FLORA
OF INDIA
Series 2

Flora of Goa, Diu, Daman, Dadra and Nagarhaveli

Volume 1

Rolla Seshagiri Rao

BOTANICAL SURVEY OF INDIA

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GOA DIU DAMAN DADRA & NAGARHAVELI

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CONTENTS

FOREWORD

As part of the floristic survey and inventorisation of plants at the national and regional levels, the Botanical Survey of India has been publishing Flora of India series. The work on the Flora of Goa, Diu, Daman, Dadra & Nagarhaveli by Dr. R. S. Rao was done when he was in charge of the Western Circle of Botanical Survey of India, Pune and it was further supplemented with additional information later on. This Flora bears the stamp of the author's intensive and sustained floristic survey of a small area rich in floristic diversity. The critical observations and taxonomic comments given under each species reflect scholarly approach to the problem. The introductory chapter deals with topography, climate, vegetation, plants of botanical value, economic and medicinal plants. The vegetation analysis and the classification of vegetation are useful for evaluation of the floristic content. The enumeration is given in accordance with the Bentham & Hooker's system of classification with keys to genera and species.

The author deals with 1115 species of Angiosperms and 27 species of Pteridophytes. The Angiosperms are spread over 146 families with the family Fabaceae being the dominant containing 79 species covering 40 genera. The Flora of Goa is under threat due to population pressure and developmental activities (e.g. mining, quarrying, etc.). Some of the degraded mine sites, as per the author, can be rehabilitated by introducing species of evergreen and deciduous forests, i. e. species of *Ailanthus*, *Calophyllum*, *Canarium*, *Cinnamomum*, *Dipterocarpus*, *Hopea*, *Palaquium*, *Tetrameles*, etc.

There is urgent need to bring out state-of-art report on the ecosystem under threat in Goa which should indicate the necessity of sustained developmental acitvities. Popular and educational material for schools and colleges for the conservation of our fragile ecosystem and our threatened flora can highlight the corrective measures required for sustained conservation. I am sure this Flora of Goa will generate the above mentioned activities during the coming years.

Dated 27 Sept. 1985
Botanical Survey of India
P-8 Brabourne Road
Calcutta 1

M. P. NAYAR
Director

INTRODUCTION

Sir Joseph D. Hooker, in 1897, on completion of the seventh and last volume of his *Flora of British India* indicated the importance of preparation of local Indian Floras and monographs of the large Indian genera of a country like India, 'perhaps the richest and certainly the most varied botanical area on the surface of the globe'. Thus, the necessity for local or regional floras has been fully recognised and with the establishment of Botanical Survey of India in 1890, there have appeared a large number of monographs and regional floras. Considerable knowledge on the plants of Western India from Sind-Kutch-Saurashtra region to North Kanara-Coorg-Kerala zone both along the Western ghats and the narrow coastal belt, has been gathered and published in various works, starting with *Hortus Malabaricus* (van Rheede, 1680-1703) to the *Flora of the Presidency of Bombay* (Cooke, 1901-1908) and the *Flora of the Presidency of Madras* (Gamble & Fischer, 1915-1934) and a few subsequent publications covering small areas. The Portuguese during their supremacy along the West-Coast did not contribute much by way of describing the plants of their occupied areas. *Colloquios dos Simples e Drogas da India* (Garcia da Orta, 1563) and *Tratado de las Drogas* (Acosta, 1578), the two publications which helped to introduce to the Western world, a few of the commonly known Indian Medicinal plants, cover a wide variety of subjects like socio-political conditions of that period etc., other than the Botany of the Portuguese possessions. However, the Portuguese played a prominent role in the introduction of new plants from their New World territories. Subsequently, besides a small publication on the *Natural History of Goa* (d'Silva, 1862) with a list of hardly 163 species, during the fourth century celebrations of the Portuguese rule in India, *Flora de Goa e Savantwadi* (Dalgado, 1898) was published, presenting a list of 731 wild species and 279 cultivated species with vernacular names and very brief notes without any specific data on the localities and the specimens collected etc. The book is out of print and the work itself is out of date and unsuitable for revision. In contrast to this, a contemporary work (Cooke, 1901-1908) on the Flora of Western India (then British India) provides ample data based on Herbarium methods of study. Further, there is practically no work on the flora of the small enclaves Diu, Daman and Nagarhaveli except a couple of lists of no proper value with occasional notes on a few economic plants (Xavier Gracias, 1902 ; 1927). Such a wide disparity in the nature of approach and the standard of scientific study has brought about 'the lacunae' in the knowledge of the range of species and their distribution along the Western India.

Since 1960, my studies on the phytogeography of the Western ghats have revealed interesting aspects of the shifting of northern limit of evergreen vegetation along the ghats, to Phonda-Ambolighat belt of Ratnagiri district, from North Kanara belt which is hitherto considered as the beginning of the ever-green zone. At this stage, the absence of detailed floristic data on Goa, the region between Ratnagiri district of Maharashtra State and North Kanara district of Karnataka State, has become quite conspicuous. Similarly, for planning a comprehensive flora of Gujarat-Saurashtra region, data on Dadra, Nagarhaveli, Daman and Diu form the missing links. But nothing could be done either by earlier workers or by the author to fill up these gaps due to political restrictions and no time was lost in undertaking this project soon after these enclaves became a part of India on December 20, 1961, after a lapse of over 450 years.

History of work—Past and present : (Fig. 1).

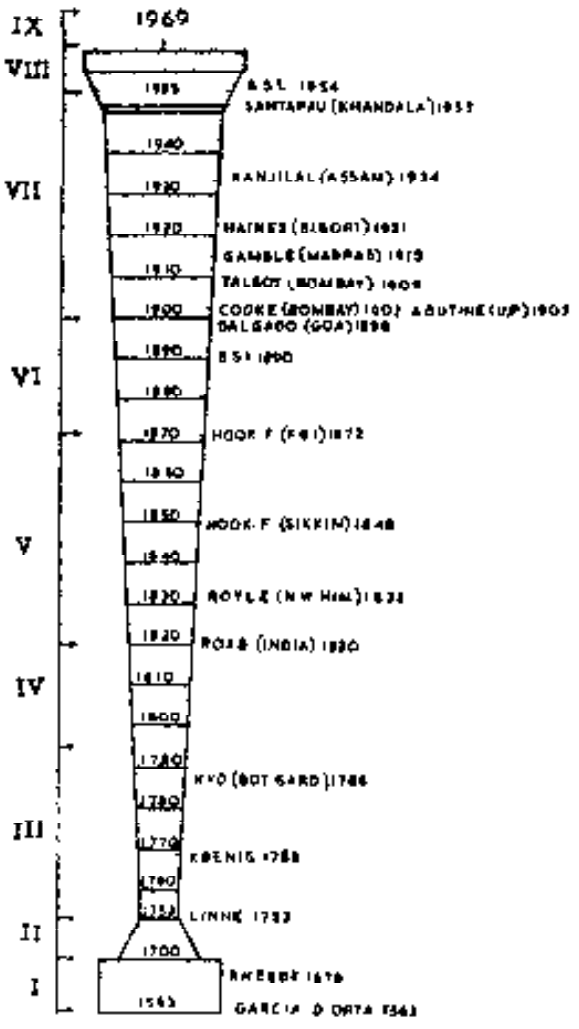


Fig. 1.
Phases of Botanical exploration & Publication

I	1563-1700	INITIAL PHASE (Pre-Linne)
II	1700-1753	Ceylon-Burmann & Linne
III	1753-1795	FIRST EXPLORATORY PHASE (Post-Linne)
IV	1795-1820	FIRST COMPILATORY PHASE (Pls. of Coromandel & Fl. Ind. by Roxburgh)
V	1820-1872	INTENSIFIED EXPLORATORY & DESCRIPTIVE PHASE
VI	1872-1900	CRITICAL GENERAL FLORA PHASE (FBI. by Hooker f. & Extensive Botanical Survey)
VII	1900-1955	DECENTRALISATION PHASE (Local & critical floras)
VIII	1955-1969	EXTENSIVE & INTENSIVE EXPLORATORY & DESCRIPTIVE PHASE (Botanical Survey.)
IX	1969	CRITICAL FLORA REVISION PHASE (Flora of India & State Floras by Botanical Survey & Universities).

Plants have been studied in India from times immemorial, particularly with reference to their medicinal properties. The Botany of *Vrikshyurveda* as it was called in ancient India, was a part of the curriculum in seats of learning, comprising collection and study in relation to environment and their efficacy as a medicine and classification was based on such studies. Sanskrit nomenclature has been quite clear and consistent which was adopted by Heinrich van Rheede in his *Hortus Malabaricus* (1680-1703), which is in fact the main source of inspiration for Linneaus in naming Indian plants in his *Species Plantarum* (1753). Even the remark of Sir William Jones, the great Orientalist and Botanist that Linneaus himself would have adopted the Sanskrit system of nomenclature, had he known the learned and ancient language of the country. Goa region, the Govapuri of the ancient times, with its rich heritage of Indian culture and study of Ayurveda, would have been another centre for the preparation of useful floristic treatise similar to *Hortus Malabaricus*, with the co-operation of Konkan Scholars and 'Ayurvedic Vydyas', had the Portuguese administrators who governed the region since 1510, expressed their interest on such projects.

However, Garcia da Orta, the personal Physician to the Viceroy of the Portuguese Colonies in India, with his vast experience of 30 years contact with local 'Ayurvedic Vydyas' and the use of Indian medicine, published *Colloquios dos Simples e Drogas da India*, in Goa in 1563, an interesting pre-Linnean publication, presenting a detailed account of fifty-seven more commonly used Indian medicinal plants in a dialogue form from first-hand knowledge, together with several digressions on social and political conditions of that period and other allied aspects quite unconnected with plants, expressing, however, many apologetic advertences. Inspite of it, various European workers connected with *Materia Medica* commented on the richness of information and the exactitude of the descriptions of Indian drug plants. Subsequently, it was the summarized Latin translation (omitting all the unnecessary data not directly related to plants) of Charles l'Escluse (Carolus Clusius), *Aromatum et Simplicium Aliquot Medicamentorum apud Indos nascentium Historia*, first published in 1567 at Antwerp, that had really made the data of *Coloquios* familiar to the European readers and this Latin translation became so popular that it ran into six editions between 1567 and 1595, subsequently followed by a folio-edition with illustrations in 1605. Simultaneously, Italian translation by Annibale Briganti, was published in 1576 at Venice followed by three more editions during 1582-1616. A French translation by Antione Colin had also come out at Lyons in 1609, and a second edition in 1619. These two translations are from the Latin of Clusius. Much later, in 1872 an edition of the *Colloquios* was published at Lisbon by F.A. de Varnhagen which is not sufficiently critical. This omission was recti-

fied by the publication of the standard annotated edition in two volumes by Count de Ficalho, an accomplished Botanist, the first volume published in 1891 and the second in 1895 at Lisbon with full and admirable notes with Botanical names to each Colloquy, evidently after consulting all books and research papers published on the subject since 1565. This edition as available with the author, was frequently consulted during the preparation of this Flora. To English readers, Sir Clements Markham's translation of Ficalho's edition, printed in 1913 at London, is a welcome addition, but A.X. Soares, in his article on "Garcia d'Orta, a little known owner of Bombay" [*Journal of Bombay branch of Royal Asiatic Society* 26 (2) : 195-229, 1922-23], citing the examples, indicates that Markham's translation is full of errors, lacunae and in many respects imperfect and unsatisfactory. However, only two hundred and fifty copies of this translation were printed and the copy No. 178 is available in Blatter Herbarium of St. Xavier's College, Bombay. Garcia da Orta, a Naturalist Humanist, Anthropologist and Ethnologist is always remembered for his famous work of that time along with distinguished names like van Rheede, Rumphius, Wight, Hooker and others.

The Spanish work of Christobal Acosta, *Tratado de las drogas y medicinas de las Indias Orientales*, published at Burgos in 1578, is another interesting book, appearing immediately after Orta's *Colloquios*. Though in preface of this book it is mentioned that it is the original work of Acosta, Markham indicates, that out of the 448 pages of text, giving sixtynine plants and other sources of drugs with good, original full-page illustrations to forty-six plants with the roots, the greater part of it is mostly copied from Orta. However, Acosta's drawings of the plants collected at Cochin and Goa are found to be useful to illustrate the Colloquios.

Thereafter, for more than three centuries, there has been no contribution on the botany of Goa and other Portuguese colonies, inspite of intense activity from 1768 in the study of Indian plants (following the binomial system of Linneaus), by the combined efforts of Koenig, Klein, Rottler, Heyne and subsequently, William Roxburgh, Wallich, Buchanan-Hamilton, Robert Wight and others on the eastern and peninsular India and of Victor Jacquemont (1832), John Graham (1839), A.N. Dalzell and A. Gibson (1861), J.C. Lisboa (1896), W.A. Talbot (1894), A.K. Nairne (1894), G.M. Woodrow (1897) and with the interesting collection by Law, Stocks, Ritchie, Sedgwick and Bell, Lush and others from the then undisturbed forests of Konkan ghats of Ratnagiri and North Kanara districts and Belgaum area, all surrounding the Goa region and by a host of other active workers reporting and publishing on the plants of various parts around the Portuguese colonies along the Western India. Except a few random collections made, possibly with the permission of the

Portuguese administration by Lush and a few others which are cited in J.D. Hooker's *The Flora of British India* (1872-1897), there is practically no record of any plant material or herbarium specimen from the Portuguese territories of India in the Indian publications on Botany of that period. The only half-hearted attempt made by the Portuguese Government to study the Natural History of Goa was to commission Manoel Galvao da Silva in 1780 to prepare the work, *Observacoes sobre a historia natural de Goa* which was finally published after a long break in 1862 at Nova-Goa (Panaji). This work consists of 46 pages with a list of 163 species, indigenous and exotic, covering more than half the book and the remaining pages with a brief outline of the Linnean system of classification. D.G. Dalgado says that d'Silva spent hardly two months in Goa and completed this work. Dalgado himself published *Classificacao botanica das Plantas e drogas descriptas nos "Colloquios da India"* in 1894 in Bombay, classifying the plants described by Garcia da Orta in his *Colloquios*, with their Botanical names and five drawings of plants. But later, probably with the publication of Hooker's *Flora of British India*, the Portuguese authorities might have encouraged Dalgado to prepare his *Flora de Goa e Savantavadi*, Lisbon (1898) to commemorate their rule of 400 years on Indian territory. Dalgado in his introduction to his flora indicates that he planned for seven years to complete this work and due to his stay for about 22 years as a Medical officer in Savantavadi State, he included that State besides Vengurla and Malwan talukas of Ratnagiri district along with Goa region, as the Flora is similar in the entire zone. Inspite of such systematic approach in the treatment of the Flora, covering 731 wild species under 478 genera classified into 134 families and cultivated exotic species 279 under 206 genera representing 69 families, he could not present the data in the proper form and the brief notes on either distribution outside Goa and Savantavadi or economic and medicinal use, are extracted from the Indian works like, Hooker's *Flora of British India*, Roxburgh's *Flora Indica* and others with occasional extracts from van Rheede's *Hortus Malabaricus*, as such references were not then available to Goa workers. As indicated by him, the vernacular names in 'Konkani' were adopted from *Diccinario-Konkani-Portuguez* by S.R. Dalgado and other local works and the Portuguese names from *Compendio de Botanica* by Felix Avellar Brotero and also *Coloquios* by Garcia da Orta. English and French names were from Indian and other various works. The vernacular names were carefully selected and presented; but he warned the reader not to depend on such vernacular names, as in many cases, a single name was used for two or three species. Dalgado expressed in very clear terms the importance of such floristic work and the practical utility of the study of plants used in medicine, food and industry ; he, however, indicated his limitations as not being a professional botanist. Thus his book as compared with others then published in British India turned out to be only an improved list of plants with brief notes. Details about his herbarium collections, their identifica-

tions, place or institution of their deposit, are conspicuously missing in his work, although such methods were sufficiently known to those working in India during that period.

The Flora of the former Portuguese colonies, Diu, Daman, Dadra and Nagarhaveli adjoining to Gujarat region has also not been so far worked out. Such data are of primary importance for any development programme, particularly after the liberation of these areas. As such, along with the Flora of Goa project, this work has been taken up by the author during the beginning of 1963. Eventhough three small books on the plants of Daman and Nagarhaveli were published in Portuguese by Caetano Gracias (1899) and C.F. Xavier Gracias (1902 & 1927), they are of no practical utility and are much out of date. Though the Flora of this group of colonies is closely allied to the coastal and hilly flora of Gujarat State, the data gathered by periodical field studies for nearly three years are included along with the Goa flora so that the data, after publication would be useful not only to various workers engaged in the projects of Goa administration as a whole, but also to those interested in the flora of Gujarat State. Similarly the bibliography given at the end of Vol. II comprises publications closely connected with the flora of Gujarat State and adjoining drier regions also.

Towards the end of the 19th century, Theodore Cooke and his associates started intensive botanical exploration covering wide areas around Goa, Daman and Nagarhaveli. At the beginning of this century, notable contributions were made by Cooke (1901-1908), Talbot (1909-1911), Saxton and Sedgwick (1918), Indraji Thaker (1910) (possibly the first floristic work in a regional language Gujarati in India) and by several others, like Blatter of St. Xavier's College and his associates (d'Almeida and McCann), Nairne and others. Inspite of such intensive work and a good number of papers on Western India plants published in various journals at that time, data on the plants of Goa, Daman, Nagarhaveli etc. based on authentic herbarium material were lacking, except for a few collections, that too mostly from Marmugao by Cooke, Talbot, Kanitkar, Bhide and Bhiwa and a few from Daman by Bhide (specimens available in BSI herbarium, Pune).

With such advancement of botanical knowledge in the Western India, some workers from Goa also published their botanical papers, a few of which, though of little significance for future reference or utility, are noted here. (1) Gracias (1896-on *Pogostemon*; 1902—147 species mostly cultivated; 1927 economic and medicinal plant data from Indian books), (2) Barreto (1954-'58 medicinal and aromatic plants data from Indian books), (3) Noronha and Pinto (1954), (4) Ramachandra Vaidya (1954-'55), (5) Souza de (1944—583 species list), (6) Gracias, C. (1899—on Cereals and legumes), (7) Souza, A.H. (1956—on Cashew nut) and (8) Alfonso (1924—on

Coconut ; 1940– on 24 species of fruit trees introduced by the Portuguese into India).

Studies from the Blatter Herbarium, St. Xavier's College, Bombay during 1940-60, also enriched floristic data of Khandala Ghats, Dangs forests and other Indian regions surrounding erstwhile Portuguese colonies.

Subsequently, with the reorganisation of the Botanical Survey of India and setting up of the Western Circle of the Department in December, 1955, a new line of activity in the exploration of various unexplored, under-explored regions along the Western parts of India, (hitherto inaccessable to the earlier workers) has begun. As there is practically no proper Flora volume and no herbarium material from Goa and other former Portuguese colonies, comprehensive study of the flora while however carrying out simultaneously other Department projects of research on Indian plants, were taken up by the author as a part-time project in the end of 1962 after their liberation. While such work is in active progress, V.D. Vartak, prepared a list of 1512 species, mostly gathered from published literature, covering the region from southern parts of Ratnagiri district to northern part of North Kanara district under an old regional name "Gomantak" (*Ennumeration of plants from Gomantak*, India, 1966). There are hardly 200 species, collected from Goa region proper, and those too from limited areas. Based on the data gathered by the author during his studies along the Western coast and the ghats of the Gujarat State on the north and the Maharashtra and Karnataka States on the south, botanical exploration of Goa region including Angidiv, an isolated island off Karwar coast and Terecol, a narrow coastal strip east of Vengurla (Ratnagiri district) and also Diu, Daman, Dadra and Nagarhaveli (except the small simbor island off Diu towards its east) has been carefully planned with three periods of field study covering pre-monsoon, late-monsoon and post-monsoon seasons of each year beginning with November 1962.

After the author's intensive study in the various field zones of the entire region for some period, he had collected further material from those zones through the Botanists of his Institution under his complete direct supervision For such assistance he is thankful to Sarvasri R.S. Raghavan, N.P. Singh, K.C. Kanodia and P.J. Cherian for Goa area and Sri M.Y. Ansari for Nagarhaveli area.

All such collections, numbering to more than 4000 field numbers for Goa region and 1800 numbers of Diu, Daman and Nagarhaveli region, have been identified and deposited in BSI herbarium, Pune and this major collection, the first of its kind from Goa, Diu, Daman, Dadra and Nagarhaveli region, forms the main basis for reference. He is thankful to Smt. B. Ahuja of his department for her assistance in the herbarium work.

Plan of the Flora :

Phytogeographically the two groups of former Portuguese enclaves namely, 1) the Goa region including Angidiv on the South and (2) the Diu, Daman, Dadra and Nagarhaveli on the north are quite distinct. Hence, the author has first presented this work in two parts so that the flora of the former which is akin to that of south Ratnagiri and north Kanara districts be studied as one composite unit and the Flora of the latter similar to that of Gujarat coast and hills, may be presented as another natural unit. However, for printing a concise flora for all the enclaves, both the parts are now merged and presented as one volume. Such long delay in publishing the flora is partly due to such merging work which disturbed the author quite considerably from his other scientific work.

Keeping in view of the present requirements of the Goa administration for the development plans both on the utilisation of vegetable wealth of the region and for improving the standard of Botany teaching at various levels, the data so far gathered from the region is very much condensed in such a form that only important aspects of its flora are presented as the first work of its kind for the region, introducing to the student as well as the research worker of Goa union territory, the taxonomic literature on the Flora of surrounding areas and enable them to understand the plants of their area, while utilising this Flora along with other major Floras on the Western India.

Further, in order to make the Flora concise without depriving the quality and its utility, every effort has been put in, to present upto-date data on distribution, nomenclature (even recent nomenclatural changes are given as Foot notes with asterik*) confirming to the *International Code of Botanical Nomenclature* (1978), synonymy, brief specific keys and taxonomic notes, deliberately omitting the descriptions of the species for which necessary reference is to be made to the regional Floras of Cooke, Gamble and others whose reprinted copies of Botanical Survey of India are available. The localities of Goa as per taluk-wise and also Diu, Daman and Nagarhaveli of the specimens collected are cited in the Flora omitting the field numbers and they are available for study at the BSI Herbarium, Pune. As such, Bentham and Hooker's System of Classification which is followed in all the Indian Herbaria and Floras, is also adopted in this work with, however, a few minor modifications particularly with reference to the circumscription of families as interpreted by Hutchinson (*Families and Flowering Plants*, ed. 2, 1959).

For the sake of brevity, a few unconventional abbreviations regarding references have been used under citations for each species. Besides many of the recognised abbreviations (I) such unconventional ones (II)

also are briefly explained below which are however fully cited under bibliography at the end of 2nd volume.

I. Fl.=Flowering ; Fr.=Fruiting ; Ill=Illustration ; Kan.=Kanarese name ; Konk.=Konkani name ; Loc.=Locality; Mar.=Marathi name ; *nom. cons.*=nomina conservanda ; Port.=Portuguese name ; *p.p.*=pro parte ; Recept.=Receptacle (under *Ficus*) ; Vern.=Vernacular name.

II. Aquat. Angiosperms=Subramanyam's Aquatic Angiosperms ; Blatt.=Blatter & McCann's Bombay Grasses; Bedd.=Beddome's ferns of Southern India ; Bedd. Fl. Sylv.=Beddome's Flora Sylvatica ; Bedd. Ic.=Beddome's Icones plantarum ; Bor.=Bor's grasses of Burma, Ceylon, India and Pakistan ; C.=Cooke's Flora of Bombay Presidency (pages as in BSI reprint vols.) ; DG.=Dalgado's Flora de Goa ; Dalz. & Gibs.=Dalzell & Gibson's The Bombay Flora ; Dangs.=Santapau's Botany of Dangs ; FBI.=Hooker's Flora of British India ; G.=Gamble's Flora of Madras Presidency (pages as in BSI reprint vols.) ; Holtt.=Holttum's Ferns of Malaya ; JBNHS.=Journal of Bombay Natural History Society-different volumes ; Pav.=Chavan and others Flora of Pavagadh ; Pflanzen f.=Engler & Prantl's Pflanzen familien ; Pflanzenr.=Engler & Das Pflanzenreich ; S.=Santapau's Flora of Khandala (pages as in 2nd ed.) ; Sant. & Irani.=Santapau & Irani's Asclepiadaceae & Periplocaceae of Bombay ; Sant.& Kapad.=Santapau & Kapadia's Orchids of Bombay ; Saur.=Santapau's Flora of Saurashtra ; Sena.=Senaratna's Grasses of Ceylon ; T.=Talbot's Forest Flora of the Bombay Presidency and Sind ; Uni. Bombay Bot. Mem.=Santapau's Acanthaceae of Bombay ; V.=Vartak's Enumeration of Plants of Gomantak ; Wt. Ic.=Wight's Icones Plantarum ; Wt. Ill.=Wight's Illustrations of Indian Botany.

TOPOGRAPHY

Goa, the land of scenic beauty with forested hills on the east and a net work of rivers flowing along the narrow undulating country, interspersed with picturesque coconut groves and joining the Arabian sea all along the projected rocky creeks which are here and there draped by small strips of soft sandy shores, is geographically situated between 73° 40'-74° 20' E and 14° 53'-15° 47' N, with Ratnagiri district of the Maharashtra State on the north, North Kanara district of the Karnataka State on the South and the Western ghats on the east and the Arabian sea on the west.

This region was known in ancient works as "Gomantak" or "Gomanchal" indicating it as the most fertile part of the Concan, with "Govapuri" (ollem Goem) as a great religious and commercial centre. The riches of the country soon made it the scene of several battles and territory changed hands from the 11th century onwards from the Kadamba Kings to

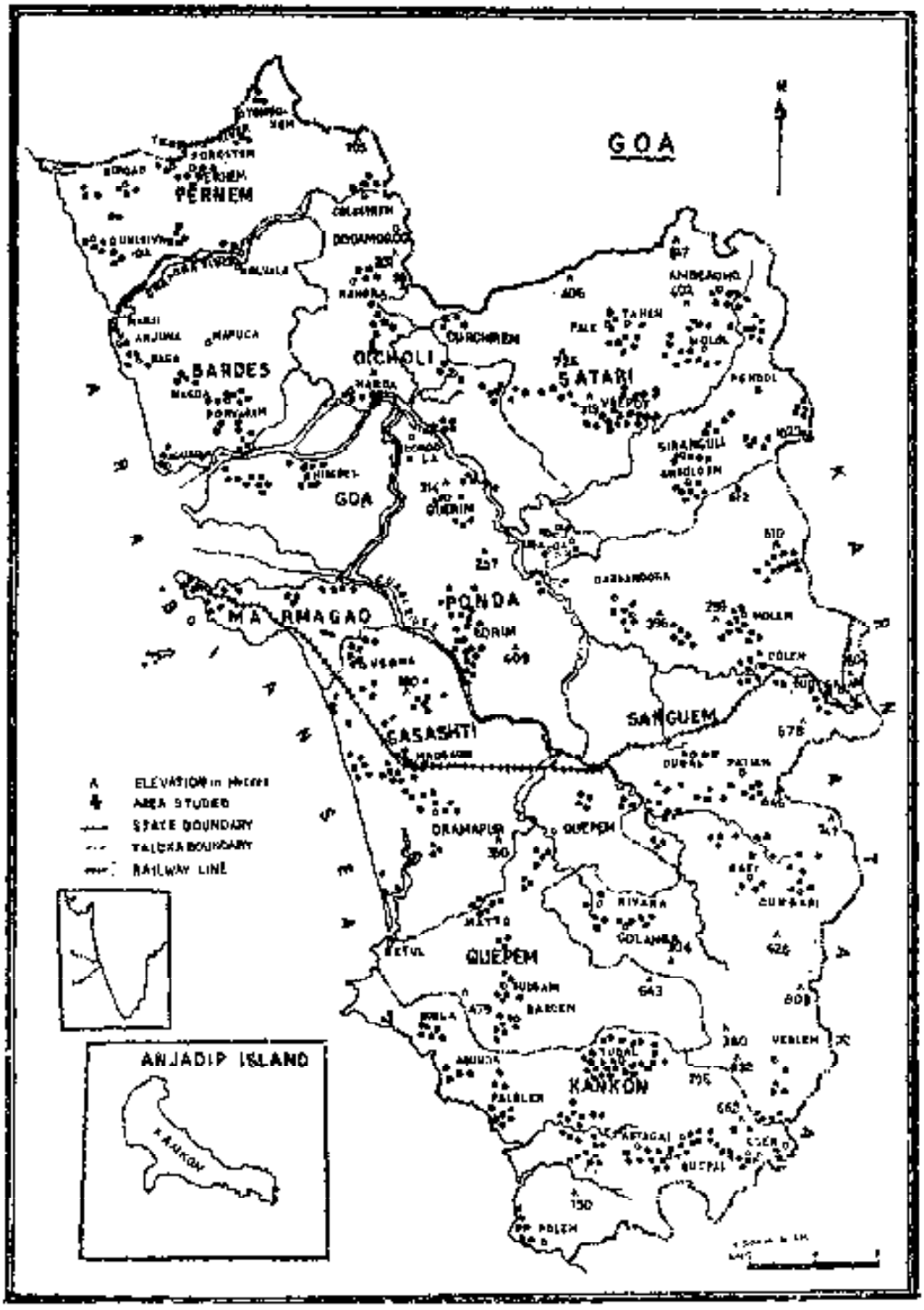
Vijayanagar rulers and subsequently to the Bahamani Kings and then to the Bijapur rulers from whom Afonso de Albuquerque annexed the city of Old Goa in 1510. After moving the seat of Portuguese Government from Cochin to old Goa and by further expansion during the 16th century, the Present Goa, with old and new conquests combined, as one sees it to-day, is finally organised into one territory in 1778 and the present capital Panaji came into prominence from 1818. Finally in December, 1961, after a lapse of 451 years, the old Portuguese colonies again became a part of India. With such interesting historical background, Goa provides several ancient monuments, temples, mosques and churches and forts, castles and arches, all of intrinsic archaeological, artistic or cultural value.

Angidiv, a part of the Goa territory, is a tiny island off Karwar coast, with no permanent residents but an old fort, built to house of Portuguese soldiers. It is situated at 74° 06′4″-74° 07′3″ E and 14° 45′1″-14° 45′7″ N and it is here that the battle of liberation began in December, 1961. It is now included as a part of *Canacona* taluka.

The area of Goa is 3806 sq. km. with 131 km. long coast line which is more or less dentate with creeks, inlets, river deltas. The maximum, length is 105 km. and the width 60 km. The area is comprised of 11 administrative units as talukas, (1) Pernem, (2) Bicholim, (3) Satari, (4) Bardez, (5) Tiswadi (Ilhas), (6) Salcete, (7) Marmugao Smallest, (8) Ponda, (9) Sanguem (largest), (10) Quepem, (11) Canacona (with Angidiv) which form the basis for presenting the distribution of species in this Flora (Map-I). Forests though very much degraded during early 60's cover about 1050 sq. km.

The region is drained by the rivers, the Mandovi (61. 6 km. long) and the Zuari (62.4 km. long) which form wide alluvial deltas before discharging into Aguada Bay and Marmugao Bay respectively. They are navigable throughout the year. The other small rivers are Sinquerim, Chapora (Colvale), Tiracol (Araundem), Sal, Talpona, Galgibaga, Baga, Mapuca, Bicholim, Sanquelim, Paroda and others, all originating from the Western Ghats, mostly outside Goa limits.

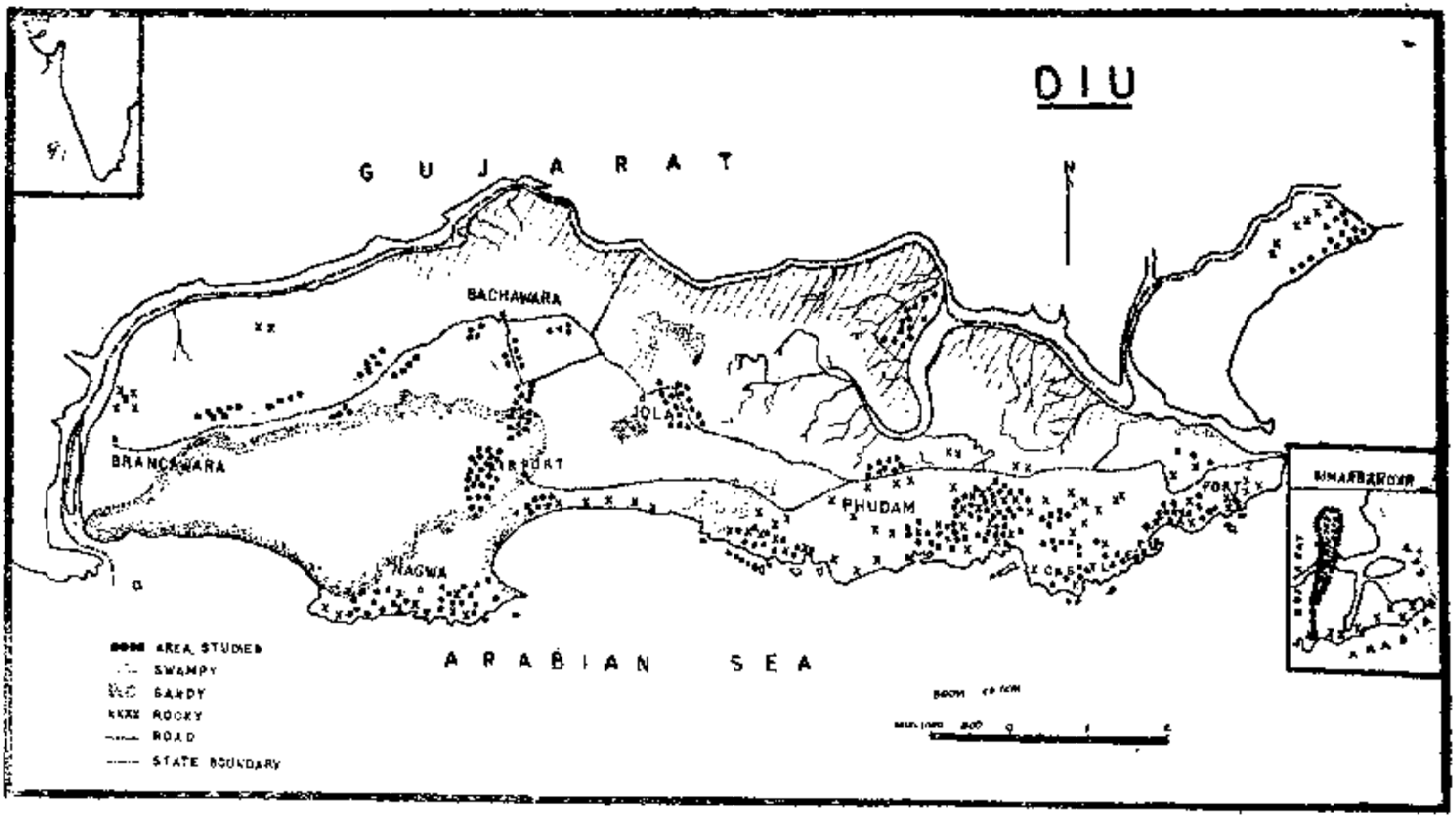
The major portion of the slopes of the Western ghat belt falls within Goa territory and the highest peak is Sonso God (alt. 1022.5 m) in Satari taluka and the other high points range from 350 m to 800 m in different talukas. The Dudhsagar Water falls (Sanguem taluka) with rushing waters of about 600 m below into the far-reaching valleys and luxurient forest, offer a gorgeous panorama, particularly during the rainy season.



MAP I

Diu :

Diu, a small island off Saurashtra coast, with narrow sandy shores and rugged rocky creeks along the south, facing the Arabian sea, is bounded by other sides by narrow swampy Chassi river which separates Gogale, a parf of the main land of Junagadh district of Gujarat State. Gogale together with another tiny Simbor island (Panikota island-situated a few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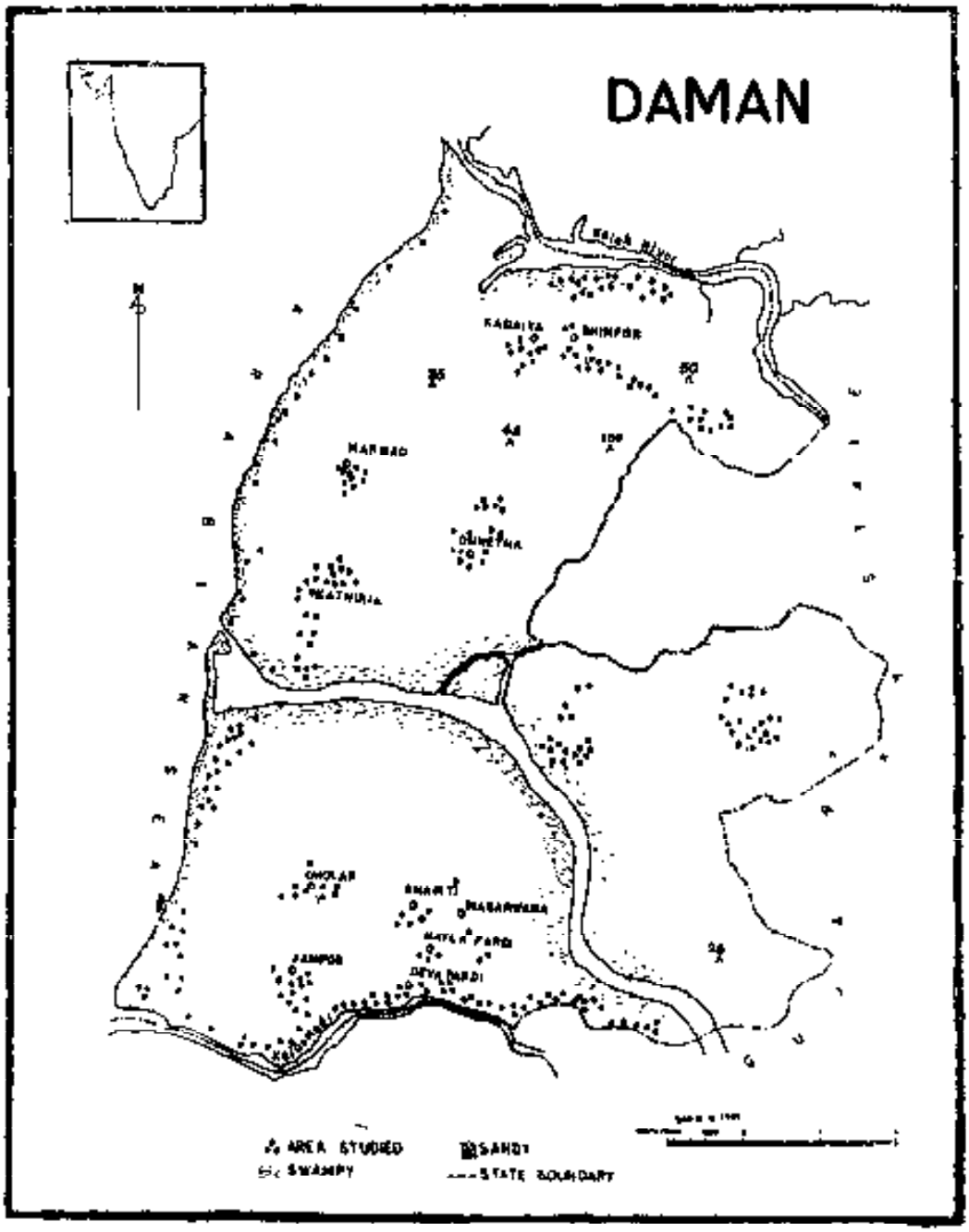
STATE BOUNDARY

MAP II

kilometres away, east of Diu along the coast but not included in the present work) forms a part of Diu district. The location of Diu is 20° 41'54"20° 44'30"N and 70°52'30"-71°0 '30"E (Map II). The island which was under the Muslim rulers of Cambay, was occupied by the Portuguese in 1534. The area of the is and is about 40 sq. km with its maximum length about 12 km and the breadth about 3 km. There is no forest zone but the sandy area is densely covered by branched palms 'okra' [*Hyphaene dichotoma* (White) Furtado].

Daman :



MAP III

Daman is a small enclave with an area of 57 sq. km., along the West coast within 20°12'-20°28' N and 72°50'-72°54'E is bounded by the Arabian sea on the West and Surat district of Gujarat State on other sides. The only important river, Daman Ganga divides the town into big Daman (Fort area with offices) and small Daman (Nani Daman with shops). The area with its ancient fortress was once under the Muslim rulers of Cambay and later in 1555-'59, was acquired by the Portuguese Governor, Francisco Laretto, in exchange of half the revenue derived from Diu. The small township is associated with villages like Bimpor, Dundorta, Dabel, Thana Paidi, Jampor etc., some of them along the swampy banks of the two small rivers, the Coileque on the north and the Calc on the south and on the sandy beach along sea coast. Thorny scrub type of vegetation is quite limited (Map III).

Dadra and Nagarhaveli :

Dadra is a small, town along the Daman-Vapi-Nagarhaveli road, about 8 km north-west of Nagarhaveli. Nagarhaveli is, however, a wide hilly tract with good forest zones. This region is situated between 20°03'-20°22' N and 72°55'-73°13' E. Nagarhaveli was under the Maratha rulers almost during the whole of 18th century and in 1781 they granted Nagarhaveli including Dadra to the Portuguese for the various favours rendered to the rulers. The area, being extremely inaccessible with mostly "Girijans" living in various groups of hamlets on different hill tops, the development even in minor projects was practically negligible during the Portuguese regime. Subsequently by the movement and uprising of the local people, liberation of Dadra was effected in July, 1954 and of Nagarhaveli in August, 1954.

The area of the region is 490 sq. km. Though it was a part of Daman district during the Portuguese regime, due to its earlier liberation, it is now administered as a separate Union territory with Silvassa as the headquarters to the Government. Forests of the area with Saily, Khanvel, Dolora etc. as forest administration centres though very much disturbed earlier, have good potential to improve their productivitiy. Daman Ganga which joins the Arabian sea at Daman is the only important river flowing across the region. The hilly ranges which represent the northern extreme of the Western ghats have high tops with altitudes ranging from 250 m to 432 m. Ghambir ghad, the highest point along the range with 684 m altitude is just outside Nagarhaveli border (Map IV).

GEOLOGY AND SOIL

Following the general pattern of the Western ghats and the west coast of the southern Maharashtra State, the Goa region can be divided into three physiographic units ; (1) Hills and valleys along the ghat zone

with old crystalline rocks of Granite-gneiss mainly of biotic type belonging to Archean age traversed by schists and quartzites. (2) Narrow coast line with sandy soils and alluvium along river banks. (3) Undulating plateau or mainland between the hills and the coast with residual laterite of the detrital type. The most interesting aspect of Goa's position is its location

MAP IV

along the transition zone between the Deccan trap and the Archean rocks. In fact, such transition actually begins from the narrow strip of the Phonda Ambolighat-Ramghat belt of south Ratnagiri district which has a definite bearing on the change in nature of vegetation and its components as observed during the author's studies. The escarpment of the ghats in

Goa mostly consists of Dharwarian Quartzites and granitegneiss which form a part of the extensive southern Archean system, thus presenting the rugged view of hills quite distinct from the terraced formation of Trappean hills of Maharashtra State [For more details on Geology and Soil of Goa, P.D. Dhepe's (1956) publications may be consulted].

The soils in Goa may be broadly classified into three main types : (1) Laterites of high and low level type formed by natural metamorphosis and degeneration of underlying rocks along the ghats. (2) Red gravelly soils derived from micaceous granite gneiss, covering the undulating plateau mixed with medium black soils adjoining river banks. (3) Alluvial soils including coastal alluvium along the coastal belt and in low lying situations.

General data on the geology of the Western India coast north of Bombay, covering the gulf of Cambay and Saurashtra coast (south) are applicable to the region under study, Diu, Daman, Dadra and Nagarhaveli. Cambay gulf basin, being now an important centre on the west coast for oil and gas exploration, is under intensive geological study. It is an intracratonic basin formed by the sinking of Deccan Trap in the form of Graben. There are a few major faults and several subsidiary faults. Along Diu, Gogale coast as in Saurashtra coast, ossiferous conglomerates are found, resting upon thick blue clay. The hills of Nagarhaveli of the Deccan Trap zone have basaltic (amygdaloidal or prophyritic) underlying rocks intersected by dykes of fine-grained basalt and red quartz.

Soils of Diu and Daman mostly belong to coastal alluvium mixed with sand and medium black soil derived from the Trap and rocky creeks of Trap origin. They vary from fine sands (which occupy a wide zone west of the air port area in Diu) to heavy clays. The soils in Dadra and Nagarhaveli area are mostly formed by disintegration of the Deccan Trap rocks, occurring as thin finely broken, well-aerated mantle mixed up with decayed organic matter.

CLIMATE

The climate of Goa region though moist and relaxing, is generally healthy with four seasons, the summer from March to May, the south-west monsoon season from June to September, the post-monsoon October and November and the winter December to February, with a distinct dry period of 6-7 months (November-May) when the rainfall is less than 100 mm in a month.

(a) Rainfall :

The onset of the south-west monsoon is no where so sudden and marked in the whole of India as on the Goa and Ratnagiri coast round

about June 7th where heavy downpours follow the poor rains of hot weather season. The record of rainfall abruptly rising from about 90 mm to 900 mm from May to June year after year, is very indicative of this phenomenon. The average annual rainfall for the Goa region as a whole which is almost continuous from June to middle of October, is 2500 mm. Considerable variation in rainfall from the coastal belt to the ghat ranges is seen from 2600 mm to 3300 mm in the former (Pernem taluka) and from 4000 mm to 5000 mm in the latter (Canacona taluka) (Marmugao 2600 mm; Sanguem 4100 mm; Colem 5000 mm). The rainiest month is July when nearly a third of the annual rainfall is received. The variation from year to year in the rainfall is not large. On the average on 154 days in the year, the Goa region gets rain of 2.5 mm or more per day. The climatic diagram of Goa gives at one sight the impression of the climate as a whole, showing distinctly the duration and the intensity of the average of dry and humid seasons during a year (Figs. 2 & 3).

(b) Temperature :

In the hot season, temperature rises slowly from March and later part of April, and May forms the hottest period with 35°-37°C. With the onset of monsoon, temperature drops by four to six degrees. Day temperatures during monsoon are lowet than those in the cold season. In the post-monsoon months of October and November, day temperatures increase and days in November are considerably very hot. Night temperatures are the lowest in January, ranging 15°-16°C. Areas within 20-25 km from the coast are the most pleasant, particularly in hot months with sea breeze blowing, nearly throughout the day, but along the inland both days and nights can be oppressive during hot season and more so in the foot hill area.

(c) Humidity :

The region on the whole is very humid being very close to the sea with the percentage of humidity varying from 70-90 along the coast and from 80-95 along the ghat zone. Even during the winter and summer months, the relative humidity seldom goes below 70%.

(d) Winds :

Winds are very strong and are mainly westerly or south-westerly during the monsoon months. In the rest of the year, winds blow from directions between north and east in the mornings and between west and north-west in the afternoons.

(e) Special Weather phenomena :

During the pre-and post-monsoon months, the region experiences very strong winds sometimes reaching gale force, particularly very near the

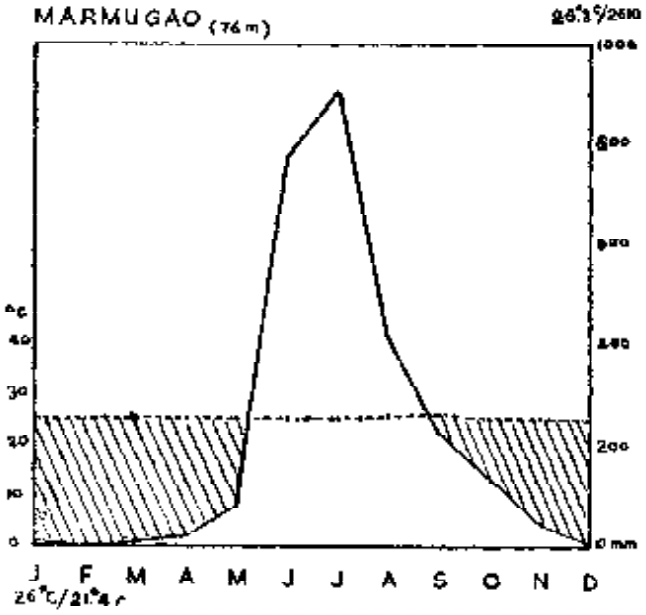


Fig. 2

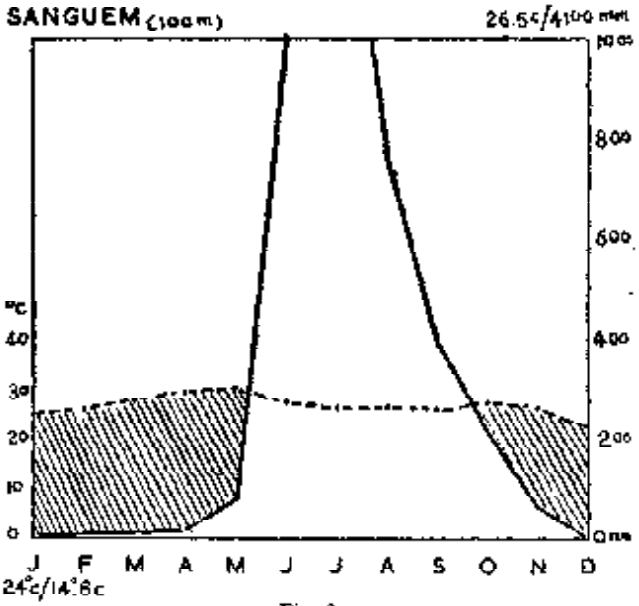


Fig. 3

Fig 2 & 3 : Climatic diagrams of Murmugao (Coastal) and Sanguem (inland) with altitude in meters, mean annual temperature in °C and mean annual rainfall in mm (given at the top of the diagram) and mean daily temperature of coldest month and absolute minimum temperature in °C (given at the bottom of the diagram), indicating temperature curve (dotedline), rainfall curve (thick line) and drought period (shaded space) and proving the drought period as practically constant irrespective of considerable variation in rainfall from coast to inland in Goa.

coast and heavy rain in association with cyclonic storms which develop in the Arabian sea and move in close proximity to the coast. Thunderstorms are common in the post-monsoon months and the latter part of the hot season.

The climatic condition of Diu, Daman, Dadra and Nagarhaveli are similar to the broad pattern characteristic of Gujarat coast and its interior. The area is dry for greater part of the year except for about 3-4 months when it receives precipitation under the influence of south-west monsoon. The post-monsoon period till the end of winter season is quite pleasant. Generally, the rainfall starts from the month of June and lasts till the middle of September, July being normally the month which receives sub stantial rain during the season. The annual average rainfall varies from 584.6 mm (in Diu) to over 2000 mm (in Daman and Nagarhaveli).

Soon after the rains, dry period sets in from October onwards followed by winter season, December-February. The temperature for the coastal places does not go below 16°C while in the hilly tract of Nagarhaveli it touches down nearly 10.5°C. With the onset of summer from March onwards, the weather becomes quite hot with temperature rising upto 37°C.

The data as available for Diu and Daman only indicate that relative humidity in the atmosphere is high during rainy season and low during summer, the percentage varying from 55 to 87 throughout the year.

VEGETATION AND ANALYSIS

The vegetation can be broadly classified into the following types :

(i) Estuarine vegetation consisting of mangrove species along the narrow muddy banks of rivers ; (ii) Strand vegetation along the few coastal belts; (iii) Plateau vegetation comprising of low deciduous as well as moist deciduous species confined especially to the lower elevations of the ghats ; (iv) Semi-evergreen and evergreen forests limited to patches along the upper elevation of the ghats.

Altitudinally, the estuarine and strand vegetation range from sea level to 50 m, the low deciduous and moist deciduous species fall within 50-500 m and the semi-evergreen and evergreen forests occur from about 500 m onwards. Besides, the area abounds in many hydrophytes and grasslands which occur at all elevations. The composition of the various types of vegetation has been briefly analysed below :

(i) *Estuarine vegetation of mangroves along swampy river banks :*

Climate has no appreciable influence on its composition and the depth of the mangroves varies with the local condition. Botanically this

zone is characterised by the peculiar root formations (stilt roots of *Rhizophora*, pneumatophores in *Avicennia*, knee roots in *Bruguiera* etc.) and viviparous fruits for seed dispersal. Selected estuarine areas along the banks of river Chapora at Colvale, along the river Zuari at Borim, and river Goa at Amona and river Tiracol at Conad have been studied in great detail but the vegetation is monotonous and uniform in all these areas with members of Rhizophoraceae being predominant.

Thickets of *Rhizophora conjugata*, *R. mucronata*, *Bruguiera gymnorrhiza*, *Kandelia candel*, *Lumnitzera racemosa*, *Sonneratia caseolaris*, *Avicennia officinalis* and *A. marina* readily strike the eye while *Cerbera manghas*, *Excoecaria agallocha* and *Aegiceras corniculatum* are rather scattered. Undergrowth is scarce being mostly confined to *Acanthus ilicifolius*, *Derris trifoliata*, *D. scandens*, *Clerodendrum inerme*, *Caesalpinia crista*, *Cyperus compactus*, *Vitex trifolia* and members of Poaceae. Often *Acanthus ilicifolius* presents pure formations and near the hightide mark, *Excoecaria agallocha* and *Clerodendrum inerme* are conspicuous together with such drought-loving species as *Crotalaria lutescens*, *Aristolochia indica*, *Boerhavia trianthema* etc.

