Skeels	*Terminalia chebula* Retz
Tabebuia argentea (Bur & Schume) Britt	*Terminalia crenulata* Roth
Tabebuia rosea DC	*Thespesia populnea* L
Tamarindus indica L	*Vitex negundo* L
Tamarix aphylla (L) Karst Deutsch	*Wrightia arborea* (Dennst) Mabb
Tecoma stans (L) H B & K	*Wrightia tinctoria* R Br
Tecomella undulata (Sm.) Seem.	*Wrightia arborea* (Dennst) Mabb
Tectona grandis L f	*Terminalia bellirica* (Gaertn) Roxb
Terminalia arjuna (Roxb *ex* DC) Wight & Arn	

Trees such as Tamarind (*Tamarindus indica*) having smaller compound leaves are generally more efficient pollution tolerant with reference to dust collectors than larger leaves. Particle deposition is heaviest at the leaf tip and along leaf margin. In the preliminary survey of dust fall on common roadside trees in Mumbai, it was noted that with typical leaves of *Mangifera indica, Polyalthia longifolia*, and *Thespesia populnea* trees captured higher amounts of dust as compared to other plants (Chakre, 2006).

The tree with the characteristic shape of its canopy, its habit of growing tall and slender or small and spreading, its spring bloom or fall color, the shape and size of its leaves, and its evergreen or deciduous nature is a beautiful element in the otherwise concrete structures in the landscape. No single item distinguishes a city more than its green areas, and probably our first reaction to a society is to its abundance or lack of trees. The shade they give from the scorching sun makes the summer heat more tolerable, and natural filters for grateful eyes the dazzling reflection from masonry and concrete. For all their beauty, city trees are no weaklings. It is sometimes surprising how they can survive the artificial and adverse conditions under which they grow. Smoke and gases, physical injuries, the disrupted water table, hard packed soil, lack of humus renewal and mulch, inadequate root space, reflected heat from

pavements and buildings, and glacial blasts of air through the wind tunnel formed by street and buildings, all make their survival a lot hard.

Table - 20 : Suitable tree species for shade and foliage

Acacia auriculiformis A Cunn *ex* Benth	*Lagerstroemia speciosa* (L) Pers
Albizia lebbeck (L) Benth	*Melia azedarach* L
Alstonia scholaris (L) R Br	*Mimusops elengi* L
Neolamarckia cadamba (Roxb) Bosser	*Polyalthia longifolia* (Sonn) Thw
Azadirachta indica A Juss	*Pongamia pinnata* (L) Pierrre
Cassia fistula L	*Punica granatum* L
Cassia javanica L	*Putranjiva roxburghii* Wall
Cassia renigera Wall *ex* Benth	*Salvadora persica* L
Cassia roxburghii DC	*Samanea saman* (Jacq) Merr
Cassia siamea Lamk	*Saraca asoca* (Roxb) de Wilde
Casuarina equisetifolia L	*Syzygium cumini* (L) Skeels
Cordia dichotoma Forster	*Tamarindus indica* L
Dalbergia latifolia Roxb	*Tecomella undulata* (Sm) Seem
Dalbergia sissoo Roxb	*Terminalia arjuna* (Roxb *ex* DC) Wight & Arn
Gliricidia sepium (Jacq) Kunth *ex* Walp	*Terminalia bellirica* (Gaertn) Roxb
Gmelina arborea Roxb	*Terminalia catappa* L
Kigelia africana (Lam) Benth	*Thespesia populnea* L

Palms are attractive tropical foliage plants which thrive in warm and humid climate. They can be grown both in pots and in the ground. In the ground, palms are used as a specimen on lawn and for avenues (*Roystonea regia, Caryota urens*). There are some palms which have economic uses like Coconut, the Palmyra, the Date Palm, the Indian Sago palm, the African oil palm, the Betel nut. The palm leaves are also used for thatching, baskets, mats, umbrella, fans (*Nipa, Borassus*), coir fiber (Coconut), gum (*Phoenix*) and sugar or '*Gud*' (*Phoenix, Caryota urens*). Cycas is the most commonly grown in the Indian gardens. It resembles palms in appearance. These are cone bearing slow growing plants. The home garden is for beauty, utility and personal enjoyment. Trees and other plants in the home garden also act as filters of dust and dirt and lessen the noise which are common pollution problems in big cities. According to the type of house, its location and available space one can choose the appropriate ornamental tree to enhance the aesthetic value of the house. If there is any tree already growing in the area where one is planning to have the garden, it would be better to utilize it in the landscape than to remove it. If the building or house is low than tall vertical trees like *Eucalyptus globulus*, *Polyalthia longifolia var pandula, Sterculia foetida* can be used. Other foliage