(ii) *Strand and creek vegetation along coastal belt* :

Much of the coastal region of Goa is rocky with projecting ridges as well as rocky boulders and consequently the strand vegetation is limited to a few patches of narrow strip bordering the Arabian sea. The vegetation along the south bank of river Mandovi near Panaji belong to this category. Tree species as *Pongamia pinnata*, *Thespesia populnea*, *Cerbera manghas*, *Calophyllum inophyllum* and *Pandanus tectorius* some of which are exotics but naturalised, growing wild, whereas *Cocos nucifera* and *Casuarina equisetifolia* are extensively cultivated affording a picturesque view. The other associates include such shrubs as *Derris trifoliata*, *Caesalpinia crista* *Flagellaria indica* and *Scaveola taccada* intermixed with *Sesuvium portulacastrum*, *Arthrocnemum indicum*, *Melanthera biflora*, *Fimbristylis schoenoides*, *Cyperus arenarius*, *Phyla nodiflora* and *Spinifex littoreus*. Along the coastal sands *Urginea indica* and *Launea fallax* flourish luxuriently with *Ipomoea pescaprae* effectively serving as a sand binder at many points especially near the river deltas the strand vegetation abruptly merges with the mangroves with the components of both the types getting intermixed.

Along the rocky creeks and projecting ridges facing the coast, could be seen many herbaceous species as *Neanotis rheedei*, *N. lancifolia*, *Iphigenia indica*, *Scilla hyacinthina*, *Cyperus squarrosus*, *Naregamia alata*, *Begonia crenata*, *Mitreola oldenlandioides*, *Habenaria grandifloriformis*, *Tricholepis glaberrima*, *Adiantum philippense* and *Trichodesma* sp. together with other members of Scrophulariaceae, Asteraceae, Acanthaceae,

Rubiaceae and Euphorbiaceae. *Cassia absus*, *Neuracanthus sphaerostachyus* and *Lepidagathis cuspidata* are common associates with such climbers as *Mucuna prurita*, *Asparagus racemosus*, *Cocculus hirsutus* and *Gloriosa superba*.

(iii) *Plateau vegetation along undulating terrain and foot hills* :

A major portion of Goa belongs to this category with the scrub jungles extending from 50-200 m and the deciduous forests confined to 200-500 m altitude.

(a) **Open scrub jungle** : Undulating rocky plateaus with scant vegetation are met with along Panaji to Cortalim, Panaji to Colvale, Cortalim to Margao and from Bicholim to Sanquelim, to mention a few which are due to manganese ore mining "Kumri" cultivation, overgrazing and other biotic factors. *Anacardium occidentale* is cultivated on an extensive scale. Severely eroded waste lands sustain patchy vegetation composed of dry deciduous elements as *Carissa congesta*, *Holarrhena antidysenterica*, *Lantana camara* var. *aculeata*, *Calicopteris floribunda*, *Woodfordia fruticosa*, *Mictocos paniculata*, *Grewia abutilifolia*, *Vitex negundo* and species of *Breynia*, *Calotropis*, *Zizyphus*, *Cassia*, *Ixora*, *Sesbania*, *Acacia*, *Albizia*, *Terminalia*, and *Crotalaria*. In the wastelands abound *Girardinia zeylanica*, *Scoparia dulcis*, *Leonotis nepetaefolia*, *Borreria stricta*, *Phyllanthus asperulatus*, *Elephantopus scaber*, *Euphorbia fusiformis* and species of *Corchorus*, *Sida*, *Leucas*, *Justicia*, *Smithia*, *Ocimum* etc. The majority of climbers are confined to Menispermaceae (*Cocculus*, *Cissampelos*), Vitaceae (*Ampelocissus*, *Cissus*), Asclepiadaceae (*Gymnema*, *Dregea*, *Pergularia*), Liliaceae (*Asparagus*, *Gloriosa*) and Dioscoreaceae (*Dioscorea bulbifera*, *D. hispida*). The herbaceous vegetation is seen at the best only immediately after the monsoon and by November-December except for members of Poaceae and Asteraceae the ground flora is negligible.

(b) **Moist deciduous forests** : Forests around Tudal, Ordofond, Butpal, Molem, Kodal, Ambiche Gol near Valpoi and Anmode ghat are essentially moist deciduous and much of the forest area in Goa fall under the above type. The important components of the deciduous forests belong to species of *Terminalia*, *Anogeissus*, *Xylia*, *Dalbergia*, *Dillenia*, *Phyllanthus*, *Careya*, *Hymenodictyon*, *Wrightia*, *Xeromphis*, *Grewia*, *Lannea*, *Sapium* etc. mixed with *Dendrocalamus* and *Bambusa*. The dominant families represented by density of population are Rubiaceae (*Ixora*, *Mitragyna*, *Morinda*, *Adina*), Bignoniaceae (*Heterophragma*, *Oroxylum*, *Radermachera*, *Stereospermum*), Euphorbiaceae (*Glochidion*, *Macaranga*, *Sapium*, *Antidesma*, *Bridelia*, *Mallotus*), Anacardiaceae, (*Spondias*, *Buchanania*, *Linnea*), Sapindaceae (*Schleichera*, *Sapindus*, *Allophyllus*, *Lepisanthes*) and Leguminosae (*Dalbergia*, *Pterocarpus*, *Acacia*, *Albiza*, *Xylia*). The tallest arboreal members include *Lagerstroemia lanceolaia*, *Terminalia crenulata*, *Albizia* sp. *Xylia xylocarpa*, *Kydia calycina*, *Schleichera*

oleosa, Lepisanthes sp., *Alstonia scholaris* and *Dalbergia latifolia.* The moderately tall trees comprising the second tier of species include species of *Grewia, Canthium* and *Morinda, Xantolis tomentosa, Sapindus emarginata, Garuga pinnata, Careya arborea, Xeromphis spinosa, Flacourtia indica, Ixora* sp., *Macaranga peltata, Buchanania lanzan, Strychnos nux-vomica, Meyna laxiflora, Antidesma diandrum, Wrightia* sp. to cite a few. The third tier is composed of shrubs or small trees such as *Callicarpa tomentosa, Ventilago maderaspatana, Zizyphus xylopyrus, Z. glaberrima.Leea latifolia, L. indica* species of *Moghania, Clerodendrum* and *Psychotria, Tarenna asiatica, Murraya paniculata, Chasalia ophioxyloides* etc.

The ground flora in forest clearings and exposed situations comprise members of Fabaceae (*Geissaspis, Crotalaria, Indigofera, Alysicarpus, Desmodium*), Acanthaceae (*Justicia, Rungia, Lepidagathis*), Rubiaceae (*Exallage, Oldenlandia, Borreria*), Scrophulariaceae (*Scoparia, Lindernia, Bacopa, Torenia, Rhamphicarpa*), Euphorbiaceae (*Phyllanthus, Euphorbia*), Asteraceae (*Eclipta, Blumea, Spilanthus, Elephantopus, Senecio, Adenostemma*) and Lamiaceae (*Ocimum, Leucas, Leonotis, Pogostemon, Orthosiphon*). Also *Pteris vittata, Selaginella tenera, S. pronifera* and *Ophioglossum fibrosum* are seen in th· moist forest floor. In addition to the climbers met with in the scrub forests, members of Cucurbitaceae, Ranunculaceae, Smilacaceae, Fabaceae, Oleaceae, Convolvulaceae etc. are represented in large numbers.

(iv) *Semi-evergreen and evergreen vegetation along the upper ghats.*

(a) **Semi-evergreen forests :**

These forests are seen only as patches along the upper elevations of the ghats mostly above 500 m and bordering the contiguous forests of Ratnagiri district on the north and North Kanara district in the south. In this belt, the moist deciduous forests gradually change into semi-evergreen formation and isolated patches of typical evergreen species are seen scattered in the sheltered ravines and valleys. Such forests are seen at Amboche gol, Molem, Butpal and Nadquem. Arboreal growth is luxurient and the tree trunks are partially laden with lianas, epiphytes and mosses. These forests are ideally suited for ferns which thrive well in humid conditions. *Angiopteris evecta* is the only tree fern recorded from this forest.

The tallest trees are composed of *Michelia champaca, Myristica malabarica, Cryptocarya wightiana, Actinodaphne angustifolia, Ficus talbotii, Lagerstroemia lanceolata, Pterospermum diversifolium, Zanthoxylum limonella, Sapindus laurifolius,* species of *Holigarna, Garcinia talbotii* and *Canthium dicoccum.* Next in order are seen trees such as *Alseodaphne semicarpifolia, Glochidion hohenackeri, Ixora nigricans, Bischofia*

javanica, Macaranga peltata, Hopea wightiana, Clausena dentata, Linociera malabarica and *Olea dioica*. Along the forest outskirts, *Leea edgeworthii, Gomphandra polymorpha* and *Wendlandia thyrsoidea, Glochidion velutinum, Ficus asperrima, Celtis cinnamomea, Blachia denudata, Cinnamomum* sp., *Ligustrum perrottetii, Ervatamia heyneana* and *Meyna laxiflora* are frequent. The third tier composed of shrubs include *Chasalia ophioxyloides, Psychotria dalzellii, Maesa indica, Gymnosporia rothiana, Paramignya monophylla, Glycosmis mauritiana, Leea indica, L. edgeworthii, Chomelia asiatica* etc. associated with other scandent shrubs, *Lavanga sarmentosa, Ancistrocladus heyneanus, Sarcostigma kleinii, Connarus wightii, Strychnos colubrina, Rourea santaloides, Salacia oblonga, Erycibe paniculata* etc. In the disturbed forest areas *Dillenia pentagyna, Careya arborea, Xeromphis spinosa* are common together with climbers such as species of *Argyreia & Jasminum, Anodendron paniculatum, Ichnocarpus frutescens, Smilax zeylanica, Mussaenda glabra, Rubia cordifolia* and members of Asclepiadaceae and Dioscoreaceae.

(b) **Evergreen forests** :

The evergreen forests never reach the climax as seen at North Kanara in Karnataka but represents a good transitional zone which actually starts from Phonda-Amboli-Ramghat belt of the south Ratnagiri district. The density is much less, often much patchy purely due to biotic interference. The transition from the semi-evergreen forests to the evergreen is gradual and almost imperciptible. The tree components are selected and few limited to such families as Clusiaceae, Ebenaceae, Lauraceae, Moraceae, Euphorbiaceae, Sapotaceae and Burseraceae. The lofty trees belong to *Calophyllum elatum, C. apetalum, Garcinia cambogia, Canarium strictum, Lophopetalum wightianum, Chroisophyllum roxburghii, Palaquium ellipticum, Artocarpus gomezianus, Diospyros ebenum* and *Knema attenuata* whereas the medium sized trees are composed of *Litsea wightiana, L. coriacea, Ficus asperrima, Aporusa lindleyana, Antidesma menasu, Carallia brachiata, Evodia lunuankenda* and *Mallotus philippensis*. Near the streams, *Hydnocarpus laurifolia, Syzygium cumini, Ficus tsjakela, F. talbotii* and *Mammea suriga* are frequent. These forests abound in lianas, such as *Butea parviflora, Entada pursaetha, Schefflera venulosa, Chonemorpha fragrans, Gnetum ula, Derris bakeri* and *Combretum latifolium*. The undergrowth is composed of such shrubs as *Ixora coccinea, Dracaena terniflora, Rauvolfia serpentina*, species of *Nilgirianthus, Thelepaepale, Mackenziea* etc. in addition to those common in semi-evergreen forests. The ground vegetation is sparse and poor limited to members of Zingiberaceae, Araceae, Urticaceae, Cyperaceae and Asteraceae, positively due to frequent cutting and grazing.

As compared to the evergreen forests of North Kanara the epiphytes are comparatively poor, limited mostly to Orchidaceae (*Dendrobium,*

Cymbidium, Eria, Bulbophyllum, Vanda, Aerides etc.), Asclepiadaceae (*Hoya pendula*) & Araceae (*Remusatia vivipara*) but a few species such as *Utricularia striatula, Argostemma courtallense, Habenaria crinifera, Begonia crenata* etc. are seen in the crevices of tree bark wherever there is a little soil and moisture thus superficially appearing as epiphytes. *Drynaria quercifolia, Microsorium membranaceum, Pyrrosia adnascens* are some of the common epiphytic ferns that abound in these forests. The root parasites belong to Scrophulariaceae, (*Striga, Sopubia, Rhamphicarpa, Centrathera*), Santalaceae (*Santalum album*) and Orobanchaceae (*Aeginetia indica*). The stem parasites are predominantly composed of members of Loranthaceae (*Viscum, Helixanthera, Helicanthes, Dendrophthoe, Taxillus* etc.), though *Cassytha filiformis* and *Cuscuta reflexa* are also frequent. The terrestrial orchids include *Platanthera susannae, Nervilia aragoana, Malaxis versicolor*, together with species of *Habenaria* and *Peristylus*. The composition of the parasitic, epiphytic and ground vegetation area is more or less similar in both the evergreen and semi-evergreen forests.

The herbaceous vegetation in these forests include *Geophila reniformis, Adenostemma lavenia, Costus speciosus, Curcuma decipiens, Ageratum conyzoides*, species of *Blumea, Smithia* and *Torenia, Emilia sonchifolia, Spilanthes panteulata* etc. along with members of Cyperaceae and Eriocaulaceae. Along moist rocky slopes occur species of *Neanotis, Canscora, Senecio, Impatiens, Utricularia, Arthraxon, Begonia, Centratherum, Lindernia* and *Oldenlandia* together with *Cheilanthes tenuifolia* and *Adiantum philippense*. Many of the herbaceous species that occur in the moist deciduous forests equally thrive well in these areas.

Hydrophytes :

Under hydrophytes, the free floating as well as the marshy plants have been included irrespective of the forest classifications. The vegetation is monotonous containing many ubiquists and are independent of the macroclimate. The rooting marsh plants include *Nelumbo nucifera, Nymphaea pubescens, N. nouchali, Monochoria vaginalis* and species of *Eriocaulon, Polygonum, Cryptocoryne* etc. besides many sedges and grasses. *Acrostichum aureum*, the littoral fern grows along back waters near Tirem (Satari taluka) and is rather rare. The submerged aquatics are composed of *Ceratophyllum demersum, Najas minor, Blyxa echinosperma, Hydrilla verticillata, Ottelia alismoides* and *Vallisneria spiralis* to cite a few. Among the hydrophytes that extensively cover the surface of water are *Ipomoea aquatica, Utricularia flexuosa, Myriophyllum intermedium, Neptunia oleracea, Cyperus cephalotes, Pistia stratiotes, Hygrorhyza aristata* etc. besides species of *Nymphoides* and *Nymphaea*. Free floating hydrophytes like *Pistia stratiotes, Nymphoides* sp. and *Utricularia flexuosa* grow gregariously-

in such dense patches that vast areas of the pond are completely covered by them. The rare species, *Eriocaulon rivulare* is an interesting collection from these areas.

In the fast flowing streams attached to the rocks are seen members of Podostemaceae, belonging to such species as *Dicraea stylosa*, *Griffithella hookeriana*, *Hydrobryopsis sessile* and *Terniola zeylanica* associated with *Eriocaulon rivulare* and *Homonoia riparia*. In moist or drying mud near ponds and streams are seen species of *Drosera*, *Bacopa*, *Xyris*, *Utricularia*, *Limnophila*, *Sacciolepis*, *Eriocaulon*, *Cyperus*, *Salomonia*, *Phyla*, *Dysophylla*, *Burmannia* in profusion. Along the banks of streams with calm water are seen *Lagenandra ovata*, *Cryptocoryne spiralis*, *Homonoia riparia*, *Crinum asiaticum*, *C. latifolium* and *Rotula aquatica*. In inundated rice fields and shallow waters of the lake *Ceratopteris thalictroides* is frequent.

The account will be incomplete without mention of rheophytes that are confined to banks of streams. *Pandanus tectorius* is conspicuous forming dense thickets with *Lygodium flexuosum* climbing over them. The other tree species that may be included under this category are *Syzygium cumini*, *Ardisia solanacea*, *Cinnamomum zeylanicum*, *Barringtonia racemosa*, *Madhuca longifolia*, species of *Ficus* and *Polygonum*, *Homonoia riparia*, *Hydnocarpus laurifolia* and *Diospyros embryopteris*. The best adopted rheophytes are members of Podostemaceae, that have already been mentioned earlier.

GRASSLANDS

Patches of grassland occur in the plains of Goa especially in low lying areas along the undulating plateau and tall grasses dominate practically suppressing other herbaceous vegetation. The region near Onda is one such fertile area. In such swampy regions, *Isachne miliacea*, *Jansenella griffithiana*, *Pseudoraphis spinescens*, *Saccharum spontaneum*, *Sacciolepis interrupta*, *Hygrorhyza aristata* and *Paspalidium geminatum* dominate. In shady parts *Ischaemum semisagittatum*, *Oplismenus compositus*, *O. burmanni*, *Sporobolus diander*, *Garnotia stricta* and *Cyrtococcum oxyphyllum* are very common. Along rocky slopes *Manisuris acuminata*, *Themeda triandra*, species of *Eragrostis* and *Digitaria stricta* occur. In cultivated fields *Centotheca lappacea*, *Cynodon dactylon*, *Digitaria adscendens*, *Echinochloa colonum*, *E. frumentacea*. *Isachne miliacea*, *Jansenella griffithiana*, *Panicum notatum* as well as species of *Paspalidium* and *Setaria* grow as weeds. *Manisuris talbotii* seems to be restricted in distribution in Goa and possibly to adjoining zones and a new species, namely *Manisuris goaensis* has been described by us from this region.

ECONOMIC AND MEDICINAL PLANTS

In Goa a wide range of wild plant material grows well and with proper planning and systematic cultivation some of the species can be developed into plants of considerable economic importance. Plants like *Cocos nucifera, Anacardium occidentale, Mangifera indica, Ananas comosus, Areca catechu, Piper nigrum, Artocarpus heterophyllus,* species of *Musa* and *Citrus, Psidium guyava* and their cultivation and further development on a commercial basis are quite well known. Species of *Garcinia indica, Cinnamomum zeylanicum, Myristica fragrans, Murraya koenigii* as condiments deserve a mention for their utility. A few other species like *Flacourtia jangomas, Averrhoa bilimbi, A. carambola, Litchi chinensis, Phyllanthus emblica* are also grown for their edible fruits.

As for the timber, variety of woods are in demand with the developing industrialisation and some of the species suggested here are known for their quality of wood. With proper management of deciduous and semi-evergreen forests, most of the species can be brought into the approved range of species required for woodbased industries. Besides the wellknown timber species of *Terminalia, Tectona, Lannea, Dalbergia, Xylia, Lagerstroemia* etc. trees like *Saccopetalum tomentosum, Hopea wightiana, Sterculia foetida, Pterocarpus marsupium, Pongamia pinnata, Bridelia retusa, Dillenia pentagyna, Holigarna arnottiana, Syzygium cumini Mitragyna parvifolia, Madhuca longifolia* also deserve special attention. Though *Tectona grandis*, the teak, does not occur wild it can possibly be introduced and cultivated as seen from the forty year old teak plantations at Valpoi which is somewhat satisfactory. Several useful exotics like *Eucalyptus, Casuarina* etc. grow well.

For extraction of fibres, oils, gums etc. several species are known to yield suitable material. Species like *Sarcostigma kleinii, Blumea eriantha, Guizotia abyssinica, Carthamus tinctorius, Mimusops elengi, Origanum vulgare, Thymus vulgaris, Santalum album, Croton tiglium, Hitchenia caulina, Vetiveria zizanioides, Cymbopogon* sp. etc. are quite important as oil producing plants. *Corchorus capsularis, Crotalaria juncea, Calamus pseudo-tenuis, Caryota urens* are some of the fibre yielding plants where as *Sterculia urens* is a good source of "Karaya" gum used as a food preservative.

The grasslands of Goa harbour many economic fodder grasses which could be profitably utilised through proper farm mangement. The highly palatable fodder grasses include *Centotheca lappacea, Cynodon dactylon, Echinochloa frumentacea, Hygroryza aristata, Isachne globosa, Paspalidium geminatum, Digitaria adscendens,* species of *Setaria, Themeda cymbaria, T. tremula* and *T. triandra.* A few species as *Alloteropsis cimicina, Apluda mutica, Chloris barbata, Coix lacryma-jobi, Garnotia stricta* etc. though not

upto the mark, are still browsed by cattle when other sources of fodder are scarce. However, care should be taken to avoid some grasses like *Dactyloctenium aegyptium* and *Paspalum scrobiculatum* which develop poisonous cyanogenetic principles especially on wilting. In addition, many forage legumes are found growing wild in these grasslands and these legumes due to their high protein content, richness in calcium and phosphorus add considerably to the nutritive value of the forage grasses if they form at least 20% of the fodder. The common legumes that occur in this region are *Desmodium triflorum, Geissaspis cristata, G. tenella, Goniogyna hirta*, species of *Alysicarpus & Indigofera, Phaseolus radiatus, P. trilobus, Sesbania sesban, Smithia sensitiva, S. conferta* and species of *Cassia, Vigna, Zornia & Tephrosia* etc. which are well known for their forage value but in nature these do not occur in proper proportion. By selecting such of the indigenous rich legumes that are common in Goa and by broadcasting the seeds during the early monsoon, the nutritive value of the fodder grass can be considerably enhanced.

The area is quite rich in medicinal plants. There is a good possibility of introduction and cultivation of several useful species required by the Pharmaceutical firms of Bombay who have already been planning for cultivation and propagation of specific medicinal plants. To mention a few, species like *Salacia chinensis, Rubia cordifolia, Spilanthes paniculata, Plumbago indica, Holarrhena antidysenterica, Rauvolfia serpentina, Gymnema sylvestre, Tylophora indica, Hemidesmus indicus, Strychnos nux-vomica, Solanum nigrum, Withania somnifera, Adhatoda vasica, Hygrophila auriculata, Ocimum basilicum, Coleus amboinicus, Zingiber officinale, Ensete superbum, Curculigo orchioides, Iphigenia indica, Aloe barbadensis, Asparagus racemosus* var. *Javanicus* and *Gloriosa superba*, well known for their medicinal value, grow under natural conditions in Goa forests.

PLANTS OF BOTANICAL VALUE

The flora of the region abounds in interesting species of botanical value both from the taxonomic as well as academic point of view especially for student community. Quite a few species have been found to be new to the science like *Manisuris goaensis, Arthraxon lancifolius* var. *hindustanicus* and species of *Fimbristylis* etc. *Ceropegia fantastica*, a rare plant has been collected again after a lapse of over 50 years. *Drosera indica* species of *Utricularia* members of Podostemaceae like *Dicraea stylosa, Griffithella hookeriana, Hydrobryopsis sessile, Terniola zeylanica* and prasites like *Aeginetia indica, Dendrophthoe, Helixanthera, Helicanthes, Loranthus, Macrosolen* and *Viscum* are quite interesting enough. Orchids both terrestrial and epiphytic like species of *Platanthera, Habenaria, Liparis, Eulophia* and species of *Pholidota, Cymbidium, Dendrobium, Vanda* etc. deserve special mention. The Pteridophyte flora is equally rich with species of

Selaginella, Ophioglossum fibrosum, Angiopateris evecta, Acrostichum aureum, Schizoloma heterophyllum and several others.

Many species of considerable values and interest along Baranzong iron ore mine area, are disturbed and eliminated. It is very necessary to level the mine areas and provide the suitable environment for the natural regeneration of the species of the surrounding forest.

Diu :

The vegetation on the island is confined to various habitats such as rocky creeks, sandy sea shore, sand stone pits, swampy backwater area, salt pans and fallow fields and roadsides. Tree species are practically absent except for *Hyphaene dichotoma* together with plants like *Borassus flabellifer, Cocos nucifera, Pongamia pinnata, Tamarindus indica, Pithecellobium dulce, Thespesia populnea* etc. most of which are exotics.

On the eroded projected rocky creeks along sea shore, a number of herbaceous species like *Statice stocksii, Portulaca quadrifida, Glinus, oppositifolius, Goniogyna hirta, Tephrosia uniflora* ssp. *petrosa, Kickxia ramosissima, Trichodesma indicum, Dipteracanthus patulus, Euphorbia parviflora, Phyllanthus debilis, Atriplex stocksii* etc. together with a climbing and trailing plants such as *Cocculus hirsutus, Clitoria ternatea, Cayratia carnosa, Mukia maderaspatana, Ipomoea maxima* etc. are common. The most common grasses met with are *Apluda mutica, Chloris montana, Cymbopogon parkeri* and a few others. At Nagoa, a small area of gravel and rock, adjoining the rocky creek, stunted bushes of *Commiphora wightii* form a dominant community mixed with *Barleria prionites, Striga gesnerioides* var. *minor* a root parasite on *Andrographis echioides* and *Lepidagathis trinervis* is rather frequent along this area.

It is quite curious to note that some of the above mentioned herbaceous taxa and *Commelina albescens*, an interesting species, so far known from Rajasthan only, grow sparsely or sometimes singly in the small shallow pits on the rocks covered by a thin layer of sand. Further some of the rocks deeply projected into the sea are heavily laden with marine algae of a wide range of species of which are considered to be of economic value, (These species are not included in the present work).

Along sea shore on the southern face of the island, sand binders like *Ipomoea pes-tigridis, Cyperus arenarius, Aeluropus lagopoides* grow luxuriantly. The other herbaceous associates are *Polycarpaea spicata, Digera alternifolia, Hydrophylax maritima, Borreria articularis, Evolvulus alsinoides, Phyla nodiflora, Indigofera cordifolia, Eragrostis ciliaris* etc.

Very near to the undisturbed sand stone ditches and excavations particularly in castle area a number of perennials such as *Abutilon indicum, Pupalia lappacea, Lantana camara* var. *aculeata, L. indica, Cassia italica, Boerhavia verticillata, B. diffusa, Triumfetta rotundifolia, Plumbago zeylanica* and annuals like *Bidens biternata, Trianthema decandra, Andrographis echioides, Trichodesma indicum, Vernonia cinerea, Pulicaria wightiana* together with trailing and twining plants like *Cardiospermum halicacabum, Cucumis prophetarum, Mukia maderaspatana, Ipomoea obscura, Rhynchosia minima* var. *laxiflora* and grasses, *Sporobolus marginatus, Cenchrus setigerus, Chloris montana, Apluda mutica, Arthraxon lancifolius, A. prionodes* are of common ocurrence.

The muddy flats along the northern edge of the island with a thin layer of alluvium harbour only one mangrove species, *Avicennia marina* var. *acutissima*. Even the mature plants are very stunted, hardly 30 50 cm high, and such growth may possibly due to regular picking up of tender leaves by local people, for cattle fodder. *Aeluropus lagopoides* and *Urochondra setulosa* which resist brackish and marshy conditions, grow in this area.

Near about salt pans, a little away from the marshy tract, halophytes represented by *Suaeda* and *Arthocnemum* together with the usual grasses and sedges *Aeluropus lagopoides, Urochondra setulosa, Fimbristylis polytrichoides* are met with. Colonies of *Cressa cretica, Arthocnemum indicum* and *Salicornia* sp. are quite predominant.

In the fallow fields covered with sandy soil mixed with gravel and rock, stunted *Xerophytes* and mesophytes are common represented by *Euphorbia nivulia, E. tirucalli, Gymnosporia emarginata, Caesalpinia crista, Leptadenia pyrotechnica, Barleria prionites, Lantana indica, Calotropis procera, Jatropha gossypifolia, Hibiscus micranthus, Cordia rothii* together with some climbers like *Pergularia daemia, Rivea hypocrateriformis, Asperagus racemosus, Ipomoea obscura* etc. In and around fields where *Setaria italica* is cultivated, annuals such as *Commelina forskalaei, Corchorus aestuans, Celosia argentea, Striga densiflora* and a few grasses like *Cenchrus setigerus, Apluda mutica, Chrysopogon fulvus, Sorghum halepense* etc. grow sparsely.

The common roadside weeds in Diu town are *Cleome viscosa, Cassia tora, Indigofera linnaei, Glinus oppositifolius, Acanthospermum hispidum, Pedalium murex, Sesamum mulayanum, Acalypha indica* etc.

The luxuriant growth of the branching palm, *Hyphaene indica* in several hundreds along the extensive sandy bed of the air field area and also the adjoining regions outside Diu boundary is really remarkable and has

no parallel anywhere in India, either along coastal or desert areas.

Daman :

Major part of the area is under cultivation either for food crops or cash crops. The sandy or strand vegetation appears all along the narrow sandy beach mixed with undulating gravelly mounds or small hillocks, practically barren or with low scrubby vegetation. The narrow strips of muddy flats present a poor mangrove vegetation.

Along the sandy belt *Aloe barbadensis*, *Sericostoma pauciflorum* *Ipomoea pescaprae*, *Solanum surattense*, *Jatropha gossypifolia*, *Thespesia populnea*, *Acacia nilotica*, ssp. *indica*, *Lantana* sp. etc. are found to be common. *Hyphaene dichotoma* grows singly or in groups along the southern coastal belt but not in such large numbers as seen in Diu and surroundings. The northern sandy belt is mostly with coconut plantations. Along the shore and a little interior, *Phoenix sylvestris* and *Borassus flabellifer* are common.

The undulating terrain and hillocks are devoid of tree growth. A few shrubs and mostly, grasses dominate such habitat. The open grassy areas and the slopes of the hillocks are dominated by species of *Themeda-Pseudanthistiria* community, commonly associated with *Ischaemum indicum*, *I. semisagittatum*, *Iseilema laxum*, *Heteropogon contortus*, *Eragrostis viscosa*, *Digitaria* sp., *Setaria glauca*, *Chloris barbata* mixed with a few legumes like *Geissaspis cristata*, *Alysicarpus bupleurifolius*, *Sopubia delphinifolia*, *Evolvulus alsinoides*, *Celosia argentea* and species of *Smithia*, *Desmodium*, *Lepidagathis*, *Borreria* etc. Among the shrubs, *Lantana* sp., *Adhatoda vasica*, *Euphorbia tirucalli*, *E. neriifolia*, *Vitex negundo*, *Grewia tiliaefolia*, *Woodfordia fruticosa*, *Zizyphus mauritiana* are found to be common along the plains.

The ruderal vegetation commonly consists of *Leucas lavandulaefolia*, *Martynia annua*, *Leonotis nepetaefolia*, *Justicia simplex*, *Alysicarpus hamosus*, *Xanthium strumarium*, *Malachra capitata*, *Cassia occidentalis*, *Achyranthes aspera*, *Tridax procumbens*, *Argemon mexicana* and such other weeds. Along the moist situations species of *Cyperus*, *Fimbristylis*, *Scirpus*, *Eriocaulon* and *Dopatrium junceum* etc. appear frequently.

The mangrove vegetation occurring on muddy flats along the river banks of Daman Ganga, Coileque and Kalei consists of mostly *Avicennia marina* var. *acutissima*, associated with *Aegiceras corniculatus*, *Acanthus ilicifolius*, *Sonneratia apetata*, *Salicornia* sp. and a few members of Cyperaceae and Poaceae.

Dadra :

The area is generally under cultivation with a few open grassy fields and wastelands.

The grasslands are generally dominated by species of *Pseudanthistiria-Themeda - Iseilema* community. The common associates in the grasslands are *Ischaemum indicum, Setaria glauca, Aeschynomene indica, Alysicarpus vaginalis, Desmodium triflorum, Smithia salsuginea, Rhamphicarpa longiflora, Merremia emarginata, Phyllanthus simplex, Aneilema* sp., *Enicostema hyssopifolium, Triumfetta rotundifolia* and a few others.

The ruderal vegetation is very similar to that of Daman with species of *Leucas, Martynia, Xanthium, Cassia, Achyranthes, Malachra, Argemone* and others. Various species of *Cyperus, Fimbristylis, Eriocaulan, Dopatrium* and *Phyla* cover moist habitat. Associated with these are the palms, *Borassus flabellifer* and *Phoenix sylvestris*.

Nagarhaveli :

The vegetation in general is that of moist deciduous type. In lower plains and valleys, cultivation of food crops is common. Small patches of open grassy fields intersperse the forest zones. The forests though quite disturbed by the nomadic "Girijans" and their shifting cultivative, have a high capacity for production with a good range of species composition. During the dry period, much of the valuable forest litters are swept-off and burnt in groups to serve as nutrient ash for their crops, a privilege followed as a right since the days of Portuguese rule.

The general pattern of the floristic composition of these forests is mostly uniform except in the frequency of a few species. The common tree species are *Tectona grandis, Terminalia crenulata, T. bellirica, Adina cordifolia, Garuga pinnata, Phyllanthus emblica, Mitragyna parvifolia, Butea monosperma, Diospyros melanoxylon, Anogeissus latifolia, Cassine glauca, Heterophragma quadriloculare, Morinda tinctoria, Careya arborea, Ficus* sp., *Dillenia indica, Bridelia squamosa, Trevia polycarpa, Dalbergia latifolia, Ougeinia oojeinensis, Lagerstroemia parviflora* and others. White stemmed trees of *Sterculia urens* are more conspicuous in the northern zone forests. *Dendrocalamus strictus* and *Bambusa bambos* are fairly common.

The shrubby layer is generally dominated by *Carissa congesta*. The other common associates are *Holerrhena antidysenterica, Wrightia tinctoria, Grewia tiliaefolia* var. *leptopetala, Helicteres isora, Woodfordia fruticosa, Leea indica, L. macrophylla, Baliospermum axillare. Thespesia lampas, Meyna laxiflora* etc.

The herbal undergrowth is rather poorly represented on account of the sweeping and clearing of forest floor and such other biotic interferences. However, species like *Scilla hyacinthina*, *Curculigo orchioides*, species of *Curcuma*, *Arisaema*, *Heliotropium*, *Iphigenia*, *Dentella repens*, *Cyanotis cristata*, *Murdannia scapiflora*, *Chlorophytum laxum*, *Lindernia crustacea*, *Impatiens kleinii*, *Pimpinella* species and other geophytes (in the early monsoon period) associated with *Neuracanthus sphaerostachyus*, *Rungia elegans*, *Blepharis asperrima*, *Barleria prattensis*, species of *Abelmoschus*, *Desmodium*, *Teramnus labialis*, *Rhynchosia rothii*, *Hemidesmus indicus*, *Corchorus aestuans*, *Trichodesma* sp., *Blainvillea acmella* and various grasses such as species of *Oplismenus* and *Ischaemum*, *Spodiopogon rhizophorus*, *Arundinella pumila* are the common components of the ground flora.

Calycopteris floribunda and *Combretum ovalifolium* are fairly common climbers of the forest, whereas species of *Aerides*, *Oberonia*, *Dendrobium* are a few of the epiphytic orchids. *Viscum articulatum* is the most common stem parasite.

The riverian vegetation on the gravelly beds and along the banks of Daman Ganga river and its tributories consist of *Homonoia riparia*, *Tamarix ericoides*, *Polygonum glabrum*, *Cyperus rotundus*, *Rotala aquatica*, *R. tenuis*, *Hygrophila serpyllum*, *Bacopa monnieri*, *Cyathocline purpurea*, *Ammania baccifera* and *Canscora diffusa* mixed with sedges and grasses as species of *Fimbristylis*, *Eleocharis*, *Isachne*, *Arundinella* and others.

ECONOMIC AND MEDICINAL PLANTS

The richness of economic and medicinal plants depends upon the richness and diversity of the flora of the region which in turn depend upon the geographical position of that region. The development of local "Small Scale Industries" depends solely upon the availability and existence of such natural resources.

Trees like *Tectona grandis*, *Terminalia crenulata*, *T. bellirica*, *Anogeissus latifolia*, *Dalbergia latifolia*, *Adina cordifolia*, *Butea monosperma*, *Mallotus philippensis*, *Lagerstroemia parviflora* etc. yield valuable timber. *Sterculia urens* is a good source of "karaya" gum used as food preservative and is being exported. The epicarp of ripe fruits of the indigenous Doum palm, *Hyphaene dichotoma* ("Okra" or "Makamberu") is edible and is consumed by local people, whereas its mature, hard endosperm is utilised in making very attractive small scent and snuff containers, thus serving as a good source for cottage industry. *Phoenix sylvestris*, *Borassus flabellifer* are often tapped for preparing liquor. *Diospyros*

melanoxylon provides "beedi leaf" which is a good source of revenue as a minor forest product.

Species like *Alhagi pseudalhagi, Asparagus racemosus, Tribulus terrestris, Sida cordata, Thevetia peruviana, Ocimum sanctum, O. gratissimum, Clitoria ternatea, Eclipta prostrata, Tridax procumbens, Holarrhena antidysenterica, Hemidesmus indicus, Solanum surattense, Salvadora persica, Adhatoda vasica, Boerhavia diffusa, Gloriosa superba, Aloe barbadensis, Commiphora wightii, Ensete superbum* are some of useful medicinal plants from these regions and a few of them are well-known for their medicinal properties.

PLANTS OF BOTANICAL VALUE

Hyphaene dichotoma (= *H. indica* Becc.) an interesting palm which has been often confused with the introduced Egyptian species *Hyphaene thebaica* (in various gardens) has been clarified by me together with its distribution along the west coast of India (1963, 1964). Record of *Moghania tuberosa*, a rare plant, poorly represented in herbaria and Rajasthan desert plants, *Cordia crenata* and *Commelina albescens* (now collected from Diu) and *Murdannia scapiflora* in Nagarhaveli, is of considerable interest.

DISCUSSION

During the studies on the flora of Goa region 1115 species of Angiosperms belonging to 657 genera arranged into 146 families have been collected. Of these 891 species under 538 genera classified under 124 families belong to Dicotyledons and 224 species under 119 genera presented under 22 families are Monocotyledons. A few Pteridophytes numbering to 27 species representing 25 genera arranged under 11 families have, however, been collected wherever available. *Gnetum ula* is the only Gymnosperm that grows wild in these forests. While analysing the number of wild species represented by each family, it is evident that there are 21 families which present more than 15 species and each such number together with the number of genera within brackets are given below against each family following the order of dominance :

I. Fabaceae-79(40) ; II. Poaceae-68(44) ; III. Euphorbiaceae-51(28) ; IV. Cyperaceae-48(9) ; V. Rubiaceae-46(28) ; VI. Acanthaceae-42(27) ; VII. Asteraceae-41(31) ; VIII. Convolvulaceae-33(12) ; IX. Malvaceae-26(11) ; X. Lamiaceae-22(14) ; XI. Mimosaceae-22(9) ; XII. Orchidaceae-21(16) ; XIII. Scrophulariaceae-20(10) ; XIV. Caesalpiniaceae-20(8) ; XV. Moraceae 19(4) ; XVI. Verbenaceae-18(11) ; XVII. Commelinaceae 18(5) ; XVIII. Vitaceae-18(5) ; XIX. Asclepiadaceae-17(13) ; XX. Cucurbitaceae-17(12) ; XXI. Apocynaceae-16(14).

Further scrutiny of the data on dominant families based on the number of species with reference to those as observed in the neighbouring zones of Goa region, namely Khandala ghats in the north and North Kanara ghats in the south besides general comparison with the peninsular India flora as given in Gamble's Flora of Madras province and as analysed by Hooker and also the India flora as presented by Hooker. f. reveals interesting points. The following table gives dominant families of Goa in regular order and the position occupied by such families in other floras.

Table

No. of species	Family	Order of dominance in Goa Flora	Santapau's Khandala Flora	North Kanara Flora	Gamble's Flora of Madras province	Hooker's order for Western peninsula	Hooker f's order for India
121	Leguminosae*	I	II	I	I	II	II
68	Poaceae	II	I	II	II	I	III
51	Euphorbiaceae	III	VI	III	V	VI	V
48	Cyperaceae	IV	V	V	VIII	V	VIII
46	Rubiaceae	V	IX	VI	III	VII	IV
42	Acanthaceae	VI	IV	IV	IV	III	VI
41	Asteraceae	VII	III	VII	VII	VIII	VII
33	Convolvulaceae	VIII	X	X	—	—	—
26	Malvaceae	IX	XV	—	—	—	—
22	Lamiaceae	X	XII	—	IX	IX	IX
21	Orchidaceae	XI	VII	VIII	VI	IV	I

*Leguminosae (*sensu lato*) is considered in this estimation.

The data as shown above indicates that the flora of North Kanara with its order of dominant families looks closer in its pattern to the flora of Goa than that of Khandala. In general the peninsular India flora as represented by Gamble's work and that of Hooker f. and the flora of India mostly signify the contrast in comparison to the floras on either side of Goa region. This observation confirms my opinion about the closer affinity of Goa flora with the evergreen forests of the Mysore ghats.

While carrying out the floristic studies of the areas Diu, Daman, Dadra and Nagarhaveli, 607 species of Angiosperms belonging to 358 genera have been collected and sorted out into 89 families. Of these, 442 species grouped into 272 genera belong to Dicot families numbering 74 and 165 species of 86 genera come under 15 Monocot families. The analysis indicating the dominance of a few families based on representative

species from the region under study, as presented in the table below, is prepared by putting together all the components available from the shore lands of Diu and Daman and the interior hills of Nagarhaveli. This is no doubt an incongruous combination when compared to the composite unit of Goa flora, but at the moment such combined data is worked out only for general comparison with the dominant families of surrounding regional floras like Pavagadh hill (near Baroda) Flora (1966) and Saurashtra check list (1967) and those as suggested by Hooker f. for Indus plains and India as a whole.

Table

No. of species (No. of genera)	Family	Order of dominance in Diu-Nagarhaveli Flora	Pavagadh Flora	Saurashtra checklist	Hooker f's order for Indus plains	Hooker f's order for India
86 (49)	Poaceae	I	II	II	I	III
80 (41)	Leguminosae	II	I	I	II	II
37 (7)	Cyperaceae	III	—	VIII	IV	VIII
27 (23)	Asteraceae	IV	III	III	III	VII
25 (9)	Euphorbiaceae	V	V	VII	IX	V
21 (13)	Acanthaceae	VI	IV	VI	—	VI
18 (13)	Scrophulariaceae	VII	XI	XIV	V	—
17 (12)	Rubiaceae	VIII	—	X	—	IV
16 (8)	Malvaceae	IX	VII	IV	VIII	—
14 (6)	Convolvulaceae	X	VI	V	X	—
13 (3)	Commelinaceae	XI	—	—	—	—

A general comparison of the gradation in the dominance of family from different regions reveals that families Poaceae, Leguminosae, Cyperaceae and Asteraceae maintain almost identical positions both in the present flora and in Hooker's data on Indus plains flora. Further, irrespective of the slight exchange, the positions of Poaceae and Leguminosae are equally dominating compared to the rest of the families in other floras and even in Flora of India as a whole. But there is one snag about this comparison between the two families. Leguminosae (*sensu lato*) according to present understanding, actually comprised three families Fabaceae, Caesalpiniaceae and Mimosaceae. Hence, if the two later families are excluded and the more prominent family Fabaceae which include highly economical species as well as good herbaceous legumes that grow as very useful components in grass lands, is treated in par with the composite grass family, even then Poaceae comes out always as the most dominant in all the drier parts, surrounding the region under study.

Further, good sandy zone of Diu and Daman where the family Poaceae is well represented may also be developed into possible grassland

areas. Before undertaking a small project even on experimental basis, proper understanding of the adaptability of grass on sandy soils and subsequently developing into good grasslands, is essential. The typical grasses have a very high transpiration rate which is not checked even by an incipient lack of water in the soil. At the moment when nearly all the water has been lost, the osmotic value of the cell sap of the leaves rises abruptly and the leaf tissue dies. After a short time, the whole grassland turns yellow. Only the growing points of the shoots at the soil surface surrounded by the dead leaf sheaths and protected by them against water loss, remain alive as do the roots in the soil. Generally the cortex of the root dies and only the central part remains loosely surrounded by the dead rhizodermis with sand particles ("root trousers"). The high transpiration rate of living grasses can be maintained because the grasses have a so called "intensive root system" with good water absorbing capacity; a comparable small soil volume is very densely permeated by fine roots. Such a root system is only appropriate, if the available water content of the soil during the growing season is high. Therefore the grassland grows best in region with summer rainfall and on fine sandy soils. Grasses are able to endure long drought periods in a "dormant" state and they do not need water for transpiration, since the leaves are dead. With the type of sandy environment, as seen in Diu, a few experiments for the grassland development on a small scale to begin with are worth the trial.

In Daman, particularly in the inland undulating plateau area, grazing of cattle and sheep is quite heavy. With this the leaf surface of the grasses is decreased by grazing, less water is therefore used by grasses and more is left in the soil during the dry season. This benefits the shrubs and trees but even their growth is stunted due to careless wood cutting for fuel etc., with the result, the small hillocks in Daman are seen covered by thorny bushes developing a scrub, thus resulting neither a forest or a grassland. It may, therefore, be advisable to carry out a few experiments by way of fencing the hillocks completely to protect them from grazing and make the necessary observations whether useful grasslands could be developed in Daman area so that an appropriate rotational system of grazing could be adopted, later. Quality of such grasslands can also be improved further by mixing up useful species of legumes which also grow well in this region and by introducing more palatable species of fodder grasses when the environment is well established for grassland development.

Another interesting observation can be made with reference to the unusually luxuriant growth of branching palms, *Hyphaene dichotoma* (=*H. indica*) in Diu and surrounding areas. The occurrence of climatic

woodland zones along very flat regions, especially on flat water sheds in East Africa, presents a distinct vegetation pattern. The plant cover is a macromosaic of branching strips of grassland amidst endless woodland. The ecological explanation of this pattern is the nearly unobservable micro-relief. During the rainy season the water overflows the slight depressions at the head of the water courses, but the penetration of the water into the soil is not deep due to a clay layer near the soil surface. During the dry season, these soils dry out entirely. No tree species can stand this alternation of inundation and drought except some palms like *Hyphaene* or *Borassus* (Walter, 1964). Therefore, on such alternately humid and arid plains a climatic woodland zone, either edaphic grassland or a palm tree savanna is developed in Africa. The environment with palms, as seen in Diu with extensive growth of *Hyphaene* and *Borassus*, is somewhat comparable to those in Sudan and North Arabia as observed by Walter (1964) who indicates that in the deserts of North Sinai on the Mediteranian coast, Date palms (*Phoenix dactylifera*) grow on the beach in front of high bare sand dunes with sea waves reaching the palm bases during stormy weather and appearing as though the palms are growing in sea water. But a more detailed examination shows that under the baye dunes there is a fresh water table forming a cushion above the saline sea water. The rainfall in this region is 100 mm. The rainwater percolates easily through these bare sand mounds. As there is no vegetation on these mounds, it is not used for transpiration and causes a ground water table. The upper surface of this fresh ground water is higher than the sea level. Therefore, it flows slowly through the sand of the beach into the sea. The roots of the date palms absorbs this fresh water. So if the fresh water table is about 3 m deep, then there is no evaporation. On such places, it is possible to plant date palm suckers so deep that the base of the sucker is in the moist sand above the ground water and only the tips of leaves bound together show above the surface of the sand. After the roots are formed the palm starts to grow and the shoot emerges from the sand. As the conditions existing in Diu are somewhat similar and the luxuriant growth of *Hyphaene* seems to be to some extent indicative of suitable environment for a possible trial cultivation of Date palms, it is worth investigating the soil structure and the availability of any good fresh water table in Diu island zone.

As regards moist deciduous forests of Nagarhaveli, no specific suggestion is required except good forest management. The adjoining Dangs forest zone with almost identical climate geology and soil is a standing example of high productivity, inspite of extreme biotic interference by the "Girijans" of those hills. No doubt, with the 400 years of bad management during the Portuguese regime, the Nagarhaveli forests have suffered considerably ; but with proper forest planning, silviculture and protection,

the forests with their wide range of tree and shrubby species would be able to compete equally well with the neighbouring forest zone including the rich Dangs forests.

During such future developmental planning, the floristic data presented in this work, I hope, would be useful for a better understanding and appreciation of the species, their identity, affinities and distribution in the region under study and also for assisting in the preparation of a major flora of the Gujarat region.

Natural vegetation is often supposed to integrate and express the whole environment (topography, geology, soil and climate). Hence the study of vegetation and its composition form the basis for the preparation of vegetation maps which in turn are useful for the land utilisation studies and for determining appropriate 'land units'. For proper interpretation of the vegetation maps it is essential to know the causative relationship between the plant distribution and the environmental factors together with the floristic composition. Such study would further lead to eco-physiological investigations about which we have a long way to go particularly in our country.

Lauer (1952) indicates that the duration of the dry season is of decisive importance and not the amount of rain for the different vegetation types in the tropics. Walter (1964) argues that this statement is not quite correct. He says that both the total rainfall and the duration of the drought are important ; the former more for the drier vegetation types and the latter more for the humid forest types.

Considering the two aspects noted above, studies on the floristic composition of seven distinct areas with three places for Goa (as noted in the table given below), selected along the Western ghat belt covering regions of Maharashtra, Goa and Mysore are carried out during 1960-68 and the various details are presented in my paper on "Floristic Patterns along the Western ghats of India" [Notes from the Royal Botanic Garden, Edinburgh 37 (1) : 95-111.1979]

Analysis of such studies presents the gradual change from the semi-evergreen type of vegetation to the evergreen type along the Western ghat belt and such change actually begins from the Phonda-Ambolighat area which along with the Goa ghats forms a transitional zone of considerable phytographical significance. The gradual change in the climatic pattern coupled closely with the geology from the Trap to the Archean type has a positive bearing on the vegetation of this interesting zone. The sudden change in the composition of vegetation from Mahabaleshwar to Ambolighat-Goa ghats (Ambechegol-Butpal & Nadquem), irrespective of heavy rainfall,

Table

Area	Altitude	Mean annual temperature	Mean annual rainfall	Mean daily temperature of coldest month	Absolute minimum temperature.	Rainy period in months	Dry period in months
	m	°C	mm	°C	°C		
Maharashtra							
Peint (Nasik Dt.)	600	23	2352	18	6	4	8
Khandala (Poona Dt.)	680	24	4900	20	9	4	8
Mahabaleshwar (Satara Dt.)	1420	20	6226	18.6	6	4-5	8-7
Amboli (Ratnagiri Dt.)	664	21	7446	19.5	6	5-6	7-6
Goa							
Colem	200	26.3	4960	24.3	15.7	5-6	7-6
Sanguem	100	26.5	4100	24	14.8	5-6	7-6 (Fig. 2)
Marmugao	76	25.3	2610	26	21.4	5-6	7-6 (Fig. 3)
Mysore							
Agumbe (South Kanara Dt.)	700	21	6602	19.5	9	7-8	5-4
Bagmandala (Coorg Dt.)	900	20.2	6032	19	9	7-8	5-4

is quite conspicuous with a generous sprinkling of such typically tall evergreen species some with buttressed roots, as *calophyllum*, *Hopea*, *Mesua*, *canarium*, *Garcinia* intermixed with other medium-sized evergreen species belonging to *Holigarna*, *Hydnocarpus*, *Symplocos*, *Diospyros*, *Syzygium* etc. Such studies confirm that both the rainfall and the period of drought together with the geological aspect are essential in determining floristic composition with the general statement that the more humid the climate is, the more luxuriant the natural vegetation and the poorer are the soils, all the other conditions being equal. Thus this Ambolighat-Goa ghats region marks the turning point of the semi-evergreen forests to the evergreen type, representing perhaps the northern-most limit of the evergreen species along the ghats which was hitherto believed to be along North Kanara ghats.

CONCLUDING REMARKS

Goa region in general and the ghat zone in particular have a high potential for good forest productivity. During the Portuguese period, there was no systematic and scientific approach for the preservation of forest resources and for artificial plantations. As such, the forests are in a poor condition due to shifting cultivation, abuse of user rights, illicit fellings,

lack of access and control and annual fires. Subsequently with the beginning of "ore rush" since 1950, forests of wide areas, were cleared, surface soil containing deposits of iron and manganese were opened up and extremely neglected, exposing the slopes to high erosion. This practice was continued as seen (in 1970) in Baranzongmine area and unless the work of levelling up the deserted mine areas is carefully attended to and closely followed up by soil conservation programme together with proper management of mining with modern machinery, the region would loose some of the valuable forest zones.

In view of the most suitable climate and soil, there is ample scope for successful introduction and production of some selected timber species from Karnataka and Kerala States and also even from Assam Zone. A study on the representative genera and species of the evergreen forests of the Western and Eastern India, and their habitat, carried out by me (1960) reveals the possibility of introduction from those zones species of *Calophyllum*, *Dipterocarpus*, *Hopea*, *Ailanthus*, *Canarium*, *Tetrameles*, *Palaquium*, *Cinnamomum* etc. Similarly several useful medicinal plants can be introduced and successfully cultivated. With the advancement of Pharmaceutical industry in our country, particularly with Bombay as the major centre, Goa region offers a suitable phytoclimatic zone for establishing medicinal plant farms and some firms from Bombay have already progressed in this direction. It is also quite possible to try and introduce *Hevea brazilliensis*, the rubber plant from the Kerala rubber estate and the Goa administration is attempting on this project.

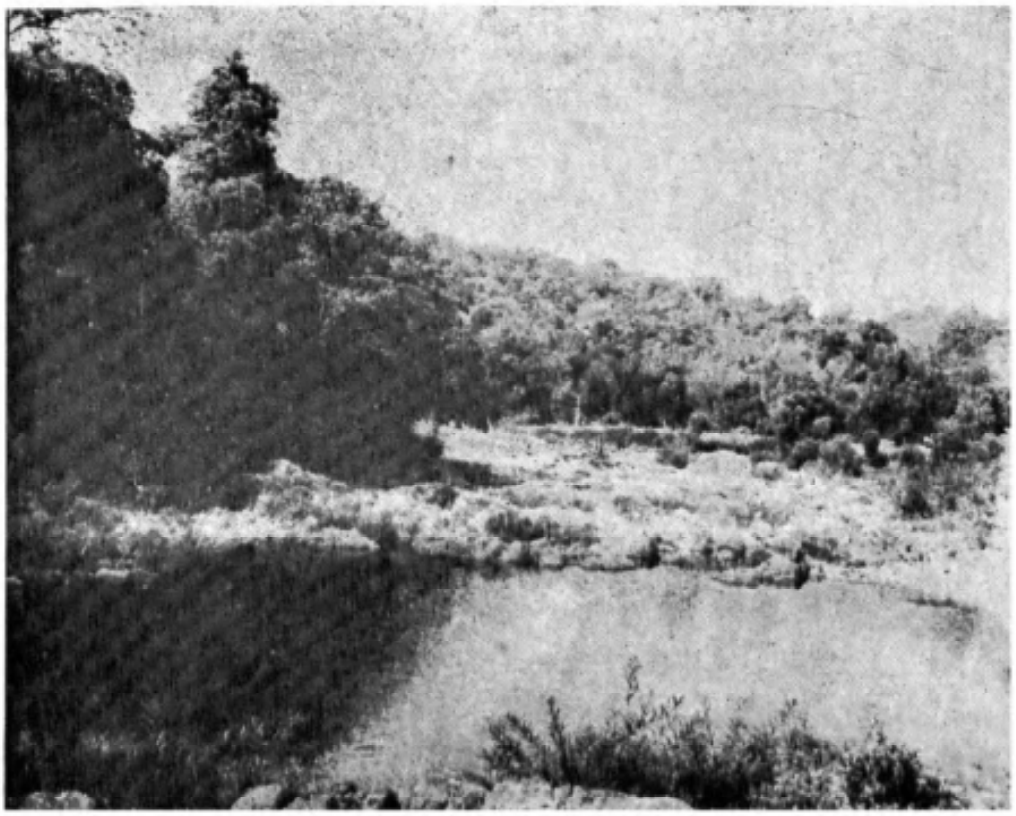
In Goa with its wide range of habitat from sea-shore to ghat zone, different plant communities are formed. Further in a transitional zone of this type, disturbance of natural conditions by man or the formation of new habitats by natural causes such as erosion, recession of glaciers or emergence from water, may provide, suitable habitats for hybrid populations. As suggested by Anderson (1959) the habitat needs "hybridising" before hybrids can survive because in the undisturbed habitat they are unable to compete with individuals of the parent genotype. Inter-specific association of species becomes more pronounced and thus the dependance of one species upon another within the general framework of the environment increases as well. As such, the botany of Goa provides ample scope by way of possible location of interesting species some of them even new to science, particularly along the ghats of Satari district to Canacona ghats, through borders of castle-rock zone and various plateau slopes. The collection of new species, *Manisuris goaensis* Rolla Rao et Hem. (1968) from the plateau area near Cortalim and Parvorim and location of *Ceropegia fantastica* Sedgewick after a lapse of over half a century in Canacona forests beyond Orthofond by Kanodia

(1964) are some of the few examples, besides several new and interesting species described from the Western ghats adjoining to Goa region. Further, the presence of minerals on surface layers of the soil may offer an interesting field of Geobotanical studies on the correlation of the herbs including grasses and low shrubs with the mineral contents of the soil. A few interesting groups like Podostemaceae, ferns and mosses and marine algae along some of the rocky creeks of the shoreland, present good scope of further studies by the academic and scientific institutes of Goa.

There is, in the chronology of taxonomical research, a fairly logical sequence of rather distinct phases characterising phytographic development. I have tried to illustrate this roughly for the Indian zone in fig. 1. Applying this sequence for the progress of Indian Botany, botanical exploration and publication since Garcia da Orta's *Colloquios* (1563) and after a gap of more than a century, Rheede's *Hortus Malabaricus* (1680-1703), have passed through various phases as shown in fig. 1 which were, however, intervened by "long vacuumes" With this background, after filling up the various "lacunae" in Indian Flora even in a broad pattern, it emanates clearly that further definite progress can only be derived from thorough revisions of the various families embracing the whole of India. In my critical studies and revision work of a few genera and families, following a biosystematic approach, based on extensive collections both living and preserved, it is evident that we are still in need of better understanding of the species concept and the various populations. Species which were considered by earlier workers as "rare" and later frequently redescribed in regional floras as "endemics" have turned out to be "false endemics" as their range of distribution is now found to be much wider. Plants like *Nanothamnus sericeus* Thoms., *Cyathocline lutea* Law ex Wt., *Senecio hewrensis* (Dalz.) Hook. f., *Rotala ritchiei* (C.B.Cl.) Kochne, *Commelina subulata* Roth, *Cyanotis concanensis* Hassk., *Indochloa clarkei* (Hack.) Bor., *Ischaemum kingii* Hook. f., *Dimeria hohenackeri* Hochst. ex Miq. are a few of the several examples from the Western ghat belt whose so called endemism is scattered to several hundreds of kilometres in different directions of the country.

Neither pure nor applied science is now served by provisional results and the knowledge and use of vegetable products are positively dependent on exact specific identification, be it for aims of scientific botany (speciation, population study distribution) or for medical botany, horticulture, silviculture or agricultural crops, for fodders or for any profit, mankind can derive from the plant world.

Semi-evergreen forest near Butpal (Canacona taluka) with *Xylia*, *Calophyllum* (Buttressed roots), *Terminalia*, *Cinnamomum*, undergrowth with *Psychotria*, *Eranthemum* and *Arundinella*



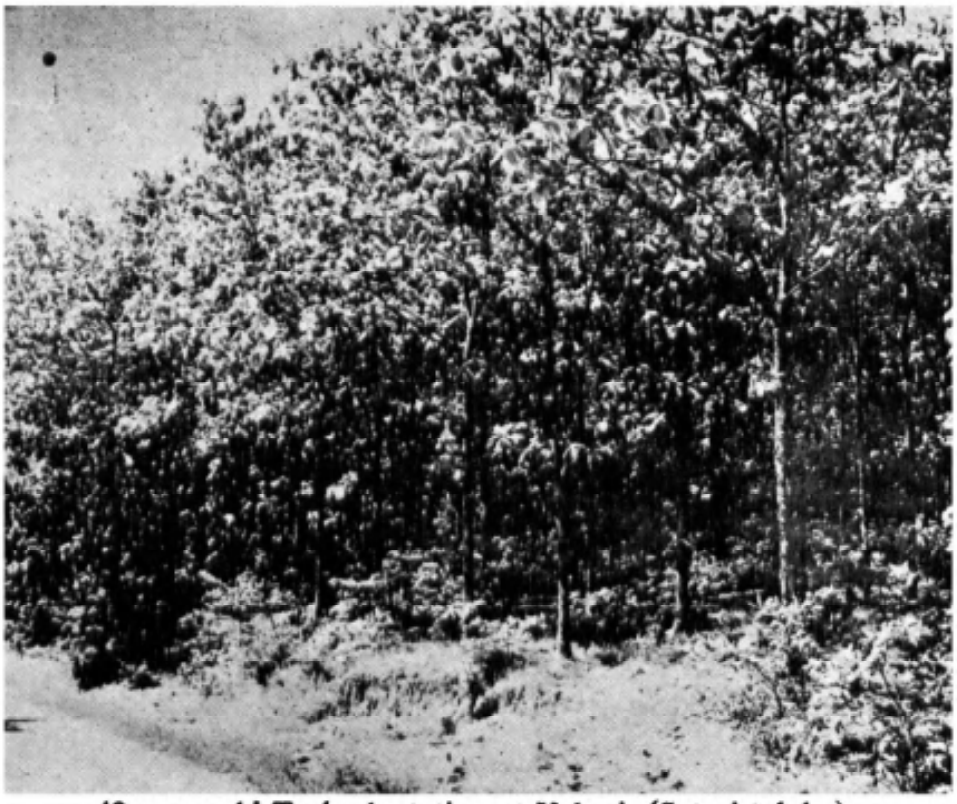
Evergreen forest at Nandore (Satari taluka) along Mahadevi river with *Syzygium*, *Diospyros*, *Knema*, *Litsea* mixed with *Dendrocalamus*.

Evergreen forest near Codal (Satari taluka) with *Hopea wightiana*, *Litsea coriacea* and *Murrava koenigii* etc. as dominant components.

A patch of *Murdannia* and *Eriocaulon* with *Drosera* on moist habitat along Verna plateau (Salcete taluka).

Grassland plateau near Onda (Bicholim taluka) with *Themeda*, *Ischaemum* and bushes of *Zizyphus*, *Ixora* etc.

Cultivated fields and Coconut groves near Novem hills Mudgao (Marmugao taluka).



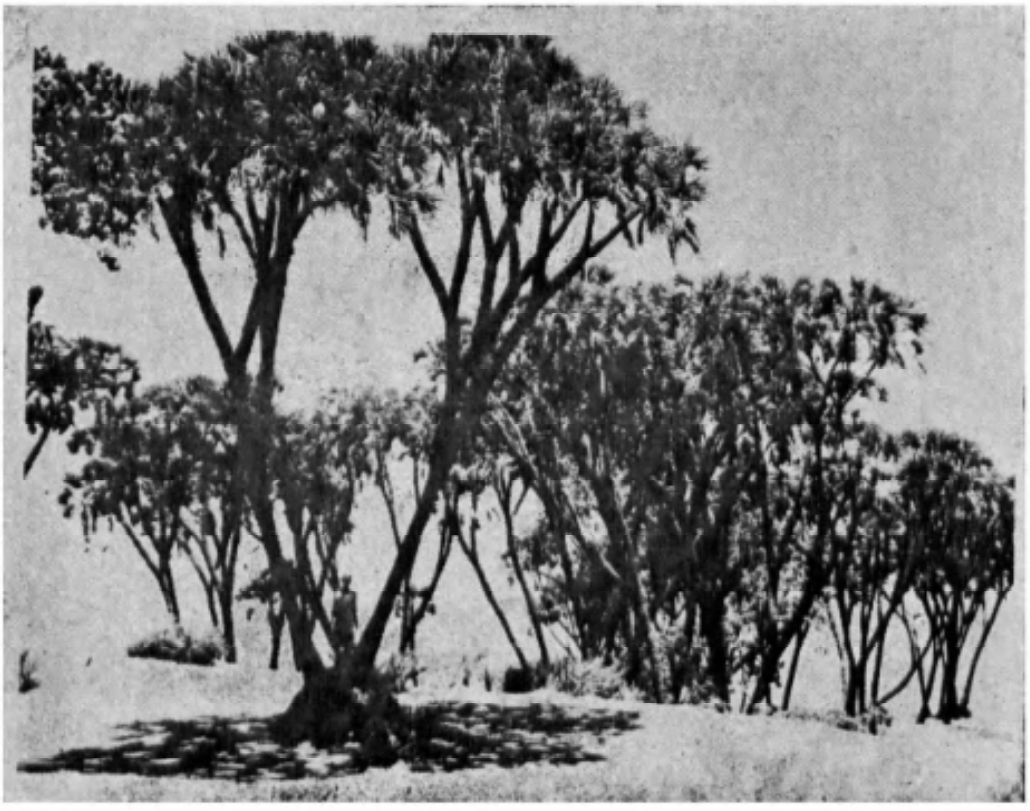
40 years old Teak plantation at Valpoi (Satari taluka)

Iron ore mine area at Baranzong (Sanguem taluka) with disturbed semi-evergreen forest.

Rocky creeks at Diu loaded with marine algae

Hyphaene indica with *Borassus flabellifer*, *Acacia* and *Zizyphus* at Diu.

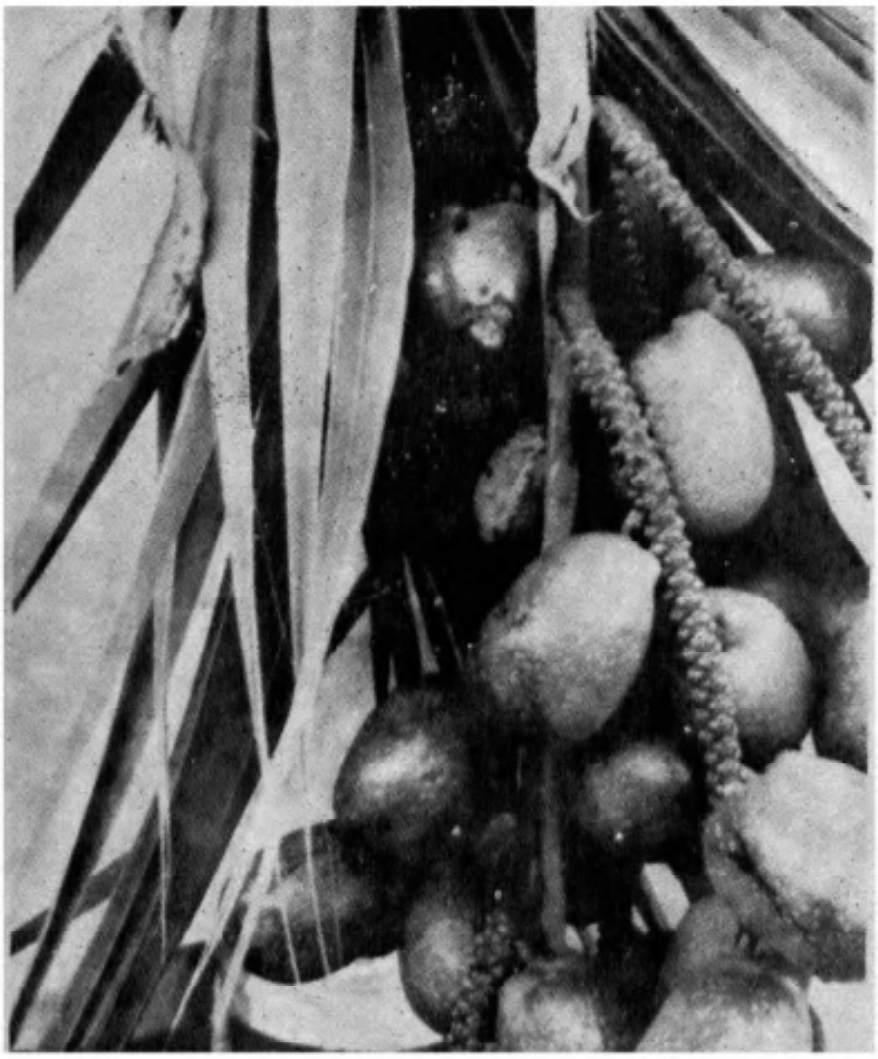
Daman coast with *Tamarindus* (bent due to wind effect), *Phoenix*, *Hyphaene* and several herbs and bushes like *Aloe*, *Lantana* etc.



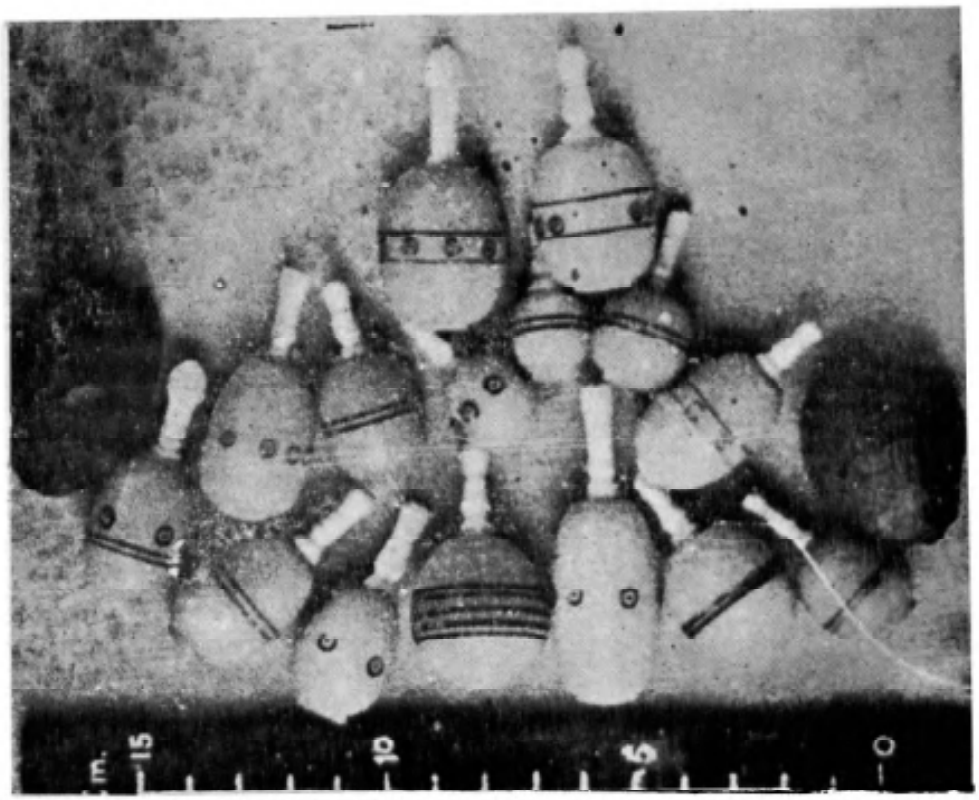
The Indian Doum palm grove (*Hyphaene indica*) along Daman sandy shore. Small palms on the ground are due to regeneration.

Deciduous forest at Athola (Nagarhaveli) with cultivated fields in the midst of forest plain.

Forest near Saily (Nagarhaveli) with deciduous trees, *Terminalia*, *Lannea*, *Tectona* and leafy *Albizia* and *Madhuca* associated with low bushes of *Carissa* and *Dendrocalamus*.



A bunch of shining fruits with male inflorescence and leaf of *Hyphaene indica*.



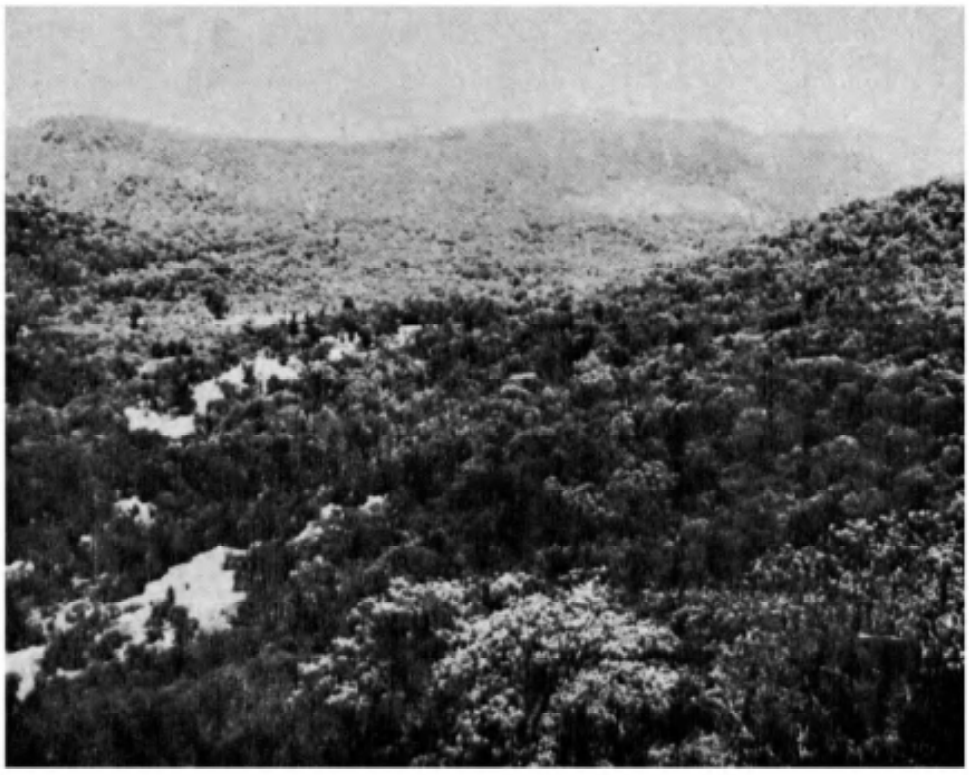
Polished and decorated containers with ivory handle to keep scented cotton & smell ; made of stony endosperm (vegetable ivory) of (*Hyphaene* seeds in Diu cottage industry. Two black unpolished seeds on either side.

Denuded forest near Saily with *Diospyros melanoxylon* surrounded by young plants of *Tectona*, *Terminalia* and spiny *Carissa* bushes.

Mangrove vegetation at Amona (Bicholim taluka) on Goa river bank with *Kandelia rheedii* with clumps of stilt roots mixed with *Rhizophora* and *Sonneratia.*

Badly managed *Terminalia* plantations on the way between Molem and Onda (Bicholim taluka).

Deciduous forests near Butpal (Canacona) with *Terminalia*, *Anogeissus*, *Phyllanthus*, *Grewia* etc.



Evergreen forests of Dudsagar ghats (Goa).

ENUMERATION OF SPECIES

RANUNCULACEAE

Terminal leaflet modified into a tendril ; petals present	*Naravelia*
Terminal leaflet not modified into tendril ; petals absent	*Clematis*

CLEMATIS Linn.

Clematis hedysarifolia DC. Syst. 1 : 148, 1818 ; FBI 1 : 4 ; C. 1 : 3. A.S. Rao in Bull. bot. Surv. India 6 : 19, 1964.

Fl. : October December. *Ill.* : Bull. bot. Surv. India 6 : 20, 1964 (Type photo).

Vern. : Bendrichivel.

Loc. : GOA : *Sanguem* : Ghatlo (Netravali). NAGARHAVELI : Dundhni-Bildhari forest.

Rare, on shrubs along outskirts of forests.

These records indicate the continuity of the distribution of the species from Gujarat to North Kanara through Nagarhaveli and Goa.

NARAVELIA DC.

Naravelia zeylanica (Linn.) DC. Syst. 1 : 157, 1818 ; FBI 1 : 7 ; C. 1 : 4 ; T. 1 : 7 ; G. 1 : 3. *Atragene zeylanica* Linn. Sp. Pl. 542, 1753.

Fl. : November. *Ill.* : f. 6.

Loc. : GOA : *Canacona* : Kodal village.

Rare, on shrubs along the margins of forests.

This record indicates the continuity of distribution of the species from North Kanara to Ambolighat.

DILLENIACEAE

DILLENIA Linn.

Leaves persistent ; flowers large, white	*indica*
Leaves deciduous ; flowers small, yellow	*pentagyna*

Dillenia indica Linn. Sp. Pl. 535, 1753 ; FBI 1 : 36 ; DG. 1 ; C. 1: 6 ; T. 1 : 10 ; G. 1 : 5.

Fl. : June. *Ill.* : T. f. 7.

Vern. : Mota Karmal (Mar.) ; Vadli Karmal (Konk.).

Though recorded from Banda (Ratnagiri Dist.) by Dalgado it is seen growing in Goa forests also.

The fruits are eaten by the local people.

Dillenia pentagyna Roxb. Pl. Corom. 1 : 21, t. 20, 1795 ; FBI 1 : 38 ; DG. 1 ; C. 1 : 7 ; T. 1 ; 10 ; G. 1 : 6 ; S. 2. Dangs. 297.

Fl. : March June. *Fr.* : April July. *Ill.* ; W. I. 1 : f. 33 ; Bedd. Fl. Sylv. t. 104.

Vern. : Kanigata (Kan.) ; Karmal (Mar.) ; Lohan Karambal (Konk.) ; Karamal (Guj.).

Loc. : GOA : *Satari* : Valpoi Caranzol hill. *Sanguem* : Pukola (Netravali). *Canacona* ; Kodal village ; Nandore village ; Nadquem ; Ordofond. NAGARHAVELI : Berpam forest ; Dudeni ; Umberkoi - Dongerpada ; Morkhal.

Frequently observed in open slopes of hills of Quepem and Ponda taluks also.

The fruit is preserved as pickle and jelly. In Nagarhaveli leaves are used for thatching roofs of huts.

MAGNOLIACEAE

MICHELIA Linn.

Michelia champaca Linn. Sp. Pl. 536, 1753 ; FBI 1 : 42 ; DG. 2 ; C. 1 : 8 ; T. 1 : 13 ; G. 6 ; S. 2. Saur. 1.

Fl. : April - September. *Fr.* : June November. *Ill.* : T. f. 8.

Vern. : Ud Champo (Konk.) ; Son Champa (Guj.).

Mostly cultivated in Goa and Nagarhaveli though indigenous to other parts of India, for its fragrant flowers. In Nagarhaveli, wood is used as ceiling for houses. The oil extracted from seeds (Champacol oil) is said to be medicinal.

ANNONACEAE

1. Anther cells concealed by the overlapping connective
   2. Scandent or sarmentose shrubs ; petals imbricate — *Uvaria*
   2. Trees or shrubs petals valvate
      3. Inner petals minute or absent ; ripe carpels confluent into a large, fleshy fruit ; many seeded — *Annona*
      3. Petals subequal ; ripe carpels berried, stalked, never united into a fleshy fruit ; 1 - seeded — *Polyalthia*
1. Anther cells not concealed by the overlapping connective
   4. Outer petals shorter than inner ; ripe carpels stalked — *Saccopetalum*
   4. Outer petals as long as the inner ; ripe carpels sessile — *Sageraea*

ANNONA Linn.

Annona squamosa Linn. Sp. Pl. 537, 1753 ; FBI 1 : 78 ; DG. 3 ; C. 1: 15 ; T. 1 : 26 ; G. 1 : 14 ; S. 2 ; Dangs. 297 ; Saur. 2 ; Pav. 29.

Fl. : May July. *Fr.* : June July (Goa) ; October - November (Nagarhaveli). *Ill.* : T. f. 17.

Vern. : Sitaphal (Konk. & Guj.) ; Ateria, Atas (Port.).

Loc. : GOA : *Bardez* : Mapuca. DAMAN : Jampor beach.

Annona squamosa though cultivated for its very sweet fruit, grows commonly in deserted places as self sown plants. Though the fruit is common in Gujarat area, fruits along Daman coast are more tasty. Besides this species, *A. reticulata* Linn. : DG. 3. (*Ramphal* on way to Sindhoni from Khanvel ; Nagarhaveli) and *A. muricata* Linn. : DG. 3 (*Mamphal*) both introduced from West Indies are also cultivated for their fruits both in Goa and other parts of India.

Pedro C. Afonso (Boletim Inst. Vasco da Gama 47 : 131, 1940) writes that though Yule e Burnell suggests, [based on the authority of Rheede (*Hortus malabaricus* 3 : t. 30 & 31)] that *A. squamosa* was introduced from Mexico through Philippines. Dalgado is of opinion, (based on General Cunningham's observations of fruits similar to *A. squamosa* from the sculptures of Bharbut and mural paintings of Ajantha), that this species might be existing in India even earlier to the Portuguese entry to India and the Portuguese had only carried 'coal to the New Castle'. Pedro C. Afonso continues that Max Mueller objects to Dalgado's view. However, it is evident from the data available so far that none of the species of *Annona* are indigenous to India and they were introduced during the entry of the Portuguese and other Europeans, into India or even earlier through the foreign trade groups.

POLYALTHIA Blume

Polyalthia cerasoides (Roxb.) Bedd. Fl. Sylvat. t. 1, 1869 ; Sant. et Wagh, Bull bot. Surv. India, 5 (2) : 107, 1963 ; FBI 1 : 63. 1872. *Uvaria cerasoides* Roxb. Corom. Pl. 1 : 30, t. 38, 1795, though included by Dalgado in his flora, does not seem to have been distributed along the Concan and Goa ghats. The record of this species from Thal ghat (Thana Dist.) by earlier authors (C. 1 : 14) needs further scrutiny.

P. fragrans (Dalz.) Hook. f. & Thoms. in FBI 1 : 63 ; 1872 ; DG. 3 ; C. 1. : 13, T. 1 : 23 ; G. 1 : 11. *Guatteria fragrans* Dalz. in Kew J. Bot. 3 : 206, 1851. *Ill.*: T. f. 15.

Vern. : Gauri (Mar.) ; Miryo (Konk.).

Though not recorded by Dalgado specifically from Goa ghat, the author observed the species fairly common along the evergreen forests of North Kanara and it is quite possible to locate the species in Goa forests also.

SACCOPETALUM Bennett

Saccopetalum tomentosum Hook. f. & Thoms. Fl. Ind. 152, 1855 ; FBI 1 : 88 ; DG. 3 ; C. 1 : 17 ; T. 1 : 31 ; G. 1 : 16. *Miliusa tomentosa* (Roxb.) Finet et Gagnep in Bull. Soc. Bot. Fr. 53 (4) : 153, 1906 ; Sinclair in Gard. Bull. 14 : 378, 1955 ; Saur. 4. *Uvaria tomentosa* Roxb. Pl. Cor. 1 : 31, t. 35, 1795.

Fl. : March. April. *Fr.* : May June. *Ill.* : T. f. 21.

Vern. : Wumb (Kan.) ; Hum (Konk) ; Humo (Guj.).

Loc. : GOA : *Sanguem* : Colem, near railway lines. NAGARHAVELI : Saily.

Rare, on the outskirts of forests. The wood is considered as valuable.

J. Hutchinson in Gen. Fl. Pl. 1 : 86-88, 1964 considers that the two genera *Miliusa* and *Saccopetalum* are distinct in the nature of petals and the position of flowers, though the earlier authors have merged *Saccopetalum* under *Miliusa*.

SAGERAEA Dalz.

Sageraea laurifolia (Grah.) Blatter in JBNHS 34 : 294, 1930 ; S. 3. *Guatteria laurifolia* Grah. Cat. 4, 1839. *Sageraea laurina* Dalz. in Kew Journ. Bot. 3 : 207, 1851 ; FBI 1 : 93 *p.p.* ; T. 1 : 33 *p.p. Bocagea dalzellii* Hook. f. & Thoms. in FBI 1 : 92, 1872 ; DG. 3 ; C. 1 : 18, *p.p. Sageraea dalzellii* Bedd. Ic. 9, t. 42, 1874 ; DG. 2.

Fl. : November *Fr.* : December April. *Ill.* : T. f. 23.

Vern : Sajeri (Mar. & Konk.).

Loc. : GOA : *Canacona* : Caranzol.

Rare in the forests.

Due to the confusion in the understanding of the two genera *Sageraea* and *Bocagea*, the descriptions given by Cooke and Talbot do not fully apply to the taxon *S. laurifolia* that grows along the Western ghats.

The wood is useful (DG.).

UVARIA Linn.

Uvaria narum (Dunal) Bl. in Fl. Java 5, 1828 *p.p.* ; FBI 1 : 50 ; DG. 2 ; C. 1 : 9 ; T. 1 : 15 ; G. 1 : 9 *pp. Unona narum* Dunal, Anon. 99, 1817 *p.p.*

Fl. : & *Fr.* : November March. *Ill.* : T. f. 9.

Vern : Kalo Apkaro (Konk.).

Loc. : GOA : *Canacona* : Butpal - Ordofond.

Dalgado records this species from ghats without any locality. The occurrence in the present locality which is quite adjoining to the ghats of Karnataka and Kerala States where the species is said to be common, indicates that the species may also grow in other parts of Goa. Its report based on earlier collections from Konkan ghats of Ratnagiri district may also be appropriate, though not supported by recent collections.

King (Ann. Roy. Bot. Gard. Calcutta 4 : 28, t. 22, 1893) separates a larger-leaved form with distinct characters of capsules and arrangement of seeds from the Western ghat materials of *Uvaria narum* and considers it as a separate species, *U. hookeri* King (*U. narum* var. *macrophylla* Hook. f. & Thom. in FBI 1 : 50, 1872 ; C. 1 : 10). Though Gamble (1 : 9) treats both the species as one, under *U. narum* it is worthwhile to check up more material of King's species by way of recent collections from Western ghats before any conclusion is drawn.

Cult. species :

Artabotrys hexapetalus (Linn. f.) Bhandari in Baileya 12 (4) : 147, 1964. *Annona hexapetala* Linn. f. Suppl., 270, 1781. *Artabotrys uncinatus* (Lamk.) Merr. in Philipp. Journ. Sc. (Bot.) 7 : 234, 1912 et in Trans. Amer. Phil. Soc. 24 : 162, 1935. *Annona uncinata* Lam., Encl. 2 : 127, 1786. *Artabotrys odoratissimus* R. Br. in Bot. Reg. t. 423, 1820 ; FBI 1 : 54 ; DG. 2 ; C. 1 : 10 ; T. 1 : 18 ; G. 1 : 10. *Ill.* : T. f. 11. *Vern.* :Hirva chapa (Mar.) ; Kalochampo (Konk.). Not indigenous, cultivated for fragrant flowers.

Polyalthia longifolia (Sonner.) Thw. Enum. 398, 1864 ; FBI 1 ; 62 ; DG. 2 : C. 1 : 13 ; T. 1 : 22 ; G. 1 ; 11 ; S. ed. 3, 327 appendix. *Uvaria longifolia* Sonner. Voy. Ind. 2 : 233, t. 131, 1782.

Fl. : April June. *Ill* : Wt. Ic. t. 1 ; T . f. 14.

Vern. : Asok (Mar. & Konk.).

This species is mostly planted as an avenue tree in parks and gardens. *P. longifolia* var. *pendula*, the drooping - branched form of this taxon which is being raised by seed, is also quite popular in the gardens.

MENISPERMACEAE

1. Woody climber
   2. Corolla absent — *Anamirta*
   2. Corolla present
      3. Leaves cordate ; flowers in terminal or axillary racemes — *Tinospora*
      3. Leaves rounded ; flowers in drooping panicles from old wood — *Diploclisia*
1. Herbaceous climber
   4. Stamens free — *Cocculus*

4. Stamens connate
5. Flowers in stalked solitary or umbellate heads — *Stephania*
5. Flowers in panicles
6. Sepals connate — *Cyclea*
6. Sepals free — *Cissampelos*

ANAMIRTA Colebr.

Anamirta cocculus (Linn.) Wt. & Arn. Prodr. 1 : 446, 1834 ; FBI 1 : 98 ; DG. 4 ; T. 1 : 37. *A. paniculata* Colebr. in Trans. Linn. Soc. 13 ; 66, 1821 ; C. 1 : 20.

Fl. & Fr. : November - April. *Ill.* : T. f. 24.

Vern. : Garund phal ; Kakmari (Konk. ; Mar.).

Loc. : GOA : *Sanguem* : *Aldune* near Netravali.

Though the species is common in evergreen forests of Karnataka State, and also recently collected by the author from Sawantwadi area, thus confirming its record from Concan ghats by earlier collectors (C. 1 : 21), it is rather rarely seen in Goa area. Dalgado also records it as rare. It is however possible to collect it from other places of Goa by further exploration.

According to Dalgado, the plant was used to be exported through Bombay port in large quantities to Europe where it was used for adulterating Beer. In Goa and adjoining areas, it was, however, used to kill or paralyse the fish.

CISSAMPELOS Linn.

Cissampelos pareira Linn. Sp. Pl. 1031, 1753 ; FBI 1 : 103 ; DG. 4 ; C. 1 : 24 ; T. 1 : 45 ; G. 1 : 21 ; S. 5 ; Saur. 4 ; Pav. 30.

Fl. & Fr. June November. *Ill.* : Pflanzenr. 46 : t. 91 A - K.

Vern. : Paharvel (Mar.) ; Padavali (Kan.) ; Bhatvel (Konk.) ; Karandhiu ; Venivel (Guj.).

Loc. : GOA : *Salcete* Near Margao, *Canacona* : Agonda. NAGARHAVELI : Saily ; Carchond forests.

A climber in the forest undergrowth. The species is a bitter tonic and diuretic.

COCCULUS DC.

Cocculus hirsutus (Linn.) Diels in Pflanzenr. 46 : 236, 1910 ; G. 1 : 21 ; S. 5 ; Dangs. 298 ; Saur. 5 ; Pav. 31. V. 21. *Menispermum hirsutum* Linn. Sp. Pl. 341, 1753. *Cocculus villosus* DC. Syst. 1 : 525, 1818 ; FBI 1 : 101 ; DG. 4 ; C. 1 : 22 ; T. 1 : 41.

Fl. & Fr. : September February. *Ill.* : T. f. 26.

Vern. : Vasanvel (Mar.) ; Sogadi balli (Kan.) ; Tan (Konk.).

Loc. : NAGARHAVELI : Bank of Damanganga near Kamcha ; Nana Randha. DADRA : Tingra village. DAMAN : Fort area. DIU : Near Air port.

Though no collection is made from any specific locality, the species is rather common in Goa (Dalgado).

The roots are used against Dyspepsia (Dalgado).

CYCLEA ARN.

Sepals 4-8 toothed, lobes not exceeding 1/4 of tube	*peltata*
Sepals 4-lobed, lobes divided nearly to the base	*fissicalyx*

Cyclea fissicalyx Dunn in Gamble, Fl. Madr. 31, 1915 ; Kew Bull. 1916 : 60 ; S. 6. *C. peltata* Miers, Contr. Bot. 3 : 236, 1871 ; C.1 : 25 (*non* Hook. f. & Thoms. & *nec.* Diels).

Fl. & Fr. : April.

Loc. : GOA : *Sanguem* : Patole near Netravali. *Canacona* : Tudal Ordofond.

Rare, climbing on *Zizyphus* Sp.

After critical study of a few dried flower buds, it appears that the only prominent character of division of calyx lobes nearly to the base [as indicated by Dunn (*l. c.*) in this species] seems to be quite variable showing teeth - like calyx segments in some flowers on the same specimen. It is quite possible that this may not be a good species. However, this issue may be finalised with a more detailed study of fresh material.

C. peltata (Lamk.) Hook. f. & Thoms. Fl. Ind. 201, 1855 ; FBI 1 : 104 ; DG. 5 ; C 1 : 25 ; T. 1 : 47 ; G. 1 : 22. *Menispermum peltatum* Lamk. Encycl. 4 : 96, 1797. *Cyclea burmanni* (DC.) Hook. f. & Thoms. Fl. Ind. 201, 1855 ; FBI 1 : 104 ; C. 1 : 25 ; S. 5.

Fl. & Fr. : September November. *Ill.* : Pflanzenr. 46 : t. 93, f. L to O ; T. f. 29.

Vern. : Pakar (Mar.) ; Padavel (Konk.)

Loc. : GOA : *Bicholim* : Fort area, near Bicholim ; Pilegaon, near Bicholim *Satari* : Nagram, near Valpoi ; Nagargoa, near Valpoi ; Tanem. *Bardez* : Betim Bardez. *Salcete* : Budsari hilly area, near Margoa. *Sanguem* : Goa border and Nandore on way to Molem ; Barazon ; Orgoni near Netravali. *Quepem* : Curchorim ; Quepem Sanguem. *Canacona* : Murkodamal, near Ordofond - Canacona ; Pollem. *Angidiv* : Hillock area. NAGARHAVELI : Sindhoni forest.

Common, climbing on shrubs and small trees.

DIPLOCLISIA Miers

Diploclisia glaucescens (Blume) Diels in Pflanzenr. 46 : 225, 1910 ; G. 1 : 20 ; S. 3. *Cocculus glaucescens* Blume, Bijdr. 25, 1825. *C. macrocarpus* Wt. & Arn. Prodr. 13, 1834 ; FBI 1 : 101 ; C. 1 : 22 ; T. 1 : 40.

Fl. : March June. *Fr.* : April August. *Ill.* : Wt. Ill. 1 ; 22, t. 7 ; T. f. 25.

Vern. : Vetyel, Vatoli (Mar.).

Loc. : GOA : *Satari* : Kawaliyan forest near Nandorem, Valpoi area. *Sanguem* : Colem Caranzol station. *Canacona* : Hathipawal, on way to Butpal ; Potiem forest.

A prominent woody climber growing sparsely in ghats.

STEPHANIA Lour.

Stephania japonica (Thunb.) Miers in Ann. Nat. Hist. (ser. 3) 18 : 14, 1866 ; G. 1 : 21 ; S. 4. *Menispermum japonicum* Thunb. Fl. Jap. 195, 1784. *Stephania hernandifolia* Hook. f. & Thoms. Fl. Ind. 196, 1855 ; FBI 1 : 103 ; C. 1 : 23 ; T. 1 : 44. All *pp.*, *non* (Willd.). Walp. (1842).

Fl. : July November. *Fr.* : September - January. *Ill.* : Wt. Ic. t. 939 ; T. f. 28.

Loc. : GOA : *Satari* : Nagargao, near Valpoi ; Ambechagol ; Catrim, Choraundum ; Caranzol. *Sanguem* : Potiem forests ; Baranzon ; Velemol, near Chumbari ; Chausaria ghats near Netravali.

An occasional climber in open situations.

Forman (Kew Bull. 1956 : 49) after critically analysing the Indo Malesian material, considers that the Indian material under *Stephania hernandifolia* as given in the Indian floras is synonymous with *S. japonica* (Thunb.) Miers and the characters indicated by him have, however, been verified and confirmed in the Western ghat material. The varieties recognised by Foreman are, however, based on unstable character of the degree of hairiness and hence untenable.

TINOSPORA Miers

Leaves glabrous	*cordifolia*
Leaves tomentose	*sinensis*

Tinospora cordifolia (Willd.) Miers in Ann. Nat. Hist. (ser. 3) 7 : 38 1851 ; FBI 1 : 97 ; DG. 4 ; C. 1 : 20 ; T. 1 : 36 ; G. 1 : 19 ; S. 3 ; Sau. 6. *Menispermum cordifolium* Willd. Sp. Pl. 4 : 826, 1806.

Fl. : January March. *Fr.* : April June. *Ill.* : Wt. Ic. t. 485, 486.

Vern. : Gulvel (Mar.) ; Amritvel (Konk.).

Loc. : Goa : *Salcete* : Raiya village hill, near Margao. *Sanguem* : Bhati.

A large woody climber ; flowers usually appear when the plant is leafless ; fairly common in Goa.

Excellent tonic and antiperiodic (Dalgado). I understand from the local Vaids that the root of the plant is used for the treatment of chronic malaria.

Tinospora sinensis (Lour.) Merr. in Sunyatsenia 1 : 193, 1934. *Campylus sinensis* Lour. Fl. Cochinch. 113, 1790. *T. malabarica* (Lamk.) Miers in Ann. Nat. Hist. (ser. 3) 7 : 38, 1851 ; FBI 1 : 96 ; DG. 4 ; C. 1 : 19 ; T. 1 : 36. *Menispermum malabaricum* Lamk. Encycl. 4 : 96, 1797.

Fl. & Fr. : December February. *Ill.* : Pflanzenf. 46 : t. 49, f. A-C.

Vern : Vhadli-Amritvel (Konk.)

Though the species is not collected from any specific locality in Goa, it is, however, not out of place to record it here as there is every possibility of its occurrence in Goa. The presumption is further supported by its record from Thana district, south Concan (Ratnagiri district) and north Kanara. Though Dalgado records this species as common, it is, however, certain that this is a much less common species than *T. cordifolia* with which it is normally confused in the absence of leaves during flowering period.

The species is also used in Indian medicines.

NYMPHAEACEAE

Leaves floating ; carpels united into multicellular ovary	*Nymphaea*
Leaves raised above the water ; carpels sunk in the torus	*Nelumbo*

Nelumbo Adans.

Nelumbo nucifera Gaertn. Fruct. 1 : 73, 1788 ; S. 7 ; V. 22. *Nelumbium speciosum* Willd. Sp. Pl. 2: 1258, 1800 ; FBI 1 : 116 ; DG. 5 ; C. 1 : 28 ; G. 1 : 26.

Fl. & Fr. : Almost throughout the year. *Ill.* : Wealth of India 7 : 9, pl. 2.

Vern. : Kamal (Konk.).

Though collections are not made from any specific locality, the species, though not very common, is seen growing in a few tanks in Ilhas and Salcete and other parts of Goa.

Roots and fruits are eaten.

NYMPHAEA Linn. emend. J. E. Smith *nom. cons.*

Leaves glabrous on the lower sides ; anthers with appendages	*nouchali*
Leaves pubescent on the lower surface ; anthers without appendages	*pubescens*

Nymphaea nouchali Burm. f. Fl. Ind. 120, 1768. Baker & Bakhuizen v.d. Brink. Fl. Java 1 : 149, 1963. *N. stellata* Willd. Sp. Pl. 2 : 1153, 1799; FBI 1 : 114 ; DG. 5 : C. 1 : 27 ; G. 1 : 24 ; V. 22.

Fl. & Fr. ; Almost throughout the year. *Ill.* : Wt. Ic. t. 178 ; CSIR Bot. Mon. 3 : t. 1.

Vern. : Krishnakamal (Mar.) ; Kasturi salak (Konk.).

Loc. : GOA : *Bardez* : Bastora. *Ilhas* : Rice fields near Santacruz village ; Gonsua Majwada. *Salcete* : Lake near Chinchinum. *Angidiv.* Locally abundant.

N. pubescens Willd Sp. Pl. 2 : 1154, 1799 ; G. 1: 24 ; S. 6 ; V. 22 ; Baker & Bakhuizen v.d. Brink Fl. Java 1 : 148, 1963. *N. lotus* auct. *non* Linn. Hook. f. & Thoms. Fl. Ind. 241, 1855 ; FBI 1 : 114 ; DG. 5 ; C. 26 (incl. var. *pubescens* Hook. f. & Thoms. *l.c.*). *N. nouchali* auct. (*non* Burm. f.) Subramanyam in Aquatic Angios. 8, Pl. I, f. 2. 1962 ; Saur. 8 ; Pav. 32.

Fl. & Fr. : Throughout the year except in the early part of monsoon. *Ill.* : CSIR Bot. Mon. 3 : t. 2.

Vern. : Salak (Konk.) ; Kamal (Guj.).

Loc. : GOA : *Salcete* : Cuncolim, on way to Margao. DAMAN : Dundarta.

Very common in ponds ; flowers white or red.

Subsequent to Conard's work (Rhodora 18 : 161-164, 1964) further study on Malesian material reveals that *N. pubescens* Willd. is quite distinct from *N. nouchali* Burm. f.

Roots and fruits are eaten.

PAPAVERACEAE

ARGEMONE Linn.

Argemone mexicana Linn. Sp. Pl. 508 ; 1753 ; FBI 1 ; 117 ; DG. 6 : C. 1 ; 29 ; G. 1 : 25 ; S. 7 ; V. 22 ; Saur. 10 ; Pav. 32. Dangs. 298.

Fl & Fr. : Throughout the year. *Ill.* : Wt. Ill. t. 11.

Vern. : Piula Dhotra (Mar.) ; Phirangi dhutro (Konk.) Balurakhis (Kan.) ; Cardo Santo (Port.).

Loc. GOA : *Satari* : Satra river between Codal and Ambechagol, near Valpoi. NAGARHAVELI : Velugaon ; Chispana ; Damanganga bank near Silvassa. DAMAN : Jampor ; Dabel.

A common prickly herb in cultivated fields and waste lands.

Dalgado records that the species, a native of Mexico, was introduced by the Portuguese to India where it has naturalised very well.

Cult. species. :

Papaver somniferum Linn. Sp. Pl. 508, 1753 ; FBI 1 : 117 ; DG. 5 ; G. 1 : 25 ; S. 7 ; V. 22.

Fl. & Fr. : Under cultivation, mostly during winter months. *Ill.* : Pflanzenr. 40 : 338, t. 37A. *Vern.* : The opium poppy (Eng.), Khaskhas (Konk.).

Dalgado records that though the original home of this species is not known, it was under cultivation freely (during the Portuguese regime) in gardens of Goa though in the British India, its cultivation was prohibited. Now under general Indian Administration rules, the plant cannot be cultivated even in Goa unless special licence is obtained.

The opium is one of the best sedatives and has various medical uses. Garcia da Orta (2 : 175-179) had given a good account of this plant and its medicinal properties and the trade of opium in those days and other allied data.

BRASSICACEAE

(CRUCIFERAE)

The various members of this family yield well known vegetables of the West and the Indian mustard and have been under cultivation for a very long time. The Portuguese were also partly responsible in introducing into India these vegetables of the European region and Dalgado records these cultivated species under four genera, *Brassica*, *Lepidium*, *Nasturtium* and *Raphanus*. As they are commonly cultivated in Goa, specific localities are not indicated in the enumeration given below. Some of these are, however, seen growing as escapes from cultivation.

1. Pods dehiscent
  2. Pods 4 angled or compressed dorsally
    3. Sepals gibbous at the base. Flowers yellow. Valves of siliqua with distinct median vein — *Brassica*
    3. Sepals not gibbous at the base. Flowers white or yellow. Valves of siliqua with median vein weak or absent
      4. Petals white or rarely purplish. Valves with weak median vein — *Nasturtium*
      4. Petals yellow. Valves veinless or with weak median vein — *Rorippa*
  2. Pods compressed laterally — *Lepidium*
1. Pods indehiscent — *Raphanus*

BRASSICA Linn.

1. Cauline leaves amplexicaul, usually auricled at the base
   2. Sepals connivent ; biennial or perennial with woody stems — *oleracea*
   2. Sepals erecto - patent, slender annual with herbaceous stem
      3. Open flowers not overtopping the buds of the inflorescence — *napus*
      3. Open flowers overtopping the buds of the inflorescence — *rapa*
1. Cauline leaves not amplexicaul
   4. Siliqua appressed to the stem ; beak filiform — *nigra*
   4. Siliqua erecto - patent or recurved ; beak attenuate to cylindric — *juncea*

Brassica rapa Linn. Sp. Pl. 666. 1753. *B. campestris* Linn. Sp. Pl. 666, 1753 ; FBI 1 : 156 ; DG. 7 : C. 1 : 36 ; G. 1 : 28 ; V. 25.

subsp. **rapa** Linn. : FBI (*l.c.*) ; DG. (*l.c.*) ; C. (*l.c.*).

Vern. : Common turnip (Eng.) ; Nabo vulgar (Port.) ; Shalgan (Mar.).

B. napus Linn. Sp. Pl. 666. 1753.

subsp. **napus** Linn. : FBI 1 : 156 ; DG. 7 ; C. 1 : 36.

Vern. : Rape ; Cole seed (Eng.) ; Nabica (Port.) ; Pivli (Mar.)

B. juncea (Linn.) Czern. et Coss, Pl. Chark 8, n. 5, 1859 et in Bull. Soc. Bot. France 6 : 609, 1859 ; Hook. f. & Thoms. in Journ. Linn. Soc. 5 : 170, 1861 *p.p.* et FBI 1 : 157 *p.p.* DG. 7 ; C. 1 : 37 ; G. 1 : 28 ; V. 22 (all *p.p.*) *Synapis juncea* Linn. Sp. Pl. 668, 1753.

Vern. : Indian mustard (Eng.) ; Mohari (Mar.)

B. nigra (Linn.) Koch. in Rochl. Deutschl. Fl. ed. 3, 4 : 713, 1833 ; FBI 1 : 156 ; DG. 7 ; C. 3 ; V. 22 *Sinapis nigra* Linn. Sp. Pl. 1753.

Vern. : Black mustard (Eng.) ; Rai, Mohari (Mar.)

B. oleracea Linn. Sp. Pl. 667, 1753 ; DG. 7 ; C. 1 : 37 ; V. 22.

var. 1. **botrytis** Linn. : DG. (*l.c.*) ; C. (*l.c.*).

Vern. : Cauliflower (Eng.) ; Couve flor (Port.).

var. 2. **capitata** Linn. : C. (*l.c.*).

Vern. : Red and white Cabbage (Eng.) ; Couve (Port.) ; Kob (Konk).

var. 3. **caulorapa** DC. : var. *gongylodes* Linn. DG. (*l.c.*) ; C. (*l.c.*).

Vern. : Knol khol (Eng.) ; Couve nabo (Port.).

LEPIDIUM Linn.

Lepidium sativum Linn. Sp. Pl. 664, 1753 ; FBI 1 : 159 ; DG. 7 ; C. 1 : 37 ; G. 1 : 28 ; V. 23.

Vern : The cress (Eng.) ; Mastruco hortense (Port.) ; Aliv (Mar.).

Possibly introduced from Persia. Leaves used as salad.

NASTURTIUM R. Br. *nom. cons.*

Nasturtium officinale R. Br. in Ait. Hort. Kew, ed. 2, 4 : 111, 1812 ; FBI 1 : 133 ; DG. 6 ; C. 1 ; 31 ; G. 1 : 27 ; V. 23.

Vern : Water cress (Eng.) ; Agriao (Port.).

RAPHANUS Linn.

Raphanus sativus Linn. Sp. Pl. 669, 1753 ; FBI 1 : 166 ; DG. 8 ; C. 1 : 37 ; C. 1 : 28 ; V. 23.

Vern : Radish (Eng.) ; Rabao ordinario (Port.) ; Mula (Mar.) Mulo (Konk.).

var. 1. **caudatus** (Linn.) Hook. f. & Thom. : DG. (*l.c.*) ; C. (*l.c.*).

Vern : Java radish ; rat tail radish (Eng.).

var. 2. **globosus**.

Vern : Rabanetes (Port.) ; Round radish (Eng.).

RORIPPA Scop.

Rorippa indica (Linn.) Hiern, Cat. Afr. Pl. Welw. 1 : 26, audit. & Corr., 1896 ; Sant. & Wagh. Bull. bot. Surv. India 5 : 108, 1963. *Sisimbrium indicum* Linn. Mant. 1 : 93, 1767. *Nasturtium indicum* DC. Prodr. 1 ; 139, 1824 ; FBI 1 : 134 ; C. 1 : 30 ; Dangs 299.

Fl. & Fr. : April June. *Ill.* : Wt. Ill. : t. 13.

Loc. : NAGARHAVELI : Chispana forest.

Not common ; seen usually in moist situations in cultivated fields and also along streams.

The combination *Rorippa indica* is sometimes wrongly attributed to Hochreut (Candollea 2 : 370, 1925) but Hiern was the first to propose it in 1896.

CAPPARACEAE

(CAPPARIDACEAE)

1. Erect herbs ; stamens on the disc or on a gynophore *Cleome*
1. Scandent shrubs or trees

2. Large unarmed tree ; leaves trifoliate — *Crateva*
2. Thorny climbing shrubs or small trees ; leaves simple — *Capparis*

CAPPARIS Linn.