trees like *Aegle marmelos, Ficus elastica, Gmelina arborea* can be planted in front part of the house. The flowering trees like *Delonix regia* and *Cassia javanica* with umbrella like canopy can also be planted in front of the house. The tall shade trees like *Alstonia scholaris, Azadirachta indica, Kigelia pinnata, Ficus benjamina* should be planted at the rear of the house, preferably on the west side to serve as a backdrop and to provide shade to the house for the hot summer months. In front side of the tall buildings or in garden of large bungalows flowering trees like *Bauhinia variegata, Cassia fistula, Ixora coccinia Gardenia resinifera, Tecoma stans, Plumeria alba, Plumeria rubra* can be planted; while *Ceiba pentandra, Neolamarckia cadamba, Ravenala madagascariensis* are suitable as ornamental foliage trees. Tall trees grown on the corners of the house help to give a 'three dimension' perspective to the building. The *Callistemon citrinus*, *Casuarina equisetifolia* with drooping branches can be planted at the back or edge of a water pool to give the weeping effect.

Table - 21 : Suitable tree species as ornamental foliage

Acacia auriculiformis A Cunn *ex* Benth	*Ficus religiosa* L
Acacia mangium Willd	*Ficus rumphii* Bl
Adansonia digitata L	*Gmelina arborea* Roxb
Aegle marmelos (L) Corr	*Grevillea robusta* A Cunn *ex* R Br
Ailanthus excelsa Roxb	*Haplophragma adenophyllum* (Wall) P Dop
Alangium salvifolium (L f) Wang	*Heterophragma quadriloculare* (Roxb) K Schum
Albizia lebbeck (L) Benth	*Holoptelea integrifolia* (Roxb) Planch
Albizia procera (Roxb) Benth	*Hyphaene dichotoma* (White) Furtado
Alstonia scholaris (L) R Br	*Juniperus bermudiana* L
Anogeissus sericea Brandis	*Juniperus chinensis* L
Araucaria columnaris (G Frost) Hook	*Juniperus procumbens* L
Araucaria heterophyllus (Salisb) Franco	*Kigelia africana* (Lam) Benth
Areca catechu L	*Kleinhovia hospita* L
Azadirachta indica A Juss	*Limonia acidissima* L
Bergera koenigii (L) Spr	*Livistona chinensis* R Br
Biota orientalis (L) Endl	*Madhuca indica* J f
Borassus flabellifer L	*Manilkara hexandra* (Roxb) Dubard
Carica papaya L	*Melia azedarach* L
Caryota urens L	*Melia dubia* Cav
Casuarina equisetifolia L	*Mimusops elengi* L
Ceiba pentandra (Linn) Gaertn	*Mitragyna parvifolia* (Roxb) Korth
Citrus limettoides Tanaka	*Pandanus odoratissimus* L f
Citrus limon (L) Burm f	*Parkia biglandulosa* Wight & Arn
Citrus medica Wight & Arn	*Phoenix sylvestris* (L) Roxb
Citrus sinensis (L) Obserck	*Pinus roxburghii* Sarg

Cocos nucifera L	*Polyalthia cerasoides* (Roxb) Bth & Hk f ex Bedd
Couroupita guianensis Aubl	*Polyalthia longifolia* (Sonn) Thw
Crescentia alata H B & K	*Polyalthia longifolia* (Sonn.) Thw. var *pendula*
Crescentia cujete L	*Pongamia pinnata* (L.) Pierrre
Cupressus sempervirens L	*Pterospermum acerifolium* (L.) Willd.
Cycas circinalis L	*Pterygota alata* (Roxb) R Br
Cycas revoluta Thunb	*Ravenala madagascariensis* J F Gmel
Cycas rumphii Miq	*Roystonea oleracea* (Jacq) O F Cooke
Dalbergia lanceolaria L f	*Roystonea regia* (H B&k) o.f. Cook
Dalbergia lanceolaria L f ssp *paniculata* Roxb	*Salvadora persica* L
Dalbergia latifolia Roxb	*Samanea saman* (Jacq) Merr
Dalbergia sissoo Roxb	*Sterculia foetida* L
Diospyros melanoxylon Roxb	*Sterculia guttata* Roxb ex DC
Drypetes roxburghii (Wallich) Hurusawa	*Sterculia urens* Roxb
Eucalyptus citriodara Hook	*Sterculia villosa* Roxb ex DC
Eucalyptus globulus Labill	*Streblus asper* Lour
Eucalyptus grandis Hill ex Maiden	*Tamarindus indica* L
Eucalyptus robusta Sm	*Tamarix aphylla* (L) Karst Deutsch
Ficus benghalensis L	*Tamarix dioica* Roxb ex Roth
Ficus benjamina L	*Tamarix indica* Willd
Ficus elastica Roxb	*Tamarix stricta* Boige
Ficus hispida L f	*Zamia furfuracea* L f
Ficus racemosa L	*Zamia integrifolia* L f