1. Erect or scandent shrub
   2. Unarmed, leaves elliptic lanceolate ; flowers large in terminal or axillary cymes — *baducca*
   2. Armed shrub ; leaves ovate ; flowers supra axillary, solitary or 2 - 3 together — *zeylanica*
1. Woody climber, much branched — *sepiaria*

Capparis baducca Rheede ex Linn. Sp. Pl. 504, 1753, *non* Blanco (1837) ; Jacobs in Blumea 12(3) : 435, 1965. (*Badukka* Rheede, Hort. Malab. 6 : 105, t. 57, 1686). *C. heyneana* Wall. ex Wt. & Arn. Prodr. 25, 1834 ; FBI 1 : 174 ; DG. 9 ; C. 1 : 48 ; T. 1 : 54 ; G. 1 : 32.

Fl. & Fr. : March - June. *Ill.*: T. f. 34.

Vern. : Tabalo (Port.) ; Chayruka ; Ran-mamdaru (Konk.).

Loc. : GOA : *Satari* : Vangiri forest, N.E. of Nandorem, Caranzol.

The record of this species by Dalgado is possibly based on earlier publications from Konkan ghats. In fact, such record from Concan ghats is yet to be confirmed though Dalzel's collection from Concan is recorded by Jacobs (*l.c.*). However, the present collections from Satari taluka (Valpoi area) further confirm the distribution of the species from the Western ghats of Kerala and Karnataka States, further north to the boundary of Goa and Maharashtra State.

The combined presentation of the genus *Capparis* with Asiatic and American elements by Linneaus in Hortus Cliffortianus 204, 1737 had subsequently led De Candolle to interpret *C. baducca* of Linneaus as comprising several elements and thereby giving a new name to the taxon, *C. rheedii* DC. (Prodr. 1 : 246, 1824). But further scrutiny, as indicated by Jacobs (*l.c.*) reveals that Linneaus in 1753 (*l.c.*) might have separated the American and Asiatic elements, thereby enabling him to record the "habitat of this taxon as Indian, referring to the distinct Rheede's plate and naming it as *C. baducca*" and as such this Linneaus name should be considered as valid. *C. baducca* of Blanco (Fl. Filip. 1 : 438, 1837) is, however, *C. spinosa* var. *mariana*.

C. sepiaria Linn. Syst. (ed. 10) 2 : 1071, 1759 ; FBI 1 : 177 ; DG. 9 ; C. 1 : 51 ; T. 1 : 61 ; G. 1 : 33 ; S. 9 ; Jacobs in Blumea 12(3) : 489, 1965.

Fl. & Fr. : February - June. *Ill.*: T. f. 40.

Though no specific localities are indicated here, the species has been observed growing on dry, exposed, gravelly plateau areas ; rather sparsely scattered.

Based on the observations made by the author on the distribution of *C. sepiaria* in South India, it appears that the species exhibits certain

preference to such of the areas of Deccan plateau and Western ghats where the dry period is pronounced during the year, inspite of considerable good rainfall.

Capparis zeylanica Linn. Sp. Pl. 720, 1762 ; G. 1 : 133 ; S. 9 ; Dangs 299 ; Pav. 36 ; Jacobs in Blumea 12 (3) : 505, 1965. *C. horrida* Linn. f. Suppl. 264, 1781 ; FBI 1 : 178 ; C. 1 : 51 ; T. 1 : 62.

Fl. & Fr. : March-November (more or less throughout the year). *Ill* : Wt. Ic. t. 173 ; T. f. 41.

Vern. : Vagamti (Konk.) ; Govindi (Mar.) ; Tottulla (Kan.).

Loc. : GOA : *Bardez* : Bastora. *Salcete* : 2 miles ahead of Santacruz village ; Raj Bhavan. *Angidiv.* NAGARHAVELI : Dolara forest ; Dhapsa ; Morkhal.

A common shrub along road sides and exposed hill slopes.

The nomenclature of this species has been considerably confused in the Indian Floras. *Capparis zeylanica* (*non* Linn.) as given in FBI 1 : 174 ; C. 1 : 47 and T. 1 : 53, f. 33, actually refers to *C. brevispina* DC. Prodr. 1: 246, 1824. In fact, Dunn in Gamble's Fl. Madras 1 : 32 has clarified this point as early as 1915 but somehow this interpretation remains unnoticed and was not included in the subsequent papers and works on the Indian Floras. *C. zeylanica* was described by Linneaus based on Herman's collection from Ceylon. Subsequently, based on Koenig's specimen from Ceylon which is identical to Herman's specimen, Younger Linneaus described *C. horrida*. Later Willdenow treated both the species as distinct. Then followed a series of interpretations by other workers who are partly correct. Hooker f. and Thomson (FBI 1872) following this confusion, applied the name *C. zeylanica* to *C. brevispina* DC., the later being cited in the synonymy and the proper *C. zeylanica* was named as *C. horrida*. This misinterpretation was followed by all the Indian Floras published after FBI, until Dunn (1915) had brought out the correct names.

CLEOME Linn.

1. Androgynophore prominent and longer than 5 mm
   2. Plant glabrous ; petals 25-35 mm long, imbricate, pink ; gynophore 6 cm — *speciosa*
   2. Plant pubescent ; petals 7-15 mm long, open in bud, white ; gynophore 3-10 mm — *gynandra*
1. Androgynophore absent or at most 2 mm long
   3. Leaves simple ; stamens 6 — *monophylla*
   3. Leaves 3-5-foliolate ; stamens numerous
      4. Plant viscous with stalked glands ; flowers yellow — *viscosa*
      4. Plant glabrous or with few scattered hairs ; pubescent ; leaves simple ; flowers pink or rose — *chelidonii*

Cleome chelidonii Linn. f. Suppl. 300, 1781 ; FBI 1 : 170 ; C. 1 : 42 ; S. 9 ; Dangs 299 ; Saur. 15.

Fl. & Fr. : After monsoon. *Ill.*: Wt. Ic. t. 319.

Vern. : Ubhitalveli (Guj.).

Loc. : NAGARHAVELI : Chrispana. DADRA.

A common herb in cultivated fields and dried up ditches.

C. gynandra Linn. Sp. Pl. 671, 1753 ; Jacobs in Fl. Males. 6 : 101, 1960. *Gynandropsis pentaphylla* DC. Prodr. 1 : 238, 1824 ; FBI 1 : 171 ; DG. 8 ; C. 1 : 42 ; C. 1 : 29 ; V. 23. *Gynandropsis gynandra* (Linn.) Briq. Ann. Cons. Jard. Bot. Geneve 17 : 382, 1914 ; S. 9.

Fl. & Fr. : All through the year. *Ill.* : Rheede Hort. Mal. 9 : t. 34.

Vern. : Tiloni (Konk.) ; Pandri-tilwav (Mar.). Adiyakha van ; Dhoti Talwani (Guj.).

Loc. DIU : Nagoa.

The species is mostly cultivated in gardens and is also seen as an escape in moist habitats outside the gardens.

There has been considerable difference of opinion about the correct interpretation of the characters of the two genera, *Cleome* Linn. and *Gynandropsis* DC. Now, with the proper understanding based on wide range of material, the connation of the staminal base with the gynophore to form an androgynophore, the character once considered to be distinct for the genus *Gynandropsis*, is treated as merely a character of degree and of quantitative value. Such opinion was expressed by Woodson (Ann. Mis. Bot. Gard. 35 : 139-141, 1948), Iltis (Brittonia 10 : 33, 1958 ; 12 : 284, 1960) and others. As such, the genus *Gynandropsis* DC. is now merged under *Cleome* Linn. and the earliest name *C. gynandra* Linn. has, therefore, been revived.

C. monophylla Linn. Sp. Pl. 672, 1753 ; FBI 1 : 168 ; DG. 8 ; C. 1 : 38 ; G. 1.

Fl. & Fr. : November February. *Ill.* ; Rheede Hort. Mal. 9 : t. 34.

A weed of wet places and cultivated fields, rather occasionally seen.

C. speciosa Raf. Fl. Ludovic. 86. 1817 ; Jacobs in Fl. Males. 6 : 101, 1960. *Gynandropsis speciosa* DC. Prodr. 1 : 238, 1824.

Fl. & Fr. : September December.

Loc. : GOA : *Satari* : Onda, near Valpoi ; Satrum. *Sanguem* : Netravali.

An erect herb with attractive flowers, a native of South America, is mostly cultivated in gardens.

C. viscosa Linn. Sp. Pl. 672, 1753 ; FBI 1 ; 170 ; DG. 8 ; C. 1 : 41 ; G. 1 : 29 ; S. 8, Dangs 299 ; Saur. 15 ; Pav. 34.

Fl. & Fr. : April - January ; *Ill.* : Wt. Ic. t. 2.

Vern. : Kanphuti (Konk.) ; Nayibela (Kan.) ; Tinnani (Guj.).

Loc. : GOA : *Satari* : Nandorem village, Valpoi area ; Caranzol. *Ilhas* : Panaji, near seashore ; Miramar. *Salcete* : Borda village, near Margao. *Canacona* : Barsare village, near Tudal. NAGARHAVELI : Chispana forest ; Bank of Daman ganga, on way to Kawcha. DAMAN : Dundorta. DIU : Diu Rest House.

A common weed in cultivated fields and waste lands.

CRATEVA Linn.

Crateva nurvala Buch. Ham. Trans. Linn. Soc. 15 : 121, 1827 ; Jacobs in Fl. Males. Ser. 1, 6 : 68, 1960 et Blumea 12(2) : 194, 1964. *Nurvala* Rheede Hort. Malab. 3 : 49, t. 42, 1682. *C. religiosa* var. *nurvala* (Buch. Ham.) Hook. f. & Thoms. in FBI 1 : 172, 1872 ; DG. 8 ; C. 1 : 44 ; T. 1 : 64 ; G. 1 : 34.

Fl. : March (also recorded as October - December). *Fr.* : Rare, mostly in winter months. *Ill* : T. f. 43.

Vern. : Pe do marto (Port.) ; Nurval (Konk.) ; Vayavarna (Mar.).

The species is occasionally seen under cultivation near mosques.

The spelling *Crataeva* as seen in all the Indian Floras has, of late, been corrected by Gomez (Lilloa 26 : 336, 1953) who traced out the origin of the name after the Greek herbalist Kratevas and this correction as *Crateva* is now accepted.

Crateva nurvala which is a distinct species, has always been confused in the Indian and S. E. Asian floras with *C. religiosa* Forst. f. Interestingly enough, *C. nurvala* is distributed widely in India, mostly Peninsular and Eastern India, extending to S. E. Asia while *C. religiosa* is restricted to Sikkim, Assam and its surroundings only, but extensively distributed in S. E. Asia and other eastern Pacific island groups. To this is closely allied *C. unilocularis* Buch. Ham. which is also at present considered to be restricted in India to areas like Nepal, Sikkim, Assam and surroundings [Jacobs (*l.c.*)].

The name *Nurvala* based on Rheede's plate no. 42 (*l.c.*) whose identity with *C. nurvala* is quite clear, was first validated by Buchanan Hamilton in 1827 who had first noted this species as distinct from others. Subsequent interpretations by various authors on Indian plants have brought about the record of *C. religiosa* with two varieties *nurvala* and *roxburghii* by Hooker f. and Thomson in FBI, and this has been subsequently followed in various local Indian Floras. In fact, var. *roxburghii* includes *C. religiosa* proper, *C. unilocularis* and other S. E. Asian species.

RESEDACEAE

Only one genus under this family is recorded in this work. Dalgado by mistake adds that *Oligomeris glaucescens* Camb. is indigenous to Concan following FBI. This species in fact, occurs in Sind and other adjoining dry localities.

Reseda Linn.

Reseda odorata Linn. Syst. ed. 10, 1046, 1759 ; FBI 1 : 181 ; DG. 10 ; C. 1 : 53.

Vern. : Mignionette (Eng.) ; Reseda de Cheiro (Port.).

The species, a native of Egypt, is mostly cultivated in gardens. Though not collected by the author, it is quite possible that the species is under cultivation in Goa gardens for its scented flowers (DG. *l.c.*).

VIOLACEAE

Hybanthus Jacq. *nom. cons.*

Hybanthus suffruticosus Baill. ex Lanessy, Pl. util. Colon Franc. 606, 1886 ; Backer & Bakhuizen in Fl. Java, 1 : 194, 1963. *Viola suffruticosa* Linn. Sp. Pl. 937, 1753. *V. ennea sperma* Linn. Sp. Pl. 937, 1753. *Ionidium suffruticosum* Ging. in DC. Prodr. 1 : 311, 1824 ; FBI 1 : 185 ; DG. 10 ; G. 1 : 35. *Hybanthus enneaspermus* (Linn.) F. v. Muell. Fragm. 10 : 81, 1876. *Ionidium heterophyllum* Vent. : C. 1 : 55.

Fl. : October December. *Ill.* : Wt. Ill. t. 9 ; Wt. Ic. t. 308.

Vern. : Bamgi (Konk.) ; Ratanparas (Mar.).

A weed of wet places, commonly seen near fields.

Cult. species :

Viola tricolor Linn. Sp. Pl. 935, 1753 ; DG. 10.

Vern. : Pansy (Eng.).

Dalgado records this species, a native of Europe, as cultivated in gardens. It is quite possible that this species along with *V. odorata* Linn. (S. 8) are normally cultivated in cooler and moist places of Bombay Province.

BIXACEAE

Bixa Linn.

Bixa orellana Linn. Sp. Pl. 512, 1753 ; FBI 1 : 190 ; DG. 10 ; C. 1 ; 57 ; T. 1 : 72 ; G. 1 : 37 ; Backer in Fl. Males I, 4(3) : 239 ; S. 10.

Fl. : August September. *Fr.* : January. *Ill.* : Wt. Ill. t. 16 ; T. f. 46.

Vern. : Anate (Fort.) ; Sendri (Mar.) ; Rangmala (Kan.).

Loc. : GOA : *Satari* : Palle near Onda ; Caranzal ; Deosali ; Charaunden.

Planted near hamlets, for the use of seed pulp as a source of orange dye (anatto).

A native of America, known as '*Urucu*' in Brazil was introduced very early into India. Though the orange dye was once in use in India and also in Goa, now it is practically out of use in view of several cheaper chemical dyes.

Dalgado records four genera, *Bixa*, *Scolopia*, *Flacourtia* and *Hydnocarpus* under the family Bixaceae. According to present interpretation, following Hutchinson's classification, *Bixa* only is treated under this family and *Flacourtia*, *Hydnocarpus* and *Scolopia* are placed under Flacourtiaceae.

FLACOURTIACEAE

1. Flowers apetalous. Fruit a capsule or drupe
   2. Leaves with linear or circular pellucid glands. Flowers bisexual in fascicles or glomerules. Stamens mostly 5 - 10, alternating with as many scale like or subulate hairy staminodes. Ovary 1 - celled. Fruit a capsule, fleshy or dry, 2 - 3 valved ; seeds usually with orange red fimbriate aril — *Casearia*
   2. Leaves otherwise. Flowers dioecious, rarely bisexual in short axillary racemes or solitary. Stamens exceeding 15, surrounded by a ring of disc glands ; staminodes nil. Ovary 2 - 8 celled by false septa. Fruit a drupe with many pyrenes ; seeds exarillate — *Flacourtia*
1. Flowers with petals. Fruit a berry
   3. Mostly armed shrubs or trees. Flowers in short racemes and bisexual. Petals without a scale at base inside. Fruit small, 2 - 4 seeded — *Scolopia*
   3. Unarmed trees. Flowers in cymes or solitary, dioecious. Petals with a scale at base inside. Fruit large, with woody pericarp, many seeded — *Hydnocarpus*

CASEARIA Jacq.

Though Samydaceae was treated as separate family distinct from Flacourtiaceae based on the perigynous flowers, the recent critical taxonomic studies covering the pan tropic species of Flacourtiaceae indicate the merging of Samydaceae into Flacourtiaceae and hence the treatment of *Casearia* under this family.

1. Leaves glabrous
   2. Leaves and calyx glabrous ; capsule orange — *esculenta*
   2. Leaves glabrous but calyx pubescent ; capsule yellow — *elliptica*
1. Leaves and calyx pubescent — *graveolens*

Casearia elliptica Willd. Sp. Pl. 2 : 628, 1800. *C. tomentosa* Roxb. Fl. Ind. 2 : 421, 1832 ; FBI 2 : 593 ; DG. 80 ; C. 1 : 554 ; T. 2 : 71 ; G. 1 : 358.

Fl. : January May. *Ill.* : T. f. 330.

Vern. : Chari (Mar.) ; Bedsi (Konk.) ; Bilioobina (Kan.) ; Fructo caurim de matto (Port.).

A fairly common species along deciduous forests of Western ghats and also recorded by Dalgado.

C. esculenta Roxb. Fl. Ind. 2 : 422, 1832 ; FBI 2 : 592 ; DG. 80 ; C. 1 : 553 ; T. 2 : 70 ; G. 1 : 368.

Fl. : May June. *Ill.* : Bedd. Fl. Sylv. t. 208.

Vern. : Modi (Mar.) ; Satagan (Konk.) ; Satagana (Port.).

This species is found to be common in Concan, Ramghat and Ambolighat adjoining Goa area from where it is recorded by Dalgado. The plant being known for its medicinal value, is also cultivated in gardens.

C. graveolens Dalz. in Kew Jour. Bot. 4 : 107, 1852 ; FBI 2 : 592 ; DG. 79 ; C. 1 : 553 ; G. 1 : 367 ; S. 91 ; T. 2 : 69 (under *C. glomerata*).

Fl. : March - May. *Fr.* : April - September.

Vern. : Bokara (Mar.) ; Pimpari (Konk.).

Loc. : NAGARHAVELI : Dudeni.

The species being common along the Western ghats of Karwar (Cooke) and also recorded by Dalgado along Goa ghats, is now included for Goa. In Nagarhaveli the species is rare, commonly associated with teak.

FLACOURTIA Linn.

1. Plants cultivated
   2. Flowers always bisexual ; leaves more or less densely pubescent beneath along mid - rib and nerves ; styles central, entirely free, sometimes very short, 4 - 5, very slightly reflexed and enlarged into disciform, bilobed stigma — *inermis*
   2. Flowers unisexual ; leaves glabrous or pubescent beneath along mid - rib and nerves ; styles 4 - 6, entirely connate into a distinct column — *jangomas*
1. Plants wild
   3. Flowers unisexual ; leaves extremely variable in shape, glabrous or pubescent beneath along mid - rib and nerves ; styles entirely free or practically so, central or nearly so, 4 - 7, spreading and reflexed both on ovary and fruit ; fruit small, usually not exceeding 1 cm in diameter — *indica*
   3. Flower unisexual ; leaves glabrous and shining above, very thinly hairy along mid - rib ; styles 4 - 6, extremely short or almost absent, connate, stigmas free and slightly reflexed ; fruit bigger, usually 1.5 - 2 cm in diameter — *montana*

Flacourtia indica (Burm. f.) Merrill, Interp. Rumph. Herb. Amb. 377, 1917 ; Sleumer in Fl. Malesiana 1(5) : 76, 1954 ; S. 11 ; Saur. 21 ; Pav. 37 ; Dangs 300. *Gmelina indica* Burm. f. Fl. Ind. 132, 1768. *Flacourtia sepiaria* Roxb. Pl. Cor. 1 : 48, 1795 ; FBI 1 : 194 ; DG. 11 ; C. 1 : 60 ; T. 1 : 78 ; G. 1 : 39 ; S. 11.

Fl. : January June. *Fr.* : July October. *Ill.* : Wt. Ic. t. 85 ; T. f. 50, 51 & 52.

Vern. : Tambat (Mar.) ; Miridi (Kan.) ; Babuli (Konk.).

Loc. : GOA : *Pernem* : Pernem village. *Bardez* : Paliem ; Betim ; Porvorim ; Acoi. *Sanguem* : Patiem forests. *Canacona* : Butpal. NAGARHAVELI : Curchond forest.

An occasional tree inside and along the forest edges. The ripe fruits are edible.

F. inermis Roxb. Pl. Corom. 3 : 16, t. 222, 1811 ; FBI 1 : 192 ; DG. 11 ; Sleumer in Fl. Males. Ser. 1. 5(1) : 71, f. 30 e g, 1954.

Vern. : Bengali Jagam (Konk.).

Dalgado records that the species which is an unarmed tree, was introduced from Sylhet and Punjab and cultivated in Concan and other parts and doubts whether it is really indigenous. Scrutiny of available data reveals that the species is only common in a cultivated or semi cultivated state in the tropics and it is said to be distributed by human agency from Eastern India to Malesia and adjoining islands. The species was first named by Roxburgh based on the specimen introduced from the Moluccas and cultivated in the Indian Botanic Garden, Calcutta. Though the species has been cited in many works, as a native of Moluccas where it is common, Sleumer, (based on his studies on the three varieties of *F. inermis*), feels that the most common plant indigenous to Moluccas may belong to *F. inermis* var. *moluccana* Sleum., representing an ancestral form from which the cultigens of *F. inermis* var. *inermis* might have originated.

The bright, cherry red, ripe fruit though too sour to eat when fresh, seems to be good for jams and pickles. Dalgado records that the fruit though edible is not as good as *F. jangomas*.

F. jangomas (Lour.) Raeusch. Nomencl. Bot. ed. 3, 290, 1797. *Stigmarota jangomas* Lour. Fl. Cochinch. 633, 1790. *Flacourtia cataphracta* Roxb. ex Willd. Sp. Pl. 4 : 830, 1805 ; FBI 1 : 93 ; DG. 11 ; C. 1 : 58 ; G. 1 ; 39.

Ill. : Wealth of India 4 : 43, f. 24.

Vern. : Jangomas (Port.) ; Jagam (Konk.).

The species is included in this work on the authority of Dalgado and this information may help to locate the species in Goa gardens and in back yards of old houses.

F. montana Grah. Cat. Bomb. Pl. 10, 1839 ; FBI 1 : 192 ; DG. 11 ; C. 1 : 58 ; T. 1 : 76 ; G. 1 : 39 ; S. 10.

Fl. : November December. *Fr.* : January April. *Ill.* : T. t. 48.

Vern. : Bhekal (Mar.) ; Gajale, Nayibela (Kan.) : Atak (Konk.).

Loc. : GOA : *Sanguem* : Orghani, near Netravali. *Canacona* : Nadquem-Quer hills ; Nadquem ; Butpal.

Occasional, on the hill slopes and forest. Ripe fruits edible.

HYDNOCARPUS Gaertn.

Hydnocarpus laurifolia (Dennst.) Sleumer in Engl. Jahrb. 69 : 33, 86, 1938. *Munnicksia laurifolia* Dennst. Schluess Hort. Malab. 27, 1818. *Hydnocarpus wightiana* Blume. Rumphia 4 : 22, 1848 ; FBI 1 : 196 ; DG. 12 ; C. 1 : 60 ; T. 1 : 79 ; G. 1 : 37.

Fl. : March May. *Fr.* April August. *Ill.* : Wt. Ill. I : t. 16 ; T. f. 53.

Vern. : Kowti (Mar.) : Suranti, Toratti (Kan.) ; Kavamthi (Konk.).

Loc. : GOA : *Pernem* : Pernem-Conad. *Bicholim* : Usgao. *Satari* : Matachi rai, near Palem (Valpoi). *Sanguem* : Sidh forests, near Bhati. *Canacona* : Canacona ; Tudal village forest ; Nandore village side ; Badsare village, near Tudal ; Nadquem.

A common tree inside and along the forest edges. Oil extracted from seeds (Kavam thel.), is used for skin diseases.

SCOLOPIA Schreb. *nom. cons.*

Scolopia crenata (Wt.) Clos. in Ann. Sc. Nat. ser. 4, 5(8) : 250, 1857 ; FBI 1 : 191 ; DG. 11 ; C. 1 : 57 ; T. 1 : 73 ; G. 1 : 38.

Vern. : Lahan Kavamthi (Konk.).

Though the species grows commonly along the Western ghat forests south of Goa, the earlier collections of Law and Stocks, and Dalzell and Gibson from Concan ghats and Ramghat of Ratnagiri district, however, indicate the possibility of the occurrence of this tree species along Goa ghats also. Hence, it is recorded here though Dalgado merely records 'on ghats' without any specific locality.

PITTOSPORACEAE

PITTOSPORUM Banks & Soland. ex Gaertn.

Twigs glabrous ; flowers in paniculate racemes	*floribundum*
Twigs densely tomentose ; flowers in umbellate racemes	*dasycaulon*

Pittosporum dasycaulon Miq. Anal. Bot. Ind. 3 : 5, 1852 ; FBI 1 : 199 ; C. 1 : 62 ; T. 1 : 13 ; G. 1 ; 40.

Fl. : November February. *Fr.* : February May.

Vern. : Gopsundi (Kan.).

Loc. : Goa : *Sanguem* : Butabai cha dongar, Verlem.

Though quite rare, the species can be located in other localities in Goa as it grows along the ghats in Ratnagiri and North Kanara districts.

***P. floribundum** Wt. & Arn. Prodr. 154, 1834 ; FBI 1 : 199 ; DG. 12 ;C. 1 : 61, T. 1 : 81 ; C. 1 : 40 ; S. 12.

Vern. : Vekli (Konk.).

Though no specific locality in Goa was given by Dalgado, as the species is common along the ghats, north and south of Goa, it is included here for Goa ghats also.

POLYGALACEAE

Small annual herbs ; flowers minute in large terminal spikes ; capsule margins toothed ; seeds not strophiolate	*Salomonia*
Herbs or shrubs ; flowers in axillary or extra axillary racemes ; capsule margin not toothed ; seeds strophiolate	*Polygala*

POLYGALA Linn.

1. Caruncle 3-fid to the base	*erioptera*
1. Caruncle cup-shaped	
2. Racemes very short, almost capitate ; capsule densely ciliate	*arvensis*
2. Racemes 5 cm or more long ; capsule not or scarcely ciliate	*elongata*

Polygala arvensis Willd. Sp. Pl. 3, 2 : 876, 1802 ; B. L. Burtt in Notes R. B. G. Edin. 32(3) : 403, 1973. *P. chinensis* auct. non. Linn. ; FBI 1 : 204 ; DG. 12 ; C. 1 : 64 ; V. 25.

Fl. & Fr. ; September March.

Vern. : Negli (Konk.).

Though not specifically collected, the species is common along grassy meadows and also near Panaji (V. 25). Dalgado records that during famine the leaves were used as vegetable.

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*P. **napaulense** (DC.) Rehder & Wilson, pl. Wilson. 3 : 326, 1916 ; Nayar & Giri, Fasc. Fl. Ind. 6 : 8, 1980.

Polygala elongata Klein. in Willd. Sp. Pl. 3 : 879, 1800 ; FBI 1 : 203 ; C. 1 : 64 ; G. 1 : 42.

Fl. & Fr. : August November.

Loc. : Goa *Bicholim* : 5 miles beyond Dodamarg ; Sanquelim. *Bardez* : Pernem-Bicholim. *Salcete* : On way to Raia village, near Madgoa. *Canacona* : Ordofond Butpal ; Ordofond.

Common weed in rice fields ; often at the edge of forest in association with *Mimosa pudica* Linn., *Smithia* sp. etc.

P. erioptera DC. Prodr. 1 : 326, 1824 ; FBI 1 : 203 ; C. 1 ; 63 ; G. 1 : 42.

Fl. & Fr. : August November.

Loc. : Goa : *Sanguem* : Baranzon.

A weed on drier localities and can be located in exposed dry fields.

Salomonia Lour. *nom. cons.*

Salomonia ciliata (Linn.) DC. Prodr. 1 : 334, 1824 ; FBI 1 : 207. *Polygala ciliata* Linn. Sp. Pl. 705, 1753. *Salomonia oblongifolia* DC. Prodr. 1 : 354, 1824 ; FBI 1 : 207 ; G. 1 : 41.

Fl. & Fr. : July October. *Ill.* : Wt. Ill. 1 : t. 22B.

Loc : Goa : *Bicholim* : 5 miles beyond Dodamarg ; Bicholim Sanquelim. *Sanguem* : Potiem forest.

Rare, tender herb along grassy fields, in open situations. Though Hooker f. in Flora of British India records this species for Peninsular India in general, the present record for Goa extends the distribution of the species north of south Kanara (*vide* ; Gamble *l.c.*).

The species is quite variable. The present understanding of the taxon, merging both the species *S. ciliata* and *S. oblongifolia* is based on the study of wide range of material.

CARYOPHYLLACEAE

Diffuse and dichotomously branched herbs ; sepals keeled, herbaceous or with scarious margin	*Polycarpon*
Usually erect herbs ; sepals not keeled, scarious, white	*Polycarpaea*

Polycarpaea Lamk. *nom. cons.*

Leaves linear ; sepals silvery white, without green midrib ; flowers in dense, terminal cymes forming flat-topped heads	*corymbosa*
Leaves obovate ; sepals with green midrib ; flowers in fascicled spikes	*spicata*

Polycarpaea corymbosa Lamk. Tabl. Encycl. 2 : 129, 1797 ; FBI 1 : 245 : DC. 12 ; C. 1 : 70 ; G. 1 : 45 ; V. 25 ; Saur. 24.

Fl. & Fr. : September December. *Ill.* : Wt. Ic. t. 712.

Vern. : Koyap (Konk.) ; Phul Chhogaro, Zinapanno okhrad (Guj.).

Loc. : GOA : *Pernem* : Terekol. *Ilhas* : Miramar sea-shore, Panaji. *Salcete* : Madgoa. DAMAN : Cataria. DIU : Nagoa.

Common herb in sandy fields and along sea-shore.

P. spicata Wt. & Arn. in Ann. Nat. Hist. Ser. 1, 3 : 91, 1839 ; FBI 1 : 246 ; C. 1 : 70 ; Saur. 25.

Fl. & Fr. : September October. *Ill.* : Wt. Ic. t. 510.

Vern. : Vajradanti (Guj.).

Loc. : DIU : Castle area ; sandy sea-shore near Jalandhar.

Very common on sandy, saline soil of sea-shore.

POLYCARPON Linn.

Polycarpon prostratum (Forsk.) Aschers. & Schwein. f. in Oster. Bot. Zeitschr. 39 ; 128, 1889 : S. 12 ; Saur. 25, Pav. 39, *Alsine prostrata* Forsk. Fl. Aeg.-Ar. 207, 1775. *Polycarpon loeflinglae* Benth. & Hook. f. Gen. Pl. 1 : 153, 1852 ; FBI 1 : 245 ; C. 1 : 69 : G. 1 : 46.

Fl. & Fr. : May-July.

Loc. : GOA : *Canacona* : Nandore along Mahadevi river. NAGARHAVELI : Chispana ; Atal forest area.

Common herb on sandy soil, along river banks. This species is often confused with *Polygonum plebeium* R. Br. but can be distinguished from it by the fact that *Polygonum* has alternate leaves and bright red to pink flowers.

Cult. species :

Dianthus caryophyllus Linn. FBI 1 : 214 ; DG. 1 : 12.

Vern. : Carnation (Eng.).

The species is cultivated in gardens for its flowers.

PORTULACACEAE

PORTULACA Linn.

1. Flowers large, attractive ; plant cultivated in gardens *grandiflora*
1. Flowers smaller, in clusters or solitary ; plants growing wild

2. Nodes without appendages — *oleracea*
2. Nodes with a ring of hairs
3. Leaves opposite ; stamens 8 to 10 ; styles 4-fid — *quadrifida*
3. Leaves alternate ; stamens 20 or more ; styles 5-cleft — *tuberosa*

Portulaca grandiflora Hook. f. in Bot. Mag. t. 2885, 1829 ; V. 25.

Vern. : Chini-gulab (Mar.).

The species was introduced into Goa from South America for its beautiful flowers and is cultivated in a few gardens as seen in Panaji (Ilhas), Madgoa (Salcete) and other places.

P. oleracea Linn. Sp. Pl. 445, 1753 ; FBI 1 : 245 ; DG. 13 ; C. 1 : 72 ; G. 1 : 47 ; S. 13 : V. 25 ; Dangs. 300 ; Saur. 26 ; Pav. 39.

Fl. & Fr. : Throughout the year. *Ill.* : Pflanzenfam. ed. 2, 16 C : 247, f. 1085, 1934 ; Tadulingam & Venkatanarayana, Handb. Some South Indian Weeds, t. 35, 1955.

Vern. : Cholchi-bhaji (Konk.) ; Beldroega (Port.) ; Motiluni (Guj.).

Loc. : GOA : *Sanguem* : Molem-Colem ; Rivona. *Canacona* : Barsane village, near Tudal. NAGARHAVELI : Atal forest area ; Bank of Damanganga river on way to Kawcha. DAMAN : Fort area.

The plant flowers profusely soon after monsoon sets in.

The species is used both as medicine and as vegetable salad.

P. quadrifida Linn. Mant. 1 : 73, 1767 ; FBI 1 : 247 ; DG. 13 ; C. 1: 72 ; G. 1 : 47 ; S. 13 ; V. 25 ; Saur. 26 ; Pav. 40.

Fl. : November December. *Ill.* : Wt. Ill. 2. t. 109.

Vern : Bhumygol (Konk.) ; Luni (Guj.).

Loc. : DIU : Rocky creek in sea, Nagoa.

Very common in different parts growing in rock crevices. Used as vegetable and salad.

P. tuberosa Roxb. (Hort. Beng. 91, 1814, *nom. nud.*) Fl. Ind. 2 : 464, 1832 ; FBI 1 : 247 ; C. 1 : 73 ; Saur. 27.

Fl. & Fr. : September-December.

Loc. : DIU : Nagoa.

Rare, in rock crevices and also on sandy ground along sea-coast. Roots tuberous.

TAMARICACEAE

TAMARIX Linn.

Tamarix ericoides Rottl. in Gesel. Naturf. Fr. Berl. Neue. Schr. 4 : 214, 1803 ; FBI 1 : 249 ; DG. 13 ; C. 1 : 76 ; T. 1 : 87 ; V. 25 ; Saur. 22.

Fl. : October January. *Ill.* : Wt. Ill. 1 : t. 248 ; Wt. Ic. t. 22 ; T. 1 : f. 56.

Vern. : Saru (Mar.).

Loc. : NAGARHAVELI : Near Atal ; Khanvel ; Morkhal ; Velugaon ; Jamunpada forest.

In Nagarhaveli this is a common shrub growing on the rocky beds of rivers. Though collections from any specific localities in Goa, have not been made by the author, in view of its occurrence along the river bed of Kalanadi which is the southern boundary for Goa, the occurrence of the species along the sandy beds of Goa rivers is equally quite possible.

ELATINACEAE

BERGIA Linn.

Stamens 5	*ammannioides*
Stamens 10	*capensis*

Bergia ammannioides Roxb. ex Roth Nov. Pl. Sp. 219, 1821 ; FBI 251. C. 1 : 77 ; G. 49.

Fl. : November December.

Loc. : GOA : *Ilhas* : Miramar sea shore, Panaji.

Rare, along the margins of moist places.

B. capensis Linn. Mant. 241, 1771 ; C. 2 : 78 ; G. 49. *B. verticillata* Willd. Sp. Pl. 2 : 770, 1799 ; FBI 1 : 252.

Fl. : August.

Loc : GOA : *Bardez* : Guirim. *Angidiv.*

Rare, in ponds and lakes. The record of this species in Goa, widens the distribution of the species further south of Maharashtra.

CLUSIACEAE

(GUTTIFERAE)

1. Stigma sessile or sub-sessile	
2. Calyx of 4 or 5 sepals	*Garcinia*
2. Calyx closed in bud, bursting into 2 valves	*Mammea*
1. Stigma on a slender style	
3. Ovary one celled, one ovuled	*Calophyllum*
3. Ovary two celled, two ovuled	*Mesua*

CALOPHYLLUM Linn.

1. Perianth segments 4 ; petioles about 1 cm long ; fruit ellipsoid, 2 cm long, red when ripe	*apetalum*

1. Perianth segments 8 ; petioles 1 1.5 cm long ; fruit sub-globose or globose, 2 - 3 cm long, yellow when ripe
   2. Young parts glabrous ; leaf apex rounded or emarginate *inophyllum*
   2. Young parts rusty tomentose ; leaf apex acute or obtusely acuminate *elatum*

Calophyllum apetalum Willd. Ges. Naturf. Fr. Berl. Mag. 5 : 79, 1811. *C. wightianum* Wall. ex T. Anders. in Hook. f. FBI 1 : 274, 1874 ; DG. 15 ; C. 1 : 86 ; T. 1 : 101 ; V. 26.

Fl. : November December. *Fr.* : January March. *Ill.* : Bedd. Fl. Sylv. t. 90.

Vern. : Ponnaca peguema (Port.) ; Lahan Umdi (Konk.).

The occurrence of the species along the ghat area establishes the continuity in its distribution from evergreen forests of Karnataka State to the Phonda Amboligha t area of Ratnagiri district of Maharashtra State where it was reported to be growing by Law & Stocks and is recently collected by the author. Dalgado's reference to the species as common is rather not quite appropriate.

C. elatum Beddome Fl. Sylv. Gen, 22, t. 2. 1869 ; G. 1 : 54. *C tomentosum* T. Anders. in FBI 1 : 274, 1874 *p.p. non* Wight, 1840 ; DG. 15 ; C. 1 : 84 ; T. 1 : 100.

Fl. : January March. *Ill.* : T. f. 62.

Vern. : Nagari (Mar.) ; Surhony (Kan.)

The species is indicated by Dalgado in his flora but has not been so far recorded in the Goa ghats though it is common in the evergreen forests of Karnataka State immediately south of Goa. It would be worthwhile to locate the possible occurrence of this species in some interior forests of Canacona area bordering North Kanara forests.

Recent critical study (Maheshwari in Bull. Bot. Surv. India 2 : 146, 1960) confirms the earlier observations that the common species along the Western ghats is *C. elatum* as *C. tomentosum* Wight does not occur in India.

As the wood is economically useful, it would be worthwhile to cultivate the species in Goa by the forest department.

C. inophyllum Linn. Sp. Pl. 513, 1753 ; FBI 1 : 273 ; DG. 14 ; C. 1 : 84 ; T. 1. 99 ; G. 1 : 55 ; V. 26.

Fl. & Fr. : December - April. *Ill.* Pflanzenfam. 3(6) : f. 105 A F.

Vern. : Ponnaca (Port.) ; Alexandrian laurel (Eng.) ; Umdi (Konk.).

This is an exotic species introduced to Goa and other parts of India several centuries back and cultivated particularly along the coastal areas.

GARCINIA Linn.

1. Flowers tetramerous
  2. Fruits globose, not grooved — *indica*
  2. Fruits oval, longitudinally grooved — *cambogia*
1. Flowers pentamerous — *talbotii*

Garcinia cambogia Desr. in Lamk. Encycl. 3 : 701, 1792 ; FBI 1 : 361 ; DG. 14 ; C. 1 : 81, T. 1 : 91 ; G. 1 : 53 ; V. 26.

Fl. : January - April, *Fr.* : May. - August. *Ill.* : Bedd. Fl. Sylv. t. 85 ; Wt. Ic. tt. 121, 960 & 961 ; T. f. 58.

Vern. : Darambo (Konk.).

Loc. GOA : *Sanguem* : Colem, along Sonavali nadi.

The species is rather rare along Goa ghats. Dalgado records this from Anjuna, a rocky coastal area where it is possibly cultivated. The fruit is eaten.

G. indica (Dupetit Thouars) Choisy in DC. Prodr. 1 ; 561, 1824 ; FBI 1 : 261 ; DG. 13 ; C. 1 : 80 ; T. 1 : 90 ; G. 1 : 53 ; S : 14. *Brindonia indica* Dupetit Thouars in Dict. Sci. Nat. 5 : 339, 1804.

Fl. : November March. *Fr.* : January August. *Ill.* : T. f. 57.

Vern. : Brindeos (Port.) ; Kokam (Mar.) ; Bhiramd (Konk.).

Loc. ; GOA : *Bicholim* : Mahim hill, near Bicholim. *Bardez* : Bastora. *Sanguem* : Patiem forest ; Molem - Belgaum road : Vangiri forest, 3 miles north - east of Nandore. *Canacona* : Butpal ; Ordofond ; Jamad forest, near Nandore ; Ordofond, near Walgaon river ; Nadquem Quer hills.

Frequent inside the forest, near the road and along the river. The fruit is edible.

In earlier days '*Kokam butter*' used to be extracted from the seeds by the Goans and was one of the trade items.

G. talbotii Raizada ex Santapau in Rec. Bot. Surv. Ind. 16 : 14, 1960 ; Maheshwari in Bull. Bot. Surv. India 6 : 113, 1964. *G. ovalifolia* Hook. f. var. *macrantha* T. Anders in FBI 1 : 269, 1874. *G. malabarica* Talbot in Jour. Bomb. nat. His. Soc. 11 : 234, 1897 (*non* Desr.) ; T. 1 : 96 ; G. 1 : 53. *G. spicata* Hook. f. var. *macrantha* Cooke, Fl. Pres. Bomb. 1 : 79, 1901.

Fl. : November March. *Fr.* : February May.

Vern. : Pansara (Mar.) ; Tavir (Konk.) ; Haldi (Kan.).

Loc. : GOA : *Canacona* : Nadquem village ; Devasthan, Nadquem.

G. talbotii which is a distinct species and common along the Sahyadris of Maharashtra and also the Goa ghats, has been confused with *G. xanthochymus* Hook. f. and *G. ovalifolia* Hook. f. (the latter now known as *G. spicata* Hook. f. var. *spicata*) by Dalgado and similarly by Cooke and

Talbot who record the occurrence in Konkan ghats. In fact, these two species grow in the evergreen forest zone of the Karnataka State. It is, however, quite possible that *G. xanthochymus* as recorded by Dalgado might be under cultivation rather than growing wild in the forest.

The fruits which are typically covered by yellow gutta gum inferior quality to that of *G. morella* Desr., are dried and used in curries like Tamarind.

G. mangostana Linn. which is indigenous to Malaysia was introduced to India and also to Goa for cultivation. But it appears that such cultivation is not quite successful particularly in Goa and Dalgado doubts its existence in Goa as a cultivated plant even as early as 1898.

Mammea Linn.

Mammea suriga (Buch. Ham. ex Roxb.) Kosterm. in Comm. For. Res. Inst. Indonesia, Bogor, 72 : 23, f. 19, 1961. *Calophyllum suriga* Buch.-Ham. ex Roxb. Fl. Ind. 2 : 608, 1832. *Ochrocarpus longifolius* Benth. & Hook. f. ex Anders. in FBI 1 : 270, 1874 ; DG. 14 ; C. 1 : 84 ; T. 1 : 97 ; G. 1 : 54 ; S. 15.

Fl. & Fr. : March - June. *Ill.* ; Wt. Ic. t. 1999.

Vern. : Surangi (Mar.) ; Wundi (Konk.).

Loc. : Goa ; *Bardez* : Baga. *Sanguem* : Bhati.

Occasional, on the hill slopes.

Dalgado records that dried flower buds of this species, known in Goa market in those days as red Nagakesar, are used for dying silk.

Mesua Linn.

Mesua ferrea Linn. Sp. Pl. 515, 1753 ; FBI 1 : 277 ; DG. 15 ; C. 1 : 86 ; T. 1 : 102 ; V. 26.

Fl. & Fr. : March - June. *Ill.* : Pflanzenfam. 3(6) : 219, f. 103.

Vern. : Nag Champo, Vadlo champo (Konk.) ; Nag chapha (Mar.).

The species is mostly cultivated in temple yards and private gardens for its flowers. Though it grows rather sparsely in the ghat forests of Goa, it is rather more common in the evergreen forests of Karnataka State.

DIPTEROCARPACEAE

Hopea Roxb. *nom. cons. prop.*

Hopea wightiana Wall. ex Wt. & Arn. 85, 1834 ; FBI 1 : 309 ; C. 1 : 91 ; T. 1 : 111 ; G. 1 : 59.

Fl. : March June. *Fr.* : June August. *Ill.* : Bedd. Fl. Sylv. t. 96 ; T. f. 67.

Vern. : Kavsi (Mar.) ; Haiga, Kuri houga (Kan.).

Loc. Goa : *Satari* : Kawaliyan forest, near Nanorem ; Satre river bank, between Codal and Ambechagol ; Codal - Nanorem road, 10 km point ; Codal Satrem road, 5 km point. *Bardez* : Arvalim. *Sanguem* : Kirban forest on way to Patiem ; Mattandonga, Netravali. *Canacona* : Near Kodal village ; Butpal, near a stream ; Nadquem ; near Nadoro stream ; Yed forest, on way to Nadquem.

Common along streams and rivers in the fringes of forest and inside the forest.

Though quite common along the ghat area all along Goa, Dalgado has not recorded this species. It is quite possible that this species has been confused with *Vateria indica* by Dalgado who indicates that it is said to be indigenous in Goa but commonly found in Kanara. *V. indica* is, in fact, a typical evegreen species growing mostly from North Kanara and southwards, if at all it grows in Goa, the only possible area is Canacona forests adjoining to North Kanara.

ANCISTROCLADACEAE

ANCISTROCLADUS Wall.

Ancistrocladus heyneanus Wall. ex Graham in Cat. Bomb. Pl. 28, 1839 ; FBI 1 : 299 ; DG. 16 ; C. 1 : 93 ; T. 1 : 116 ; G. 62 ; S. 15 ; V. 26.

Fl. & Fr. : March May. *Ill.* Wt. Ic. t. 1987 88.

Vern. : Khardali (Konk.).

Though the species has not been collected during the present work, its record by the author from the ghats of the Ratnagiri district, the northern boundary and of the North Kanara district, the southern boundary fully justifies its occurrence in the forests of Goa ghats also.

This single genus which was once under Dipterocarpaceae is now treated under a separate family Ancistrocladaceae with only one species in India, mostly restricted to the Western ghats only from Maharashtra to Kerala State.

MALVACEAE

1. Styles connate upto apex, consequently the flowers seemingly monostylous. Calyx entire or minutely 5-toothed
   2. Epicalyx segments 3, large, foliaceous, cordate, persistent. Seeds densely and long lanate. Ovary and capsule 3-5 merous. Almost all parts punctate with black oil glands *Gossypium*

2. Epicalyx segments 3-8, small, narrow, caducous. Seeds glabrous or short hairy. Ovary and fruit 5-merous. Never black punctate	*Thespesia*
1. Styles not connate upto apex or free. Calyx distinctly divided	
3. Carpels separating at maturity or united into a capsule (*Kydia*)	
4. Flowers in dense heads	*Malachra*
4. Flowers axillary, solitary or in clusters	
5. Involucre bracts present	
6. Involucre bracts 3	*Malvastrum*
6. Involucre bracts 4-6	
7. Trees	*Kydia*
7. Herbs or shrubs	
8. Fruit glochidiate	*Urena*
8. Fruit nonglochidiate	*Pavonia*
5. Involucre bracts absent	
9. Ovule one in each cell	*Sida*
9. Ovules two or more in each cell	*Abutilon*
3. Carpels not separating at maturity	
10. Calyx not spathaceous	
11. Involucre bracts 5 or more ; ovary 5-celled	*Hibiscus*
11. Involucre bracts 10 ; ovary 10-celled	*Decaschistia*
10. Calyx spathaceous	*Abelmoschus*

ABELMOSCHUS Medic.

1. Involucre bracts 4, distinct, leafy	*manihot*
1. Involucre bracts more than 5, linear	*moschatus*

Abelmoschus manihot (Linn.) Medic. Malv. Fam. 46, 1787 ; S. 18 ; Dangs 301 ; Saur. 50 ; Pav. 47. *Hibiscus manihot* Linn. Sp. Pl. 696, 1753 ; G. 1 : 69. *H.tetraphyllus* Roxb. [Hort. Beng. 52, 1814 (*nom. nud.*)]. Fl. Ind. 3 : 211, 1832 ; FBI 1 : 341 ; DG. 19 ; C. 1 : 118 ; T. 1 : 123 ; V. 27.

Fl. & Fr. : October-December. *Ill.* T. f. 74 ; Wt. Ic. t. 53.

Vern. : Ran bhendi (Mar.) ; Ranb hindo, Kantala bhindo (Guj.).

Loc. : GOA : *Pernem* : Pernem village ; Codal village ; north-east Valpoi. *Bardez* : Bastora ; Mapuca. *Sanguem* : Beti ; Patrim. *Canacona* : Ordofond village. NAGARHAVELI : Saily forest ; Dolara forest ; Chispana ; Nana ; Bank of Damanganga river on way to Kawcha ; Dhapsa.

Occasional, along the fringes of forest. From some populations, an interesting form almost identical to this taxon but with seeds much larger in size, as big as 4-5 mm in diameter, has been isolated and such form has been recollected from a few localities in Maharashtra also. As such, the large seeded form has been recently described as *A. manihot* (Linn.) Medic. ssp. *tetraphyllus* (Roxb. ex Hornem.) Bors. var. *megaspermus* Hemadri in Bull. BSI 11 (3 & 4) : 338, 1969.

A. moschatus Medic. Malv. Fam. 46. 1787. *Hibiscus abelmoschus* Linn. Sp. Pl. 696, 1753 ; FBI 1 : 342 ; DG. 19 ; C. 1 : 118 ; V. 28.

Fl. & Fr. : November March. *Ill.* : Pflanzenf. 3(6) : 49, f. 21, B-F.

Vern. : Kasturi Bhendo (Konk.) ; Musk mallow (Eng.).

The species, though under cultivation during the early part of the century in different parts of India and also in Goa for its seeds with musk-like odour, has been collected in wild state by the author along the Satpuras and in Chanda forests and very likely may occur along the Western ghats also.

However, the species is included in this work to suggest the necessity of investigation about the possibility and the usefulness in undertaking its systematic cultivation in Goa as the volatile oil extracted from the seeds (Musk seed oil or Ambrette seed oil), is used in high grade perfumery and also as adulterant for animal musk.

Cult. species :

Abelmoschus esculentus (Linn.) Moench. Meth. 617, 1794 ; S. 18 ; Dangs 301 ; Saur. 49. *Hibiscus esculentus* Linn. Sp. Pl. 696, 1753 ; FBI 1 : 343 ; C. 1 : 119.

Fl. & Fr. : Throughout the year.

Vern. : Bhindo (Guj.)

Loc. : DIU : Castle area ; Nagoa.

Cultivated species, sometimes occurring as an escape. The fruit is used as vegetable.

ABUTILON Miller

1. Carpels 5 ***persicum***
1. Carpels 10-20 ***indicum***

Abutilon indicum (Linn.) Sweet, Hort. Brit. 1 : 54, 1826 ; FBI 1 : 326 ; DG. 18 ; C. 1 : 102 ; G. 1 : 65 ; V. 27 ; Dangs 301 ; Saur. 40 ; Pav. 45. *Sida indica* Linn. Cent. Pl. 2 : 26, 1756.

Fl. & Fr. : Throughout the year. *Ill.* : Wt. Ic. t. 12.

Vern. : Tutti (Kan.) ; Mudra (Mar.) ; Petari (Konk.) ; Khapat, Khansaki (Guj.).

Loc. : GOA : *Bardez* : Bastora ; Mapuca. *Ilhas* ; Miramar ; Panaji. DAMAN : Fort area. DIU ; Nagoa ; Castle area.

Occasional in hedges and waste places.

With the present understanding of the genus, *A. asiaticum* G. Don as given by Dalgado is possibly a less hairy and a smaller form of *A. indicum*. Dalgado however records it as indigenous to Ceylon (possibly following FBI) and as cultivated in Goa in the gardens at Moria and Parra, near Mapuca (Bardez) under the Concan name "Vhadli petari". Further scrutiny of such cultivated material if still available in Goa is essential for the correct identity of this taxon.

The plant under the name *A. asiaticum* is said to be medicinally used in Goa in those days (Dalgado).

Abutilon persicum (Burm. f.) Merr. Philip. J. Sc. 19 : 364, 1921 ; Backer & Bakh. f. in Fl. Java 1 : 423, 1963 ; van. Borssum Waalkes in Blumea 14(1) : 163, 1966. *Sida persica* Burm. f. Fl. Ind. 148, t. 47, f. 1, 1768. *S. polyandra* Roxb. (Hort. Beng. 50, 1814, *nom. nud.*) Fl. Ind. 3 : 173, 1832. *Abutilon polyandrum* (Roxb.) Wight & Arn. Prodr. 55, 1834.

Fl. : November March. *Fr.* : December March.

Vern. : Madam (Mar.) ; Ran-petari (Konk.).

Loc. : GOA : *Sanguem* : Goa boundary near Anmode.

Occasional, in the slopes of hills.

The species with its very bright flowers and under proper pruning of side shoots, would be quite an attractive plant for introduction in Gardens.

DECASCHISTIA Wt. & Arn.

Decaschistia trilobata Wt. Ic. 1, t. 88, 1840 ; FBI 1 : 332 ; C. 1 : 109 ; T. 1 : 118 ; V. 28.

Fl. & Fr. : October February.

Loc. : GOA : *Sanguem* : Surla ; Verlem ; Ravanacha Donger.

Common in the forest areas.

GOSSYPIUM Linn.

1. Twigs and young leaves finely pubescent ; bracteoles entire or with 3 to 4 coarse, shallow teeth — *arboreum*
1. Twigs and young leaves glabrous or sparsely hairy ; bracteoles with long acuminate teeth
   2. Capsule ovoid, acuminate ; seeds covered with readily separable cotton — *barbadense*
   2. Capsule ovoid-globose ; seeds covered with not readily separable cotton — *hirsutum*

Gossypium arboreum Linn. Sp. Pl. 693, 1753 ; FBI 1 : 347, *p.p.* ; DG. 21 ; C. 1 : 125, *p.p.* ; V. 28 ; Saur. 57.

Fl. & Fr. : September March. *Ill.* : Wealth of India 4 : 171, Pl. 11.

Vern. : Kapas (Guj.).

Loc. : GOA : *Ilhas* : Home garden in Panaji area. DIU : Near Church.