Table - 22:Suitable tree species as ornamental flowering

Acacia auriculiformis A Cunn *ex* Benth	*Gliricidia sepium* (Jacq) Kunth ex Walp
Alangium salvifolium (L f) Wang	*Grevillea robusta* A Cunn *ex* R Br
Averrhoa carambola L	*Grewia tiliafolia* Vahl
Bauhinia foveolata Dalz	*Guaicum officinale* L
Bauhinia malabarica Roxb	*Ixora brachiata* Roxb
Bauhinia purpurea L	*Ixora coccinea* L
Bauhinia racemosa Lamk	*Ixora pavetta* Andr
Bauhinia tomentosa L	*Jacaranda mimosifolia* D Don
Bauhinia variegata L	*Kigelia africana* (Lam) Benth
Bixa orellana L	*Lagerstroemia indica* L
Bombax ceiba L	*Lagerstroemia microcarpa* Wight
Bombax ceiba var *alba*	*Lagerstroemia parviflora* Roxb
Bombax insigne Wallich	*Lagerstroemia speciosa* (L) Pers
Butea monosperma (Lamk) Taub	*Magnolia grandiflora* L
Butea monosperma var *lutea* (Witt) Maheshwari	*Michelia champaca* L
Caesalpinia coriaria (Jacq) Willd	*Millingtonia hortensis* L f
Caesalpinia sappan L	*Mitragyna parvifolia* (Roxb) Korth
Callistemon citrinus (Curtis) Skeels	*Moringa oleifera* Lamk
Callistemon viminalis (Soland ex Gaertn) G Don	*Murraya paniculata* (L) Jack
Cascabella thevetia (L) Lippold	*Neolamarckia cadamba* (Roxb) Bosser
Cassia auriculata L	*Nyctanthes arbor-tristis* L
Cassia fistula L	*Ochna obtusata* DC
Cassia javanica L	*Parkinsonia aculeata* L
Cassia montana Hyene ex Roth	*Pavetta crassicaulis* Bremek
Cassia renigera Wall *ex* Benth	*Peltophorum pterocarpum* (DC) Baker *ex* K Heyne
Cassia roxburghii DC	*Plumeria alba* L
Cassia siamea Lamk	*Plumeria rubra* L

Cassia surattensis Burm f	*Quassia amara* L
Ceriscoides turgida (Roxb) Tirveng	*Saraca asoca* (Roxb) de Wilde
Clerodendrum multiflorum (Burm f) O Ktz	*Sesbania grandiflora* (L) Poir
Cordia sebestena L	*Sesbania javanica* Miq
Couroupita guianensis Aubl	*Sesbania sesban* L var *bicolor*
Crateva magna (Lour) DC	*Sesbania sesban* L var *picta*
Delonix elata (L) Gamble	*Spathodea campanulata* P Beauv
Delonix regia (Bojer *ex* Hook) Rafm	*Tabebuia argentea* (Bur & Schume) Britt
Erythrina stricta Roxb	*Tabebuia pallida* (Lindl) Miers
Erythrina suberosa Roxb	*Tabebuia pentaphylla* Hamsl
Erythrina variegata L	*Tecoma capensis* (Thunb) Lindl
Erythrina variegata var *picta* (L) Blatter & Millard	*Tecoma stans* (L) H B & K
Firmiana colorata (Roxb) R Br	*Tecomella undulata* (Sm) Seem
Gardenia resinifera Roth	*Thespesia populnea* L
Gardenia turgida Roxb var *turgida*	*Vitex negundo* L

Trees like *Annona squamosa, Citrus limon, Manilkara zapota, Mangifera indica, Syzygium cumini, Terminalia catappa* can be grown in the backyard of houses which provides shade as well as edible fruits.