The species is mostly cultivated in home gardens and temple compounds for the use of cotton for religious prayers.

Dalgado wrongly indicates that *G. stocksii* indigenous to Sind, forms the source for *G. arboreum*.

Gossypium barbadense Linn. Sp. Pl. 693, 1753 ; var. **brasiliense** (Macf.) Cooke, Fl. Pres. Bomb. 1 : 125, 1901. *G. brasiliense* Macf. Fl. Jamaica 72, 1837. *G. barbadense* Linn. var. *acuminatum* Roxb. ; FBI 1 : 347 *p.p.*

Fl. & Fr. : November May. *Ill.* : Wealth of India 4 : 174, f. 81-82.

Vern. : Karihatti (Kan.) ; Kidney cotton (Eng.).

Loc. : GOA : *Ilhas* : Shirodkar's house, Panaji (old Goa-Ponda road crossing). *Canacona* : Barsane village, near Tudal. NAGARHAVELI : Dhapsa.

Hutchinson and his co-workers (The Evolution of *Gossypium* etc., Oxford Univ. Press, London, 1947) published their combination of the variety *brasiliense* in their work in 1947 only. Hence authorship for the variety should be correctly attributed to Cooke only.

This variety *brasiliense*, a distinct ecotype, can be distinguished from the typical *G. barbadense* by their large flowers, long balls and connate seeds.

This variety called Brazillean cotton, was introduced by the Portuguese during the earlier centuries from Peru and Brazil but it could not be well established in Goa and also in other parts of Indian West coast. However, a few plants are still under cultivation in the back-yards of a few residences in Goa and also in the adjoining district of Ratnagiri of Maharashtra State.

G. herbaceum Linn. Sp. Pl. 693, 1753 ; FBI 1 : 345 ; C. 1 : 123.

Fl. : December - April. *Fr.* : May.

Vern. : Rui, Kapas (Guj.).

Loc. : DAMAN : Prial.

Cult. species :

G. hirsutum Linn. Sp. Pl. ed. 2 : 975, 1753. *G. herbaceum* Linn. var. *hirsutum* Mast. & var. *religiosum* Mast. in FBI 1 : 347, 1874 *p.p.*; C. 1 : 124.

Fl. & Fr. : November February. *Ill.* : Wealth of India 4 : 179, Pl. 13.

Vern. : Kapas (Mar.) ; American cotton (Eng.).

Loc. : GOA : *Ilhas* : Shivaji Vardha residence, Panaji ; residence near Tech. School, Panaji.

According to Hutchinson (*l.c.*), this species comprises of seven distinct races which are comparatively less hardy. It demands higher standard of cultivation and yield well under irrigation or high rainfall.

However, Goa area has not been found to be suitable for its cultivation. Only a few plants are seen cultivated in the home gardens for its cotton used for 'Puja' lamp wicks.

HIBISCUS Medic.

1. Herbs or shrubs
   2. Prickly climbing shrubs ; involucral bracts with leafy appendages
      3. Stipules semicordate — *surattensis*
      3. Stipules lanceolate — *furcatus*
   2. Erect herbs or shrubs ; involucral bracts without appendages
      4. Flowers large, yellow with purple centre ; seeds not cottony — *vitifolius*
      4. Flowers small, pink or white ; seeds cottony
         5. Leaves broadly ovate, not lobed — *ovalifolius*
         5. Leaves long and narrow, lower often lobed — *hirtus* var. *talbotii*
1. Trees — *tiliaceus*

***H. furcatus** Roxb. [Hort. Beng. 51, 1814 *nomen nud.*] ex DC. Prodr. 1 : 449, 1824 *non* Willd FBI 1 : 335. DG. 18 ; C. 1 : 112 ; T. 1 : 119 ; G. 1 : 70.

Fl. : September November. *Fr.* : November May. *Ill.* : T. f. 71.

Vern. : Vadloran bhendo ; Huligowri (Kan.).

Loc. : GOA : *Satari* : South of Codal, 3 km point. *Sanguem* : Molem-Avelde jungle ; Colem. *Quepem* : Budsari Goundugarha. *Canacona* : Tudal village. NAGARHAVELI : Saily forest.

Common in the undergrowth of forest.

****H. hirtus** Linn. var. **talbotii** Rakshit, Sci. & Cult. 27 : 193, t. 2, 1961. *H. hirtus* non. Linn. FBI 1 : 335 ; C. 1 : 113 : T. 1 : 122 ; G. 1 : 70 ; S. 17, Saur. 44.

Fl. & *Fr.* ; October May. *Ill.* : Wt. Ic. t. 41 ; T. f. 73.

Vern. : Dupari, Nareri (Mar.) ; Raporis (Guj.).

Loc. : GOA ; *Pernem* ; Terekhol. NAGARHAVELI : Saily forest ; Umberkoi Dongerpada forest ; Carchond forest ; Dudhmi Bilhari forest.

Common along lower slopes of ghats and coastal forest clearings.

H. ovalifolius (Forsk.) Vahl, Sym. Bot. 1 : 50, 1790. *H. micranthus* Linn. f. Suppl. 308, 1781 ; FBI 1 : 335 ; C. 1 : 113 ; G. 1 : 70 ; S. 17, Saur. 44.

Fl. & *Fr.* : April November.

Vern. : Chanakbhindo (Guj.).

***Hibiscus aculeatus** Roxb. Fl. Ind. 3 : 206, 1832 ; Paul & Nayar in Bull. Bot. Surv. India 22 : 194, 1980.

H. **talbotii (Rakshit) Paul et Nayar *l.c.* 197, 1980.

Loc. : GOA : *Canacona* : Butpal forest. DIU : Jhorla village ; Nagoa : Rare, in the cleared up forest areas.

Hibiscus surattensis Linn. Sp. Pl. 696, 1753 ; FBI 1 : 334 ; C. 1 : 112 ; G. 1 : 70.

Fl. : October. *Ill.* : Wt. Ic. t. 197.

Loc. : GOA : *Bardez* : College compound, Bastora ; Bardez.

Rare.

H. tiliaceus Linn. Sp. Pl. 694, 1753 ; FBI 1 : 343 ; DG. 20 ; C. 1 : 119 ; V. 28.

Fl. & Fr. : January March.

Vern. : Khari kapusi ; Belipata (Konk.).

The species closely associated with mangroves, grows along the river mouths and banks with muddy soil and not rocky coasts and it is recorded from the banks of Terricol river. It is quite possible to locate the species along the banks of river Mandovi and other rivers of Goa where the muddy soil cover is considerably good, as it is fairly common along Maharashtra and Karnataka estuarine region.

H. vitifolius Linn. Sp. Pl. 696, 1753 ; FBI 1 ; 338 ; DG. 18 ; C. 1 : 115 ; G. 1 : 70 ; Saur. 45 ; Pav. 47.

Fl. : September - January. *Fr.* : January February.

Vern. : Dukto Kalo bhendo (Konk.) ; Jangli bhindo (Guj.).

Loc. : GOA : *Ilhas* : Raj Bhavan area forest, Panaji. Angidiv. NAGARHAVELI : Dolara forest ; Umberkoi Dongerpada forest.

Common as an undergrowth in the forests.

Cult. species.

Besides the six species, the genus is represented by a few more species commonly cultivated in the gardens of Goa area which are given below :

H. cannabinus Linn. Syst. Nat. ed. 10, 2 : 1149, 1759 ; FBI 1 : 339 ; DG. 19 ; C. 1 : 116 ; V. 27.

Vern. : Ambadi (Konk.)

This species yields good fibre and the leaves are used as vegetable.

H. mutabilis Linn. Sp. Pl. 624, 1753 ; FBI 1 : 344 ; DG. 20 ; C. 1 : 120 V. 28.

Vern : Rosa da china (Port.) ; Madyani (Konk.).

Introduced from China.

H. rosa-sinensis Linn. Sp. Pl. 694, 1753 ; FBI 1 : 344 ; DG. 20 ; C. 1 : 120 ; S. 17 ; V. 28.

Vern. : Darsun (Konk.).

Introduced possibly from China and several colour forms of this species are cultivated. Dalgado records that the demulscent flowers are used in those days for blackening the boots.

Hibiscus schizopetalus (Mast.) Hook. f. in Curtis Bot. Mag. 3 : 36, t. 6524, 1880 ; S. 18.

Mostly grown in gardens.

H. subdariffa Linn. Sp. Pl. 695, 1753 ; FBI 1 : 340 ; DG. 19 ; C. 1 : 117 ; V. 27.

Vern. : Tamdi ambadi ; Red Serrel (Eng.).

Possibly introduced from tropical America. The succulent sepals are used in making jelly.

KYDIA Roxb.

Kydia calycina Roxb. (Hort. Beng. 51, 1814, *nom. nud.*) Pl. Corom. 3 : 11. t. 215 & 216, 1815 ; FBI 1 : 348 ; DG. 21 ; C. 1 : 100 ; T. 1 : 127 ; S. 16 ; Dangs 303 ; Saur. 32.

Fl. : September - December. *Fr.* : December April. *Ill.* : T. t. 78.

Vern : Varang.

Loc. : NAGARHAVELI : Morkhal ; Carchond forest ; Dongerpada-Umberkoi.

The species is common along the Goa ghats from Satari to Canacona taluks as observed by the author. In Nagarhaveli this is a common tree species.

MALACHRA Linn.

Malachra capitata (Linn.) Linn. Syst. ed. 12, 2 : 458, 1767 ; FBI 1 : 329 ; C. 1 : 105 ; G. 1 : 73 ; Dangs 303 ; Saur. 33. *Sida capitata* Linn. Sp. Pl. 685, 1753.

Fl. & Fr. : September - December.

Vern. : Vanbhendi (Mar.).

Loc. : GOA : *Bardez* : Parvorim ; Mapuca. *Ponda* : Borim. NAGARHAVELI : Silvassa ; Dhapsa. DAMAN : Bamoti.

Common weed on waste lands, dried up puddles and along road sides.

MALVASTRUM A. Gray *nom. cons.*

Malvastrum coromandelianum (Linn.) Garcke in Bonplandia 5 : 297, 1857 ; G. 1 ; 64. *Malva coromandeliana* Linn. Sp. pl. 687, 1753. *Malvastrum tricuspidatum* (R. Br.) A. Gray, Pl. Wright, 1 ; 16, 1852 ; FBI 1 : 321.

Fl. & Fr. : November December.

Loc. : GOA : *Bardez* : Porvorim - Betim roadside.

Commonly observed in open situations in wastelands and cultivated fields etc.

Though the species grows rather frequently in Maharashtra, Karnataka and along the adjoining regions of Goa, it is not recorded by Cooke or other workers on the Flora of erstwhile Bombay Presidency.

PAVONIA Cav. *nom. cons.*

Pavonia procumbens (Wt. & Arn.) Walp. Rep. Bot. Syst. 1 : 301, 1842 (non Casaretto, 1842). *P. patens* (Andr.) Chiov. in Ann. de Bot. 13 : 409, 1915 ; Saur. 51 ; Rao & Safui in Proc. Ind. Acad. Sci. 58 : 365, 1963.

Fl. : February *Ill.* : Borssum Waalkes in Blumea, 14 (1) : 134, f. 17, 1966.

Loc. : DIU : Fort area.

A comparatively rare species.

SIDA Linn.

1. Prostrate or trailing herbs	*cordata*
1. Sub - erect or erect herbs	
2. The whole plant glutinose hairy	*mysorensis*
2. The whole plant stellately hairy	
3. Petioles spiny	*spinosa*
3. Petioles not spiny	
4. Awns as long as the carpels	*cordifolia*
4. Awns shorter than the carpels	
5. Leaves lanceolate, glabrous on both sides	*acuta*
5. Leaves ovate - cuneate, glabrous on upper side	*rhombifolia*

Sida acuta Burm. f. Fl. Ind. 147, 1768 ; C. 1 : 98 ; G. 1 : 64 ; S. 15 ; V. 27 ; Dangs 303 ; Saur. 34 ; Pav. 44. *S. carpinifolia* Mast. in FBI 1 : 323, 1874 (*non* Linn. f.) ; DG. 17.

Fl. : September - November. *Fr.* : October December. *Ill.* : Wt. Ic. t. 95.

Vern. : Chikna, Tukti (Mar.) ; Bhiman Visha (Kan.) ; Bala ; Jangli-methi (Guj.).

Loc. : GOA : *Ilhas* : Panaji (Miramar) ; Chimbel water reservoir area.

Canacona : Barsare village near Tudal. NAGARHAVELI : Saily ; Dolara forest ; Jamunpada forest ; Sindhori forest. DAMAN : Coileque area ; Fort area.

Fairly common on the hill slopes and in the forest undergrowth ; occasionally as a weed in wasteland.

This species is very easily confused with *S. rhombifolia* var. *rhomboidea* but can be distinguished by its glabrous leaves and calyx. All the specimens collected by the author are referable to *S. acuta* ssp. *acuta*.

The roots are known in the Indian medicine.

Sida cordata (Burm. f.) Borss. in Blumea 14 : 182, 1966. *Melochia cordata* Burm. f. Fl. Ind. 143, 1768. *Sida veronicaefolia* Lamk. Encycl. 1 : 5, 1785 ; C. 1 : 97 ; G. 1 : 64 ; V. 27 ; Dangs 303 ; Saur. 37 ; Pav. 42. *S. multicaulis* Cav. Diss. 1 : 10, t. 1, f. 6, 1785. *S. humilis* Cav. Diss. 5 : 277, t. 134, f. 2, 1788 ; FBI 1 : 322 ; DG. 16.

Fl. & Fr. : October January.

Vern. : Bhoybal (Mar.) ; Bhumy petari (Konk.) ; Bhoyabala (Guj.).

Loc. : GOA : *Pernem* : Terecol. *Ilhas* : Old Goa. *Sanguem* : Sanguem-Barazan mine area. *Quepem* :* Budsari-Goundugarha. NAGARHAVELI : Khuntly forest ; Dudhni-Bildhari forest. DADRA : Dadra forest. DAMAN : Coileque area. DIU : Jhoola.

Common in the forest undergrowth and in waste places.

Santapau (Fl. Saurashtra, 1962) treats *S. veronicaefolia* as a separate species from *S. multicaulis* Cav. on the nature of axillary inflorescence as single flower in the former and fasciculate flowers in the latter. But as this character is not quite stable as studied from a wide range of material from Gujarat to Karnataka, *S. multicaulis* does not stand as a distinct species.

This species normally is referred to in the Floras as *S. veronicaefolia* Lamk. or *S. humilis* Cav., but the oldest name is clearly *Melochia cordata* Burm. f. and hence the valid name should be *S. cordata* only.

S. cordifolia Linn. Sp. Pl. 684, 1763 ; FBI 1 : 324 ; DC. 17 ; C. 1 99 ; G. 1 : 64 ; V. 27 ; Saur. 38 ; Pav. 44.

Fl. : October November.

Vern. : Khiranti (Mar.) ; Hehulti (Kan.) ; Bal, Bala, Baladana, Kharenti (Guj.).

Loc. : GOA : *Ilhas* : Miramar, Panaji. *Sanguem* : Chaosuria ghats near Netraveli. NAGARHAVELI : Morkhal. DAMAN : Marvor beach. DIU : Nagoa ; Goali.

This species grows as a weed sparsely. Juice of roots is used for healing wounds.

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*Collection from Budsari-Goundugarha is identified as *Sida beddomei* Jacob in Journ. Bomb. nat. Hist. soc. 47 : 48-51, Pl. 3, 1947 (Vide Karthikeyan, Sharma & Mudaliar in Bull. Bot. Surv. India. 22 : 235, 1980).

Sida mysorensis Wt. & Arn. Prodr. 1 : 59, 1834 ; FBI 1 : 322 ; DG. 17. *S. glutinosa* Roxb. (Hort. Beng. 97, 1814, *nom. nud.*) Fl. Ind. ed. Carey, 172, 1832 (*non* Cav. 1785) ; C. 1 : 97 ; G. 1 : 64 : V. 27.

Fl. & Fr. : November January. *Fr.* : December March.

Vern : Dhakti tupkati (Konk.).

Loc. : GOA : *Canacona* : Choram hill top, Nadquem.

Rare on the open hill top.

van Borssum Waalkes (Blumea 14 : 190, 1966) indicates that *S. glutinosa* Cav. which is a native of tropical America is mostly known as an introduced species in south east Asia and is often confused with *S. mysorensis* Wt. & Arn. which grows wild in South India.

S. rhombifolia Linn. Sp. Pl. 684, 1753 ; emend. Mast. in FBI 1 : 323 24, 1874 (incl. vars. *retusa* & *rhomboidea*) ; DG. 17 ; C. 1 : 99 ; S. 16 ; V. 27 ; Saur. 35 ; Pav. 43. *S. orientalis* Cav. Diss. 1 : 21, t. 12, f. 1, 1785.

Fl. : October - November. *Fr.* : November December.

Vern. ; Sahadevi (Mar.) ; Tupkati (Konk.) ; Kallangadale (Kan.) ; Baladana (Guj.).

Loc. : GOA : *Pernem* : Pernem village. *Satari* : Codal village ; Valpoi ; Onda. *Bardez* : Betim ; Porvorim forest area ; Bastara, near Church. *Salcete* : Goodier, near Margoa. *Sanguem* : Molem ; Chichegol ; Netraveli ; Bavanabunda ; Bati. *Canacona* : Barsare village near Tudal.

A common weed along the forest edges, on the roadsides and in waste places.

On the basis of the variation of leaves from collections made from different regions, different varieties such as *retusa*, *rhombifolia* and *microphylla* have been recognised. But the leaf variation is so intergrading that it is difficult and rather inappropriate to separate them as varieties. As such, the author treats all such variations under one species only *i.e.*, *S. rhombifolia*.

S. spinosa Linn. Sp. Pl. 683, 1753 ; FBI 1 : 323 ; C. 1 : 98 ; G. 1 : 64 ; Dangs 303 ; Pav. 43. *S. alba* Linn. Sp. Pl. ed. 2, 960, 1763 ; Exell. in Fl. Zambees. 1 : 477, 1961 ; Saur. 36.

Fl. & Fr. : October November. *Ill.* : K. Schum. in Pflanzenfam. 3 (6) : 42, f. 18, J. & K.

Vern. : Ganget (Mar.) ; Kadumenthya (Kan.) ; Kantalobal (Guj.).

Loc. : GOA : *Canacona* : Choram hill top, Nadquem. NAGARHAVELI : Dhapsa ; Charchond forest. DAMAN : Fort area.

Occasional, in cultivated fields.

Though considerable confusion exists in the correct identity of *S. spinosa* Linn. and *S. alba* Linn., critical study of the wide range of

material together with the types of the two species at the Linnean Herbarium and of the recent monograph (van Borssum Waalkes in Blumea 14 : 191, 1966), indicates that both the names refer to one and the only species which is extremely variable. As such, the earlier name is considered as valid.

THESPESIA Soland. ex Correa

Shrubs. Leaves with a linear nectary on midrib beneath, usually 3-5 lobed, except those sustaining a flower. Flowers 1 - 4. Bracteoles of epicalyx during anthesis under 1 cm. Fruit 1.5 - 3 cm long ; seeds hairy around hilum only	*lampas*
Tree. Leaves without nectary on midrib beneath, not lobed. Flowers solitary. Bracteoles 1.2 - 1.5 cm high. Fruit 2.8 - 4 cm across ; seeds densely short hairy	*populnea*

Thespesia lampas (Cav.) Dalz. & Gibs. Bomb. Fl. 19, 1861 ; FBI 1 : 345 ; DG. 20 ; T. 1 : 124 ; S. 19 ; van Borssum Waalkes in Blumea 14 : 116, 1966 ; Pav. 303. *Hibiscus lampas* Cav. Diss. 3 : 154. t. 56, f. 2, 1787 ; Saur. 47. *Thespesia macrophylla* Bl. Bijdr. 73, 1825 ; C. 1 : 121. *Azanza lampas* (Cav.) Alef. in Bot. Zeit. 19 : 299, 1861.

Fl. : September November. *Fr.* : October January. *Ill* : Wt. Ic. t. 5 : T. f. 75.

Vern. : Jangli bhendi (Mar.) ; Turuve (Kan.) ; Ranbhendi (Konk.) ; Paruspipio (Guj.).

Loc. : GOA : *Bicholim* : Usgao ; Nanora forest. *Satari* : Arvolam, near Onda ; Caranzol ; Codal ; Nanorem. *Sanguem* : Goa border from Anmod ; Patlem ; Netraveli ; Cumbari ; Molem. *Quepem* : Budsari Goundugarha. NAGARHAVELI : Saily forest ; Dolara forest ; Chispana ; Dudhni Bildhari forest ; Umberkoi forest ; Carchond forest ; Morkhal.

Common along roadsides and the margins of cultivated fields. Also cultivated in the gardens.

Many earlier workers treated *T. lampas* under the genus *Hibiscus* Linn. But recently Exell and Hillcoat (Contr. Fl. Mocamb. 2 : 58, 1954) reinstated the genus *Azanza* Alefeld, on the basis of the connate style, appearing as monostylous and transferred *T. lampas* to *Azanza*. Subsequently van Borssum Waalkes (1966) after the study of a wider range of material from Malesia, indicates that though the taxon is closely allied to *Hibiscus* with a distinct sectional status, the various characters like general habit, presence of nectary in midrib, shape of stipules and typical shape and nature of dehiscent capsule, besides the connate style, present more convincingly a closer affinity with the genus *Thespesia* Soland. ex Correa. This approach being more appropriate, is followed in this work.

Thespesia populnea (Linn.) Soland. ex Correa in Ann. Mus. Hist. Nat. Paris 9 : 290, 1807 ; FBI 1 : 345 ; DG. 20 ; C. 1 : 121 ; T. 1 : 125 ; G. 1 : 72 ; S. 18 ; V. 28 ; Dangs 304 ; Saur. 32. *Hibiscus populneus* Linn. Sp. Pl. 694, 1753.

Fl. : November - January. *Fr.* : March May. *Ill.* T. f. 76.

Vern. : Ranbhendi (Mar.) ; Khari kapusi (Konk.) ; Arasi (Kan.) ; Pauderosa (Port.) ; Bhindi (Guj.).

Loc. : GOA : *Pernem* : Terecol. *Ilhas* : Panaji. Angidiv. NAGARHAVELI : Carchond forest. DAMAN : Fort area. DIU : Diu town.

Planted along roadsides as an avenue tree ; also grown in gardens.

Though introduced into India in the earlier centuries, the plant is naturalised along the coastal parts of India. Leaves, bark and flowers are medicinal while wood is used for cheap furniture.

URENA Linn.

Urena lobata Linn. Sp. Pl. 692, 1753 ; FBI 1 : 329 ; DG. 18 ; C. 1 : 106 ; G. 1 : 66 ; S. 17 ; V. 27 ; Dangs 304 ; Saur. 54 ; Pav. 46.

Fl. : October November. *Fr.* : November - March. *Ill.* ; Pflanzenfam. 3 (6) : 45, f. 19, D-E.

Vern. : Vanbhendi (Mar.) ; Otte (Kan.) ; Tupkate (Konk.) ; Carrapiche (Port.) ; Wagdau bhindo (Guj.).

Loc. : GOA : *Pernem* : Paliem. *Satari* : Codal village. *Bardez* : Bastora. *Ilhas* : Panaji. *Salcete* : Chimbel water reservoir. *Ponda* : Borim. *Sanguem* : Molem ; Patim - Sanguem ; Barazon ; Orgoni near Netraveli. *Quepem* : Budsari Goundegarha. *Canacona* : Tudal village ; Choram hill top ; Nadquem ; Ordofond. NAGARHAVELI : Silvassa ; Khuntly forest ; Chispana ; Carchond forest ; Bank of Daman ganga ; Velugaon ; Nanarandha ; Morkhal ; Umberkoi.

Common on the hill slopes in open situations and in wastelands.

There is considerable variation in the shape, margin and hairiness of the leaf and is evident that the two species *U. lobata* and *U. sinuata* separated on such characters of leaf, are one and the same.

Cult. species :

Althaea rosea (Linn.) Cav. Diss. 2 : 91, t. 28, f. 1, 1786 ; FBI 1 : 319 ; DG. 16 ; C. 1 : 95.

This plant is a native of Crete and Greece and is commonly grown in the Indian gardens for its beautiful flowers, under the name Hollyhock.

BOMBACACEAE

BOMBAX Linn.

Bombax ceiba Linn. Sp. Pl. 511, 1753 *p.p.*; Pav. 48; Robyns in Taxon 10 (6): 110, 1961. *B. malabaricum* DC. Prodr. 1: 479, 1824; FBI 1: 349; DG. 21; C. 1: 127; T. 1: 130; G. 1: 71. *Salmalia malabarica* (DC.) Schott. & Endl. Melet. 35, 1832; S. 19; Dangs 304; Saur. 59.

Fl.: February March. *Fr.*: March April. *Ill.*: T. f. 79 & 80.

Vern.: Samar (Mar.); Sauri (Kan.); Panheira (Port.); Vhadli savar (Konk.); Shimul (Guj.); Silk cotton tree (Eng.).

Loc.: GOA: *Salcete*: Lake near Chinchinim; Margao Raija village road. NAGARHAVELI: Nanarandha; Berpam forest; Khuntly forest; Carchond forest; Jamunpada forest. DIU: Nagoa road.

Common in the deciduous forest producing bright red flowers.

Cotton obtained from fruits is used for filling pillows and mattresses. The soft wood is used for making match sticks and water channel tubes for irrigation.

Cult. species:

Adansonia digitata Linn. Sp. Pl. 1190, 1753; FBI 1: 348; DG. 21; C. 1: 126; T. 1: 20; G. 1: 73; V. 28. *Ill.*: Pflanzenfam. 3 (6): 59, f. 28.

Vern.: Gorak chinch (Mar.); Baubab (Konk.); Baobad (Port.); Monkey bread (Eng.).

The tree is indigenous in tropical Africa where it is endemic and is supposed to have been introduced by the Arabian traders to Western India. Dalgado records the cultivation of this species in Siroda (near Borim Bridge), Salcete. A cooling syrup used to be made from the pulp of the fruits though it is not in vogue now.

Durio zibethinus Murr. Syst. Nat. Veg. ed. 13: 581, 1774: FBI 1: 351; DG. 22; V. 28.

This Malayan species is said to be introduced into Goa for its edible fruit as indicated by Dalgado. It can be located in the back yard gardens in some houses at Goa.

STERCULIACEAE

1. Herbs or undershrubs
   2. Stem and branches nearly glabrous; flowers pink ***Melochia***
   2. Stem and branches either pubescent or prickly; flowers yellow or white

3. Stem and branches softly pubescent ; flowers yellow	
4. Staminodes absent	*Waltheria*
4. Staminodes present	*Melhania*
3. Stem and branches sometimes prickly ; flowers white	*Byttneria*
1. Trees	
5. Flowers unisexual ; petals absent	
6. Fruit dehiscent	
7. Follicles capsular covered with stinging hairs or at least densely rusty villous	*Sterculia*
7. Follicles membranous, opening before maturity, glabrous or nearly so	*Firmiana*
6. Fruit indehiscent with thin narrow beak	*Heritiera*
5. Flowers hermaphrodite ; petals present	
8. Staminal column adnate to the gynophore ; staminodes present	
9. Fruit a spirally twisted follicle	*Helicteres*
9. Fruit a woody loculicidal capsule	*Pterospermum*
8. Staminal column tubular ; staminodes absent	*Eriolaena*

BYTTNERIA Loefl. *nom. cons.*

Byttneria herbacea Roxb. Cor. Pl. 1, t. 29, 1795 ; FBI 1 : 376 ; DG. 24 ; G. 1: 80 ; V. 29.

Ill. : Wt. Ic. t. 488.

Though Dalgado records this species for Goa, it is rather uncommon for this area. However, it is included in this work to locate it if available.

ERIOLAENA DC.

1. Bracteoles much divided and persistant	*candollei*
1. Bracteoles entire or lobed and caducous	*quinquelocularis*

Eriolaena candollei Wall. Pl. As. Rar. 1 : 51, t. 64, 1830 ; FBI 1 : 370 ; DC. 23 ; T. 1 : 151 ; C. 1 : 140 ; V. 29.

Ill. : T. f. 92, 93.

Vern. : Bothi (Mar.) ; Batgu (Konk.).

Talbot (*l.c.*) has treated the four species of the genus recorded by Cooke from Western peninsula under the earliest name *E. candollei* Wall. (1830). However, the author feels ; after critical study that all the four species could be treated under two clear species namely, *E. quinquelocularis* Wt. (1847) as distinct and *E. candollei* Wall. comprising *E. stocksii* Hook. f. & Thoms. and *E. hookeriana* Wt. & Arn. also.

E. quinquelocularis (Wt. & Arn.) Wt. Icon. 3 : 7 ubi describ. t. 882, 1847 ; FBI 1 : 371 ; C. 1 : 140. *Michrochlaena quinquelocularis* Wt. & Arn. Prodr. 71, 1834.

Fl. : May July. *Fr.* : June August. *Ill.* : Wt. Ic. t. 882.

Loc. : NAGARHAVELI : Dolara forest.

Occasional. Talbot (Forest Flora 1 : 151, 1909) treats all the 4 species enumerated by Cooke for Bombay Presidency, under *E. candollei* Wall. (1830). However, the author feels that *E. quinqueloculatis* Wt. is distinct from *E. candollei* and that the latter species embraces both *E. stocksii* Hook. f. & Thoms. and *E. hookeriana* Wt. & Arn.

FIRMIANA Marsili

Firmiana colorata (Roxb.) R. Br. in Bennett, Pl. Jav. Rar. 235, 1844 ; G. 1 : 76 ; S. 21. *Sterculia colorata* Roxb. Pl. Cor. 1 : t. 25, 1795 (descr. excl.) ; FBI 1 : 359 ; DG. 23 ; C. 1 : 133 ; T. 1 : 140 ; V. 29 ; Saur. 61 ; Pav. 51.

Fl. : March - April. *Fr.* : May June. *Ill.* : T. f. 85 & 86.

Vern : Khavas, Kawsey (Mar.) ; Kholthe (Konk.).

Loc. : GOA ; *Bardez* : Bastora, Porvorim. NAGARHAVELI : Carchond forest.

Flowers usually make their appearance before the leaves.

HELICTERES Linn.

Helicteres isora Linn. Sp. Pl. 963, 1753 ; FBI 1 : 365 ; DG. 23 ; C. 1 : 136 ; T. 1 : 146 ; G. 1 : 77 ; S. 21 ; V. 29 ; Dangs 304 ; Saur. 62 ; Pav. 50.

Fl. : August November. *Fr.* : September June. *Ill.* Wt. Ic. t. 180 ; T. f. 89.

Vern : Kevani, Muradseng (Mar.) : Kavargi (Kan.) ; Kiran (Konk.) ; Pau de chanca (Port.) ; Mardasinghi (Guj.).

Loc. : GOA : *Bicholim* : Colguirem. *Bardez* : Bastora Porvorim. *Satari* : Galauli ; Caranzol ; Ambechagol. *Illias* : Rajbhavan forest area, Panaji. *Ponda* : Mollru-Ponda. *Sanguem* : Goa border area from Anmod ; Sanguem Barazon mine area ; Cumbari ; Bati Sidh ; Verlem ; Netraveli ; Molem ; Durgin hills. *Quepem* : Budsari - Goundugarha. *Canacona* : Canacona-Balli ; Tudal area ; Jamalghati, near Nadquem ; Poinguinim, near Ordofond. NAGARHAVELI : Berpam forest ; Sally ; Khuntly forest ; Chispana area ; Morkhal ; Carchond forest ; Umberkoi Dongarpada forest : Nanarandha ; Dudeni - Bildhari forest.

Common in the undergrowth of forests.

Bark and seeds are used in medicine and for making ropes.

HERITIERA Ait.

Heritiera littoralis Dryand in Ait. Hort. Kew ed. 1. 5(3) : 546, 1789 ; FBI 1 : 363 ; C. 1 : 134 ; T. 1 : 145 ; G. 1 : 74 ; V. 29.

Fl. : July October. *Fr.* October -January. *Ill.* : Bedd. Fl. Sylv. 75, t. 11, f. 6 ; T. f. 88.

Vern : Sundrichand, Koleand (M.) ; Chandmara (K.) ; Looking glass tree (E.).

Cooke (l. c.) has recorded this mangrove species from Kalanadi river bank which is near the border of Goa and Karnataka and subsequently T. Ananda Rao (*Bull. bot. Surv. India* 13 : 198, 1971) reported the species from Maharashtra and Karnataka. Though not collected by the author from Goa area, it is included in this work as it is quite possible to locate it particularly along Mandovi and Zuari river banks in the region away from the estuary where the salinity of water is less.

Its vernacular name "*Sundri*" as given by Cooke (*l. c.*) and in other Western India Floras, is rather confusing. This Name specifically represents *H. fomes* Buch.-Ham. which has so far recorded from the Gangetic estuarine zone, the Sundribans of West Bengal and Bangladesh (the name derived from *Sundri*) and now from Mahanadi estuary (Orissa) only (T. Ananda Rao *l. c.*), and nowhere else from the Indian Coast either eastern or western. According to Kostermans, the distribution of this species (*Sundri*) is restricted to Bay of Bengal extending along the estuarine zones of Chittagong (Bangladesh), Burma and Tenasserim only. But *H. littoralis* is the most common species extensively distributed along the Andamans, Malaysia, North Australia etc., towards the south east and East Africa towards the West. The record of occurrence of *H. fomes* in Sylhet and Borneo in FBI (*l. c.*) is due to its confusion with *H. dubia* and *H. littoralis* [A. J. G. H. Kostermans in *Reinwardtia* 4(4) : 477 & 491, 1959]

MELHANIA Munro ex Mast.

Melhania futteyporensis Munro ex Mast. in FBI 1 : 373, 1874 ; Saur. 63 ; *M. tomentosa* Stocks ex Mast. in FBI 1 : 373, 1874 ; C. 1 : 142.

Fl. & Fr. : September November.

Vern. : Adban Khapat (Guj.).

Loc. : Diu : Nagoa.

Rare, in the rocky creeks along the sea shore.

MELOCHIA Linn.

Melochia corchorifolia Linn. Sp. Pl. 675, 1753 ; FBI 1 ; 374 , DG. 23 ; C. 1 : 142 ; C. 1 : 79 : V. 29 ; Danes 305 ; Saur. 63 ; Pav. 50

Fl. : April September. *Fr.* ; September November.

Vern. : Chuncha Khapat (Guj.).

Loc. : GOA : *Satari* : Masarde village, near Valpoi ; Caranzol ; Tanem ; Pale forest, near Valpoi. *Bardez* : Porvorim - Betim road side ; Bastora. *Ilhas* ; Miramar, Panaji. *Salcete* : Margao. *Sanguem* : Nandorna near Molem ; Cumbari ; Patiem ; Baranbunda ; Baranzong ; Rivana. *Canacona* ; Ordofond ; Nadquem. NAGARHAVELI : Saily forest ; Khanvel ; Morkhal. DADRA : Tingra village. DAMAN : Dundorta.

Common in open areas along road sides and in sugarcane fields. According to Haines the leaves are used as vegetable.

PTEROSPERMUM Schreb. *nom. cons.*

Leaves 3-5 lobed, base cordate, 1 - nerved ; stipules entire	*diversifolium*
Leaves polymorphous, palmately lobed, base cordate or peltate, 7 - 12 nerved ; stipules multifid	*acerifolium*

Pterospermum acerifolium Willd. Sp. Pl. 3 : 729, 1801 ; FBI 1 : 368 ; DG. 23 ; C. 1 : 137 ; T. 1 : 149 ; V. 29.

Ill. : Wt. Ic. t. 63.

Vern. : Karnikar (Mar.) ; Kunak champo (Konk.).

The species has been reported by Dalgado from the hills of Mulgaon (Sanguem), possibly planted. Though not collected from Goa, the author has, however, recorded its cultivation in gardens of Goa area and has also reported elsewhere its occurrence in wild state along the Western ghats and areas adjoining to Goa.

P. diversifolium Blume Bijdr. 88, 1825 ; FBI 1 : 367 ; G. 1 ; 78. *P. glabrescens* Wt. & Arn. Prodr. 1 : 69, 1834 ; FBI 1 : 369 ; DG. 23 ; V. 29.

Fl. : November. *Ill.* : Rheede Hort. Mal. 6, t. 58.

Vern. : Sripad (Konk.) ; Solda (Port.).

Loc. : GOA : *Satari* : Codal village.

Rather a rare species along the Western ghats and an interesting record for Goa area.

STERCULIA Linn.

1. Leaves palmately 5 - 7 lobed	
2. Calyx yellow, pubescent within ; follicles villous with stinging hairs	*urens*
2. Calyx pink, glabrous within ; follicles villous with non - stinging hairs	*villosa*
1. Leaves simple	

3. Petioles and undersurface of leaves rusty tomentose ; calyx segments broadly ovate, densely tomentose ; follicles obovoid *guttata*
3. Petioles and leaves glabrous ; calyx segments linear, subglabrous ; follicles oblong with acuminate tip *balanghas*

Sterculia balanghas Linn. Sp. Pl. 1007, 1753 ; FBI 1 : 358 ; DG. 22 ; G. 1 : 76.

Ill. : Wt. *Ill.* t. 30.

Vern. : Bemkare (Konk.).

Dalgado records this species for Goa. Though it has not been collected so far for this area and also the adjoining region in Maharashtra and Karnataka States, its occurrence along the Western ghats is rather not uncommon. Hence, it is included in this work for its possible collection in future.

S. guttata Roxb. (Hort. Beng. 50, 1814, *nom. nud.*) Fl. Ind. 3 : 148, 1832 ; FBI 1 : 355 ; DG. 22 ; C. 1 : 132 ; T. 1 : 139 ; G. 1 : 76 ; S. 20.

Fl. : November March. *Fr.* : December onwards, persisting till the flowering season. *Ill.* : Wt. Ic. t. 487 ; T. f. 84.

Vern. : Kookur, Goldar (Mar.) ; Happu savaga (Kan.) ; Kuhindar (Konk.) ; Estrella de alva (Port.).

Loc. : GOA : *Satari* : Jamad forest near Nandorem ; Ivari. *Bardez* : Betim hill slopes. *Canacona* : Ordofond near Walgon river ; Nadquem-Quer hills.

Common on the hill slopes in deciduous forest.

S. urens Roxb. Pl. Cor. 1 : 25, 1795 ; FBI 1 : 355 ; DG. 22 ; C. 1 : 131 : T. 1 ; 137 ; G. 1 : 75 ; S. 20 ; Dangs 304 ; Saur. 60 ; Pav. 51.

Fl. : Oct. onwards. *Fr.* : January May. *Ill.* : T. f. 83.

Vern. : Karai (Mar.) ; Pinari (Kan.) Pandrukh (Konk.) ; Kadayo ; Kogdol (Guj).

Loc. : GOA : *Ilhas* : Chimbel reservoir to Brahmapuri temple. NAGARHAVELI : Berpam forest ; Dongarpada Umberkoi ; Bank of Damanganga river on way to Kawcha.

Common in the deciduous forests on the hills.

A gum is obtained from this species which is used as a substitute for Tragacantha.

S. villosa Roxb. (Hort. Beng. 50, 1814, *nom. nud.*) Fl. Ind. 3 : 153, 1832 ; FBI 1 : 355 ; DG. 22 ; C. 1 : 132 ; T. 1 : 138 ; G. 1 : 76 ; S. 20.

Fl. ; December - January.

Vern. : Sarda (Mar.) ; Saraya (Kan.) ; Saykhanda (Konk.).

Fibre is obtained from the bark which is used for making bags and ropes.

This species though not collected by the author from Goa is quite frequently met with along Phonda Amboligbat of Maharashtra State adjoining Goa area.

Cult. species :

Sterculia foetida Linn. Sp. Pl. 1008, 1753 ; FBI 1 : 354 ; DG. 22 ; C. 1 : 130 ; T. 1 : 136 ; G. 1 : 75. *Ill.* : Wt. Ic. t. 181 ; T. f. 82.

Vern. : Pun (Mar.) ; Nagin (Konk.) ; Satirao (Port.).

The flowers of this species have very offensive odour. The wood is used in making mats for boats and the seeds are eaten. Though Dalgado states it is common, there does not seem to be any record of its occurrence in wild state. The species is rather cultivated in some residential back yards in Goa area.

WALTHERIA Linn.

Waltheria indica Linn. Sp. Pl. 673, 1753 ; FBI 1 : 374 ; C. 1 : 144 ; G. 1 : 79 ; S. 22.

Fl. ; November.

Loc. : GOA : *Ilhas* : Miramer, Panaji. *Salcete* : Goodier, 1 mile beyond Margao ; Cavollossim beach.

Common on hill slopes and moist sandy areas.

Cult. species :

Abroma augusta (Linn.) Willd. in Linn. f. Suppl. 341, 1781 ; FBI 1 : 375 ; DG. 24 ; C. 1 : 144 ; V. 29.

This species was introduced into India quite early and is cultivated in the gardens for its flowers.

Pentapetes phoenicea Linn. Sp. Pl. 608, 1753 ; FBI 1 : 371 ; DG. 23 ; C. 1 : 144 ; G. 1 : 81 ; V. 29. *Ill.* : Pflanzenfam. 3 (6) : 77, f. 40, D-E.

Vern. : Dupari (Mar.) ; Tombdi dupani (Konk.).

An ornamental plant cultivated in the gardens.

TILIACEAE

1. Trees or shrubs
   2. Fruits small ; flowers in terminal or extra-axillary cymes or racemes
      3. Flowers in terminal racemes ; drupes not lobed *Microcos*

3. Flowers in terminal, axillary, extra-axillary or leaf-opposed cymes	*Grewia*
2. Fruits large, flowers in terminal panicles	*Erinocarpus*
1. Herbs or undershrubs	
4. Capsules smooth, elongate or sub-globose	*Corchorus*
4. Capsule spiny, globose or oblong	*Triumfetta*

CORCHORUS Linn.

1. Capsule spherical, beak absent	*capsularis*
1. Capsule elongate, beak present	
2. Capsule beak entire	
3. Capsule glabrous, beak long	*olitorius*
3. Capsule scabrous, beak short	*trilocularis*
2. Capsule beak trifid or lobed	
4. Capsule 6-angled, 3 winged	*aestuans*
4. Capsule cylindrical, neither angled nor winged	
5. Capsule ending in 3-radiating points	*tridens*
5. Capsule ending in a single beak, lobed at the summi	*fascicularis*

Corchorus aestuans Linn. Syst. ed. 10, 2 : 1079, 1759 ; S. 25 ; V. 30 ; Dangs 305 ; Saur. 72 ; Pav. 53. (*non* Forsk.). *C. acutangulus* Lamk. Encycl. 2 : 104, 1786 ; FBI 1 : 398 ; DG. 25 ; C. 1 : 160 ; G. 1 ; 86.

Fl. & Fr. : September-November. *Ill.* : Wt. Ic. t. 739.

Vern. : Chunch ; Chathari Chunch (Guj.).

Loc. : GOA : *Pernem* : Pernem. *Satari* : Codal village. *Bardez* : Baga Jungle ; Porvorim village fields ; Mapuca ; Moira. *Ilhas* : Chimbel reservoir to Brahmapuri temple. *Sanguem* : Dudal ; Baranzan ; Bavanbunda. *Quepem* : Bali. *Canacona* : Amdiga near Butpal ; Angidiv. NAGARHAVELI : Saily ; Dolara ; Damanganga. DADRA. DAMAN : Coileque area. DIU : Jalandhar ; Castle area ; Gogali.

Common in cultivated fields and in waste places.

C. capsularis Linn. Sp. Pl. 529, 1753 ; FBI 1 : 397 ; DG. 25 ; C. 1 : 157 ; G. 1 : 87 ; S. 25 ; Dangs 305 ; Saur. 70 ; Pav. 54.

Fl. & Fr. : September-November. *Ill.* ; Wt. Ic. t. 311.

Vern. : Chaunchan (Mar.) ; Juta (Port) ; Tupkati (Konk.) ; Chunch ; Bora-Chunch (Guj.).

Loc. : GOA : *Ilhas* : Brahmapuri village near Vela Goa. *Salcete* : Navelim beyond Madgao. *Sanguem* : Borim ; Patrem ; Orgoni near Netravali ; Velemol ; 1½ km before Molem. *Canacona* : Ordofond ; Angidiv. NAGARHAVELI : Saily ; Khanvel ; Dhapsa ; Jamunpada forest.

Rare, in open areas and in wastelands. Mostly cultivated for its jute-fibre and the plants growing wild may be considered as escape from cultivation.

Corchorus fascicularis Lamk. Encycl. 2 : 104, 1786 ; FBI 1 : 398 ; C. 1 : 159 ; G. 1 : 87 ; Saur. 71 ; Dangs 305.

Fl. : September.

Vern. : Bahuphalli (Guj.).

Loc. : NAGARHAVELI

C. olitorius Linn. Sp. Pl. 529, 1753 ; FBI 1 : 397 ; DG. 25 ; C. 1 : 158 ; G. 1 : 87 ; S. 25 ; Dangs 305 ; Saur. 71 ; Pav. 55.

Fl. : September.

Vern. : Motichunch (Mar.). Chunchhado ; Chunchho (Guj.).

Loc. : GOA : *Sanguem* : Velemol ; Rumde near Netravali. *Canacona* : Angidiv. NAGARHAVELI : Saily ; Khanvel.

An occasional plant in open areas. This species is cultivated in Bengal for extraction of jute fibre.

C. tridens Linn. Mant. App. 566, 1771 ; FBI 1 : 398 ; C. 1 : 159 ; Pav. 53.

Fl. & Fr. : August-October.

Loc. : NAGARHAVELI : Silvassa, towards Atal forest. DIU : Nagoa : Gogalo

Rare, on loamy soil.

C. trilocularis Linn. Mantissa, 77, 1771 ; FBI 1 : 397 ; C. 1 : 158 ; G. 1 : 87.

Fl. : September.

Vern. : Kadu-Chinch (Mar.).

Loc. : GOA : *Canacona* : Angidiv.

ERINOCARPUS Nimmo

Erinocarpus nimmonii Grah. Cat. Bomb. Pl. 21, 1839 ; FBI 1 : 394 ; DG. 24 ; C. 1 : 155 ; T. 1 : 165.

Fl. : August-September. *Ill.* : T. f. 104.

Vern. : Chaora (Mar.) ; Hilvo (Konk.).

The species fairly common along the Western ghats of Maharashtra and Karnataka, is recorded by Dalgado in Goa forests.

GREWIA Linn.

1. Straggling shrubs
2. Leaves roundish-ovate, more or less lobed, sub-cordate at base ; flowers bisexual, peduncles 1-2-flowered *abutilifolia*

2. Leaves linear-oblong, rounded at base ; flowers polygamous ; peduncles many flowered — *hirsuta*

1. Erect shrubs or small trees

3. Leaves 3-ribbed, ovate to lanceolate ; peduncles equal to or larger than the petioles

4. Drupe hairy — *orientalis*

4. Drupe glabrous — *serrulata*

3. Leaves 5-ribbed, ovate or orbiculate ; peduncles much shorter than the petioles ; leaves sparsely hairy, hoary or softly greyish tomentose beneath — *tiliaefolia* (incl. var. *leptopetala*)

Grewia abutilifolia Vent. ex Juss. in Ann. Mus. Par. 4 : 92, 1804 ; FBI 1 : 390 ; C. 1 : 152 ; T. 1 : 165 ; S. 23 ; Saur. 69. *G. aspera* Roxb. (Hort. Beng. 42, 1814, *nom. nud.*) Fl. Ind. 2 : 591, 1832 ; G. 1 : 85.

Fl. : March-August. *Fr.* : June-December. *Ill.* ; T. f. 102.

Vern. : Khar phulsa (Mar.) ; Kowri (Kan.).

Loc. : GOA : *Ilhas* : Raj Bhavan forest area near Panaji. *Canacona* : Butpal-Kanpal hill top. NAGARHAVELI : Saily ; Dolara forest ; Dudhni to Bildhari forest ; Carchond forest ; Dongarpad-Umberkoi.

Common on hill tops and plateau areas in deciduous forest.

G. hirsuta Vahl Symb. 1 : 34, 1790 ; C. 1 : 153 ; T. 1 : 166 ; G. 85. *G. polygama* Roxb. Hort. Beng. 42, 1814 ; DG. 24.

Fl. : August-September. *Ill.* : Wt. Ic. t. 76.

The most common species of the genus, widely distributed in deciduous forests, as observed by the author.

G. orientalis Linn. Sp. Pl. 964, 1753, FBI 1 : 384 ; DG. 24 ; T. 157, C. 1 : 147 ; G. 184.

Fl. : June. *Ill.* : T. f. 95.

Vern. : Bemdarli (Konk.) ; Garcilha (Port.).

Though Dalgado records this species for Goa area it is rather very rare and grows mostly in the higher rainfall zone of south India. However, it is included here with the hope of locating it in future work.

G. serrulata DC. in Prodr. 1 : 510, 1824. *G. glabra* Blume Bijdr. 115, 1825. *G. disperma* Rottl. ex Spreng. Syst. 2 : 579, 1825 ; S. 23. *G. laevigata* auct. plur. (*non* Vahl, 1790) ; FBI 1 : 389 ; C. 1 : 152 ; T. 1 : 164.

Fl. : August-October. *Fr.* : October-November. *Ill* : T. f. 101.

Vern : Kaori, Gulgallop (Mar.) ; Gurguri (Kan.).

Loc. : GOA : *Bicholim* : Nanora. *Satari* : Koparda ; Ivorem. *Bardez* : Betim forests ; Bastora, near boys hostel. *Sanguem* : 1½ km before Molem ; Bati ; Netravali. *Quepen* : Colomba-Rivona. *Canacona* : Ordofond-Tudal ; Poinguinam. NAGARHAVELI ; Dudhni to Bildhari forest.

Common in cleared areas along deciduous forests.

The nomenclature of this species has been a confusing issue for several workers like Drummond (Jour. Bot. 49 : 329, 1911), Burret (Notizblatt. 9 : 592, 1926), Narayanaswami & R. S. Rao [(Journ. Ind. Bot. Soc. 29(4) : 179, 1950)] and others. The author, after scrutiny of the types of *G. serrulata* DC. and *G. glabra* Bl. from the herbaria at Geneva and Leiden respectively, in 1958 and after further consultation of other species at Kew and other herbaria in 1958 and 1964, confirms now that *G. serrulata* DC. is the earliest valid name for this taxon.

Grewia tiliaefolia Vahl Symb. 1 : 35, 1790 ; FBI 1 : 386 ; DG. 24 ; C.I : 150 ; T. 1 ; 160 *in part*; G. 1 : 84.

Fl. : May - August. *Ill.*: Bedd. Fl. Sylv. t. 108.

Vern. : Thadsal (Mar.) ; Dhaman (Konk.).

Though the species proper grows commonly in the deciduous forests, the author's observations along the Western ghats indicate that this taxon is very rare when compared to the common growth of its variety *leptopetala* It is quite possible that Dalgado's record of this taxon is actually based on the variety *leptopetala*.

G. tiliaefolia Vahl var. leptopetala Cooke, Fl. Pres. Bomb. 1 : 150, 1901 ; Saur. 69. *G. leptopetala* Brandis, Ind. Tr. 100, 1906. *G. tiliaefolia* Vahl : Brandis For. Fl. N.W. & Central India 41. 1874 *p.p.* ; T. 1 : 160 *p.p.*; S. 23. *G. tiliaefolia* var. *argentea* Burret in Notizbl. Bot. Gart : Berlin, 9 : 661, 1926.

Fl. : April July. *Fr.* : August September.

Vern. : Dhaman (Mar.).

Loc. : GOA : *Satari* : Caranzol field area. *Bardez* : Porvorim ; Dumpien. *Canacona* : Ordofond-Tudal ; Butpal-Ordofond ; Ordofond-Butpal (4th mile) ; Angidiv. NAGARHAVELI: Atola forest ; Dolara forest ; Nana Randha forest. DAMAN : Regunvara.

Occasional on the edge of the forest.

Though *G. tiliaefolia* is a common associate of deciduous forests of India and is widely distributed in the Deccan plateau, the variety *leptopetala* with its characteristic densely, softly, greyish-tomentose leaves is restricted in distribution in India. It appears from the available data that it grows in Western ghats along the lower plateaus of the Sahayadris and also along Goa area where it is more common than *G. tiliaefolia* var. *tiliaefolia*.

Though Brandis (1906) considered *G. leptopetala* as a distinct species on the character of its tomentum, general judgement of various characters of this taxon and *G. tiliaefolia*, indicates that it would be appropriate to treat this taxon as a variety of *G. tiliaefolia* and Cooke (1901) is the first author who published it in his flora.

Burret (1926) while recognising this distinct form, named it as *G. tiliaefolia* var. *argentea* and considers, by mistake, *G. leptopetala* Brandis as a synonym to *G. tiliaefolia* var. *tiliaefolia*. The recognition of this taxon by Brand is quite clear and the subsequent publication of the *leptopetala* by Cooke as a variety makes Burret's name var. *argentea*, a superfluous synonym for this variety.

Microcos Linn.

Microcos paniculata Linn. Sp. Pl. 514, 1753 ; *Grewia microcos* Linn. Syst. ed. 12, 2 : 602, 1767 ; FBI 1 : 392 ; DG. 24 ; C. 1 : 154 ; T. 1 : 168 ; G. 1 : 83.

Fl. : May October. *Fr.* : September November. *Ill.* : Wt. Ic. t. 84.

Vern. : Shirul (Mar.) ; Abharangu (Kan.) ; Amsali (Konk.).