Table - 23 : Trees with edible fruit

Aegle marmelos (L) Corr	*Madhuca indica* J f
Anacardium occidentale L	*Mangifera indica* L
Annona reticulata L	*Manilkara hexandra* (Roxb) Dubard
Annona squamosa L	*Manilkara zapota* (L) van Royen
Areca catechu L	*Miliusa tomentosa* (Roxb) Sinclair
Averrhoa carambola L	*Mimusops elengi* L
Bombax ceiba L	*Morinda pubescens* J E Sm
Borassus flabellifer L	*Moringa oleifera* Lamk
Buchanania cochinchinensis (Lour) Almeida	*Morus alba* L
Careya arborea Roxb	*Musa paradisiaca* L
Carica papaya L	*Phoenix sylvestris* (L) Roxb
Citrus limon (L) Burm f	*Pithecellobium dulce* (Roxb) Benth
Citrus medica Wight & Arn	*Psidium guajava* L
Citrus sinensis (L) Obserck	*Punica granatum* L
Cocos nucifera L	*Salvadora persica* L
Cordia dichotoma Forster	*Syzygium cumini* (L) Skeels
Dillenia pentagyna Roxb	*Tamarindus indica* L
Diospyros melanoxylon Roxb	*Terminalia bellirica* (Gaertn) Roxb
Emblica officinalis Gaertn	*Terminalia catappa* L
Garcinia indica (Thouars) Choicy	*Terminalia chebula* Retz
Limonia acidissima L	*Ziziphus mauritiana* Lamk

In developing countries, the use of synthetic drugs is at its peak but majority of the people still rely upon traditional system of medicine for health care. Countries like India and China had their own well developed traditional system of medicines. *Ayurveda* is the oldest system of healing in the world.

Tree species like Neem (*Azadirachta indica*), Baheda (*Terminalia bellirica*), Amla (*Emblica officinalis*) etc are known world wide for their medicinal uses.

Table - 24: Suitable tree species for medicinal uses

Acacia auriculiformis A Cunn *ex* Benth	*Mimusops elengi* L
Acacia catechu (L f) Willd	*Moringa oleifera* Lamk
Aegle marmelos (L) Corr	*Morus alba* L
Ailanthus excelsa Roxb	*Nyctanthes arbor-tristis* L
Annona reticulata L	*Pongamia pinnata* (L) Pierrre
Annona squamosa L	*Salvadora persica* L
Azadirachta indica A Juss	*Santalum album* L
Bombax ceiba L	*Saraca asoca* (Roxb) de Wilde
Butea monosperma (Lamk) Taub	*Sterculia urens* Roxb
Cassia fistula L	*Strychnos nux-vomica* L
Cordia dichotoma Forster	*Swietenia macrophylla* King
Emblica officinalis Gaertn	*Tamarindus indica* L
Eucalyptus globulus Labill	*Tecomella undulata* (Sm) Seem
Garcinia indica (Thouars) Choicy	*Terminalia arjuna* (Roxb *ex* DC) Wight & Arn
Gliricidia sepium (Jacq) Kunth *ex* Walp	*Terminalia bellirica* (Gaertn) Roxb
Gmelina arborea Roxb	*Terminalia catappa* L
Kigelia africana (Lam) Benth	*Terminalia chebula* Retz
Madhuca indica J f	*Ziziphus mauritiana* Lamk
Melia azedarach L	

Urbanization is the most common factor to affect biodiversity in all aspects. Cities are expanding and with increasing population, the industries are expanding enormously. Man has occupied everything including agricultural fields which come in his way for his facilities. The live hedges contain a distinct ecosystem. The hedge is made up of climbers, herbs, shrubs and trees, which are inhabited by various animals, birds and insects. Near residential areas ornamental and flowering plants can be used as hedges which increase the beauty of area as well as serve the purpose of boundary. To keep the nature in balance, the developments need to be sustainable, so that every single species can survive in their natural habitat including human being.

Table - 25: Suitable tree species for Agriculture

Suitable tree species for farm boundary	
Acacia auriculiformis A Cunn *ex* Benth	*Moringa oleifera* Lamk
Acacia catechu (L f) Willd	*Morus alba* L
Acacia nilotica (L) Willd ex Delile ssp *indica* (Benth) Brenan	*Parkinsonia aculeate* L
Acacia senegal (L) Willd	*Pithecellobium dulce* (Roxb) Benth
Cordia dichotoma Forster	*Prosopis cineraria* (L) Druce
Erythrina variegata L	*Syzygium cumini* (L) Skeels
Gliricidia sepium (Jacq) Kunth *ex* Walp	*Tecomella undulata* (Sm) Seem
Melia azedarach L	*Thespesia populnea* L