Loc. : Goa : *Pernem* : Pernem-Conad ; Paliem. *Bicholim* : Bicholim; Vadem. *Satari* : Valpoi Nagram ; Caranzol village ; Maloli forests ; Valpoi ; Tamen. *Bardez* : Betim Bardez ; Porvorim ; Chopora ; Kaisuva fort ; Bordez. *Ilhas* : Near Santa cruz village ; Raj Bhavan. *Salcete* : Verna village. *Sanguem* : Tanem ; Patrem ; Molem ; Bavanbunda. *Canacona* : Ordofond-Butpal ; Butpal.

Very common inside the forest.

The author after careful analysis of several African and Malaysian species, is convinced that this single Indian species should be considered under *Microcos* only. This genus is distinct from *Grewia* by several characters as indicated by the author (Journ. Ind. Bot. Soc. 29 ; 181, 1950).

Triumfetta Linn.

1. Stamens 5 — *pentandra*
1. Stamens more than 5
   2. Fruit including bristles exceeding 1.75 cm across — *pilosa*
   2. Fruit including bristles not exceeding 1.75 cm across
      3. Lower leaves 3 to 5 lobed ; bristles of fruits glabrous — *rhomboidea*
      3. Leaves orbicular ; bristles of fruits puberulous — *rotundifolia*

Triumfetta pentandra A. Rich. in Guill. & Perr. Fl. Seneg. Tent. 93, t. 19, 1831 ; FBI 1 : 396 ; G. 1 : 86. *T. neglecta* Wt. & Arn. Prodr. 75, 1834 ; FBI 1 : 396.

Fl. : September December. *Fr.* : November March.

Loc. : Nagarhaveli : Nana Randha.

Occasional.

Triumfetta pilosa Roth Nov. Pl. Sp. 223, 1821 ; FBI 1 : 394 ; C. 1 ; 156 ; G. 1 : 86 ; S. 25 ; V. 30.

Fl. : October - November. *Fr.* : January March.

Vern. : Landga (Mar.) ; Nichardi (Guj.).

Loc. : NAGARHAVELI ; Jamunpada forest ; Dongerpada Umberkoi ; Sindhoni forest ; Morkhel.

Fairly common.

T. **rhomboidea** Jacq. Enum. Pl. Craib. 22, 1760 ; FBI 1 : 395 ; DG. 26 ; C. 1 : 156 ; G. 1 : 86 ; Saur. 73 ; Pav. 52. *T. bartramia* Linn. Syst. ed. 10, 2 : 1044, 1759 (*nom. illegit.*) ; S. 24.

Fl. : September - December. *Fr.* : September - April. *Ill.* : Wt. Ic. t. 320.

Vern. : Thinpudi (Mar.); Jhipato (Guj.).

Loc. : GOA : *Pernem* : Paliem. *Satari* : Valpoi Nagram. *Bardez* : Baga jungle, hills of Mona. *Ilhas* : Panaji (coastal area) ; Raj Bhavan compound, Panaji ; Chimbel reservoir. *Salcete* : Goodier, 1½ km before Margoa ; Poda village. *Marmugao* : Marmugao hill top (around the fort). *Sanguem* : Goa area after Anmod ; Surta ; Orgoni, *Canacona* : Ordofond-Sadashivgad ; Angidiv. NAGARHAVELI : Saily ; Dolara forest ; Dudhni to Bildhari forest ; Mokhal. DADRA : Tingra village. DAMAN : Cataria ; Fort area. DIU : Gogale.

Common on the hill slopes and on sandy, shady waste places.

T. rotundifolia Lamk. Encycl. Meth. 3 : 42), 1792 ; FBI 1 : 395 ; C. 1 : 157 ; G. 1 : 86 ; Saur. 73 ; Pav. 53.

Fl. & Fr. : August - September.

Vern.: Jhipato (Guj.).

Loc. : GOA : *Bardez* : Bastora near Church. DADRA. DIU : Castle area.

Occasional in open grassy areas. Leaves, flowers and fruits are medicinal.

OXALIDACEAE

Leaves trifoliate	*Oxalis*
Leave abruptly pinnate	*Biophytum*

BIOPHYTUM DC.

Leaflets nearly glabrous, pedicels very short or absent ; seeds ridged but not tubercled	*sensitivum*

Leaflets strigosely hairy, pedicels short ; seeds with tubercled ridge in irregularly spiral lines *candolleanum*

Biophytum candolleanum Wt. Ill. 1 : 161, t. 62, 1840 ; G. 1 : 95. *B. sensitivum* var. *candolleana* Edgew. & Hook. f. in FBI 1 : 437, 1876. *B. reinwardtii* (Zucc.) Klotzch Peters, Reise Mossamb. Bot. 85, 1961.

Fl. & Fr. : August November. *Ill.*: Wt. Ill. t. 62.

Loc. : GOA : *Satari* : Nagargao, near Valpoi. *Bardez* : Betim - Bardez; Sukur village, *Salcete* : Rai village area. *Marmugao* : Marmugao area. *Canacona* : Ordofond forest ; Ordofond. NAGARHAVELI : Carchond forest ; Sindhoni forest ; Morkhal ; Silvassa towards Atal forest ; Khuntly forest ; Dolara forest. DADRA : Tingra village.

Common as undergrowth and on open wastelands.

The difference between *B. candolleanum* Wt. (1840) and *B. reinwardtii* (Zucc.) Klotzch are very subtle and overlapping. The character of calyx and the arrangement of ridges and tubercles on seeds are not constant and the latter character can best be described as ridges or tubercles irregularly spirally arranged on seeds. It is, therefore, appropriate to consider these two species as one.

B. sensitivum (Linn.) DC. Prodr. 1 : 690, 1824 ; FBI 1 : 436 ; DG. 27 ; C. 1 : 177 ; G. 1 : 95 ; V. 31 ; Dangs 306 ; Saur. 79 ; Pav. 56. *Oxalis sensitiva* Linn. Sp. Pl. 434, 1753.

Fl. & Fr. : August November. *Ill.* : Pflanzenfam. 3(4) : f. 140.

Vern ; Jharera (Mar.) ; Satri (Konk.) ; Zarer (Guj.).

Loc. : GOA : *Canacona* : Angidiv. NAGARHAVELI : Bank of Damanganga river on way to Kawcha. DAMAN : Dandoria.

Occasional weed in grassland and forest undergrowth and also in Goa main land as observed (though no specific collection is made there).

OXALIS Linn.

Oxalis corniculata Linn. Sp. Pl. 435, 1753 ; FBI 1 : 436 ; DG. 27 ; C. 177 ; G. 1 : 94 ; S. 27 ; V. 31 ; Saur. 79 ; Pav. 56.

Fl. & Fr. : January September. *Ill.* : Wt. Ic. t. 18.

Vern. : Ambuti (Mar.) ; Pullampurachi sappu (Kan.) : Ambuti (Konk.).

Loc. : DAMAN : Fort area.

Occasional in open wastelands all over the area under study.

Cult. species :

Averrhoa bilimbi Linn. Sp. Pl. 428, 1753 ; FBI 1 : 439 ; DG. 27 ; C. 1 : 178 ; T. 1 : 183.

Fl. : October. *Ill.* : Bedd. Fl. Sylv. t. 117.

Vern. : Bilambi (Mar.) ; Bilimbi (Kan.) ; Bilimbine (Port.).

Cultivated for its edible fruits in Goa which are made into tarts and preserves or pickles (*Satari* ; Valpoi).

Averrhoa carambola Linn. Sp. Pl. 428, 1753 ; FBI 1 : 439 ; DG. 27 ; C. 1 : 178 ; T. 1 : 182 ; G. 1 : 95 ; V. 31.

Fl. : May-August *Ill.* : T. f. 112.

Vern. : Kamaranga (Mar.) ; Karmal (Konk.).

It is supposed to have been introduced into Goa by the Portuguese from Moluccan islands. Cultivated for its fruits used for making jams.

Oxalis latifolia H.B.K., in Nov. Gen. 5 : 184, t. 567, 1821 ; S. 27 ; V. 31.

Vartak has collected this species from Panaji. Evidently under cultivation in gardens.

BALSAMINACEAE

IMPATIENS Linn.

1. Leaves radical ; flowers in terminal racemes — *acaulis*
1. Leaves cauline ; flowers axillary, solitary or 2-6 together
   2. Spur exceeding 2 cm long — *pulcherrima*
   2. Spur not exceeding 1.5 cm long
      3. Leaves alternate ; pedicels of flowers equalling or shorter than petioles ; capsules tomentose — *balsamina*
      3. Leaves opposite ; pedicels of flowers longer than petioles ; capsules glabrous
         4. Pedicels glabrous ; capsules ribbed or winged
            5. Spur shorter than wing petals ; seeds exceeding 0.3 cm long
               6. Flowers yellow — *dalzellii*
               6. Flowers purple with orange tinge — *oppositifolia*
            5. Spur longer or equalling wing petals ; seeds not exceeding 0.2 cm long — *kleinii*
         4. Pedicels hairy along margins ; capsules not ribbed or winged
            7. Spur absent or very minute
               8. Lip saccate ; leaves upto 10 cm — *inconspicua*
               8. Lip boat shaped ; leaves upto 2.5 cm — *lawii*
            7. Spur present, 0.9 long — *kleiniformis*

Impatiens acaulis Arn. in Hook. Comp. Bot. Mag. 1 : 325, 1835 ; FBI 1 : 443 ; C. 1 : 180. G. 1 : 98 ; S. 30.

Fl. & Fr. : September-November. *Ill.* : Hook. Bot. Mag t. 3587 (*I. scapiflora* Hook. *non* Heyne).

Loc. : GOA : *Sanguem* : Molem area.

Common on wet rocks with attractive flowers.

Impatiens balsamina Linn. Sp. Pl. 938, 1753 ; FBI 1 : 453 ; DG. 27 ; C. 1 : 184 ; G. 1 : 101 ; S. 29.

Fl. : July-September. *Fr.* : August-November.

Vern. : Terada (Mar.) : Gulmendi (Guj.).

Loc. : GOA : *Bicholim* : Dodamarg area. *Bardez* : Chopra ; Kaisura fort ; Arvalim. *Salcete* : Raiya village area ; Balli. *Canacona* : Angidiv.

Common in forest undergrowth and in fields ; occasionally on old walls.

var. **rosea** Hook. f. in FBI 1 : 453 ; S. 29 ; Saur. 77 ; Pav. 57. *I. balsamina* var. *brevicalcarata* Cooke in Fl. Bomb. Pres. 1 : 185. 1901 (Reprint 1958).

Fl. : June-November *Fr.* : August-November. *Ill.* Lindl. Bot. Reg. t. 27.

Vern. Tirda (Mar.).

Loc. : GOA : *Satari* : Deosali near Caranzol : Chraundem ; Waghori.

This is very similar to the typical variety but differs in having a shorter recurved spur, under 5 mm long.

I. dalzellii Hook. f. & Thoms. in Journ. Linn. Soc. 4 : 123, 1860 ; FBI 1 : 449 ; C. 1 : 183.

Fl. : November.

Loc. GOA : *Canacona* : Amdiga near Butpal.

Rare.

I. inconspicua Benth. ex Wt. & Arn. Prodr. 139, 1834 ; FBI 1 : 447 ; C. 1 : 182. *I. pusilla* Heyne ex Hook. f. & Thoms. in Journ. Linn. Soc. 4 : 122. 1860 ; G. 1 : 100.

Fl. : August-October. *Ill.* : Wt. Ic. tt. 750 & 970.

Vern. : Bhavdi (Mar.).

Loc. : GOA : *Pernem* : Pernem-Bicholim. *Canacona* : Ordofond-Butpal, 6 km.

Occasional in ghat areas in open situations as well as in the undergrowth of forests ; sometimes gregarious during the monsoon.

I. kleiniformis Sedgwick in Rec. Bot. Surv. India 6 (8). 351, 1919 ; Journ. Bomb. Nat. Hist. Soc. 25(3) : 482. 1918.

Fl. : August. *Fr.* : September-October.

Loc. : GOA : *Satari* ; Ambechagol.

The species was first located by Sedgwick in August 1917 at Castle rock (550 m alt.) in ditches and wet places along the railway line. The present collection from Satari taluk, a little away towards north indicates

the possibility of its growth along the Goa ghats if not along the surrounding hilly tract.

Though the species is very close to *I. kleinii* Wt. & Arn. a very common and very small-flowered species along the western ghats of Maharashtra and Karnataka, it can be distinguished by the lines of pubescence on the pedicels, sessile upper leaves with cordate base and pale pink flowers with two darker lines on the wing petals.

Impatiens kleinii Wt. & Arn. Prodr. 140, 1834 ; FBI 1 : 445 ; C. 1 : 181 ; G. 1 : 100 ; S. 29.

Fl. & Fr. : August-October. *Ill.* : Wt. Ic. t. 884.

Loc. : GOA : *Salcete* : Raiya village area ; Margao. *Sanguem* : Durgin forests. *Canacona* : Ordofond forest on way to Tudal.

Common in the forest undergrowth, occasionally in open situations on the slopes of the hills.

I. lawii Hook. f. & Thoms. in Journ. Linn. Soc. 4 : 122, 1860 ; FBI 1 : 448 ; C. 1 : 183.

Fl. & Fr. : October-November.

Loc. : GOA : *Satari* : Nanachadongar, near Oodal ; Satrem. *Sanguem*: Butabencha digar, near Verlem.

Common on gravelly soil and undulating slopes.

I. oppositifolia Linn. Sp. Pl. 937, 1753 ; FBI 1 : 448 ; C. 1 : 182 ; S. 30.

Fl. & Fr. : July-October. *Ill.* : Wt. Ic. t. 883.

Loc. : GOA : *Sanguem* : Bavanbunda, near Molem area.

Common along open areas.

I. pulcherrima Dalz. in Hook. Kew Journ. Bot. 2 : 37, 1850 ; FBI 1 : 458 ; C. 1 : 185 ; G. 1. 102.

Fl. : August-October.

Loc. : GOA : *Bicholim* : Usgao-Parda. *Bardez* : Aravalim. *Ponda* : Vernem *Sanguem* : Dudal ; Bhati village (10 km. south of Sanguem).

Common on gravelly soil towards the margins of forests.

A very variable species and all the varieties of Cooke (*l.c.*) may be considered as synonymous to species proper.

RUTACEAE

1. Ovary 2 to 5 lobed ; fruit a capsule
   2. Unarmed ; leaves opposite, bifoliate — *Evodia*
   2. Armed ; leaves alternate, 3 or more foliate — *Zanthoxylum*

1. Ovary entire ; Fruit a berry	
3. Style very short, persistent	*Glycosmis*
3. Style deciduous	
4. Leaves simple or unifoliate	*Paramignya*
4. Leaves trifoliate or pinnate	
5. Unarmed, erect, shrubs or trees	
6. Staminal filaments dilated at the base	*Clausena*
6. Staminal filaments not dilated at the base	*Murraya*
5. Climbing shrub, usually armed	*Lavanga*

CLAUSENA Burm. f.

Inflorescence in terminal panicles	*indica*
Inflorescence in axillary, cymose panicles or racemes	*dentata*

Clausena dentata (Willd.) M. Roem. Syn. Hesp. 44, 1846. *Amyris dentata* Willd. Sp. Pl. 2 : 337, 1799. *Clausena willdenowii* W. & A. Prodr. 96 ; 1834 ; FBI 1 : 506 ; C. 1 : 194 ; T. 1 : 195 ; G. 1 : 110.

Fl. : February. *Ill.* : Wt. Ic. t. 14.

Loc. : GOA : *Pernem* : Conad.

Occasional in the forest. This record in Goa forest establishes the continuity of the species distribution from the ghats of Ratnagiri district to North Kanara forests.

C. indica Oliver in Journ. Linn. Soc. 4, Suppl. 2 : 36, 1861 ; DG. 29 ; C. 1 : 194 ; T. 1 : 194 ; G 110.

Fl. : April-May. *Ill.* Pflanzenf. 3 ; 187, f. 108 ; T. f. 119.

Dalgado records it to be very common along ghats of Braganza (*Sanguem*). Though it has not been collected from other parts of Goa area and the adjoining areas of Maharashtra, its occurrence along the North Kanara ghats is well-known. Hence it is recorded here for its possible collection in future.

EVODIA Forst.

Evodia lunu-ankenda (Gaertn.) Merrill in Phil. Journ. Sci. 7 : 378, 1912 ; G. 1 : 105 ; S. 29. *Fagara lunu-ankenda* Gaertn. Fruct. 1 : 334, 1788. *Evodia roxburghiana* Benth. Fl. Hongk. 59, 1861 ; FBI 1 : 487 ; C. 1 : 188 ; T. 1 : 185.

Fl. : September. *Ill.* : Wt. Ic. t. 204.

Vern. : Kabale (Kan.).

Loc. : GOA : *Satari* : Dinarai forest near Palle, Valpoi.

A rare plant. This record establishes the continuity of the species distribution along the forests of lower Western ghats.

GLYCOSMIS Corr.

Glycosmis mauritiana (Lamk.) Tanaka in Bull. Soc. Bot. Fr. 75 : 708, 1928 ; S. ed. 32. *Limonia mauritiana* Lamk. Encycl. 3 : 517, 1792. *L. pentaphylla* Roxb. Pl. Cor. 1 : 60, t. 84, 1798, *non* Retz. 1788. *Glycosmis pentaphylla* DC. Prodr. 1 : 538, 1824 ; FBI 1 : 499 ; DG. 29 ; C. 1 : 192 ; T. 1 : 191, t. 117 ; S. 30.

Fl. : October-November. *Fr.* : December-June. *Ill.* : Wt. Ic. t. 167 ; T. f. 117.

Vern : Manikyan (Kan.) ; Kirmira (Mar.) ; Menki (Konk.).

Loc. : GOA : *Satari* : Caranzol hill ; Nanacha dongar ; Codal ; Pale ; Tanem ; Satrem ; Ambechagol near Satari ; Kawaliayan forest, near Nandore ; south of Codal. *Sanguem* : Avelde jungle, Mole. Goa area after Anmod ; Sidh forest near Bati. *Canacona* : Nadquem forest ; Jalan, near Nadquem ; Barsare village.

Common in the undergrowth of the forest.

The nomenclature of this species has been confused considerably. Recently Brizicky (Journ. Arn. Arb. 43 : 90, 1962) has clarified that Correa (1805) while describing a new genus *Glycosmis* did not publish the new combination as required by the International rules of nomenclature, though he indicated that *Limonia arborea* Roxb. and *L. pentaphylla* Retz. furnish the characters of this new genus *Glycosmis*. Subsequently, de Candolle (1824) published the new combinations, transferring the epithets from *Limonia* to *Glycosmis*. Now the confusion created by various authors is cleared up with two names for the Indian species, namely, *G. arborea* (Roxb.) DC. and *G. mauritiana* (Lamk.) Tanaka, the latter being the common species growing along Western ghat region.

LAVANGA Linn.

Lavanga sarmentosa (Bl.) Kurz in Journ. As. Soc. Beng. 39(2) : 69, 1870 (*Luvunga sarmentosa*) ; Backer & Bakhuizen in Fl. Java 2 : 105, 1965. *Triphasia sarmentosa* Bl. Bijd., 132, 1825. *Luvunga eleutherandra* Dalz. in Kew. Journ. Bot. 2 : 258, 1850 ; FBI 1 : 509 ; C. 1 : 196 ; T. 1 : 196 ; G. 1 : 112.

Fl. : January February. *Fr.* ; March. *Ill.* : T. f. 120.

Loc. : GOA : *Satari* : Vangiri forests, 5 km north west of Nandore. *Canacona* : Nadquem-Quer hills.

Not quite common.

The genus should be correctly spelt as *Lavanga* only. Though Hooker (Fl. Brit. India 1 : 509) suggests *L. eleutherandra* Dalz. to be a variety of *L. scandens* with smaller leaves and fruits and though Beddome & Talbot

(*l. c.*) suggest the possibility of the occurrence of both the species along the evergreen forests of North Kanara and southwards, it appears that the former is a distinct species restricted to peninsular India and the latter to Eastern India. The present collections establish the continuity in the distribution of the species along the Western ghats of Maharashtra and Karnataka States.

MURRAYA Koen. ex Linn.

Whole plant strongly scented ; leaflets 11 - 25 ; flowers numerous	*koenigii*
Plants not strongly scented ; leaflets 3 - 7 ; flowers few	*paniculata*

Murraya koenigii (Linn.) Spreng. Syst. 2 : 315, 1825 ; FBI 1 : 503 ; DG. 59 ; C. 1 : 193 ; T. 1 : 193 ; G. 1 : 111 ; S. 30. *Bergera koenigii* Linn. Mant. 1 : 565, 1767.

Fl. : March April. *Fr.* : April June. *Ill.* ; Wt. Ic. t. 13.

Vern. : Karhi nimb (Mar.) ; Kuribevu (Kan.) ; Kadinimb (Konk) ; Amargoseira macha (Port.) ; Kadhilimbdo, Mitholimbdo (Guj.).

Loc. : GOA : *Pernem* : Tamboxin. *Satari* : Beyond poda village, near Valpoi ; Siranguli near Caranzol. DIU : Jhoola village.

Occasional. Leaves used for seasoning curries. Whole Plant is medicinal.

M. paniculata (Linn.) Jacq. in Malay. Misc. 1(5) : 31, 1820 ; S. 31. *Chalcas paniculata* Linn. Mant. 1 : 68, 1767. *Murraya exotica* Linn. Mant. 2 : 563, 1771 ; FBI 1 : 502 ; DG. 29 ; C. 1 : 193 ; T. 1 : 193, t. 118 ; G. 1 : 111.

Fl. : July - September. *Fr.* : September - May. *Ill.* ; Wt. Ic. t. 96.

Vern. : Limbu (Mar.) ; Pamdhri (Konk.).

Loc. : GOA : *Satari* : Caranzol.

Though growing wild in Goa area and also along Western ghats, it is also cultivated in gardens.

The leaves are used to flavour curries etc.

PARAMIGNYA Wight

Paramignya monophylla Wt. Ill. 1 : 109, 1840 ; FBI 1 : 510 ; C. 1 : 197 ; T. 1 : 199 ; G. 1 : 13.

Fl. : November - January. *Fr.* : January April. *Ill.* ; T. f. 122.

Vern. : Kurwa - Wagutti (Mar.) ; Kankanchibally (Kan.).

Loc. : GOA : *Satari* : Beyond Poda village ; Kedgi forest, Nandore ; Codal-Nanora road, 5 km point. *Sanguem* : Molem (Avelde jungle). *Canacona* : Nadquem.

Occasional plant in the forest growing near streams.

ZANTHOXYLUM Linn.

Zanthoxylum rhetsa (Roxb.) DC. Prodr. 1 : 728, 1824 ; FBI 1 : 495 ; DG. 28 ; C. 1 : 188 ; G. 107. *Z. limonella* (Dennst.) Alston in Trim. Handb. Fl. Ceylon Suppl. 6 : 37, 1931 ; Hartley in Jour. Arn. Arb. 47(3) : 197, 1966. *Tapalia limonella* Dennst. Schulss. Hort. Malab. 31, 1818. *Fagara budrunga* Roxb. (Hort. Beng. 11, 1814, *nom. nud.*) Fl. Ind. 1 : 437, 1820 ; *Zanthoxylum budrunga* DC. Prodr. 1 : 728, 1824 ; FBI 1 : 495 ; G. 1 : 107. *Fagara rhetsa* Roxb. (Hort. Beng. 11, 1814, *nom. nud.*) Fl. Ind. 1 : 438, 1820.

Fl. : July August. *Fr.* : September November.

Vern. : Tisal (Mar.) ; Sessal (Kan.), Tirphal (Konk.), Limao pimentose (Port.).

Loc. : GOA : *Bicholim* : Nanora forest. *Satari* : Onda. *Bardez* : Betim hill ; Bastora. *Sanguem* : Butabaicha dongar near Verlem. *Canacona* : Ordofond, near forest office.

Common in the cleared forest areas on the hills.

The genera *Fagara* Linn. and *Zanthoxylum* Linn. (*Xanthoxylum*, *Xanthoxylon* and *Zanthoxylon* as variant spellings) have been considerably confused in the earlier taxonomic literature. Though Brizicky (Jour. Arn. Arb. 43 : 80 - 83, 1962) treats the Indian species under *Fagara* which is considered as distinct from *Zanthoxylum*, based on the differentiation of perianth lobes, biseriate in the former and uniseriate in the latter, Hartley (1966) on the basis of additional data gathered from Chinese material presenting an intermediate type of perianth, concludes that there is a general transition in the perianth characters from biseriate to uniseriate condition and thereby indicates that the separation of *Fagara* from *Zanthoxylum* is not justified. With such convincing data, Hartley's views are followed in this work. Further, the variability in the occurrence of oil dots, marginal crenations and the number of leaflets, is now found out to be the source of confusion between *Z. budrunga* and *Z. rhetsa* which belong to only one species.

Tipalia limonella Dennst. (1818), the earliest name for this taxon is a *nomen nudum* (vide : Rickett & Stafleu in Taxon 10 : 80, 1961 ; Manitz in Taxon 17 : 496 - 501, 1968). Dennstedt's publication of the name with only a reference to a plate and description, is invalid. The next available names are *Fagara budrunga* Roxb. (1820) and *F. rhetsa* Roxb. (1820) with

same date of publication and form the basionyms for *Z. budrunga* DC. and *Z. rhetsa* DC. respectively. But Pierre (1893) reduced *Z. budrunga* to a variety of *Z. rhetsa* for the first time and according to the rules of ICBN (1972), Pierre's choice of *Z. rhetsa* is followed here.

In Goa area, only one species is recorded which is common along the ghats of Maharashtra and Karnataka States.

Cult. species :

Aegle marmelose Corr. in Trans. Linn. Soc. 5 : 223, 1800 ; FBI 1 : 516 ; DG. 31 ; C. 1 : 204 ; T. 1 : 206 ; G. 1 : 115 ; Dangs. 306 ; Saur. 81 ; Pav. 57.

Fl. : April May. *Ill.* : Wt. Ic. t. 16.

Vern. : Bel (Mar.) ; Bilpatre (Kan.) ; Bel (Konk.) ; Billy, Bil (Guj.).

The plant is cultivated for its medicinal fruits. However, in Nagarhaveli the plant is occasionally met within forest areas also (Jamunpada & Chispana forests).

The following *Citrus* species and their hybrids have been observed under cultivation rather sparsely, mostly in the back yards of residences in Goa, though these species are extensively cultivated in other parts of India.

Citrus aurantifolia (Christ) Swingle in Citrus Industry, 1, 1946. *C. medica* Linn. var. *acida* Roxb. FBI 1 : 515 ; DG. 30 ; C. 1 : 201 ; T. 1 : 203 *p. p.* ; S. 32 *p. p.*

Vern. : Limoeiro azedo (Port.) ; Sour (lime Eng.) ; Limbi (Konk.).

Fairly well cultivated.

C. aurantium Linn. Sp. pl. 782, 1753 ; C. 1 : 201. *C. aurantium* Linn. var. *bigaradia* Hook. f. FBI 1 : 515 ; DG. 31. *Ill.* : Wealth of India 2 : 159, f. 77.

Vern. : Larangeira azeda (Port.) ; Heralay (Kan.) ; Bitter orange (Eng.) ; Begarade (Fr.).

Possibly indigenous to south India but not much cultivated in Goa. Even the other var. *bergamia* (FBI 1 : 515 ; DG. 31, Bergamot orange) is considered to be a form of bitter orange or as a hybrid. But the fruit which is mostly grown in southern parts of Calabria, Italy, looks distinct by its colour and scent. Bergamot oil is extracted from its peels. Once introduced to Goa but with very little success.

C. limettioides Tanaka in Jour. Ind. Bot. Soc. 16(4) : 227, 1937. *Citrus medica* Linn. var. *lametta* Hook. f. FBI 1 : 515 ; DG. 30 ; C. 1 : 201.

Vern. : Limocirodoce (Port.) ; Sweet lime (Eng.) ; Sonar limbi (Konk.) ; Gajanimbe (Kan.).

Citrus limon (Linn.) Burm. f., Fl. Ind. 173, 1768. *C. medica* Linn. var. *limonum* Hook. f. FBI 1 ; 515 ; DG. 30 ; C. 1 : 201.

Vern. : Limoeiro (Port). ; Lemon (Eng.) ; Bijapura (Kan.).

Occasionally cultivated.

C. maxima (Murr.) Merrill, Sp. Blancoanae, 1918. *C. decumana* Murr. in Linn. Syst. ed. 13 : 580, 1774 ; FBI 1 : 516 ; DG. 31 ; C. 1 : 202 ; T. 1 : 203. *Ill.* : Wealth of India 2 : 191, f. 78.

Vern. : Toronja (Port.) ; Shaddock (Eng.) ; Sakkota (Kan.) ; Hid (Konk.).

A native of Malaysia and Polynesia, introduced into Goa and other parts of India for its large fruits.

C. medica Linn. Sp. Pl. 782, 1753. *C. medica* Linn. var. *medica* FBI 1. 514 ; DG. 30 ; C. 1 : 201 ; T. 1 : 203, *p.p.*; S. 32, *p.p. Ill.*: Wealth of India 2 : 192, f. 79.

Vern.: Cidreira (Port.) ; Citron (Eng.) ; Mavlung (Konk.) ; Madala (Kan.).

C. reticulata Blanco, Fl. Filip. ed. 1 : 610, 1837. *C. aurantium* Linn. var. *aurantium* FBI 1 : 515 ; DG. 31 ; C. 1 : 201 ; T. 1 : 203 ; S. 32, all *p.p. Ill.* : Wealth of India 2 : 195, Pl. 12.

Vern. : Lavangeira doce (Port.) ; Portugal orange ; Mandarin orange (Eng.) ; Laramj (Konk.) ; Santara.

All the earlier workers including Dalgado include two distinct species, the Santara and the Musambi [*C. sinensis* (Linn.) Osbeck.] under this name. Dalgado records that this species and the Musambi were introduced into India by the Portuguese at the end of 17th Century and their cultivation though not very encouraging along the Concan belt, is quite extensive in Nagpur, Poona and other parts. This species is a native of China and Indo-China.

C. sinensis (Linn.) Osbeck. in Ost. Ind. Rosa, 41, 1775. *C. aurantium* Linn. var. *aurantium* FBI 1 : 515 ; DG. 31 ; C. 1 : 201 ; T. 1 : 203 ; S. 32 all *pp.*

Vern. : Mozambique orange (Eng.); Musambi (Mar.) ; Sathgudi (Kan.).

A native of China and India and is cultivated in Goa gardens.

Limonia acidissima Linn. Sp. Pl. ed. 2, 554, 1762 ; DG. 29. *Feronia elephantum* Corr. in Trans. Linn. Soc. 5 : 225, 1800 ; FBI 1 : 516 ; DG. 31 ; C. 1 : 203 ; T. 1 : 204.

Fl. : March. *Ill.* : T. f. 124.

Vern. : Kavath (Mar.) ; Balal (Kan.) ; Sit-ran-limbi (Konk.) ; Limoes de folha crusada (Port.).

Though the species is native of India and Malaysia, it is mostly seen under cultivation. The pulp of the fruit is made into jelly and chutney etc.

Ruta graveolens Linn. Sp. Pl. 383, 1753. *R. graveolens* Linn. var. *angustifolia* Hook. f. FBI 1 : 485 ; DG. 28 ; C. 1 : 187 ; V. 3.

Strongly smelling herb, mostly cultivated in the gardens for its medicinal properties.

OCHNACEAE

OCHNA Linn.

Ochna obtusata DC. Ann. Mus. Paris 17, 411, t. 11, 1811 ; A. Kanis in Blumea 16(1) : 29, 1968. *O. squarrosa* auct. *non* Linn. FBI 1 : 523 ; C. 1 : 208 ; T. 1 : 212 ; G. 1 : 118.

Fl. : February April. *Fr.* : April June. *Ill.* : T. f. 129.

Vern. ; Mudah, Narole (Kan.).

Loc. : GOA : *Bardez* ; Uccasin, Bastora. *Sanguem* : Bhati ; Netravali. *Canacona* : Ordofond ; Tudal ; Naveshat hill ; Nadquem Quer hills ; Nadquem.

Rare, on the hills in association with *Emblica, Randia* etc.

The record is interesting in establishing the continuity of distribution along the Western ghats. This species commonly known in Indian floras as *O. squarrosa* Linn. (1762), is an illegitimate synonym of *O. jabotapita* Linn. (1753), a Ceylonese species.

BURSERACEAE

1. Tree
   2. Calyx 3-fid ; disc annular — *Canarium*
   2. Calyx 5-fid ; disc adnate to the calyx tube — *Garuga*
1. Shrub — *Commiphora*

CANARIUM Linn.

Canarium strictum Roxb. [Hort. Beng. 49, 1814 (*nom. nud.*)] Fl. Ind. 138, 1832 ; FBI 1 : 534 ; DG. 33 ; C. 1 : 214 ; T. 1 : 221 ; G. 1 : 123.

Fl. : February April. *Ill.* : T. f. 133 ; Bedd. Fl. t. 128.

Vern. : Raldhup (Mar.) ; Konda. (Kan.)

Loc. : *Satari* : Sirangoli near Caranzol.

Occasional on the Goa ghats and also along the ghats of Maharashtra and Karnataka States.

COMMIPHORA Jacq. *nom. cons.*

Commiphora wightii (Arn.) Bhandari in Bull. Bot. Surv. Ind. 6(2-4) : 327, 1964. *Balsamodendron wightii* Arn. in Ann. Nat. Hist. Soc. 3 : 86, 1839 ; *B. mukul* Hook. ex Stocks in Hook. Kew Journ. Bot. 1 : 259, t. 8, 1849 ; FBI 1 : 529. *Commiphora roxburghii* (Stocks) Engler in Pflanzenf. ed. 2, 19A : 436, 1931 ; Saur. 86. *C. mukul* Engler in DC. Mon. Phan. 4 : 12, 1883 ; C. 1 : 212.

Fr. ; September.

Vern. : Gugal (Guj.).

Loc. : DIU : Nagoa.

Locally abundant, in open rocky areas near the sea.

GARUGA Roxb.

Garuga pinnata Roxb. [Hort. Beng. 33, 1814 (*nom. nud.*)] Pl. Cor. 3 : 5, t. 208, 1811 & Fl. Ind. 2 : 400, 1832 ; FBI 1 : 528 ; DG. 32 ; C. 1 : 211 ; T. 1 : 217 ; G. 1 : 121 ; S. 32 ; Dangs. 306 ; Saur. 85 ; Pav. 59.

Fl. : February May. *Fr.* : June-August. *Ill.* : Wt. Ic. tt. 1594 & 1595 ; T. f. 130.

Vern. : Kudak, Kakad (Mar.) ; Holddbalagi, Khandergai (Kan.) ; Kunak (Konk.) ; Kankara, Kusimb (Guj.).

Loc. : GOA : *Canacona* : Ordofond near the river. NAGARHAVELI : Nana Randha ; Morkhal ; Carchond forest ; Velugaon ; Saily ; Berpam forest ; Duderi.

Common in deciduous forests.

The fruit is pickled and used in medicine.

MELIACEAE

1. Small undershrubs ; leaves trifoliate ; petioles winged — *Naregamia*
1. Large shrubs or trees ; leaves trifoliate or pinnate ; petioles not winged — *Soymidia*
   2. Seeds winged
   2. Seeds not winged

3.	Leaflets serrate ; flowers and staminal tube oblong ; style long	
4.	Disc absent ; petals 5	*Azadirachta*
4.	Disc present ; petals 4	*Dysoxylum*
3.	Leaflets entire ; flowers and staminal tube globose or turbinate ; style short	
5.	Filaments connate into an almost entire, irregularly incised or 3-lobed fleshy tube. Stamens 6 ; anthers included	*Amoora*
5.	Filaments almost free or shortly connate only at base. Stamens 10 ; anthers wholly exerted	
6.	Fruit dehiscent, a two valved capsule	*Trichilia*
6.	Fruit indehiscent and baccate	*Walsura*

AMOORA Roxb.

Amoora lawii (Wt.) Bedd. in Fl. Sylv. t. 133, 1871 ; FBI 1 : 561 ; DG. 34 ; C. 1 : 225 ; T. 1 : 239 : G. 1 : 130 ; S. 34. *Nimmonia lawii* Wt. in Calc. Journ. Nat. Sci 7 : 13, 1847.

Fl. : December-January. *Ill.* : T. f. 114.

Vern. : Burumb (Mar.) ; Madrasada (Kan.) ; Burombi (Kan.).

As the species is common along Western ghats, it is included here on the authority of Dalgado.

The other species *A. cucullata* Roxb. mentioned by Dalgado from Ambolighat area is normally found in the littoral swamp forests of Bengal and its occurrence in the Western ghats is doubtful.

AZADIRACHTA A. Juss.

Azadirachta indica A. Juss. in Mem. Mus. Par. 19 : 221, t. 13, f. 5 ; 1830 ; C. 1 : 220 ; T. 1 : 228 ; Dangs 307 ; Saur. 87 ; Pav. 59. *Melia azadirachta* Linn. Sp. Pl. 385, 1753 ; FBI 1 : 544.

Fl. : April - May. *Fr.* : June-July. *Ill.* : Wt. Ic. t. 17.

Vern. : Nim (Mar.) ; Kai-bevu (Kan.) ; Margosa (Port.) ; Limdo, Limbra (Guj.).

Loc. : GOA : *Bardez* : Bastora. DAMAN : Veracunda.

Occasional, planted in gardens and houses etc. The plant is known for its medicinal value.

DYSOXYLUM Bl.

Dysoxylum binectariferum (Roxb.) Hook. f. ex Bedd. in Trans. Linn. Soc. 25 : 212, 1866 ; FBI 1 : 546 ; DG. 34 ; C. 1 : 221 ; T. 1 : 231 ; G. 1 :

127 ; S. 34. *Guarea binectarifera* Roxb. [Hort. Beng. 28, 1814 (*nom. nud.*)] Fl. Ind. 2 : 240, 1832.

Fl. : August-September. *Fr.* : September. *Ill.* : T. f. 137.

Vern. : Yerindi (Mar.) ; Erand (Konk.).

The species is common along Concan ghats and has been collected by the author from Ambolighat area adjoining Goa, hence, it is included in this work following Dalgado.

NAREGAMIA Wt. & Arn.

Naregamia alata Wt. & Arn. Prodr. 117, 1834 ; FBI 1: 542 ; DG. 33, C. 1 : 217 ; G. 1 : 125.

Fl. : August-October. *Fr.* : October-December. *Ill.* : Pflanzenf. 3(4) : 281, f. 158, G-H.

Vern. : Nalenaringa (Kan.) ; Kapur-bhendi (Mar.).

Loc. : GOA : *Satari* : Onda. *Bardez* : Chopra ; Kaisura forest; Moira. *Marmugao* ; Certallim-Vasco. *Sanguem* : Potiem forest, 12 km from Sanguem ; Durgin forests near Darbandora ; Sanguem fort ; Anvaldem near Molem ; Aldune near Netravali ; Caranzol ; Colomba. *Canacona* : Butpal ; Butpal-Nadquem ; Ordofond-Tudal ; Ordofond.

Common as undergrowth in open forest along with *Chlorophytum*, *Euphorbia* and *Oldenlandia*.

The root is considered highly medicinal and the plant is known as 'Goan Ipecacuanha.' Dalgado records that the roots were used to be exported to Germany for experiments against bronchitis and that Dr. Antonio Jose Homem used the root successfully against dysentery.

SOYMIDA A. Juss.

Soymida febrifuga A. Juss. Mem. Mus. Par. 5 : 19. 1830 ; FBI 1 : 567 ; C. 1 : 228 ; T. 1 : 245 ; G. 1 : 132 ; Dangs 307.

Fl. : March-April. *Fr.* : April-May. *Ill.* : Roxb. Cor. Pl. 1 : t. 17.

Vern. : Rohini (Guj.) ; Rohan (Hindi ; Mar.). ; Sombi (Kan.).

Loc. : NAGARHAVELI : Morkhal.

In open forest and along river banks. Wood strong and valuable and the bark is medicinal.

TRICHILIA P. Browne

Trichilia connaroides (Wt. & Arn.) Bentvelzen in Acta Bot. Neerl. 11 : 11-20. 1962 ; Backer & Bakhuizen in Fl. Java 2 : 130. 1965. *Zanthoxylon connaroides* Wt. & Arn. Prodr. 1 : 148, 1834. *Heynea trijuga* Roxb. [Hort. Beng. 32. 1814 (*nom. nud.*)] Fl. Ind. 2 : 390, 1832 ; FBI 1 : 565 ; DG. 34 ; C. 1 : 227 ; T. 1 : 242 ; G. 1 : 131 ; S. 35. *Walsura trijuga* (Roxb.) Kurz in Journ. As. Soc. Beng. 44 (2) : 148. 1875.

Ill. : T. f. 144.

Vern. : Gundira (Mar.) ; Kora (Kan.) ; Tusal (Konk.).

This species, a common one in Maharashtra and Karnataka has been included, based on its record for Goa by Dalgado.

WALSURA Roxb.

Walsura trifoliata (A. Juss.) Harms in Engl. and Prantl Pflanzenf. ed. 2, 19, 119, 1940. *Heynea trifoliata* A. Juss. in Mem. Mus. Paris 19 ; 235, 1830. *Walsura piscida* Roxb. [Hort. Beng. 32, 1814 (*nom. nud.*)] Fl. Ind. 2 : 387, 1832 ; FBI 1 : 564 ; DG. 34 ; C. 1 : 227 ; T. 1 : 241 ; G. 1 : 131.

Fl. : November-December. *Ill.* : T. f. 143.

Vern. : Walsuri (Mar.) ; Valsuri (Konk.).

The earlier collections of this species from Ramghat of Ratnagiri district indicate the possibility of its occurrence along the Goa ghats also. Hence, it is recorded here following Dalgado.

OLACACEAE

OLAX Linn.

Olax wightiana Wall. ex Wt. & Arn. Prodr. 89, 1834 ; FBI 1 : 575 ; C. 1 : 235 ; T. 1 : 257 ; G. 1 : 136 ; S. 36.

Fl. : December-February. *Fr.* : March-May. *Ill.* : T. f. 152.

Vern. : Kukarbit (Mar.) ; Gendgisa (Kan.).

Loc. : GOA : *Canacona* : Yed forests, on way to Nadquem ; Brahmada, on way to Kadriayan from Nadquem.

Rare, climber on *Strychnos* and *Artocarpus* sp.

The fruit is eaten and is also said to be used in "Sherbet".

OPILIACEAE

Cansjera rheedii Gmel. Syst. 2 : 280, 1791 ; FBI 1 : 582 ; DG. 35 ; C. 1 : 237 ; T. 1 : 262 ; G. 1 : 138 ; S. 36.

Fl. : November-December. *Fr.* : December-March. *Ill.* : Wt. Ic. t. 1961 ; T. f. 155.

Vern. : Tarar (Mar.) ; Bodbakka (Kan.) ; Tilo karo (Konk.) ; Trepadeira de fructa parada (Port.).

Loc. : GOA : *Ilhas* : Plateau on way from Military camp to Chimbel reservoir. *Sanguem* : Verlem.

Grows rather sparsely in isolated places.

ICACINACEAE

1. Erect shrubs or trees ; anthers pendulous ; stigma long, discoid
   2. Petals glabrous within — *Gomphandra*
   2. Petals villous within — *Nothapodytes*
1. Climbing shrubs ; anthers erect ; stigma sessile — *Sarcostigma*

GOMPHANDRA Wall.

Gomphandra polymorpha Wight Ill. 103, 1840 ; FBI 1 : 586 ; C. 1 : 238 ; G. 1 : 139. *G. axillaris* Wall. Cat. 3718, 1828 ; FBI 1 : 586 ; C. 237 ; T. 1 : 263.

Fl. : April. *Ill.* : Wt. Ic. t. 953.

Loc. ; GOA : *Satari* : Caranzol.

Rare. This record of the species which is common in the evergreen forests of North Kanara, however, establishes the continuity in distribution along the Western ghats of Maharashtra and Karnataka States.

The correct identity of the two very variable taxa, *G. axillaris* Wall and *G. polymorpha* Wt. has been confused cosiderably in the Floras. In view of the author's studies based on the wide range of material from the Western ghats, it is evident that the texture of the leaves is very variable from membranous to coriaceous and the other characters on which the two species are based are quite superficial. As such, the species are now treated under the available earlier name *G. polymorpha* Wight as *G. axillaris* Wall. is not validly published.

NOTHAPODYTES Blume

Nothapodytes foetida (Wt.) Sleumer in Notizbl. 15 : 247, 1940. *Stemonurus foetidus* Wt. Icon. t. 955, 1843-45. *Mappia foetida* Miers. FBI 1 : 589 ; C. 1 : 239 ; T. 1 : 267 ; G. 1 : 141 ; S. 40.

Fl. : October-November. *Fr.* : December February. *Ill.* : Wt. Ic. t. 955.

Vern. : Kalgur ; Ghanera (Mar. & Kan.).

The species was recorded by Cooke (l.c.) on the basis of Dalzell and Gibson's collection from the ghats opposite to Goa ; but so far, it has not been collected again from the Goa ghats. As the species grows along Mahabaleswar ranges of Maharashtra and Belgaum and North Kanara ghats of Karnataka State, it is quite possible to locate it in Goa ghats also particularly from the forests of Satari and Canacona taluks.

Though *Mappia* Jacq. is *nom. cons.*, Slumer (*l.c.*) considers this genus as purely of tropical South America and the Indian taxa as belonging to the Indo-malayan genus *Nothapodytes* Bl.

Sarcostigma Wt. & Arn.

Sarcostigma kleinii Wt. & Arn. in Edin. New Phil. Journ. 14 : 299. 1832-33 ; FBI 1: 594 ; C. 1 : 240 ; T. 1 : 265 ; G. 1 : 142.

Fl. : November. *Fr.* May. *Ill.* : Wt. Ic. t. 1854.

Loc. Goa : *Canacona* : Nadquem ; Caranzol.

The record of the species in Goa extends its distribution further north beyond North Kanara forests. It is possible to locate the species in forests of Satari taluk and also Ambolighat ranges of Ratnagiri district.

Oil is extracted from the seeds.

AQUIFOLIACEAE

Ilex Linn.

Ilex malabarica Bedd. Fl. Sylv. t. 143, 1871 ; FBI 1 : 600 ; DG. 35 ; C. 1: 241 ; T. 1 : 260 ; G. 1 ; 143.

Ill. T. f. 159.

The occurrence of this species along Concan and North Kanara ghats, the boundary zones of Goa area, suggests the possibility of its being located in Goa ghats also. Dalgado, however, records this species in his work.

CELASTRACEAE *nom. cons.*

There has been great diversity of opinion in the recent few years about the interpretation and appropriate delimitations of the genera in the

family Celastraceae, thereby leading to the separation of Hippocrateaceae as a distinct family from Celastraceae by some and by other, to the maintenance of the Celastraceae as one composite family. Though considerable variation in such understanding had been expressed based on the work of American species, with more and more data accumulating on the range of variation in the Malesian and African species, the so-called distinct characters once considered to be characteristic for the separation of genera from *Hippocratea* Linn., forming into a separate family Hippocrateaceae, are now being considered as unreliable with variety of intermediates, thus reverting back to Hooker f.'s opinion of composite family of Celastraceae. As such, in most of the recent major flora works of the tropics including Africa (Flora of Zambesiaca) published after 1948, Hippocrateaceae is treated under Celastraceae and *Hippocratea* Linn. as a composite genus, merging *Pristimera* Miers (1872), *Loeseneriella* A. C. Smith (1941) and *Reissantia* Halle (1958) under *Hippocratea* Linn. The author, therefore, proposes to present here the family Celastraceae with its old conception and assemblage of genera, following however, the recent nomenclatural changes with valid earlier published names.

The report of a few interesting genera of this family from the Goa area and the adjoining ghats of Ratnagiri district, is yet to be confirmed by recent collections and it is worthwhile to locate species of *Lophopetalum* and *Microtropis* from this region. *Cassine glauca* (Rott.) O. Ktz. (—*Elaeodendron glaucum* Pers.) has been observed by the author all along Western India from Gujarat southwards and can be located in Goa area also.

1. Fruit indehiscent — *Cassine*
1. Fruit dehiscent
   2. Stamens 3 rarely 2. Branchlets often widening in 1-2 coils around a support and then continuing their growth without further coils
      3. Flowers in forked cymes or in corymbs. Capsule 3-lobed; seeds winged — *Hippocratea*
      3. Flowers mostly fascicled on tubercles or in condensed racemes. Fruit baccate; seeds not winged — *Salacia*
   2. Stamens 4-5 alternating with petals. Trees or straggling or erect shrubs
      4. Leaves opposite or nearly so
         5. Seeds arillate — *Euonymus*
         5. Seeds ex-arillate — *Lophopetalum*
      4. Leaves alternate or spirally arranged
         6. Scandent unarmed shrubs. Flowers creamy in axillary or terminal panicles. Ovary free from disc — *Celastrus*
         6. Erect shrubs, mostly spinous. Flowers white in axillary cymes or in axillary fascicles. Ovary partly immersed in disc — *Gymnosporia*

CASSINE Linn.

Cassine glauca (Rottb.) O. Ktz. Rev. Gen. Pl. 1 : 114, 1891 ; *Mangifera glauca* Rottb. Nyel Samm. Vid. Selsk. Skrift. 2 : 534 ; t. 4, 1. 1783. *Elaeodendron glaucum* Pers. Syn. 1 : 241, 1805 ; FBI 1 : 623 ; C. 1 : 248 ; T. 1 : 275. *E. roxburghii* Wt. & Arn. Prodr. 157, 1834 ; S. 38.

Fl. : February-August. *Ill.* : T. f. 162.

Vern. ; Alan (Guj.).

Loc. ; NAGARHAVELI : Dolara forest ; Morkhal ; Nana Randha ; Dongerpad-Umberkoi ; Carchond forests.

Common.

CELASTRUS Linn

Celastrus paniculata Willd. Sp. Pl. 1 : 1125, 1797 ; FBI 1 : 617 DG. 35 ; C. 1 : 245 ; T. 1 : 276 ; G. 1 : 150 ; S. 37 ; Saur. 89 ; Pav. 60.

Fl. : March May. *Fr.* : May - November *Ill.* : Wt. Ic. t. 158 ; T. f. 163.

Vern. : Kanguni (Mar.) ; Kariganne (Kan.) Malkamgoni (Konk) ; Alfeneire sempre verde (Port.) : Malkankanino (Guj.).

Loc. : GOA : *Satari* : Palle. *Salcete* : Margao. *Sanguem*: Patrem ; Goa border area after Anmod. *Canacona* : Ordofond-Muddi ; Ordofond-Tudal ; Angidiv. NAGARHAVELI : Berpam forest ; Khanvel ; Chispana ; Donger pad Umberkoi ; Carchond forests.

Common along the borders of deciduous forest.

GYMNOSPORIA (Wt. & Arn.) Hook. ex Benth. & Hook. *nom. cons.*

Exell (Bol. Soc. Brot. 2, 26 : 222, 1952 & Kew Bull. 1953 : 103, 1953) is of the view that the separation of *Gymnosporia* and *Maytenus* as defined by Loesener (in Engl. & Prantl. Pflanzenf. ed. 2, 20b : 109, 1942) is artificial and Ding Hou (in Fl. Males. ser. 1, 6 : 238, 1962) agrees that the difference between the two genera cannot be maintained. Further, *Gymnosporia* is also conserved. (Int. Code Bot. Nom., Edinburgh, 1964). Hence the various species treated in FL Malesiana and African floras under *Maytenus* Molina should be included under *Gymnosporia* only.

1. Fruit not exceeding 1 cm long — *emarginata*
1. Fruit exceeding 1.5 cm long — *wightiana*

Gymnosporia emarginata (Willd.) Thw. En. Pl. Zeyl. 409, 1864. *Celastrus emarginatus* Willd. Sp. Pl. 1, 2 : 1128, 1798 ex descr. *non* R. & P, 1802. *Gymnosporia montana* Benth. Fl. Austr. 1 : 400, 1863 ; FBI 1 : 621

C. 1 : 249 ; T. 1 : 281 ; G. 1 : 150. *Maytenus emarginata* (Willd.) Ding Hou in Fl. Males. ser. 1, 6 (1). 241, 1962. *M. senegalensis* auct. *non* (Lamk.) Exell : Saur. 90 ; Pav. 60.

Fl. : October-January. *Fr.* : December-April. *Ill.* Wt. Ic. t. 382 ; T. f. 166.

Vern. : Vikalo, Vikaro (Guj.) ; Baikal (Hind.).

Loc. ; Diu : Banxiwara-Diu road, *Rolla* 102629.

Rare, along roadside.

Santapau (Fl. Saur. 90, 1962) & Oza (Fl. Pavagadh, 60, 1966) following Loesener (*l.c.* 147, 1942) include the present species under *Maytenus senegalensis* (Lamk.) Exell. Loesener has evidently confused the African *G. senegalensis* with the Asian-Malesian species, *G. diversifolia* Maxim, but neither of these occur in India. Actually *G. emarginata* has 3 celled ovary and fruits, whereas both *G. senegalensis* and *G. diversifolia* have 2-celled ovary a nd fruit.

Gymnosporia wightiana (Babu) Rolla Rao, *nov. comb. Maytenus wightiana* Babu in Bull Bot. Surv. India 10 : 349, 1968. *Celastrus serrulatus* Roth Nov. Pl. Sp. 155. 1821. *pro parte* (*non* R. Br. 1805-1810). *C. rothianus* Wt. & Arn. Prodr. 159, 1834 (*non* Roem. & Schult. 1819). *Gymnosporia rothiana* (Wt. & Arn.) Laws. in FBI 1 : 620. 1875 ; C. 1 : 246 ; T. 1. : 278. V. 36.

Fl. : March-April. *Fr.* : Almost throughout the year. *Ill.* : T. f 164.