Suitable tree species for live fences and hedges	
Callistemon citrinus (Curtis) Skeels	*Prosopis cineraria* (L) Druce
Cassia fistula L	*Punica granatum* L
Casuarina equisetifolia L	*Salvadora persica* L
Erythrina variegata L	*Santalum album* L
Gliricidia sepium (Jacq) Kunth *ex* Walp	*Tecoma stans* (L) H B & K
Lagerstroemia speciosa (L) Pers	*Tecomella undulata* (Sm) Seem
Parkinsonia aculeata L	*Thespesia populnea* L
Pithecellobium dulce (Roxb) Benth	

Tree plays an effective role in the urban environment by supporting many fundamental sub-systems like hydrological cycle, nutrient cycle, atmospheric gas balance, climate in the surrounding and others. It is sometimes surprising how trees can survive the artificial and adverse conditions under which they grow. Air pollution is one of the most challenging global issues of the 21st centaury. It will touch everyone and needs to be addressed on a time scale unlike anything human kind has ever undertaken. A good number of tree species have successfully been found to withstand and mitigate air pollution hazards.

The wastelands and marginally productive lands can be utilized in best way by planting of trees. The practice under which a particular tree species having its specific or characteristics of multiple utility is raised on large scale and is felled as per local need for fuel, fodder, small timer etc is called tree farming. It is advantageous where full utilization of resources is offing. Several species may not come up well up to economic level under a particular set of climatic and edaphic conditions. Selected trees should be fast growing, multipurpose and have ability to improve degraded soils and to reduce air-pollution, soil erosion, flood havocs and improve aesthetic value which makes life living better. A huge quantity of leaf biomass that fall beneath the canopy of the tree upon rotting improves physical, chemical and biological properties of soil.

Table - 26: Suitable tree species for problematic soils

Suitable tree species for saline, alkali or user soil	
Acacia auriculiformis A Cunn *ex* Benth	*Madhuca indica* J f
Acacia nilotica (L) Willd ex Delile ssp indica (Benth) Brenan	*Melia azedarach* L

Albizia procera (Roxb) Benth	*Morus alba* L
Albizia lebbeck (L) Benth	*Parkinsonia aculeata* L
Azadirachta indica A Juss	*Phoenix sylvestris* (L) Roxb
Butea monosperma (Lamk) Taub	*Pongamia pinnata* (L) Pierrre
Callistemon citrinus (Curtis) Skeels	*Prosopis cineraria* (L) Druce
Cassia auriculata L	*Prosopis juliflora* (Swartz) DC
Cassia fistula L	*Punica granatum* L
Casuarina equisetifolia L	*Salvadora oleoides* Decne
Emblica officinalis Gaertn	*Salvadora persica* L
Eucalyptus globulus Labill	*Terminalia arjuna* (Roxb *ex* DC) Wight & Arn
Gliricidia sepium (Jacq) Kunth *ex* Walp	*Thespesia populnea* L
Lagerstroemia indica L	*Ziziphus mauritiana* Lamk
Suitable tree species for lateritic soils	
Acacia auriculiformis A Cunn *ex* Benth	*Dalbergia sissoo* Roxb
Albizia lebbeck (L) Benth	*Grevillea robusta* A Cunn *ex* R Br
Alstonia scholaris (L) R Br	*Hardwickia binata* Roxb
Anacardium occidentale L	*Holoptelea integrifolia* (Roxb) Planch
Anogeissus latifolia (Roxb *ex* DC) Wall *ex* Guill & Perr	*Madhuca indica* J f
Bambusa arundinacea (Retz) Willd	*Pterocarpus marsupium* Roxb
Bombax ceiba L	*Santalum album* L
Dalbergia latifolia Roxb	
Suitable tree species for damp and marshy lands	
Avicennia officinalis L	*Rhizophora mucronata* Poir
Barringtonia acutangula (L) Gaertn	*Salix tetrasperma* Roxb
Casuarina equisetifolia L	*Toona ciliata* Roem
Pongamia pinnata (L) Pierrre	*Trewia nudiflora* L
Suitable tree species for ravine lands	
Acacia auriculiformis A Cunn *ex* Benth	*Holoptelea integrifolia* (Roxb) Planch
Acacia catechu (L f) Willd	*Moringa oleifera* Lamk
Acacia nilotica (L) Willd ex Delile ssp indica (Benth) Brenan	*Morus alba* L
Albizia lebbeck (L) Benth	*Pithecellobium dulce* (Roxb) Benth
Azadirachta indica A Juss	*Pongamia pinnata* (L) Pierrre
Cassia siamea Lamk	*Prosopis cineraria* (L) Druce
Dalbergia sissoo Roxb	*Prosopis juliflora* (Swartz) DC
Gliricidia sepium (Jacq) Kunth *ex* Walp	*Syzygium cumini* (L) Skeels
Gmelina arborea Roxb	*Ziziphus mauritiana* Lamk
Suitable tree species for skeletal soils	
Acacia catechu (L f) Willd	*Cassia siamea* Lamk
Albizia amara (Roxb) Boivin var *amara*	*Hardwickia binata* Roxb
Albizia lebbeck (L) Benth	*Prosopis cineraria* (L) Druce
Anacardium occidentale L	*Prosopis juliflora* (Swartz) DC
Suitable tree species that can stand short duration water logging condition	
Acacia nilotica (L) Willd ex Delile ssp *indica* (Benth) Brenan	*Lagerstroemia speciosa* (L) Pers
Albizia procera (Roxb) Benth	*Pongamia pinnata* (L) Pierrre
Neolamarckia cadamba (Roxb) Bosser	*Salix tetrasperma* Roxb
Butea monosperma (Lamk) Taub	*Syzygium cumini* (L) Skeels