Vern. : Gawlin, Moti-yekkadi (Mar.); Dutte Chably (Kan.).

Loc. : Goa : *Satari* : Poshigen forest, near Pengereal village. *Salcete* : Margao.

Infrequent along the forest edges. Occasionally armed with spines. The present collection while establishing the continuity of its distribution along the Western ghats of Maharashtra and Karnataka States, further supports the view of Cooke and Talbot as endemic to this Western ghat region.

Both the available earlier specific epithets of *Celastrus*, namely *serrulatus* and *rothiana* are pre-occupied (the former being also comprised with more than one taxa). Hence the new name proposed by Babu (*l.c.*) under *Maytenus*, is now used in the new combination.

Hippocratea Linn.

Hippocratea africana (Willd.) Loes. ex Engl. Pflanzenf. W. Afr. 3(2) : 240, 1921. *Tonsella africana* Willd. Sp. Pl. 1 : 194, 1797. *Hippocratea obtusifolia* Roxb. Fl. Ind. 1 : 166, 1832 ; DG. 36 ; FBI 1 : 623 (excl. syn.) ; C. 1 : 247 ; T. 1 : 282. *Loeseneriella obtusifolia* (Roxb.) A. C. Smith in Amer. Jour. Bot. 28 : 440, 1941.

Fl. : January-March. *Ill.* : Wt. Ic. t. 963.

Vern. : Daushir (Mar.) ; Davas (Konk.).

Though not collected by the author from Goa area, the species has been found by him as fairly common in the adjoining regions of Goa and hence included in this work. Dalgado also records the species as common. In fact, the other two species *H. grahamii* Wt. and *H. indica* Willd. which are fairly common along the Western ghats of Maharashtra and Karnataka States can also be located in Goa area.

Keay and Blakelock in their revision of Hutchinson and Dalzell's Flora of West Tropical Africa 1 (2) : 628, 1958 treat the Indian and African forms as one species only and hence the new combination *H. africana*. Synonyms indicated by Lawson in FBI (*l.c.*) actually refer to other species growing in Malaysia. Cooke and Talbot followed Lawson only. *H. obtusifolia* Roxb. does not occur in Malaysia. With this understanding, the distribution of the taxon even in other parts of India besides the Western ghats needs further scrutiny.

Dalgado notes that the leaves are used to make 'bidis' and 'camdos'. It is rather doubtful whether the leaves of this species are now used for such purpose with the present advancement in the manufacture of cheap bidis, cigars and cigarettes.

LOPHOPETALUM Wt. ex Arn.

Lophopetalum wightianum Arn. in Ann. Nat. Hist. ser. 1, 3 : 151, 1839 ; DG. 35 ; C. 1 : 244 ; T. 1 : 272. *L. fimbriatum* Wt. Ill. 1 : 178 ; FBI 1 : 615.

Fl. : March-May. *Fr.* : May-June. *Ill.* : Wt. Ic. t. 162.

Vern. : Balpale ; Bolpali (Kan.).

Dalgado records this species from Danoli and neighbouring forests of Ratnagiri district. Cooke's record of the species from Concan ghats evidently represents this area only. With its wide range of distribution along the Western ghats of Karnataka and other parts of Assam as studied by the author [and also south-east Asia--Ding Hou, Fl. Malesiana ser. 1, 6(2) : 267, 1962] it is quite possible to locate the species in Goa ghats also, particularly along the forests of Satari and Canacona. Ding Hou, while presenting the distribution of the genus in Fl. Malesiana (*l.c.* 266), however, wrongly includes the whole of Western India even upto Gujarat. With the studies carried out by the author, it is evident that there is absolutely no possibility of this species growing north of Ratnagiri district along the ghats of Western India. But with the present understanding of the species, it is clear that the species grows in other heavy rainfall zones of India like Assam and surroundings and extends to Burma and Malaysia.

SALACIA Linn.

Flowers fascicled on axillary tubercles ; leaves less than 10 cm long	*chinensis*
Flowers in axillary pedunculate head or branching cyme ; leaves 10 - 18 cm long	*oblonga*

Salacia chinensis Linn. Mant. 2 : 293, 1761. *S. prinoides* DC. Prodr. 1 : 571, 1824 ; FBI 1 : 626 ; DG. 36 ; C. 1 : 250 ; T. 1 : 286 ; G. 1 : 154 ; S. 37. *S. latifolia* Wall. (Cat. 4222) ex Lawson in FBI 1 : 629, 1875.

Fl. : December-February. *Fr.* : May-August.

Vern. : Nisul-bondi (Mar.) ; Nisal bomdi (Konk.).

Loc. : GOA : *Sanguem* : Maduca jungle ; Madgoa (Dalgado).

The species is extremely variable in habit and morphological features of stem and leaf. Such variability is due to its extensive distribution in the tropics of India and Malaya. In moist situations it grows as a scandent shrub and along lower elevations of hilly slopes as an erect shrub. Such extreme variabilities have led to the confused identity under several botanical names. After considerable scrutiny by Ding. Hou [Fl. Malesiana ser. 1, 6(2): 419, 1964] and others of Linnean type specimen of *S. chinensis*, the type species of the genus *Salacia*, the nomenclature of the species as given above, has been finalised.

The species, of late, has come into prominence for its high medicinal properties in the treatment of diabetes.

S. oblonga Wall. ex Wt. & Arn. Prodr. 106, 1834 ; FBI 1 : 628; C. 1 : 252 ; T. 1 : 287 ; G. 1 : 155.

Fl. : December-March. *Fr.* : June-October. *Ill.* : Wt. Ic. t. 47 ; Wt. Ill. t. 47, B.

Loc. : GOA : *Pernem* : Matachi Rai, near Palem.

Though rare in Goa ghats, it is observed as fairly common in Karnataka ghats.

The species as a potential drug for Diabetes is worth investigating.

RHAMNACEAE

1.	Unarmed climbing shrubs ; flowers in axillary or terminal panicles	*Ventilago*
1.	Trees or erect or sarmentose shrubs ; flowers in axillary fascicles or cymes	
2.	Trees or shrubs armed with straight hooked thorns ; fruits globose or oblong, indehiscent	*Ziziphus*
2.	Unarmed shrubs ; fruits subglobose, dehiscent	*Colubrina*

COLUBRINA L. C. Rich.

Colubrina asiatica (Linn.) Brogn. in Ann. Sc. Nat. 10: 369, 1827 ; FBI 1 : 642 ; C. 1 : 261 ; T. 1 : 304 ; G. 1 : 61 ; S. 41. *Ceanothus asiaticus* Linn. Sp. Pl. 196.

Fr. : November. *Ill.* : T. f. 170.

Vern. : Guti, Guli (Mar.).

Loc. : GOA : *Pernem* : Terekhol. *Salcete* : Margao-Mudubra road.

Occasional, along the coast.

VENTILAGO Gaertn.

Calyx tube adnate to the base of the nut	*madraspatana*
Calyx tube covering more than half the nut	*denticulata*

Ventilago denticulata Willd. in Ges. Naturf. Fr. Neue. Schr. 3 : 417, 1801 ; Pav. 63. *V. maderaspatana* Roxb. Pl. Cor. 1 : 55, t. 76. 1796-98 (*non* Gaertn., 1788). *V. calyculata* Tulasne in Ann. Sc. Nat. (ser. 4) 8 : 124, 1857 ; FBI 1 : 631 ; C. 1 : 254 ; T. 1 : 292 ; Dangs. 307.

Fl. : November January. *Fr.* : January February. *Ill.* : T. f. 174.

Loc. : NAGARHAVELI : Khuntly forest ; Dolara forest ; Chispana forest.

Occasional in deciduous forest, climbing on high trees. The flowers are sweet scented.

V. madraspatana Gaertn Fruct. 1 : 223, t. 49, f. 2, 1788; FBI 1 : 631 ; DG. 36 ; C. 1 : 253 ; T. 1 : 290 ; G. 1 : 156 ; S. 39.

Fl. : November-January. *Fr.* : February-April. *Ill.* : Wt. Ic. t. 163 ; T. f. 172 & 173.

Vern. : Lokhandi (Mar.) ; Khamdvel (Konk.).

Loc. : GOA : *Sanguem* : Valchem. NAGARHAVELI : Dudhni-Bildhari forests ; Morkhal.

Occasional in dense and open forests.

ZIZIPHUS Mill.

There has been some confusion regarding the spelling of the generic name. Miller's name *Ziziphus* as published in Gard. Dict. 1754 is now accepted.

1. Straggling or climbing shrubs ; flowers in long pedunculate cymes arranged in long, axillary or terminal panicles ; petals absent — *rugosa*
1. Erect shrubs or trees usually ; petals 5
   2. Flowers in fascicles or sessile or short - peduncled cymes ; styles 2
      3. Leaves distichous, acute or acuminate, rufous - tomentose beneath ; a scrambling shrub — *oenoplia*
      3. Leaves not distichous, rounded at both ends, buff - tomentose beneath ; a tree — *mauritiana*
   2. Flowers in pedunculate cymes ; styles 3
      4. Leaves glabrous on both sides — *glaberrima*
      4. Leaves glabrous above, pubescent beneath — *xylopyrus*

Ziziphus glaberrima Sant. in Journ. Bomb. Nat. Hist. Soc. 51 : 803, 1953 ; S. 40 ; Saur. 94. *Z. xylopyra* var. *glaberrima* Sedgw. in Ind. For. 45 : 71, 1919.

Fl. : May-July. *Fr.* : August.

Loc. : GOA : *Satari* : Codal. *Canacona* : Butpal, Kanpal hill top ; Butpal. NAGARHAVELI : Khuntly forest ; Dolara forest.

Common, in deciduous forest. This species is very similar to *Z. xylopyrus* but differs principally in the leaves being glabrous.

Z. mauritiana Lamk. Encycl. 3 : 319, 1789 ; Sant. 39 ; V. 36 ; Dangs 308 ; Saur. 92 ; Pav. 61. *Z. jujuba* Lamk. Encycl. 3 : 318, 1789 ; FBI 1 : 632 ; DG. 36. C. 1 : 256 ; T. 1 : 294 ; G. 1 : 157 (*non* Miller, 1768).

Fl. : September-November. *Fr.* : November-March. *Ill.* : T. f. 175.

Vern. : Ber (Mar.) Hanji (Kan.) ; Bar (Konk.) ; Jujubeira (Port.) ; Ber, Bor (Guj.).

Loc. : GOA : *Pernem* : Conadin Pernem. *Bardez* : Chopra ; Kaisura fort. *Ilhas* : Panaji road side ; Raj Bhavan, Panaji. *Canacona* : Ordofond-Muddi. NAGARHAVELI : Saily forest ; Sindhoni forest. DIU : Jhoola village.

Frequent on open hills and planted near the roadside.

The plant that goes under the name of *Z. jujuba* Lamk. (*l.c.*) in our Floras is a later homonym of *Z. jujuba* Mill. (in Gard. Dict. ed. 8, no 1, 1768), a south European and African plant. Hence the next available valid name for the common Indian Ber tree is *Z. mauritiana* Lamk.

Z. oenoplia Mill. Gard. Dict. ed. 8, no. 3, 1768 ; FBI 1 : 634 ; C. 1 : 257 ; T. 1 : 296 ; G. 1 : 158 ; S. 40. Dangs 308 ; Saur. 93 ; Pav. 62.

Fl. : August-October. *Fr.* ; November. *Ill.* : T. f. 176.

Vern. : Kaner-balli (Mar.) ; Purgi (Kan.).

Loc. : GOA : *Pernem* : Pelernum village ; Terekhol. *Bicholim* : Nanore forest. *Satari* : Valpoi ; Tanem ; Caranzol. *Bardez* : Betim ; Chopra ; Kaisura fort ; Porvorim forest; Bastora ; Mapuca. *Salcete* : Raiya village,

near Margao. *Sanguem* : Dargini ; Sanguem-Dudal, 5 km point ; Patole near Netraveli. *Quepem* : Budsari-Goundugarha. *Canacona* : Butpal ; Ordofond. NAGARHAVELI : Morkhal. DAMAN : Regunvara ; Cale area. DADRA.

Common in forest areas and village surroundings.

Ziziphus rugosa Lamk. Encycl. 3 : 319, 1789 ; FBI 1 : 636 ; DG. 36 ; C. 1 : 258 ; T. 1 : 298 ; G. 1 : 158 ; S. 40 ; Saur. 95 ; Dangs. 308 ; Pav. 61.

Fl. : December-March. *Fr.* : April-May. *Ill.* : Wt. Ic. t. 339 ; T. f. 177.

Vern. : Turan (Mar.) ; Suna-boorli (Kan.) ; Churni (Konk.).

Loc. : GOA : *Bardez* : Betim. *Salcete* : Margao-Raiya village (road side). *Sanguem* : Avelde jungle, Molem ; Sidh forests near Bhati. NAGARHAVELI : Carchond forest ; Nana Randha.

Common in open forest area. The fruit is edible.

Z. xylopyrus Willd. Sp. Pl. 1 : 1104, 1797 ; FBI 1 : 634 ; DG. 36 ; C. 1 : 258 ; T. 1 : 298 ; G. 1 : 158 ; S. 94.

Fl. : April July. *Fr.* : November.

Vern. : Ghot ber (Mar.) ; Godachi (Kan.) ; Ran bor (Konk.) ; Gutbordi (Guj.).

Loc. : GOA : *Satari* : Wolancha Dongar ; Caranzol (old railway station area). *Bardez* : Porvorim Betim. *Ilhas* : Chimbel reservoir Brahmapuri temple. *Sanguem* : Cumbari. *Canacona* : Tudal village ; Nadquem. NAGARHAVELI : Saily forest ; Dongarpada Umberkoi forests.

Common in open forest area.

VITACEAE (incl. LEEACEAE)

1. Erect shrubs without tendrils. Petals connate at base. Anthers included in the paracorolla, connate into a funnel. Ovary 6 - celled, the cells 1 - ovuled — *Leea*
1. Not all characters concomitant. Mostly climbing or creeping, invariably tendrilled. Petals free or connate at top only. Anthers free. Ovary 2 - celled, the cells 2 - ovuled
   2. Inflorescence cirriferous. Flowers polygamo - monoecious, 4 - 5 merous — *Ampelocissus*
   2. Inflorescence otherwise. Flowers bisexual or polygamo - dioecious, 4 - merous
      3. Flowers polygamo - dioecious. Stigma much broadened and lobed — *Tetrastigma*
      3. Flowers bisexual. Stigma otherwise
         4. Leaves palmately or pedately 3 or more foliate. Berry 2 - 4 seeded — *Cayratia*
         4. Leaves simple. Berry 1 (2) - seeded — *Cissus*

AMPELOCISSUS Planch. *nom. cons.*

Leaves ovate, glabrous above ; flowers greenish-purple	*arnottiana*
Leaves 3 to 7-lobed, glabrous above ; flowers reddish-brown	*latifolia*

Ampelocissus arnottiana Planch. in Journ. Vigne Amer. 374, 1884 & in DC. Monogr. Phan. 5(2) : 379, 1887 ; G. 1 : 165. *Vitis indica* Wt. & Arn. *non* Linn. ; FBI 1 ; 653 ; DG. 38 ; C. 1 ; 269 ; T. 1 : 316.

Vern. : Ram draksha (Mar.) ; Huttige-balli (Kan.) ; Ran dakho (Konk.) ; Uras dos bugious (Port.).

Dalgado records this species from Goa ghats where it can be located again as it is common in North Kanara and Concan ghats, the two adjoining regions of Goa area.

A. latifolia (Roxb.) Planch. in Journ. Vigne Amer. 374, 1884 & in DC. Monogr. Phan. 5(2) : 370, 1887 ; G. 1 : 165 ; S. 41. Dangs 309 ; Saur. 96. *Vitis latifolia* Roxb. [Hort. Beng. 18, 1814] Fl. Ind. 1 : 661, 1820 ; FBI 1 : 652 ; DG. 37 ; C. 1 : 269 ; T. 1. : 315.

Fl. : June-August.

Vern. : Nadena (Mar.) ; Katulam (Konk.) ; Uras de elephante (Port) ; Jungli draksh (Guj.).

Loc. : NAGARHAVELI : Dolara forest. DADRA. DAMAN : Cale area ; Chispana area.

Though common in the moist ghat forests of Ratnagiri and North Kanara districts, the species has not been collected by the author in Goa. However, there is every possibility of its occurrence in Goa ghats also and Dalgado records it, without any precise locality. In fact, it has been recorded as the most common species in Khandala by Santapau (*l.c.*) though he also considers it as somewhat rare along the adjoining ghats.

CAYRATIA Juss.

1.	Leaves tri or penta or multifoliate	
	2. Leaves trifoliate	*trifolia*
	2. Leaves 5-11-pedately foliate	
	3. Leaves 5-7-foliate ; stems glabrous	*tenuifolia*
	3. Leaves 7-11-foliate ; stems pubescent	*pedata*
1.	Leaves digitately 3-5-lobed	
	4. Leaflets nearly sessile ; stipules broad, peltate or cordate ; tendril simple	*elongata*
	4. Leaflets long-stalked ; stipules broad falcate ; tendril with 2 or 3 branches	*auriculata*

Cayratia auriculata (Roxb) Gamble in Fl. Pres. Madr. 237. 1918. *Cissus auriculata* Roxb. Fl. Ind. 1 : 130, 1820. *Vitis auriculata* (Roxb.) Wall ex Wt. & Arn. Prodr. 129, 1834 ; FBI 1 : 658 ; DG. 38 ; C. 1 : 273.

Fl. : March-June. *Fr.* : July-August. *Ill.* : T. f. 191.

Vern. : Pundi-balli (Kan.) ; Khat-Khatumbo (Guj.).

Loc. : GOA : *Marmugao* : Marmugao harbour hills. NAGARHAVELI : Khanvel.

Occasional in the forest and in hedges.

C. elongata (Roxb.) Susseng. in Pflanzenfam. 20 d : 281 & 391. 1953. *Cissus elongata* Roxb. Fl. Ind. 1 : 411, 1820 ; S. 41. *Vitis elongata* (Roxb.) Wall ex Wt. & Arn. Prodr. 128, 1834 ; FBI 1 : 658 ; C. 1 : 273 ; T. 1 : 320.

Fl. : April October. *Fr.* : May January. *Ill* : T. f. 190.

Vern. : Khajulgi (Mar.).

Loc. : GOA : *Pernem* : Mandorem. *Satari* : Onda ; Kutachemal ; Ivorem. *Bardez* : Betim Bardez ; Porvorim forest area ; Kunchelim ; Bastora ; Betim Porvorim. *Salcete* : Goodier. *Sanguem* : Potiem forest.

Common climber along with *Dioscorea bulbifera.*

C. pedata (Lour.) Juss. Dict. Sci. Nat. 10 : 103, 1818 ; Backer & Bakhuizen in Fl. Java 2 : 93, 1965. *Columella pedata* Lour. Fl. Cochinch. 1 : 86, 1790. *Vitis pedata* (Lour.) Wall. Cat. 6027, 1828-32 ; FBI 1: 661 ; DG. 38 ; C. 1 : 274 ; T. 1 : 323.

Fl. : April-June.

Vern. : Gorpad ved (Mar.) ; Sarbari vel (Konk.) ; Uras ; de aljo fre machas (Port.).

This species is found growing from Concan southwards. As there is every possibility of its being located in Goa area, it is included in this work on the authority of Dalgado.

C. tenuifolia (Wt. & Arn.) Gagnep. in Not. Syst. 1 : 349, 1911 ; G. 1 : 170 *Vitis tenuifolia* Wt. & Arn. Prodr. 129, 1834 ; FBI 1 : 660 (excl. syns.) ; C. 1 : 273 ; T. 1 : 322 (*omnes pp. non* Lecomte). *Cissus tenuifolia* Heyne ex Planch. 563, 1887 ; S. 42.

Fl. : May-August. *Fr.* : October-November.

Loc. : GOA : *Satari.* Dinarai forest ; Palle ; Satrem ; Ivorem. *Sanguem* : Organi, near Netraveli ; Molem.

Occasional.

C. trifolia (Linn.) Domin in Biblioth. Bot. 89 ; 371, 1927. *Vitis trifolia* Linn. Sp. Pl. 203, 1753 ; C. 1 : 271. *Cissus carnosa* Lamk. Encycl.

1 : 31, 1783. *Vitis carnosa* (Lamk.) Wall. ex Wt. & Arn. Prodr. 127, 1834 ; FBI 1 ; 654 ; DG.38. *Cayratia carnosa* (Lamk.) Gagnep. in Not. Syst. 1 : 347, 1911 ; G. 1 : 169 ; Dangs 309 ; Saur. 98 ; Pav. 64.

Fl. & *Fr.* : May-October. *Ill.* : Wt. Ic. t. 171 ; T. f. 187 & 188.

Vern. : Ambet-bel (Mar.) ; Heggoli (Kan.) ; Sarbari bel (Konk.) ; Khat-Khatumbo (Guj.).

Loc. : GOA : *Bardez* : Porvorim. *Salcete* : Verna village outskirts. *Ponda* : Borim ; Old Goa. *Ilhas* : Panaji. *Canacona* : Maxem ghat. NAGARHAVELI : Dolora forest ; Dhapsa forest ; Dongerpad-Umberkoi. DADRA : Tingra village. DAMAN : Dundorta ; Fort area. DIU : Castle area ; Nagoa.

Common along backwaters mixed with *Exoecaria* and *Clerodendrum* etc. or in shady areas along streams.

Root is used in the treatment of sores and boils.

Cissus Linn.

1. Stem and branches acutely angled or winged — *quadrangularis*
1. Stem not angled or winged
   2. Leaves simple
      3. Leaves almost glabrous
         4. Leaves irregularly blotched, white above, deep red and shining beneath ; branches sub-angled, red — *discolor*
         4. Leaves pale green ; branches terete, mealy-white — *repens*
      3. Leaves pubescent or tomentose beneath
         5. Leaves orange-red, pubescent beneath ; flowers greenish-yellow — *adnata*
         5. Leaves tomentose or sub-tomentose ; flowers green or pink
            6. Leaves deeply cordate, bristle-crenate ; flowers green — *gigantea*
            6. Leaves shallowly cordate, repand-crenate ; flowers pink — *repanda*
   2. Leaves usually trifoliate — *trilobata*

Cissus adnata Roxb. Fl. Ind. 1 : 405. 1820 ; G. 1 : 168 ; *Vitis adnata* Wall. Cat. 5998, 1828 ; FBI 1 ; 649 ; C. 1 : 267 ; T. 1 : 314.

Fl. & *Fr.* : November-January. *Ill.* : Wt. Ic. t. 144.

Loc. : NAGARHAVELI : Surangai forest.

Rare.

C. discolor Blume Bijdr. 181, 1825 ; G. 1 : 168. *Vitis discolor* Dalz. in Hook. Kew Journ. Bot. 2 : 39, 1850 ; FBI 1 : 647 ; C. 1 : 266 ; T. 1 : 309 ; S. 41.

Fl. : August-September. *Fr.* : October-November.

Vern. : Talitsayel (Mar.).

Loc. : GOA : *Satari* : Codal ; Satrem ; Ambecha gol ; Nanacha dongar. *Sanguem* : Orgoni ; Ghotto ; Molem. *Canacona* : Amdiga, near Butpal.

Frequent along forest edges.

Cissus gigantea (Bedd.) Planch. in DC. Mon. Phan. 5(2) : 622, 1887. *Vitis gigantea* Bedd. in Trans. Linn. Soc. 25 : 212, 1866 ; FBI 1 : 648 ; C. 1 : 267 ; T. 1. 311.

Fl. : August-September. *Ill.* : T. f. 183.

Loc. : GOA : *Satari* : Dinariai forest.

Occasional on bushes along the hill slopes.

This record of little-known species which is reported as very rare from Anamalai hills (FBI.) and Karwar (C.) is quite interesting and extends its distribution further north along the Western ghats.

C. quadrangularis Linn. Mant. 39, 1767 ; G. 1 : 167 ; *Vitis quadrangularis* Wall. ex Wt. & Arn. Prodr. 125, 1834 ; FBI 1 : 645 ; DG 37 ; C. 1 : 266 ; T. 1 : 308.

Fl. : June-July. *Ill.* Wt. Ic. t. 51.

Vern. : Kandavel (Mar.) ; Mangaroli (Kan.) ; Mhasvel (Konk.) ; Babosa quinada (Port.) ; Harsankar ; Vedhavi (Guj.).

Loc. : DAMAN : Doler.

The plant is sometimes grown in the gardens as a hedge in Goa.

Succulent stems are used in curries when tender.

C. repanda Vahl. Symb. 3 : 18, 1794 ; G. 1 : 167 ; S. 47. *Vitis repanda* Wt. & Arn. Prodr. 125, 1834 ; FBI 1 : 648 (excl. *C. vitiginea* Linn.) ; C. 1 : 267 ; T. 1 : 312.

Fl. : April-June. *Ill.* : T. f. 184 & 185.

Loc. : GOA : *Satari* : Nandore forests. : *Bardez* : Mapuca. *Canacona* : Ordofond-Parsol hill ; Ordofond ; Thorijarval, near Ordofond ; Ordofond Tudal, 3 km point.

Occasional, on bushes.

C. repens Lamk. Encycl. 1 : 31, 1783 ; G. 1 : 167. *Vitis repens* Wt. & Arn. Prodr. 125, 1834 ; FBI 1 : 646 ; DG. 37 ; C. 1 : 265 ; T. 1 : 308.

Fl. : February-March.

Vern. : Basil (Konk.) ; Folha aredilha (Port.).

Loc. : GOA : *Sanguem* : Organi, near Netraveli.

The plant is completely devoid of leaves when in flower.

Cissus trilobata Lamk. Encycl. 1 : 31, 1783 ; G. 1 : 167. *Vitis rheedei* Wt. & Arn. Prodr. 127, 1834 ; FBI 1 : 653 ; DG. 38 ; C. 1 : 270 ; T. 1 : 316.

Vern. : Vamsa (Konk.) ; Uvas dos bois (Port.).

Dalgado records this species for Goa area. Though it is not quite common for Concan ghats, it is worthwhile to locate species in Goa ghats.

LEEA Linn.

1. Leaves simple — *macrophylla*
1. Leaves pinnate
   2. Leaves simply pinnate
      3. Stem not winged
         4. Leaflets cordate — *edgeworthii*
         4. Leaflets long acuminate, more or less acute at base — *herbacea*
      3. Stem winged
         5. Petiole and inflorescence branches with crisp wings — *crispa*
         5. Petiole and inflorescence branches not winged — *latifolia*
   2. Leaves bipinnate — *indica*

Leea crispa Linn. Mant. 1 : 124, 1767 ; FBI 1 : 665 ; C. 1 : 276 ; G. 1 : 171.

Fl. : August. September.

Loc. : GOA : *Sanguem* : Molem area.

Occasional in the forest area.

L. edgeworthii Sant. in Rec. Bot. Surv. Ind. 16 (1) : ed. 1, 54, 1953 ; S. 43. *L. aspera* Edgew. in Trans. Linn. Soc. 20 : 36, 1841 ; FBI 1 : 665 ; C. 1 : 277 ; T. 1 : 327 ; G. 1 : 171 (*non* Wall. in Roxb. Fl. Ind. 2 : 468, 1824).

Fl. : July August. *Fr.* : September November.

Loc. : GOA : *Bicholim* : Nanora. *Satari* : Goa border area after Anmod. *Bardez* : Agoda ; Porvorim forest. *Salcete* : Rayi village ; Margao ghat. *Sanguem* : Nondrona ; Molem. *Canacona* : Polem forest ; Angidiv. NAGARHAVELI : Saily ; Kuntly forest.

Common in open forest area, on hillock, and in forest undergrowth.

L. herbacea Buch. Ham. in Wall. Cat. no. 6829 ex C. B. Clarke in Jour. Bot. 19 : 137, 1881 ; G. 1 : 171.

Fl. : July September.

Loc. : GOA : *Satari* : Satrem. *Sanguem* : Molem area.

This species is commonly mixed up with *L. edgeworthii* Sant. (=*L. aspera* Edgew. *non* Wall.) which is fairly common along the Konkan area.

Its record from Goa, though interesting from Western India, needs further study.

Leea indica (Burm. f.) Merrill in Phil. J. Sci. Bot. 14 : 245, 1919 ; S. 43. *Staphylea indica* Burm. f. Fl. Ind. 75. t. 24, f. 2, 1768. *Leea sambucina* Willd. Sp. Pl. 1 : 1177, 1797 ; FBI 1 : 666, *p.p.* ; DG. 39 ; C. 1 : 277 ; T. 1 : 327 ; G. 1 : 172.

Fl. : February October. *Fr.* : Almost throughout the year. *Ill.* : Wt. Ic. t. 78 ; T. f. 194.

Vern. : Rai dinda (Mar.) ; Nurche (Kan.) ; Ratanhia (Port.) ; Dimdo (Konk.).

Loc. : GOA : *Pernem* : Tomboxim, near Pernem ; Pernem village ; Matachi Rai, near Palem ; Palem. *Bicholim* : Mahim village, near Bicholim. *Satari* : Sukad forest, near Maloli ; Maloli forest ; Valpoi ; Caranzol ; Ambechagol. *Bardez* : Chopora, Kaisura fort ; Bastora ; Arvalim ; Aldona. *Salcete* : Santa cruz area ; Verna village. *Sanguem* : Sanguem Bara zan mine area ; Molem area ; Ghatto, Netraveli ; Bati ; Madka bangalow, near Molem. *Canacona* : Butpal ; Ordofond. NAGARHAVELI : Damanganga on way to Kawcha ; Dolara forest ; Khuntly forest. DAMAN : Bamoti.

Very common shrub found on the outskirts of the forests. Sometimes the young stems and shoots are used as vegetable. The roots are medicinal.

L. latifolia Wall. ex C. B. Clarke in Trim. Journ. Bot. 138, 1881 ; C. 1 : 277 ; T. 1 : 330 ; G. 1 : 171. *L. cinerea* Laws. in FBI 1 : 665, 1875.

Fl. : August.

Loc. : GOA : *Marmugao* : Nuvem hills. DAMAN : Dundorta.

Rare, on gravelly hill slopes.

L. macrophylla Roxb. ex Hornem. Hort. Hafm. 1 : 231, 1813 ; FBI 1 : 664 (excl. syn. *L. latifolia*) ; C. 1 : 276 ; T. 1 : 326 ; DG. 39 ; G. 1 : 171 ; Dangs 309.

Fl. : July September. *Fr.* : October. *Ill.* : Wt. Ic. t. 1154.

Vern. : Dinda (Mar.) ; Jino (Konk.).

Loc.: GOA : *Marmugao* : Nuvem hills. NAGARHAVELI : Dolara forest ; Chispana forests : Dudhni Bildhri forests ; Dongarpad.

Common in the forest undergrowth. The species has the largest leaves.

TETRASTIGMA Planch.

Tetrastigma lanceolarium (Roxb.) Planch. in DC. Monog. Phan. 5 : 423, 1887. *Cissus lanceolaria* Roxb. [Hort. Beng. 11, 1814 (*non. nud.*)]

Fl. Ind. 1 : 412, 1832. *Vitis lanceolaria* (Roxb.) Wall. Cat. 6013, 1828 ; FBI 1 : 660 ; DG. 38 ; C. 1 : 274 ; T. 1 : 324.

Fl. ; November - December. *Fr.* : May.

Vern. Kazorlicha yel (Mar.) ; Choral (Konk.) ; Uvas de tove (Port.).

As it is found to be common species of Concan and North Kanara ghats, it can be located in Goa ghats also as recorded by Dalgado.

Cult. species :

Vitis vinifera Linn. Sp. Pl. 202, 1753 ; FBI 1 : 652 ; DG. 37 ; C. 1 : 275 ; T. 1 : 316 ; G. 1 : 163.

Vern. : Draksha (Mar.) ; Dakhechem jhad (Konk.) ; Videira (Port.).

Dalgado records that the cultivation of this species was well tried in Aguada area of Bardez taluk and also other parts of Goa. His indication that the species is indigenous to the Himalayas is rather incorrect.

SAPINDACEAE

1. Herbs climbing by circinate tendrils. Leaves biternate, leaflets pinnatifid - pinnati - lobed. Capsule inflated — *Cardiospermum*
1. Shrubs or trees. Leaves and fruit otherwise
   2. Flowers irregular
      3. Leaves pinnate ; leaflets not serrate, 2 to 3 pairs — *Lepisanthes*
      3. Leaves ternate ; leaflets usually serrate — *Allophylus*
   2. Flowers regular
      4. Petals absent ; flowers small, fascicled in interrupted racemes or panicles — *Schleichera*
      4. Petals present ; flowers in axillary and terminal racemes or panicles
         5. Sepals free, much imbricate ; drupe globose or ovoid — *Sapindus*
         5. Sepals connate, valvate or nearly so : drupe oblong — *Euphoria*

ALLOPHYLUS Linn.

Allophylus cobbe (Linn.) Raeusch. Nomencl. ed. 3 : 108, 1797 ; Leenhouts in Blumea 15 : 322, 1967 ; FBI 1 : 673 ; DG. 40 ; C. 1 : 282 ; T. 1 : 334. *Rhus cobbe* Linn. Sp. Pl. 267, 1753.

Fl. : May - August. *Fr.* : August October. *Ill.* : Wt. Ic. t. 964.

Vern. : Titwi (Mar.) ; Kasa - bally (Kan.).

Loc. : GOA : *Bicholim :* Nanora forest. *Satari* : Colem ; Caranzol hills ; Codal forests. *Bardez* : Paliem ; Bardez. *Sanguem* : Vilujan forest, (13 km south of Sanguem). *Canacona* : Ordofond Butpal. 6 km point.

Common inside the forest.

The genus *Allophylus*, one of the largest in the family Sapindaceae presents considerable difficulty in specific delimitation and even the so called careful work of Radlkofer on the genus [Pflanzenreich 98, 1931 34 and Rec. Bot. Surv. Ind. 3 (3) : 341, 1907] is now considered, (on the basis of wide range of material covering the Pan-tropic zone of the continents of Africa, India and Malaysia), as presenting extremely vague delimitation of the species, often with inter - grading or overlapping specific characters. In the recent conspectus of the genus by P. W. Leenhouts [Blumea 15 (2) : 301, 1967,] a careful analysis of Radlkofer's work is made out, using extensive range of herbarium material. As distinct morphological gaps between species to species in the genus *Allophylus* do not exist and as most of the variations, particularly in the nature of leaf, inflorescence and fruit mostly in size and number of flowers, seen in the wide range of material, are quite intergrading either due to polyploidy or geographical range along the tropics and as no definite conclusions can be drawn as to present the valid reasons for such intergrading variations purely of quantitative nature, it would be most appropriate, as the present knowledge in the genus indicates to conclude, that phenetically speaking *Allophylus* consists of only one species.

Now as for the name of that specific epithet, though two names *cobbe* and *zeylanicus* (both of Linneaus Species Plantarum with same year 1753) exist, the epithet *cobbe* has been widely used by several authors to represent the Asian species and *zeylanicus* being used in a restricted way to represent the race from Ceylon, it is considered, following Leenhouts (*l.c.*) that *Allophylus cobbe* (Linn.) Raeusch. is the most acceptable name according to rules of nomenclature and taxonomic judgement. As many as 270 names of species are enumerated by Leenhouts (*l.c.*) which represent the only species, *Allophylus cobbe.*

CARDIOSPERMUM Linn.

Cardiospermum halicacabum Linn. Sp. Pl. 366, 1753 ; FBI 1 : 670 ; DG. 39 ; C. 1 : 280 ; G. 1 : 175 ; Dangs 309 ; Saur. 100 ; Pav. 65.

Fl. : November - December. *Ill.* : Wt. Ic. t. 508.

Vern. : Kapalaphodi (Mar.) : Kakaralata (Kan.) ; Kagadolio, Korolio (Guj.).

Loc. : GOA : *Salcete* : Budsari - Goundugarha. DADRA. DIU : Castle area.

Common on hedges and wastelands.

EUPHORIA Commers. ex Juss.

Euphoria longan (Lour.) Steud. Nomench. Bot. 328, 1821. *Dimocarpus longan* Lour. Fl. Cochinch. 233, 1790. *Euphoria longana* Lam. Encycl. 3 : 574, 1791. *Nephelium longana* Camb. in Mem. Mus. Par. 18 ; 30, 1829 ; FBI 1 ; 688 ; DG. 40 ; C. 1 ; 285 ; T. 1 : 338 ; G. 1. 180.

Fl. : March. *Ill.* : T. f. 200.

Vern. : Wumb (Mar.) ; Kanakindali (Kan.).

Loc. : GOA : *Canacona* : Yed forests, near Nadquem.

It is very similar to "Litchi" plant. The aril of the fruit is sweet and edible.

LEPISANTHES Blume

Lepisanthes tetraphylla (Vahl) Radlk. in Sap. Holl. Ind. 35 (105), 1877 ; G. 1 : 176 ; S. 44. *Sapindus tetraphyllus* Vahl Symb. 3 ; 54, 1794. *Hemigyrosa canescens* Blume in Rumph. 3 : 166, in Obs. 1847 ; FBI 1 : 671, (excl. syn. *H. trichocarpa* Thw.) ; DG. 39 ; C. 1 : 281 ; T. 1 : 332.

Fl. : February April. *Fr.* : April - May.

Vern. : Kurpa, Lakhandi (Mar.) ; Kurpah (Kan.).

Loc. : GOA : *Saturi* : Kawaliyan forest, near Nandorem ; Codal Satrem road, 5 km point. *Sanguem* : Sidh forests, near Bhati. *canacona* : Butpal forest ; Nadquem Butpal road, 5 km point.

Common in moist areas of the forest.

SAPINDUS Linn.

Leaves lanceolate, acute of acuminate	*laurifolius*
Leaves oblong, emarginate	*emarginatus*

Sapindus emarginatus Vahl, Symb. 3 : 54, 1794 ; G. 1 : 178 ; S. 102. *S. trifoliatus* auct. *non* Linn. ; FBI 1 : 682, *p. p.* ; DG. 40. *S. laurifolius* var. *emarginatus* Cooke 1 : 267.

Fl. : April.

Vern. : Ritha (M.), Rimgi ; Rimthi (Konk.).

Loc. : GOA : *Canacona* : Angidiv.

Frequent in the deciduous forests and also cultivated for its fruits. The fruits are used as a substitute for soap.

Sapindus laurifolius Vahl, Symb. 3 : 54, 1794 ; C. 1 : 284 ; T. 1 : 337 ; G. 178 ; S. 45. *S. trifoliatus* Hiern. in FBI 1 : 682, *p. p. non* Linn.

Fl. : December.

Vern. : Ritha (M.) ; Aratala (Kan.).

Loc. : GOA : *Bardez* : Bastora, Duleur.

Occasional in the evergreen forests. The fruits are used as substitute for soap.

SCHLEICHERA Willd.

Schleichera oleosa (Lour.) Oken, Allg. Naturg. 3 (2) : 1341, 1841 ; S. 44, Saur. 101. *Pistacia oleosa* Lour. Fl. Cochinch. 2 : 615, 1790. *Schleichera trijuga* Willd. Sp. Pl. 4 (2) ; 1096 ; 1805 ; FBI 1 : 681 ; DG. 40 ; C. 1 : 283 ; T. 1 : 335 ; G. 1 : 177 ; Dangs 310.

Fl. : March April. *Fr.* : April June. *Ill.* : Wt. *Ill.* t. 141 ; T. f. 198.

Vern. : Kusumb (Mar.) ; Sagada (Kan.) ; Carvalho de Ceylao (Port.) ; Kossono, Kosama, Kosumb (Guj.).

Loc. ; GOA : *Satari* : Codal Satrem road, 5 km point. *Sanguem* : Bhati. *Canacona* : Kairuwala, Ordofond area ; Butpal - Nadquem ; Brahma nadi area (on way to Kadriyan from Nadquem) ; Nadquem. NAGARHAVELI : Silvassa area.

Occasional. Also recorded by Dalgado from taluks (councils) of Quepem, Sanguem and Canacona.

Oil extracted from seed is recommended for the growth of hairs. This aspect is worth the experiment in more detail. The fruit is somewhat edible.

Cult. species :

Litchi chinensis Sonn. Voy. Ind. 3 : 255, 1782. *Nephalium litchi* Camb. in Mem. Mus. Par. 19 : 36, 1829 ; FBI 2 : 687 ; DG. 40 ; C. 1 : 286 ; T. 1 : 340 ; G. 1 : 180.

Fl. ; November December. *Fr.* ; April May. *Ill.* : Wt. Ic. t. 43.

Vern. : Litchi.

This species was introduced into India from South China and is now cultivated in many parts of India including Goa. The aril of the fruit which is juicy and edible, is not so well developed and not so sweet along Western India including Goa.

ANACARDIACEAE

1. Leaves compound, imparipinnate
   2. Leaflets with intramarginal vein ; flowers polygamous, in terminal, spreading panicles ; drupe fleshy, ovoid — *Spondias*
   2. Leaflets without intramarginal vein ; flowers monoecious or dioecious, in simple or branched racemes ; drupe small, compressed, reniform — *Lannea*
1. Leaves simple, alternate
   3. Flowers in short, axillary racemes — *Nothopegia*
   3. Flowers in axillary or terminal panicles
      4. Stamen 1 — *Mangifera*
      4. Stamens 5
         5. Leaves oblanceolate, petiole with 2 to 4 spur-like appendages ; peduncle not enlarging in fruit ; fruit inferior — *Holigarna*
         5. Leaves obovate ; petiole without spur-like appendages ; peduncle fleshy in fruit ; fruit superior — *Semecarpus*
      4. Stamens 8 to 10
         6. Leaves broadly oblong, obtuse, glabrescent above, more or less villous beneath — *Buchanania*
         6. Leaves obovate or elliptic, rounded at the apex, glabrous — *Anacardium*

ANACARDIUM Linn.

Anacardium occidentale Linn. Sp. Pl. 533, 1753 ; FBI 2 : 20 ; DG. 41 ; C. 1 : 292 ; T. 1 : 350 ; G. 1 : 185 ; S. 47.

Fl. : November March. *Fr.* : April May. *Ill.* : T. f. 205.

Vern. : Kaju (Mar.) ; Gadambe (Kan.) ; Kaju (Konk.) ; Gajueiro (Port).

Loc. : GOA : *Satari* : Maloli Valpoi road. *Bardez* : Estates and open hills. *Salcete* : Madgao area. *Sanguem* : Orgoni near Netraveli. *Canacona* : Ordofond.

The species was introduced by the Portuguese from Brazil. Due to the cultivation of the species for over a century or two, it grows almost spontaneously in several areas in Goa, thus mixing with other components of Goa's flora.

Cultivated for the Cashew nut seeds which is a flourishing small scale industry in Goa.

BUCHANANIA Spreng.

Buchanania lanzan Spreng. in Schrade Journ. 4 : 234, 1801 ; C. 1 : 293 ; G. 1 : 184. *B. latifolia* Roxb. Fl. Ind. 2 : 385, 1832 ; FBI 2 : 23 ; DG. 41 ; T. 1 : 349.

Fl. : January March. *Fr.* : April May. *Ill.* : Bedd. Fl. Sylv. t. 165.

Vern. : Charoli (Mar.) ; Nurkal (Kan.) ; Char (Konk.).

Loc. : GOA : *Satari* : Caranzol. *Bardez* : Betim Porvorim ; Acoi. *Sanguem* : Sidh forest, near Bhati. *Canacona* : Ordofond Tudal ; Nadquem hills ; Hathipawal, near Butpal.

Common in open areas of deciduous forest. The nut is eaten which tastes somewhat like almond.

HOLIGARNA Buch. Ham.

1. Leaves glabrous beneath or midrib slightly pubescent ; stipular appendages 2
   2. Leaves obovate - cuneate, acute, about 23 cm long ; tomentum of the inflorescence golden brown ; drupe ellipsoid — *arnottiana*
   2. Leaves obovate, obtuse, about 15 cm long ; tomentum of the inflorescence purplish - brown ; drupe obovoid — *ferruginea*
1. Leaves pubescent beneath ; stipular appendages 4 — *wightii*

Holigarna arnottiana (Wt. & Arn.) Hook. f. in FBI 2 : 36, 1876 ; DG. 42 ; C. 1 : 298 ; T. 1 : 357 ; G. 1 : 191. *H. longifolia* Wt. & Arn. Prodr. 169, 1834 (*non* Roxb.).

Fl. : January February. *Fr.* : March June. *Ill.* : Bedd. Fl. t. 107.

Vern. : Sudrabilo (Mar.) ; Hoolgeri, Holigar (Kan.) ; Ranbibo (Konk.) ; Uvas do inferno (Port.).

Loc. : GOA : *Satari* : Codal Satrem road, 5 km point ; Mattan dongar near Netraveli. *Bardez* : Vadem. *Sanguem* : Talem forest, on way to Patiem ; Bhati. *Canacona* : Amdiga, near Butpal ; Nadquem - Quer hills.

Occasional in the forest in association with *Glochidion*, *Vitex*, *Calamus* etc.

H. ferruginea March. Rev. Anacard. 171, 1869 ; FBI 2 : 37, T. 1 : 358 ; G. 1 : 191.

Fl. : March - May. *Fr.* : April July. *Ill.* : T. f. 209.

Loc. : GOA : *Canacona* : Nadquem.

Occasional, in the forest. This large tree species of typical evergreen forests of Karnataka State is an interesting record for Goa area, thus extending the distribution of species further north along the Western ghats.

H. wightii Balak. in Jour. Bomb. Nat. Hist. Soc. 63 (2) : 327, 1966. *Semecarpus grahamii* Wight. Ic. Pl. Ind. Or. 1 : t. 235, 1839.

Holigarna grahamii Hook. f. in FBI 2 : 37, 1876 (*non* Kurz. 1872) ; C. 1 : 298 ; T. 1 : 359 ; G. 1 : 191.

Fl. : January February. *Fr.* : May June. *Ill.* : Wt. Ic. t. 235.

Vern. : Bipte (Mar.) ; Biboi (Konk.).

The species though not collected by the author, is rather common along the ghats of Maharashtra and Karnataka States as observed by the author and hence included in this work. *H. grahamii* Kurz. (excl. *Semecarpus grahamii* Wight) is only a Burmese species.

LANNEA Rich. *nom. cons.*

Lannea coromandelica (Houtt.) Merrill in Journ. Arn. Arb. 19 : 353, 1939 ; S. 47 ; Saur. 103 ; Pav. 66. *Dialium coromandelicum* Houtt. Nat. Hist. II, 2 : 39, t. 5, f. 2, 1774. *Odina wodier* Roxb. [Hort. Beng. 29, 1814 (*nom. nud.*)] Fl. Ind. 2 : 293, 1832 ; FBI 2 : 29 ; DG. 41 ; C. 1 : 296 ; T. 1 : 353 ; G. 1 : 187.

Fl. : February March. *Fr.* : March - June. *Ill.* : T. f. 207.

Vern. : Shimti (Mar.) ; Gugul (Kan.) ; Bainheico (Port.).

Loc. : GOA : *Satari* : Sukad forest, near Maloli. *Bardez* : Tirim ; Bardez area ; Betim Porvorim. *Sanguem* : Sidh forest, near Bhati ; Bhati-Sanguem. *Canacona*, Mukadanal Ordofond ; Bhatpalon Ordofond ; Ordofond (near the bridge). NAGARHAVELI : Surangai forest ; Jamunpada forest.

Common deciduous tree in the forest, seen leafless when in fruits. The bark is astringent and is used in medicine.

MANGIFERA Linn.

Mangifera indica Linn. Sp. Pl. 200, 1753 ; FBI 2 : 13 ; DG. 41 ; C. 1 : 291 ; T. 1 : 348 ; G. 1 : 185 ; S. 47 ; Dangs 310 ; Saur. 103 ; Pav. 66.

Fl. : January March. *Fr.* : April May. *Ill.* : Bedd. Fl. Sylv. t. 162.

Vern. : Amba (Mar.) ; Mavina Mara (Kan.) ; Ambo (Konk.) ; Mangueira (Port.) ; Ambo (Guj.).

Loc. : GOA : *Canacona* : Amdiga Butpal.

The species being indigenous, forms an interesting component in the various forests in India, though its various hybrids are well known under cultivation for their sweet fruits. '*Alphonse*' variety produced in Goa is well known in mango market of the country.

NOTHOPEGIA Bl.

Nothopegia racemosa (Dalz.) Ramamurthy.

(**Nothopegia dalzellii** Gamble) Fl. Pres. Madr. 265, 1918. *N. colebrookiana* Blume, Mus. Bot. 1 : 203, 1849 ; FBI 2 : 40 ; DG. 42 ; C. 1 : 299 ; T. 1 : 360.

Fl. : January March. *Fr.* : March May.

Vern. : Sonemau (Mar.) ; Ambatti (Kan.) ; Amberi (Konk.).

Loc. : GOA : *Satari* : Matachi Rai, near Palem ; Vangiri forest (5 km north - east of Nandore). *Canacona* : Yed forest, on way to Nadquem.

Occasional, in the deciduous forests along streams.

SEMECARPUS Linn. f.

Semecarpus anacardium Linn. f. Sp. Pl. 182, 1781 ; FBI 2 : 30 ; DG. 41 ; C. 1 : 298 ; T. 1 : 355 ; G. 1 : 190.

Fl. : May July. *Fr.* : November February. *Ill.* : T. f. 208.

Vern. : Bibba (Mar.) ; Gero (Konk.) ; Bibo (Konk.) ; Anacardo (Port.).

The juice of the pericarp is used for making marking ink and also in medicine. Garcia de Orta (1 : 67) indicates that in Goa, the *Anacardium* juice is mixed with milk as a nutritious food for asthma and is also used against worms in the intestines.

SPONDIAS Linn.

Spondias pinnata (Linn. f.) Kurz, Pegu Rep. A. 44, 1875. *Mangifera pinnata* Linn. f. Suppl. 156, 1781. *Spondias mangifera* Willd. Sp. Pl. 2 : 751, 1799 ; FBI 2 : 43 ; DG. 42 ; C. 1 : 299 ; T. 1 : 362, G. 1 : 186.

Fl. : February April. *Ill.* : Wt. Ill. t. 76 ; Bedd. Fl. Sylv. t. 169.

Vern. ; Ambada (Mar.) ; Amate (Kan.) ; Gajuero (Port.) ; Ambado (Konk.).

Loc. : GOA : *Bardez* : Bardez area. NAGARHAVELI : Chispana forest ; Carchond forests ; Nana Randha ; Velugaon.

Occasional, in the deciduous forests.

The other species, *S. acuminata* Roxb. (Ran-ambado, Konk.) mentioned by Dalgado as growing in hills of Mulgaon seems to be a small-leaved form of *S. pinnata* (Linn. f.) Kurz which is more common.

Though indigenous as a forest species, it is also cultivated for its green fruits used as vegetable and pickles.

MORINGACEAE

MORINGA Adans.

Leaves 2-pinnate ; leaflets up to 3.3 cm long with distinct nerves. Flowers yellow, streaked red	*concanensis*
Leaves mostly 3-pinnate ; leaflets under 2 cm long with obscure nerves. Flowers white	*oleifera*

Moringa concanensis Nimmo in Grah. Cat. Bomb. Pl. 43, 1839 ; FBI 2 : 45 ; DG. 43 ; C. 1 : 301 ; T. 1 : 365 ; G. 1 : 192.

Fl. : November - January. *Fr.* : February April.

Vern. : Mosing (Konk.).

Though the species is not quite common along Concan area, it is mostly cultivated for its fruits in the back-yards of houses in Goa area.

Though now indicated as a distinct species, its status in relation to *M. oleifera* Lamk. needs critical study and it may just be a polyploid form of *M. olifera* from which it differs on very minor characters.

M. oleifera Lamk. Encycl. 1 : 398, 1785 ; G. 1 : 192. *M. pterygosperma* Gaertn. Fruct. 2 : 314, 1791 ; FBI 2 : 45 ; DG. 43 ; C. 1 : 301 ; T. 1 : 364 ; G. 1 : 192.

Fl. : December February. *Fr.* : March May. *Ill.* : T. f. 212.

Vern. : Shevga (Mar.) ; Nuggi mara (Kan.) ; Mosing (Konk.) ; Moringueiro (Port.).

Lamarck (1785) cited *Balanus myrepsica* Garsault (1764) under *M. oleifera*. But *B. myrepsica*, being a distinct species, was later reduced to *M. myrepsica* (Gars.) Theil. Some authors doubting the circumscription of *M. oleifera* contend that its original description by Lamarck includes two species, *M. oleifera* and *M. myrepsica* and hence the next available name *M. pterygosperma* Gaertn. (1791) be considered as valid. But van Steenis [Fl. Males. ser. 1, 5(4) : 554, 1958] clearly indicates that Lamarck's description refers to only one species *M. oleifera* which should be treated as valid for this taxon.

Though the species is indigenous in other parts of India, it is, however cultivated in Goa for its fruits used as vegetable. 'Ben oil' is extracted from the seeds. The bark of the root mixed with cashew nut (caju) liquor, works as a good external stimulant of the skin.

CONNARACEAE

Calyx accrescent ; capsule sessile	*Rourea*
Calyx not accrescent ; capsule stalked	*Connarus*

CONNARUS Linn.

1. Leaflets elliptic, 3-5 nerved, not conspicuously reticulate. Follicles 3.8-5 cm long, neither striate nor glossy *monocarpus*
1. Leaflets elliptic-lanceolate or elliptic-ovate, 5-8 nerved, prominently reticulate. Follicles under 4 cm, striate and glossy
   2. Follicles chestnut-brown, 3-4 cm long, shortly narrowed into a stalk *wightii*
   2. Follicles pale brown, 1.8-2.5 cm long, cordate at base *ritchiei*

Connarus monocarpus Linn. Sp. Pl. 675. 1753 ; FBI 2 : 50 ; DG. 43 ; C. 1 : 303 ; T. 1 : 370 ; G. 1 : 194.