Dalbergia sissoo Roxb	*Terminalia arjuna* (Roxb *ex* DC) Wight & Arn
Suitable tree species for catchment areas	
Acacia catechu (L f) Willd	*Syzygium cumini* (L) Skeels
Acacia nilotica (L) Willd ex Delile ssp *indica* (Benth) Brenan	*Tamarindus indica* L
Azadirachta indica A Juss	*Terminalia arjuna* (Roxb *ex* DC) Wight & Arn
Cassia siamea Lamk	*Terminalia bellirica* (Gaertn) Roxb
Dalbergia sissoo Roxb	*Ziziphus mauritiana* Lamk
Prosopis juliflora (Swartz) DC	

Tree plantations around any industrial areas form the green belt which is known to taken up atmospheric pollutants. This can be done by studying the types of pollutants, wind flow based on which plantation strategies can be adopted. The evergreen plants with large canopy, spreading branches can be planted in green belts to reduce harmful effects of industrial pollutants at some extent. Trees with dense foliage like *Alstonia scholaris, Ficus benghalensis, Putranjiva roxburghii, Polyalthia longifolia, Mimusops elengi, Azadirachta indica*; shrubs like *Bougainvillea, Lantana, Cassia alata, Murraya exotica, Thevetia nerifolia, Nerium odorum* can be planted in industrial areas and cities.

Table - 27: Suitable tree species for desert ecosystem

Suitable tree species for sand dune stabilization	
Acacia nilotica (L) Willd *ex* Delile ssp *indica* (Benth) Brenan	*Cordia gharaf* (Forsk) Ehrenb & Asch
Acacia senegal (L) Willd	*Dalbergia sissoo* Roxb
Ailanthus excelsa Roxb	*Parkinsonia aculeata* L
Albizia lebbeck (L) Benth	*Pongamia pinnata* (L) Pierrre
Anacardium occidentale L	*Prosopis cineraria* (L) Druce
Azadirachta indica A Juss	*Prosopis juliflora* (Swartz) DC
Balanites aegyptiaca (L) Del	*Salvadora oleoides* Decne
Capparis decidua (Forssk) Edgew	*Tecomella undulata* (Sm.) Seem
Casuarina equisetifolia L	*Ziziphus mauritiana* Lamk
Hydrocarben – yielding tree species	
Alstonia scholaris (L) R Br	*Mimusops elengi* L
Artocarpus heterophyllus Lam	*Plumeria alba* L
Ficus elastica Roxb	*Putranjiva roxburghii* Wall
Ficus racemosa L	*Wrightia tinctoria* R Br
Madhuca indica J f	*Wrightia arborea* (Dennst) Mabb
Manilkara hexandra (Roxb) Dubard	
Suitable tree species for nitrogen fixing	
Acacia auriculiformis A Cunn *ex* Benth	*Gliricidia sepium* (Jacq) Kunth *ex* Walp
Acacia catechu (L f) Willd	*Moringa oleifera* Lamk
Acacia nilotica (L) Willd ex Delile ssp *indica* (Benth) Brenan	*Parkinsonia aculeate* L
Acacia senegal (L) Willd	*Pithecellobium dulce* (Roxb) Benth
Butea monosperma (Lamk) Taub	*Pongamia pinnata* (L) Pierrre

Cassia fistula L	*Prosopis cineraria* (L) Druce
Cassia siamea Lamk	*Prosopis juliflora* (Swartz) DC
Casuarina equisetifolia L	*Samanea saman* (Jacq) Merr
Dalbergia latifolia Roxb	*Saraca asoca* (Roxb) de Wilde
Dalbergia sissoo Roxb	*Tamarindus indica* L
Delonix regia (Bojer *ex* Hook) Rafm	
Tree species bearing oilseeds	
Azadirachta indica A Juss	*Melia azedarach* L
Cocos nucifera L	*Mimusops elengi* L
Garcinia indica (Thouars) Choicy	*Pongamia pinnata* (L) Pierrre
Madhuca indica J f	*Strychnos nux-vomica* L
Manilkara hexandra (Roxb) Dubard	
Suitable tree species for firewood	
Acacia catechu (L f) Willd	*Gmelina arborea* Roxb
Acacia nilotica (L) Willd ex Delile ssp *indica* (Benth) Brenan	*Parkinsonia aculeate* L
Acacia senegal (L) Willd	*Peltophorum pterocarpum* (DC) Baker *ex* K Heyne
Albizia lebbeck (L) Benth	*Pongamia pinnata* (L) Pierrre
Anogeissus sericea Brandis	*Prosopis cineraria* (L) Druce
Azadirachta indica A Juss	*Prosopis juliflora* (Swartz) DC
Cassia siamea Lamk	*Tamarindus indica* L
Cordia gharaf (Forsk) Ehrenb & Asch	*Tecomella undulata* (Sm) Seem
Dalbergia sissoo Roxb	*Tectona grandis* L f
Emblica officinalis Gaertn	*Ziziphus mauritiana* Lamk
Erythrina variegata L	

As per the age-old practice people collect firewood from the forest. They generally collect the dry fallen material of trees like *Tectona grandis, Holarrhena antidysenterica, Acacia nilotica var. nilotica, Terminalia elliptica, Butea monosperma, Prosopis juliflora* etc. The *Tectona grandis* is the best for fuel because it burns for long time, however, *Holarrhena antidysenterica* and *Acacia nilotica var. nilotica* are also good for fire.

Many trees are used in different industrial areas like wood pulp in paper industry, lac production on *Schleichera oleosa*; Gum and rubber, tanning, timber and furniture making. Some of the trees are listed below which support several industries.

Table - 28: Suitable tree species for Industries

Suitable tree species for paper and pulp	
Acacia auriculiformis A Cunn *ex* Benth	*Dalbergia sissoo* Roxb
Acacia nilotica (L) Willd ex Delile ssp *indica* (Benth) Brenan	*Eucalyptus globulus* Labill
Aegle marmelos (L) Corr	*Gmelina arborea* Roxb
Ailanthus excelsa Roxb	*Lannea coromandelica* (Houtt) Merr
Albizia lebbeck (L) Benth	*Lagerstroemia speciosa* (L) Pers

Bombax ceiba L	*Madhuca indica* J f
Boswellia serrata Roxb *ex* Colebr	*Moringa oleifera* Lamk
Butea monosperma (Lamk) Taub	*Morus alba* L
Casuarina equisetifolia L	*Sterculia urens* Roxb
Suitable tree species for tanning	
Artocarpus heterophyllus Lam	*Psidium guajava* L
Bauhinia purpurea L	*Tamarindus indica* L
Bauhinia variegata L	*Terminalia arjuna* (Roxb *ex* DC) Wight & Arn
Butea monosperma (Lamk) Taub	*Terminalia catappa* L
Cassia siamea Lamk	*Ziziphus mauritiana* Lamk
Casuarina equisetifolia L	
Suitable tree species as a host for lac production	
Acacia catechu (L f) Willd	*Schleichera oleosa* (Lour) Oken
Acacia nilotica (L) Willd ex Delile ssp *indica* (Benth) Brenan	*Ziziphus mauritiana* Lamk
Butea monosperma (Lamk) Taub	
Suitable tree species for charcoal making	
Acacia auriculiformis A Cunn *ex* Benth	*Dalbergia sissoo* Roxb
Albizia lebbeck (L) Benth	*Emblica officinalis* Gaertn
Anogeissus sericea Brandis	*Eucalyptus globulus* Labill
Azadirachta indica A Juss	*Parkinsonia aculeate* L
Butea monosperma (Lamk) Taub	*Pithecellobium dulce* (Roxb) Benth
Casuarina equisetifolia L	*Prosopis cineraria* (L) Druce
Cordia dichotoma Forster	*Prosopis juliflora* (Swartz) DC
Cordia gharaf (Forsk) Ehrenb & Asch	*Ziziphus mauritiana* Lamk
Suitable tree species for furniture making	
Acacia nilotica (L) Willd ex Delile ssp *indica* (Benth) Brenan	*Gmelina arborea* Roxb
Haldina cordifolia (Roxb) Ridsd	*Madhuca indica* J f
Albizia lebbeck (L) Benth	*Melia azedarach* L
Azadirachta indica A Juss	*Tectona grandis* L f
Dalbergia latifolia Roxb	*Terminalia arjuna* (Rox *ex* DC) Wight & Arn
Dalbergia sissoo Roxb	*Terminalia bellirica* (Gaertn) Roxb
Suitable tree species for match-box and stick	
Ailanthus excelsa Roxb	*Bombax ceiba* L
Alstonia scholaris (L) R Br	*Madhuca indica* J f
Neolamarckia cadamba (Roxb) Bosser	*Polyalthia longifolia* (Sonn) Thw
Suitable tree species for plywood making	
Haldina cordifolia (Roxb) Ridsd	*Dalbergia sissoo* Roxb
Ailanthus excelsa Roxb	*Gmelina arborea* Roxb
Albizia lebbeck (L) Benth	*Grevillea robusta* A Cunn *ex* R Br
Alstonia scholaris (L) R Br	*Holoptelea integrifolia* (Roxb) Planch
Neolamarckia cadamba (Roxb) Bosser	*Madhuca indica* J f
Bombax ceiba L	*Swietenia macrophylla* King
Boswellia serrata Roxb *ex* Colebr	*Syzygium cumini* (L) Skeels
Dalbergia latifolia Roxb	*Tectona grandis* L f
	Terminalia bellirica (Gaertn) Roxb

Suitable tree species for silk industry	
Anogeissus sericea Brandis	*Morus alba* L
Dalbergia sissoo Roxb	*Terminalia arjuna* (Roxb ex DC) Wight & Arn
Lagerstroemia speciosa (L) Pers	*Ziziphus mauritiana* Lamk
Madhuca indica J f	
Suitable tree species for wood carving	
Albizia lebbeck (L) Benth	*Gmelina arborea* Roxb
Crateva magna (Lour) DC	*Santalum album* L
Dalbergia latifolia Roxb	*Tectona grandis* L f
Dalbergia sissoo Roxb	*Wrightia arborea* (Dennst) Mabb

Along with art and craft, literature too mirrors a culture, and there are innumerable Indian literary references to trees. In many ancient cultures, trees held sacred. The Indian region's reverence for trees goes back to prehistory, to the animist belief of primitive people. Later it is evident in the seals of Mohenjo-Daro and Harappa, one of which depicts a horned goddess in Peepal (*Ficus religiosa*) tree. Long passages in the Mahabharata and Ramayana describes the kalpvriksha. Krishna recalls the Kadamba (*Neolamarckia cadamba*), under whose boughs he played his flute and in to whose branches he escaped after sealing the gopi's clothes. He is also associated with the night-fragrant harsingar or Parijat (*Nyctanthes arbor-tristis*), which is said to have stolen from the garden of Indra, the king of Gods. The Buddhist Jataka tales tell of similar tree inhabited by deities who feed and clothe weary travelers. Kalidasa in Shakuntala refers to kindly forest spirits who cared for the simple hermit girl.

Given the religious and cultural ethos, common beliefs surrounding trees are legion. The Ashoka (*Saraca asoca*) dispels sorrow, the Neem (*Azadirachta indica*) bestows happiness. Women unable to conceive must pray to the Peepal (*Ficus religiosa*) to be blessed with offspring. Weddings are arranged between trees – in South India the Peepal (*Ficus religiosa*) and Neem (*Azadirachta indica*) are grown closer and ceremonial marriage is solemnized between these two.

All in all, the Indian association with trees is a dense matrix, as many-stranded and interwoven as the roots of the Banyan (*Ficus benghalensis*). It is an acknowledgement that man and tree are closely connected in their life and fate, an aspect of the wider interdependence of man and nature. Yet, in somewhere in this complex coexistence, humans have turned exploiters. The 20th century had seen a grave annihilation of these very trees and forests, a plunder so terrible that vast tracts of precious forests had been disappeared over the years. It might be the time to rekindle some of the religious, emotional and reverential bonds that we had very recently witnessed in the past. A time has come for man and trees to become friends once more.