Fl. : February March. *Fr.* : April June.

Vern. : Sundar (Mar.) ; Sundari (Konk.).

Though not collected from Goa area, the author has collected and studied the species in the forests of Maharashtra and Karnataka States on either side of Goa area and in fact, it is more common than the other two species of the genus ; hence it is included in this work as Dalgado also records it as most common along ghats.

C. ritchiei Hook. f. in FBI 2 : 51, 1876 ; C. 1: 304 ; T. 1 : 370 ; G. 1 : 194.

Fl. & Fr. : April July. *Ill.* : T. 1. f. 214.

The species, though comparatively less common than the other two species of *Connarus* noted in this work, has been collected from Amboli-Ramghat area by the author and it is also recorded from North Kanara ghats. As its occurrence in Goa is not unlikely, it is included in this work.

The status of the species is not quite clear from the limited range of material so far collected and it would be worthwhile to study the taxon in living condition with reference to *C. wightii* Hook. f.

C. wightii Hook. f. in FBI 2 : 51, 1876 ; C. 1 : 304 ; T. 1 : 370 ; G. 1 : 194.

Fl. : February March. *Fr.* : April May.

Vern. : Kutkuta (Mar.).

Loc. : GOA : *Satari* : Sukad forest, near Malali ; Vangiri forest, 5 km north - east of Nandore ; Siranguli, near Caranzol. *Sanguem* : Anmod area. *Canacona* : Kanpal hill top ; Tudal hill ; Choram hill top. Nadquem ; Budsare - Tudal.

Common in the forest on hill slopes.

ROUREA Aubl.

Rourea santaloides Wt. & Arn. Prodr. 144, 1834 ; FBI 1 : 47 ; C. 1 : 303 ; T. 1 : 367 ; G. 1 : 193.

Fl. : October. *Fr.* : April. *Ill.* : Pflanzenfam. 3(3) : 63, f. 34 (F-H).
Vern. : Huleshadlabally (Kan.) ; Wakeri (Mar.).
Loc. : GOA : *Canacona* : Nadquem.
Growing mostly in forest areas.

FABACEAE

1. Flowers either white or pink or red or orange
   2. Flowers white or pink
      3. Scandent shrubs or trees
         4. Leaves trifoliate
            5. Stamens diadelphous ; style bearded below the stigma ; pod linear, straight or incurved — *Vigna*
            5. Stamens monadelphous ; style not bearded ; pod linear, compressed or turgid with a distinct rib on each valve near the upper suture — *Canavalia*
         4. Leaves pinnate, more than 3
            6. Leaves paripinnate, petiole terminated by a bristle ; pod dehiscent — *Abrus*
            6. Leaves imparipinnate ; petiole not terminated by bristle ; pod indehiscent
               7. Leaflets alternate — *Dalbergia*
               7. Leaflets opposite
                  8. Pods indehiscent
                     9. Pods almost woody, not winged — *Pongamia*
                     9. Pods membranous, winged on one or both sutures — *Derris*
                  8. Pods dehiscent — *Gliricidia*
      3. Herbs or erect shrubs
         10. Leaflets 1 to 3-foliate (rarely 5-foliate) pods jointed — *Desmodium*
         10. Leaflets 1-many foliate ; pods not jointed
            11. Leaflets opposite ; stamens diadelphous ; pods not thickened at the sutures — *Tephrosia*
            11. Leaflets opposite or alternate ; stamens monadelphous ; pods thickened at the sutures — *Mundulea*
   2. Flowers either red or orange or scarlet
      12. Trunk armed with conical prickles ; pod stalked, falcate, turgid — *Erythrina*
      12. Trunk unarmed ; pods flat, thickened at the sutures, silky pubescent — *Butea*
1. Flowers either blue or violet or yellow
   13. Flowers blue or violet or purple
      14. Trees — *Ougeinia*
      14. Herbs or shrubs, erect or climbing
         15. Climbing shrub
            16. Leaflets 3 or more ; style bearded below the stigma — *Clitoria*
            16. Leaflets 3-foliate ; style not bearded
               17. Pods orbicular or S-shaped, clothed with brown, irritating bristles — *Mucuna*
               17. Pods linear or oblong, not clothed with irritating bristles

18. Pods linear, glabrous or appressedly hairy — *Teramnus*
18. Pods oblong, clothed with long villous hairs
19. Leaves gland-dotted beneath — *Dunbaria*
19. Leaves not gland-dotted — *Pueraria*

15. Herbs or shrubs, erect
20. Leaves simple
21. Anthers apiculate — *Indigofera*
21. Anthers not apiculate
22. Pods one seeded — *Psoralea*
22. Pods many seeded
23 Pods turgid — *Alysicarpus*
23. Pods flattened
24. Pods jointed — *Desmodium*
24. Pods not jointed — *Tephrosia*

20. Leaves compound
25. Leaves trifoliately compound
26. Armed herbs or under-shrubs — *Alhagi*
26. Unarmed herbs or under-shrubs
27. Stamens monadelphous — *Cyamopsis*
27. Stamens diadelphous
28. Anthers not apiculate
29. Pods jointed — *Alysicarpus*
29. Pods not jointed — *Pseudarthria*
28. Anthers apiculate — *Indigofera*

25. Leaves pinnately compound, leaflets more than 3
30. Pods distinctly jointed, joints folding on one another — *Uraria*
30. Pods flattened, scarcely septate — *Tephrosia*

13. Flowers yellow or greenish-yellow
31. Stamens diadelphous
32. Stamens isodiadelphous
33. Trees or shrubs often climbing
34. Pods oblong or strap-shaped, not winged — *Dalbergia*
34. Pods broadly ovate with broad rigid wing — *Pterocarpus*
33. Erect or diffused herbs
35. Bracts large, ciliate, persistent — *Geissaspis*
35. Bracts persistent, not ciliate
36. Pods enclosed in the calyx — *Smithia*
36. Pods not enclosed in the calyx — *Aeschynomene*

32. Stamens not isodiadelphous but 9+1
37. Erect shrubs or small trees — *Sesbania*
37. Climbing herbs or shrubs
38. Leaves gland-dotted beneath
39. Pods 1-2-seeded — *Rhynchosia*
39. Pods 3 or more seeded — *Atylosia*
38. Leaves not gland-dotted
40. Stigma terminal — *Dolichos*
40. Stigma oblique — *Phaseolus*

31. Stamens monadelphous

41. Herbs. Leaves bifoliate — *Zornia*
41. Shrubs or herbs. Leaves simple
42. Bracts large, persistent, flowers enclosed in the bracts — *Flemingia*
42. Bracts small, linear-lanceolate, persistent ; flowers not enclosed in bracts
43. Pods inflated — *Crotalaria*
43. Pods flat — *Goniogyna*

ABRUS Linn.

Abrus precatorius Linn. Syst. ed. 12 : 472, 1767 ; FBI 2 : 175 ; DG. 49 ; C. 1 : 382 ; T. 1 : 397 ; G. 1 : 247 ; Dangs. 311 ; Saur. 158 ; Pav. 82.

Fl. : August September. *Fr.* : October December. *Ill.* : T. f. 223.

Vern. : Gunj (Mar.) ; Kati (Kan.) ; Chanoti ; Gunja (Guj.).

Loc. : GOA : *Satari* : Onda - Bicholim. *Bardez* : Betim. *Ilhas* : Chimbel reservoir—Brahmapuri temple, near Panaji. *Marmugao* : Santa cruz village area. *Canacona* : Tudal Ordofond, forest area ; Poinginnam ; Angidiv. NAGARHAVELI : Saily ; Dolara ; Chispana. DADRA. DAMAN : Coileque area ; Bamoti.

Common in forest on steep rocky slopes along forest edges.

Roots and leaves are used in native medicine and the fruits by jewellers as weights. The white seeded form which is mostly cultivated in gardens, has been considered to be highly medicinal, the leaves being used recently for leukaemia (Blood Cancer) by the Ayurvedic doctors at Poona.

AESCHYNOMENE Linn.

Aeschynomene indica Linn. Sp. Pl. 713, 1753 ; FBI 2 : 151 ; DG. 47 ; C. 1 : 363 ; G. 1 : 234 ; Saur. 144.

Fl. : August December. *Ill.* : Wt. Ic. t. 405.

Vern. ; Nalabi (Konk.). Bhony ikad, Jhini ikad (Guj.).

Loc. : GOA : *Bardez* : Baga jungle. *Satari* : Pale near Tanem. *Salcete*: Fields near Rest house, Margao ; Cavollosim area. NAGARHAVELI : Saily ; Khanvel ; Velugaon ; Damanganga, on way to Kaweha ; Umberkoi ; Nana Randha. DADRA, DAMAN : Cataria.

Common in moist places especially in the rice fields.

ALHAGI Tourn. ex Adans.

Alhagi pseudalhagi (M. Bieb.) Desv. in Journ. de Bot. 1 : 120, 1813 ; Saur. 141 ; Pav. 69. *Hedysarum pseudalhagi* M. Bieb. Fl. Taur. Cauc.

2 : 174, 1808. *Alhagi camelorum* Fisch. Ind. Hort. Pl. Gorenk ed. 2 : 72, 1812 ; C. 1 : 355 ; T. 1 : 389. *A. maurorum* Baker in FBI 2 : 145, 1876 (*non* Desv.).

Fl. : March April.

Vern. : Javaso (Guj.).

Loc. : DAMAN : Along Bimalpur Janivancore ; Airport area.

Occasional, on hill slopes. The plant is medicinal, reported to be efficaceous in asthma and opacities of cornea.

ALYSICARPUS Neck. ex Desv.

1. Calyx shorter or about as long as or slightly longer than the first joint of the pod
   2. Pods moniliform, veinless, clothed with hooked hairs — *monilifer*
   2. Pods not moniliform, veined
      3. Calyx shorter than the first joint of the pod — *procumbens*
      3. Calyx equal or slightly longer than the first joint of the pod — *vaginalis*
         4. Pods rugose
            5. Joints 4-sided — *tetragonolobus*
            5. Joints 2-sided — *rugosus*
         4. Pods not rugose
1. Calyx much longer than the first joint of the pod
   6. Flowers usually in pairs on spike-like lax racemes ; pods exerted — *bupleurifolius*
   6. Flowers in spike-like dense racemes ; pods included or slightly exerted — *longifolius*

Alysicarpus bupleurifolius (Linn.) DC. Prodr. 2 : 352, 1825 ; FBI 2 : 158 ; C. 1 : 370 ; G. 1 : 239 ; S. 55 ; Saur. 148 ; Pav. 71. *Hedysarum bupleurifolium* Linn. Sp. Pl. 745, 1753.

Fl. : September October. *Fr.* : November December. *Ill.* Roxb. Cor. Pl. t. 194.

Vern. : Khad Samervo (Guj.).

Loc. ; GOA : *Bicholim* : Usgao *Satari* : Tanem. *Ponda* : Near Sancoale. *Sanguem* : Patrem ; Kumde, near Netraveli ; Molem. *Canacona* : Tudal Ordofond. NAGARHAVELI : Saily ; Velugaon. DADRA : Tingara village. DAMAN : Dundorta.

Common in rice fields.

A. longifolius Wt. & Arn. Prodr. 233, 1834 ; FBI 2 : 159 ; DG. 48 ; C. 1 : 370 ; G. 1 : 239 ; S. 55 ; Dangs 311 ; Saur. 148 ; Pav. 72.

Fl. & Fr. : August October. *Ill.* : Wt. Ic. t. 251.

Vern. : Sevara (Mar.). Ghoda Samervo, Moto Samervo, Ubho-Samervo (Guj.).

Loc. : NAGARHAVELI : Dolara. DAMAN : Dundorta. DIU : Nagoa Castle area.

Dalgado records this species from Goa as somewhat rare. However, in Nagarhaveli etc. the species is common in open grass lands and rocky creeks along sea shore, sometimes found in cultivated fields also.

Roots are said to be a good substitute for liquorice.

Alysicarpus monilifer (Linn.) DC. Prodr. 2 : 353, 1825 ; FBI 2 : 157 ; C. 1 : 368 ; Saur. 147. *Hedysarum moniliferum* Linn. Mant. 1 : 102. 1967.

Fl. & *Fr.* : September November.

Loc. : DAMAN : Cataria.

Occasional on sandy wastelands.

A. procumbens (Roxb.) Schindl. in Fedde Repert. 21 : 11, 1925 ; Saur. 147 ; Pav. 71. *Hedysarum procumbens* Roxb. [Hort. Beng. 56. 1814 (*nom. nud.*)] Fl. Ind. 3 : 345. 1832 (*non* Mill. 1768). *Alysicarpus hamosus* Edgew. in Journ. Asiat. Soc. Beng. 21 : 32 & 171. 1852 ; FBI 2 : 157 : C. 1 : 368 ; Dangs 311.

Fl. : September October. *Fr.* : November December.

Loc. : NAGARHAVELI : Saily Khuntly forest. DAMAN : Fort area ; Cale area.

Occasional in open forests especially in moist shady areas. Often confused with *Desmodium rotundifolium* Baker but can be distinguished readily by the denser racemes and pods not being indented along the margins.

A. rugosus (Willd.) DC. Prodr. 2 : 353. 1825 ; FBI 2 : 159 ; DG. 48 ; C. 1 ; 371 ; G. 1 : 239 ; S. 55 ; van Steenis in Reinwardtia 6 : 88, 1962. *Hedysarum rugosum* Willd. Sp. Pl. 3(2) : 1172, 1803. *Alysicarpus violaceum* (*non Hedysarium violaceum sensu* Forsk.) Schindler in Fedde Repert. 21 : 13, 1926 ; Saur. 149.

Fl. : & *Fr.* : September October.

Loc. : GOA : *Bardez* : Bastora, near Church. *Sanguem* : Netraveli ; Molem. *Canacona* : Angidiv. NAGARHAVELI : Merkhal ; Dudhi, Poildhari forest ; Daman ganga river bank on way to Kawcha ; Nana Randha ; Velu gaon. DAMAN : Fort area.

Schindler confused the nomenclature of the taxon due to his misidentification of *Hedysarum violaceum* Forsk. as *H. rugosum* Willd. Though the specific epithet of *H. violaceum* Forsk. is preoccupied, this taxon is not conspecific with *Alysicarpus rugosus* but with *A. glumaceus* (Vahl) DC. Thus *A. rugosus* (Willd.) DC. is a distinct species by itself. The opinion as expressed by Leonard (Bull. Jard. Bot. Brux. 24 : 92. 1954) and van Steenis (*l.c.*) is followed here.

A. rugosus, though widely distributed in India, grows predominantly in drier regions. But its unique adaptability to grow in variety of habitats including very moist areas, may be the primary reason for producing considerable variation in the size of the plant, leaf, inflorescence, hairy texture etc. Various forms described under the taxa *A. heyneanus* Wt. & Arn. (robust plant), *A. styracifolius* DC. (small stunted hairy plant), *A. ludens* Wall., *A. pilifer* Wall *A. rugosus* var. *minor* Prain (all very small and more hairy plants), grow in mixed populations in India with considerable intermediates. For the present the author treats them under one species, *A. rugosus* (Willd.) DC., until proper analysis of this species-complex is made by bio systematic studies.

Alysicarpus tetragonolobus Edgew. in Jour. As. Soc. Beng. 21 : 169, 1853 ; FBI 2 : 159 ; C. 1 : 372. Dangs 312 ; Pav. 71.

Fl. & Fr. : September November.

Loc. : NAGARHAVELI : Dhapsa.

A. vaginalis (Linn.) DC. Prodr. 2 : 353, 1825 ; FBI 2 : 158 ; C. 1 : 369 ; G. 1 : 238 ; S. 55 ; Saur. 148 ; Pav. 71. *Hedysarum vaginale* Linn. Sp. Pl. 746, 1753. *A. vaginalis* var. *nummularifolius* Baker in FBI 2 : 158, 1876 ; C. 1 : 369 ; G. 1 : 238.

Fl. : September October. *Fr.* : November.

Vern. : Bhony-Samervo; Jhinko Samervo (Guj.).

Loc. : GOA : *Pernem* : Amberem, near Pernem. *Bardez* : Bardez area. *Satari* : Ivorem ; Carda. *Ilhas* : Panaji coastal area. *Sanguem* : Dudal. *Canacona* : Ordofond ; Angidiv. NAGARHAVELI : Saily ; Dhapsa ; Nana Randha ; Damanganga on way to Khawcha. DADRA, DAMAN : Marvor ; Regunvara. DIU : Jhoola ; Gogale.

Common in sandy soil along sea shore and along roadsides, sometimes forming a matty cover on sand.

ATYLOSIA Wt. & Arn.

1. Climbers ; flowers in peduncled racemes ; pods distinctly depressed between the seeds, clothed with brown hairs
   2. Pod 6 mm broad, with deep lines between the seeds — *scarabaeoides*
   2. Pod 12 mm broad, with sharply - defined (not deep) lines between the seeds — *platycarpa*
1. Erect shrubs ; flowers solitary or in pairs, not peduncled ; pods not prominently depressed between the seeds, clothed with whitish hairs — *lineata*

Atylosia lineata Wt. & Arn. Prodr. 258, 1834 ; FBI 2 : 213 ; DG. 55 ; C. 1 : 408 ; G. 1 : 260 ; S. 66.

Fl. : September December. *Fr.* : April. *Ill.* : Wt. Ic. t. 93.

Vern. : Rantur (Mar. & Konk.)

Loc. : Goa : *Satari* : South of Codal, 3 km point.

Atylosia platycarpa Benth. Pl. Jungh. 2 : 243 ; 1852 ; FBI 2 : 216 ; C. 1 : 410 ; Saur. 174.

Fl. & *Fr.* : August November.

Loc. : Nagarhaveli : Saily ; Morkhal ; Jamunpada forest ; Khanvel-Sindhoni.

A. scarabaeoides (Linn.) Benth. in Miq. Pl. Jungh. 3 : 243, 1852 ; FBI 2 : 215 ; C. 1 : 409 ; G. 1 : 261 ; Dangs 312 ; Saur. 175. *Dolichos scarabaeoides* Linn. Sp. Pl. 1020, 1753.

Fl. : June October. *Fr.* : November December.

Loc. : Goa : *Bicholim* : Usgao. *Marmugao* : Santa cruz village area. *Canacona* : Ordofond. Nagarhaveli : Morkhal ; Umberkoi Dongerpada forest.

An occasional climbing herb on *Cassia*, *Ardisia*, *Memecylon* etc. on rocky slopes of cleared forest area.

Butea Roxb. *nom. cons.*

1. A scandent or climbing shrub
   2. Flowers small, panicled, cream - coloured *parviflora*
   2. Flowers large in fascicles, exceeding 2 cm long, orange - scarlet coloured *superba*
1. An erect tree *monosperma*

Butea monosperma (Lamk.) Taub. in Engl. & Prantl, Pflanzenfam. 3(3) : 366, 1894 ; S. 60 ; Dangs 312 ; Saur. 163 ; Pav. 88. *Erythrina monosperma* Lamk. Encycl. 1 : 391, 1785. *Butea frondosa* Koenig ex Roxb. in As. Res. 3 : 469, 1792 ; FBI 2 : 194, DG. 51 ; C. 1 : 395 ; T. 1 : 407 ; G. 1 : 252. *Plaso monosperma* (Lamk.) O. Kuntze, Rev. Gen. Pl. 1 : 202, 1891.

Fl. : January March. *Fr.* : February April. *Ill.* : T. f. 231 32.

Vern. : Palas (Mar.) ; Muttala (Kan.) ; Faras de engenho (Port.) ; Khakaro Palas, Phullas kakria (Guj.).

Loc. : Nagarhaveli : Saily ; Surangai forest ; Nana Randha ; Morkhal ; Velugaon.

A common species along the Western ghats. Dalgado also records it from Goa. In Nagarhaveli, it is fairly common.

An attractive plant when in flower in the forest areas.

The combination *Butea monosperma* is sometimes credited to O. Kuntze, which is wrong as O. Kuntze did not validly publish the combination but merely cited it when he published *Plaso monosperma* in 1891. It was Taubert who effectively published the combination in 1894.

Butea parviflora Roxb. [Hort. Beng. 53. 1814 (*nom. nud.*)] Fl. Ind. 3 : 248, 1832 ; S. 60. *Spatholobus roxburghii* Benth. Pl. Jungh. 238, 1851-52 ; FBI 2 : 193 ; C. 1 : 394 ; T. 1 : 407 ; G. 1 : 253.

Fl. : January February. *Fr.* : March June. *Ill.* Wt. Ic. t. 210.

Vern. : Phulsum (Mar.).

Loc. : GOA : *Sanguem* : Durgin forests.

This is a huge climber, mostly restricted to forest areas only.

B. superba Roxb. Pl. Cor. 1 : 23 ; t. 22, 1795 ; FBI 2 : 195 ; C. 1 : 396 ; T. 1 : 410 ; G. 1 : 252 ; S. 61.

Fl. : November January. *Fr.* : February March.

Vern. : Palasvel (M.).

Loc. : GOA : *Satari* : Ivorem. NAGARHAVELI : Sindhoni forest.

CANAVALIA DC. *nom. cons.*

Canavalia microcarpa (DC.) Piper in DC. Biol. Soc. Wash. 30 : 177. 1917 ; *Lablab microcarpus* DC. Prodr 2 : 402, 1825. *Canavalia ensiformis* Baker (*non* DC.) var. *turgida* Baker in FBI 2 : 196, 1876 ; T. 1 : 404 ; *C. obtusifolia* Prain (*non* DC.) in Journ. As. Soc. Beng. 66 : 63, 1897 ; G. 1 : 254.

Fl. : September October. *Fr.* : November. *Ill.* : T. f. 228 ; Chatterjee in Jour. Ind. Bot. Soc. 28 (1) : 84 & 89, 1949.

Loc. : GOA : *Bicholim* : Tirla. *Ilhas* : Panaji, along coastal area ; Raj Bhavan forest area. *Salcete* : Budsari Goundugarha. *Canacona* : Angidiv. DADRA.

This is a littoral species, mostly growing along the coastal area. Backer & Bakh. f. in Fl. Java 1 : 633, 1963 refer to this species as *C. microcarpa* (DC.) Merr. which needs verification.

Cult. species :

Canavalia gladiata (Jacq) DC. *Canavalia ensiformis* (Linn.) DC. Prodr. 2 : 404, 1825. FBI 2 : 195 : C. 1 : 397. Wealth of India 2 : 55.

Vern. : Bada sem (H.) ; Pandhri abai (Mar.). This species, a native of West Indies, is cultivated for forage and fruits in Nagarhaveli and was collected at Dhapsa.

CLITORIA Linn.

Twining stem ; flowers solitary	*ternatea*
Erect stem ; flowers in pairs	*biflora*

Clitoria biflora Dalz. in Kew Jour. Bot. 2 : 35, 1850 ; FBI 2 : 208 ; DG. 54 ; C. 1 : 406 ; S. 64. Dangs, 313 ; Saur. 313. Pav. 80.

Fl. : July October. *Fr.* : August November.

Vern. : Dakti supli (Konk.).

Loc. : NAGARHAVELI : Sindhoni forest ; Dhapsa.

Following Dalgado who records this species as rare in forest areas, it is included for Goa as it commonly grows along the Western ghats. Santapau records it as fairly common in Khandala area. In Nagarhaveli, it is a common species.

Though Dalgado records that the root of this species is used for leucoderma, it does not seem to have been tried seriously in the treatment of the disease. Chemical analysis is worth the study.

C. ternatea Linn. Sp. Pl. 753, 1753 ; FBI 2 : 208 ; DG. 54 ; C. 1 : 405 ; G. 1 : 258 ; Dangs 313 ; Saur. 171 ; Pav. 80.

Fl. & *Fr.* : June November.

Vern. : Kajli (Mar.) ; Sankhpushpa balli (Kan.) ; Fula crigua (Port.) ; Garani, Koyala (Guj.).

Loc. : GOA : *Bardez* : Anjuna. *Ilhas* : Miramar ; Panaji. DAMAN : Airport area. DIU : Jalandhar ; Castle area ; Nagoa.

Common in cultivated fields and sandy sea shore. Also cultivated in gardens.

CROTALARIA Linn.

1. Leaves 3 - 7 foliate	
2. Pods not inflated	
3. Pods glabrous, many seeded	*mucronata*
3. Pods hairy, 2 - seeded	*medicaginea*
2. Pods much inflated, hooked at the apex	*quinquefolia*
1. Leaves simple	
4. Pods glabrous	

5. Pods obliquely subglobose
   6. Pods 4 - seeded *linifolia*
   6. Pods more than 5 - seeded *nana*
5. Pods oblong
   7. Stipules absent
      8. Corolla exerted
         9. Prostrate herb ; stem filiform *filipes*
         9. Erect herb ; stem not filiform
            10. Leaves cuneate, obtuse, emarginate ; pods less than 2 cm long, 6 to 12 seeded *albida*
            10. Leaves narrow lanceolate ; pods more than 2 cm long, many seeded *lutescens*
      8. Corolla not exerted ; prostrate herb ; leaves oblique *prostrata*
   7. Stipules present ; leaves retuse *retusa*
4. Pods hairy
   11. Stem triquetrous *triquetra*
   11. Stem not triquetrous
      12. Flowers blue in racemes ; stipules prominent *verrucosa*
      12. Flowers yellow in panicles ; stipules absent *fulva*

Crotalaria albida Heyne ex Roth in Nov. Pl. Sp. 333, 1821 ; FBI 2 : 71 ; C : 1 : 315 ; C. I : 208 ; S. 49.

Fl. : December March. *Ill.* : Fyson Fl. Nilg. & Puln. Hill tops, t. 78.

Loc. : GOA : *Sanguem* : Sanguem Barazon mine area.

Though occassionally seen, the species is fairly common along the Western ghats.

C. filipes Benth. in Hook. Lond. Journ. Bot. 2 : 475, 1843 ; FBI 2 : 66 ; C. I : 312 ; G. 1 : 206 ; S. 48 ; Dangs 314 ; Saur. 113.

Fl. : September April. *Fr.* : October - April.

Vern. : Makhmali adadiyo (Guj.).

Loc. : GOA : *Satari* : Arvalam. *Ilhas* : Near Merces village (on way to Curca) ; Chimbel reservoir Brahmapuri temple. *Canacona* : Amdiga, near Butpal ; Nadquem. NAGARHAVELI : Chispana area : Khawel - Sindhoni ; Damanganga river near Kawcha ; Dongerpada Umberkoi. DADRA.

Common in open rocky, gravelly soil and fields.

C. fulva Roxb. Fl. Ind. 3 : 266, 1832 ; FBI 2 : 80 ; C. 1 : 321 ; T. 1 : 379.

Fl. : February March. *Fr.* : April - May.

Loc. : GOA : *Canacona* : Nadquem Dongar ; Nadquem.

Occasional.

Crotalaria linifolia Linn. f. Suppl. 322, 1781 ; FBI 2 : 72 ; C. 1 : 317 ; S. 49 ; Saur. 114 ; Pav. 83.

Fl. : July August. *Fr.* : September October.

Vern. : Adahan shan (Guj.).

Loc. : NAGARHAVELI : Saily ; Dolara ; Khanvel ; Nana Randha ; Khawel Sindhoni ; Umberkoi Dongerpada ; Jamunpada forest ; Dhapa.

Occasional in grasslands and in open areas.

C. lutescens Dalz. in Hook. Kew Journ. 2 : 34, 1850 ; FBI 2 : 74 ; C. 1 : 318 ; G. 1 : 207.

Fl. & Fr. : October November.

Loc. : GOA : *Bardez* : Bardez. *Satari* : Valpoi Nagargao. *Canacona* : Butpal Kanpal hill top ; Ordofond.

Common weed in fields and along hill slopes.

C. medicaginea Lamk. Encyl. 2 : 201, 1786 ; FBI 2 : 81 ; C. 1 : 322 ; Saur. 119 ; Pav. 84.

Fl. : May August. *Fr.* : September - October.

Vern. : Ranmethi (Guj.).

Loc. : DAMAN : Cataria ; Fort area. DIU : Jalandhar ; Gogale.

Common weed on sandy soil, in fields and along sea shore. An extremely variable plant in field.

C. mucronata Desv. Journ. Bot. 3 : 76, 1814. *C. striata* DC. Prodr. 2 : 131, 1825 ; FBI 2 : 74 ; C. 1 : 323 ; T.I. : 380 ; G. 1 : 212.

Fl. : September November. *Fr.* : December March.

Loc. : GOA : *Pernem* : Terekol. *Bicholim* : Tirla. *Satari* : Nagrami, near Valpoi ; Arvolam. *Bardez* : Porverim village fields. *Ilhas* : Panaji coastal area. *Salcete* : Verna village (road side) ; Cuncolim.

Common in fields and waste lands.

In Indian floras this species is often referred to as *C. striata* DC. W.J. De Munk in Reinwardtia 6 : 210, 1962 pointed out that the correct name of the species is *C. mucronata* Desv.

C. nana Burm. Fl. Ind. 156, t. 48, f. 2, 1768 ; FBI 2 : 71 ; C. 1 : 315; G. 1 : 208.

Fl. & Fr. : September November.

Loc. : GOA : *Sanguem* : Ravancha dongar ; Verlem ; Surla ; Sanguem.

C. prostrata Rottl. ex Willd. Enum. Hort. Berol, 747, 1809 ; FBI 2 : 68 ; C. 1 : 312 ; G. 1 : 206. *C. prostrata* Roxb. Fl. Ind. 3 : 270, 1832.

Fl. : October November. *Fr.* : November December.

Loc. : GOA : *Satari* : Valpoi Nagram. *Marmugao* : Marmugao hill top forest.

Occasional.

Crotalaria quinquefolia Linn. Sp. Pl. 716, 1753 ; FBI 2 : 84; C. 1 : 324 ; G. 1 : 213.

Fl. : September. *Ill.* : Wt. Ic. t. 16.

Loc. : GOA : *Salcete* : On way to Cavollosim.

Rare.

C. retusa Linn. Sp. Pl. 715, 1753 ; FBI 2 : 75 ; DG. 43 ; C. 1 : 318 ; T. 1 : 378 ; G. 1 : 207 ; S. 49 ; Saur. 115 ; Pav. 83. *C. leschenaultii* Grah. Cat. Bomb. Pl. 44, 1839, *non* DC. ; DG. 44.

Fl. : November January. *Fr.* : January April. *Ill.* : T. f. 215.

Vern. : Ghagri (Konk.) ; Kalkala (Mar.).

Loc. : GOA : *Ilhas* : Panaji, coastal area. *Canacona* : Nadquem ; Butpal. NAGARHAVELI : Velugaon.

Occasional, near the paddy fields. Also from Colvalle (Bardez) and other areas as indicated by Dalgado.

As indicated by Cooke (1 : 319), Ritchie's specimen from Ramghat, identified as *C. leschenaultii* is nothing but *C. retusa*. *C. leschenaultii* DC. does not occur in Goa area.

The plant is very attractive when in flowers.

C. triquetra Dalz. in Hook. Kew Journ. Bot. 2 : 34, 1850 ; FBI 2 : 71 ; C. 1 : 314 ; G. 1 : 209 ; S. 49 ; Dangs 314 : Saur. 116 ; Pav. 83.

Fl. : October - December. *Fr.* : October - April.

Loc. : GOA : *Bardez* : Porvorim rocky plateau. *Ilhas* : Raj Bhavan forest area near Panaji. NAGARHAVELI : Velugaon ; Khanvel Sindhoni ; Damanganga near Kawcha ; Nana Randha ; Carchond forest ; Morkhal.

Occasional, in rock crevices.

C. verrucosa Linn. Sp. Pl. 715, 1753 ; FBI 2 : 77 ; DG. 44 ; C. 1 : 319 ; G. 1 : 210.

Fl. : October November. *Fr.* : November. *Ill.* : Wt. Ic. t. 200.

Vern. : Ghagari (Mar.).

Loc. : GOA : *Pernem* : Terekhol. *Ilhas* : Panaji sea coast. *Ponda* : Borim ; Borim area. *Sanguem* : Sanguem area. *Canacona* : Angidiv.

Occasional.

Cult. species :

Crotalaria juncea Linn. Sp. Pl. 714, 1753 ; FBI 2 : 79 ; DG. 44 ; C. 1 ; 320 ; T. 1 : 379 ; G. 1 : 210 ; S. 50. Dangs. 314 ; Saur. 118.

Fl. & Fr. : October November. *Ill.* : Roxb. Pl. Cor. 2 : t. 193 ; Wealth of India 2. f. 136.

Vern. : Dhakti ghagri (Konk.) ; Linho (Port.) ; Shan, Suna (Guj.) ; Sunhemp or Brazillian hemp (Eng.). Cultivated for its fibre. Occasionally found as an escape from cultivation.

CYLISTA Ait.

Cylista scariosa Roxb. Pl. Cor. 1 : 64, t. 92 ; 1798 ; FBI 2 : 219 ; DG. 55 ; C. 1 : 412 ; T. 1 : 415 ; G. 1 : 262 ; S. 66.

Fl. : November February. *Fr.* : March. *Ill.* : Wt. Ic. t. 1597 ; T. f. 34.

Vern. : Ran ghevda (Mar. & Konk.)

Following Dalgado, the species being common along the Western ghats, is included in this work.

DALBERGIA Linn. f. *nom. cons.*

1. Stamens 9 or 10, in one bundle — *sympathetica*
   2. Scandent shrubs — *latifolia*
   2. Tall trees
1. Stamens 10, in two bundles of 5 each
   3. Plants spinous ; a shrub — *spinosa*
   3. Plants non spinous
      4. Climber — *volubilis*
      4. Trees
         5. Standard narrow, oblong with a rather long claw — *paniculata*
         5. Standard broad with a very short claw — *lanceolaria*

Dalbergia lanceolaria Linn. f, Suppl. 316, 1781 ; FBI 2 : 235 ; C. 1 : 425 ; T. 1 : 428 ; S. 68 ; Dangs. 315 ; Saur. 178 ; Pav. 87.

Fl. : March May. *Fr.* : July October. *Ill.* : Wt. Ic. t. 266 ; Wealth of India f. 2.

Vern. : Tautosi (Guj.).

Loc. : NAGARHAVELI : Dudeni ; Carchond forest ; Nana Randha.

Rare.

This is a good timber tree. The oil from the seeds is used in medicine.

D. latifolia Roxb. Pl. Cor. 2 : 7, t. 113, 1799 ; FBI 2 : 281 ; DG. 56 ; C. 1 : 422 ; T. 1 : 423 ; G. 1 : 270 ; S. 67 ; Dangs. 315 ; Saur. 178 ; Pav. 86.

Fl. : March April. *Fr.* : December February. *Ill.* : T. f. 239.

Vern. : Shisham (Mar.) ; Biti (Kan.) ; Siso (Konk.) ; Pau Preto (Port.), Shissam (Guj.).

Loc. : NAGARHAVELI : Morkhal ; Atal forest ; Along Damanganga river bank ; Dudeni ; Dolara forest.

As recorded by Dalgado, the species though not quite common, grows in Goa area as the author has recorded the plant in the forsests adjoining Goa. In Nagarhaveli it is a common species.

The plant yields a fine timber, the rose-wood of south India, used in furniture.

Dalbergia paniculata Roxb. Cor. Pl. 2 : 8, t. 114, 1799 ; FBI 2 : 236 ; DG. 57 ; C. 1 : 426 ; T. 1 : 429 ; G. 1 : 270.

Fl. : April May.

Vern. : Phansi (Mar.) ; Husrani (Kan.) ; Posi (Konk.).

Dalgado records this species as rare in forests of Goa. The author has, however, recorded it from Ambolighat area of Ratnagiri district.

D. spinosa Roxb. Fl. Ind. 3 : 233, 1832 ; FBI 2 : 238 ; DG. 57 ; C. 1 : 426 ; T. 1 : 430 ; G. 1 : 269.

Ill. : Prain Annals Roy. Bot. Garden, Calcutta, 10, t. 9, 1905.

The species is commonly associated with the coastal flora of India. Talbot (Trees of Bomb. 75, 1902) and Cooke (*l.c.*) have not seen this plant growing in the Concan coast or in the Bombay Presidency but have included in their work on the authority of Watt (Dict. Econ. Prod. 3 : 15) Dalgado, however, records it to be rare with a specific indication of locality i.e. Mulachivod and Madgao area and Madgoa (*Salcete*). As such, it is included in this work for possibly locating it in the area.

The roots are said to be used for reducing the effects of alcohol as the powdered root has the capacity of absorbing alcohol.

***D. sympathetica** Nimmo ex Grah. Cat. 55, 1839 ; FBI 2 : 234 ; DG. 57 ; C. 1 : 424 ; T. 1 : 426 ; S. 68. *D. multiflora* Heyne ex Wall. Cat. 5848, 1832 (*nom. nud.*) : G. 1 : 269.

Fl. : November April. *Fr.* : December August. *Ill.* : T. f. 240.

Vern. : Yekyel (Mar.) ; Muldi (Kan.) ; Pemtguli (Konk.) ; Fava turquesca (Port.).

Loc. : GOA : *Sanguem* ; Bhati forest (6 miles north of Sanguem). *Canacona* : Angidiv.

**D. horrida* (Dennst.) Mabberly in Taxon 25 : 538, 1977. *Amerimnon horridum* Dennst. Schl. Hort. Ind. Malab. 34, 1818.

Though occasionally seen, this record indicates the continuity of the species distribution along the Western ghats.

Dalbergia volubilis Roxb. Cor. Pl. 2 : 48, t. 191, 1799 ; FBI 2 : 235 ; DG. 57 ; C. 1 : 427 ; T. 1 : 429 ; G. 1 : 270 ; S. 68.

Fl. : February March. *Fr.* : April May. *Ill.* : T. f. 241.

Vern. : Alai (Mar.) ; Kobbali (Kan.) ; Alyo (Konk.).

Dalgado records it as common. It is, however, not difficult to locate it in Goa area.

Cult. species :

D. sissoo Roxb. [Hort. Beng. 53. 1814 (*nom. nud.*) &] Fl. Ind. 3 : 223, 1832 ; FBI 2 : 231 ; DG. 18 ; C. 1 : 421 ; Saur. 179.

Fl. : April - June.

Vern. : Noto shisham (Guj.).

Cultivated for its valuable timber, especially for making furniture. Bark and leaves are medicinal.

DERRIS Lour. *nom. cons.*

1. Flowers in large, axillary or terminal panicles ; standard petal with two callosites at the base of the limb — *canarensis*
1. Flowers in axillary racemes or fascicles ; standard petal without callosites at the base of the limb
   2. Pods winged along upper suture
      3. Leaflets many, elliptic - oblong, oblanceolate, shining ; pods narrow, acute at both ends. 5 - seeded — *scandens*
      3 Leaflets 3 to 7, ovate - acuminate, dull ; pods broad, obliquely ovate, obtuse at both ends, 2 - seeded — *trifoliata*
   2. Pods winged along both sutures — *bakeri*

Derris bakeri Thothathri in Bull. Bot. Surv. Ind. 3 : 187, t. 6, 1961. *Pongamia heyneana* Wt. & Arn. Prodr. 1 : 263, 1834 (*non* Grah.). *Derris heyneana* Benth. var. *paniculata* Baker in FBI 2 : 244, 1878.

Fl. : March. *Ill.* : Bull. Bot. Surv. Ind. 3 ; 188, Pl. 6.

Loc. : GOA : *Satari* : Satte river bank, Codal Ambechagol.

The species is sparsely collected along the Western ghat forests and is rather rare in Goa forests.

Prain (J. As. Soc. Beng. 66 : 461, 1897) considered the two varieties of *Derris heyneana* Benth., var. *heyneana* and var. *paniculata* of Baker are distinct with clear characters deserving specific status. Thothathri (*l.c.*) confirming Prain's opinion, named var. *paniculata* as *D. bakeri* as the var. *paniculata* is not available due to its preoccupation by *D. paniculata* Benth. [Jour. Linn. Soc. 4 (Suppl.) ; 105, 1860].

Derris canarensis (Dalz.) Baker in FBI 2 : 246, 1878 ; C. 1 : 433 ; T. 1 : 437 ; G. 1 : 273. Thoth. in Bull. Bot. Surv. India 3 : 190, 1961. *Pongamia canarensis* Dalz. in Hook. Kew Journ. Bot. 2 : 37, 1850. *Derris oblonga* Benth. in J. Linn. Soc. 4 (Suppl.) : 112, 1860.

Fl. : April May. *Fr.* : September. *Ill.* : T. f. 246, 247.

Loc. : GOA : *Satari* : Dhave village. *Sanguem* : Colem, on way to old Caranzol railway station.

Occasional climbing on bamboos. With the recent data on distribution and synonymy, it is evident that the species is distributed all along the Western ghats from Ambolighat zone of Ratnagiri district (Stocks collection from Concan) to Kerala State through Goa area.

D. scandens (Roxb.) Benth. in Journ. Linn. Soc. 4 (Suppl.) : 103. 1860 ; FBI 2 : 240 ; DG. 58 ; C. 1 : 430 ; T. 1 : 234 ; G. 1 : 273 ; S. 69 ; Dangs 315 ; Thoth. in Bull. Bot. Surv. India 3 : 177, 1961. *Dalbergia scandens* Roxb. Pl. Cor. 2 : t. 192, 1798.

Fl. : June August. *Fr.* : September November. *Ill.* : Wt. Ic. t. 275 ; T. f. 244.

Vern. : Kajarvel (Mar.) ; Handi Galli (Kan.) ; Salori (Konk.) ; Folhas do porco (Port.).

Loc. : GOA : *Pernem* : Varcande near Pernem. NAGARHAVELI : Chispana area.

An occasional climber in the forest.

D. trifoliata Lour. Fl. Cochinch. 2 : 433, 1790. Thoth. in Bull. Bot. Surv. India 3: 181, 1961. *D. uliginosa* Benth. in Miq. Pl. Jungh. 252, 1852 ; FBI 2 : 241 ; DG. 58 ; C. 1 : 431 ; T. 1 : 435 ; G. 1 : 273.

Fl. : February March. *Fr.* : March.

Vern. : Kajarvel (Mar.) ; Firtan (Konk.).

Loc. : GOA : *Bardez* : Bardez area. *Ponda* : Zueri river, Borim.

Occasional, climbing on mangroves along the banks of tidal river. It is also recorded along the muddy flats of other rivers of Goa including Colvale (*Pernem* and *Bardez*).

DESMODIUM Desv. *nom. cons.*

1. Pods dehiscing into 1 - seeded bits
   2. Leaves simple
      3. Petiole winged — *triquetrum*
      3. Petiole not winged
         4. Branches angled ; joints of pods longer than broad — *gangeticum*
         4. Branches terete ; joints of pods as long as broad — *velutinum*
   2. Leaves trifoliate
      5. Herbs

6. Trailing herbs with spreading branches — *triflorum*
6. Erect herbs — *dichotomum*
5. Shrubs or undershrubs
7. Flowers in axillary, peduncled umbels — *triangulare*
7. Flowers in axillary and terminal racemes
8. Leaflets broadly lanceolate; racemes lax, 15 - 20 cm long; pods scarcely constricted — *laxiflorum*
8. Leaflets obovate, cuneate; racemes congested, 2.5 - 7.5 cm long; pods indented, ciliate on both edges — *heterocarpon*
1. Pods dehiscing along the ventral suture — *motorium*

Desmodium dichotomum (Willd.) DC. Prodr. 2 : 336, 1825. *Hedysarum dichotomum* Willd. Sp. Pl. 3, 2 : 1180, 1803. *H. diffusum* Willd. l.c. 1803. *Desmodium diffusum* (Willd.) DC. Prodr. 2 : 336, 1825 *nom. illeg., non* 335 quoad *D. laxiflorum* DC.; FBI 2 : 169; C. 1 : 377, Dangs 315; Saur. 154.

Fl. & Fr. : September October. *Ill.* : Wt. Ic. t. 298.

Vern. : Bethi Salvan, Pandariyo Samervo (Guj.).

Loc. : NAGARHAVELI : Dolara forest; Velugaon; Dhapsa; Morkhal.

Common in forest undergrowth along the roadsides and edges of cultivated fields.

In 1803, Willdenow published *Hedysarum dichotomum* and *H. diffusum* which De Candolle transferred to *Desmodium dichotomum* and *D. diffusum* respectively in his Prodromus (Oct., 1825). However, De Candolle in Ann. Sc. Nat. 4 : 100 (Jan., 1825) had earlier published another species under *D. diffusum* (based on Roxburgh's specimen, *nom. nud.*) which also he had quoted on p. 336 of Prodromus. Though Wt. & Arn. (Prodr. 226. 1834) had combined both the Willdenow species under *D. diffusum* (Willd.) DC., the name is illegitimate being a later homonym and hence the next available name has to be considered as valid.

D. gangeticum (Linn.) DC. Prodr. 2 : 327. 1825; FBI 2 : 168; DC. 48; C. 1 : 379; T. 1 : 394; G. 1 : 244; S. 57; Saur. 156; Pav. 72. *Hedysarum gangeticum* Linn. Sp. Pl. 746, 1753.

Fl. & Fr. : October December. *Ill.* : Wt. Ic. 271; T. f. 222.

Vern. : Salpanni (Mar.); Murelehonne (Kan.); Salparni (Konk.); Ek pani Pandadulo, Salwan (Guj.).

Loc. : GOA : *Sanguem* : Sanguem. *Canacona* : Butpal, near stream; Poinguinim. NAGARHAVELI : Khanvel Khuntly forest; Nana Randha; Carchond forest; Dongerpad Umberkoi. DAMAN : Dundorta.

Common in open forest areas, along edges of rocky slopes and in grass lands. The root is medicinal.

Desmodium heterocarpon (Linn.) DC. Prodr. 2 : 337, 1825, *s.l.*; Knaap van Meeuwen in Reinw. 6 : 251, 1962. *Hedysarum heterocarpon* Linn. Sp. Pl. 747, 1753. *H. polycarpum* Poir. Encycl. 6 : 413, 1804. *D. polycarpum* (Poir) DC. Prodr. 2 : 334, 1825 ; FBI 2 : 171 ; DG. 49 ; C. 1 : 377 ; T. 1 : 396 ; G. 1 : 224 ; S. 57.

Fl. : August November. *Fr.* : November - December. *Ill.* : Wt. Ic. t. 406.

Loc. : GOA : *Satari* : Onda ; Valpoi ; Ambachagol. *Bardez* : Plateau area, Porvorim Betim. *Sanguem* : Rivona Colomba ; Sanguem area ; Chausuria ghats ; Chinchegal ; Ghatto. *Canacona* : Ordofond Butpal ; Ordofond ; Poinguinum. NAGARHAVELI : Chaura village, Dongerpad-Umberkoi.

Common on rocky slopes and in rice fields. The original spelling is "*heterocarpon*" and not "*heterocarpum* as indicated in some floras.

D. laxiflorum DC. in Ann. Sci. Nat. Paris, ser. 1, 4 : 100, 1825 and in DC. Prodr 2 : 335, no. 87, 1825 ; FBI 2 : 164 ; C. 1 : 376 ; T. 1 : 394 ; G. 1 : 243 ; S. 56.

Fl. : October November. *Fr.* : November December. *Ill.* ; Wt. Ic. tt. 374, 409.

Vern. : Jangli ganja (Mar.) ; Runchalo pandadiyo (Guj.).

Loc. : GOA : *Satari* : Kutachemal ; Ivorem ; Wadicha donger ; Caranzol ; Waghari ; near Poda village ; beyond Poda village ; Nagram near Valpoi. *Salcete* : Margao. *Sanguem* : Molem ; Surla : Chausuria ghat Bati Sidh. *Canacona* : Amdiga, near Butpal ; Butpal. NAGARHAVELI : Sally ; Khuntly forest ; Dolara forest ; Carchond forest ; Morkhal.

Common in forest undergrowth and on rocky, dry, exposed areas.

D. motorium (Houtt.) Merr. in Journ. Arnold Arb. 19 : 345, 1938 ; Meeuwen in Reinw. 6 : 254, 1962. *Hedysarum motorium* Houtt. Nat. Hist. 2, 10 : 246, 1779. *D. gyrans* (Linn. f.) DC. Prodr. 2 : 326, 1825. FBI 2 : 174 ; C. 1 : 382 ; G. 1 : 245. *Codariocalyx motorius* (Houtt.) Ohashi in Journ. Jap. Bot. 40 : 367, 1965.

Fl. & Fr. : August February. *Ill.* : Wt. Ic. t. 294.

Loc. : GOA : *Sanguem* : Bati Sidh.

D. triangulare (Retz.) Merr. in Journ. Arn. Arb. 23 : 170, 1942. *Hedysarum triangulare* Retz. Obs. 3 : 40, 1783. *Desmodium cephalotes* Wall. Cat. 5721, 1828 ; FBI 2 : 161 ; DG. 48 ; C. 1 : 375 ; T. 1 : 393 ; G. 1 : 242.

Fl. : August October. *Fr.* : November December. *Ill.* : Wt. Ic. t. 373.

Loc. : GOA : *Pernem* : Pernem Bicholim. *Satari* : Onda : Satrem ; Caranzol ; Ivorem ; Bazuruco ; Codal. *Ilhas* : Chimbel water reservoir, near Curca. *Salcete* : Margao ghat. *Sanguem* : Barazon ; Bati Sidh ; Ravanacha Donger ; Verlem ; Chausuria ; Netraveli ; Pericha Tem ; Cumbori ; Molem ; Nandora ; Durgin forest, near Darbandora ; Potiem forest, 8 miles west of Sanguem ; Rivona Colomba. *Quepem* : Near Quepem. *Canacona* : Ordofond Butpal ; Ordofond. NAGARHAVELI : Saily ; Chispana area ; Nana Randha ; Khawel Sindhori ; Jamunpada ; Dongerpada Umberkoi ; Morkhal.

Common as an undergrowth of forest, along with *Strobilan thes Helic teres*, *Leea*, *Terminalia* etc.

Hedysarum triangulare Retz. *l.c.* being the earlier name for this taxon Merrill (*l.c.*) made the present combination.

Desmodium triflorum (Linn.) DC. Prodr. 2 : 334, 1825 (excl. syn. cit. *D. biflorum*) ; FBI 2 : 173 ; DG. 49 ; C. 1 : 378 ; G. 1 : 245 ; S. 57 ; Dangs 316 ; Saur. 155 ; Pav. 73. *Hedysarum triflorum* Linn. Sp. Pl. 749, 1753, excl. var. βetγ.

Fl. : March November. *Fr.* : October November. *Ill.* : Wt. Ic. t. 292.

Vern. : Janglimethi (Mar.) ; Ran methi (Konk.) ; Zino Pandadiyo ; Jhino phandhio (Guj.).

Loc. : GOA : *Bardez* : Betim hill slopes. *Ilhas* : Panaji, along road side. *Sanguem* : Cumbari ; Patrem. *Canacona* : Kanpal hill top, Butpal ; Bansare, near Tudal ; Ordofond ; Angidiv. NAGARHAVELI : Dudeni ; Morkhal ; Dhapsa. Kawcha Damanganga ; Khanwel Sindhoni. DADRA. DAMAN : Coilique area ; Dandorta.

Common on hill slopes, on moist soil, in sugarcane fields and on wastelands.

D. triquetrum (Linn.) DC. Prodr. 2 : 326, 1825 ; FBI 2 : 163, (excl. syn. *D. auriculatum*, *D? pseudo triquetrum* & *D. alatum* DC.) C. 1 : 378 ; T. 1 : 393 ; G. 1 : 244 ; S. 57 ; Saur. 156. *Hedysarum triquetrum* Linn. Sp. Pl. 746, 1753.

Fl. : October November. *Fr.* : November December.

Vern. Antbarlu (Kan.).

Loc. : GOA : *Bicholim* : Mahim forest, near Bicholim ; Usgao. *Satari* : Codal. *Bardez* : Betim. *Salcete* : Nuvem hills, Verne plateau ; Goodier, 1 mile beyond Margao. *Sanguem* : Ravancha dongar, Verlem ; Foot of Patiem hill ; Avelde jungle, Molem ; roadside along Goa ghats, after Anmod. *Canacona* : Butpal, near stream ; Ordofond ; Nadquem. NAGARHAVELI : Saily ; Dolara forest ; Dongerpad - Umberkoi ; Morkhal.

Common in open forest area and as forest undergrowth.

Desmodium velutinum (Willd.) DC. Prodr. 2 : 328, 1825 ; *Hedysarum velutinum* Willd. Sp. Pl. 3 (2) : 117, 1803. *Desmodium latifolium* DC. Prodr. 2 : 328, 1825 ; FBI 2 : 168 ; DG. 49 ; C. 1 : 380 ; G. 1 : 244 ; Saur. 157.

Fl. & Fr. : July September. *Ill.* : Wt. Ic. t. 270.

Loc. : NAGARHAVELI : Dongerpad Umberkoi ; Morkhal.

D. velutinum based on *Hedysarum velutinum* (1803) is considered to be the valid name for *D. latifolium* DC., the name commonly used in the Indian floras.

DOLICHOS Linn.

The genus is mostly represented by the cultivated species, *Dolichos biflorus*, *D. bracteatus* (Baker in FBI 2 : 210, 1876) which grow wild along Western ghats and can also be located in Goa during further exploration work.

Cult. species :

Dolichos biflorus Linn. Sp. Pl. 727, 1753 ; FBI 2: 210 ; DG. 55 ; C. 1 : 407 ; G. 1 : 259 ; S. 65 ; Saur. 172 ; Pav. 79.

Fl. : October November. *Fr.* : November December. *Ill.* : Wt. Ic. 3 : 59.

Vern : Kulith (Mar.) ; Hurali (Kan.) ; Kulit (Konk.) ; Colita (Port.) ; Horse gram (Eng.).

Cultivated as a dry crop in Bicholim area near Amona ferry crossing and in other parts of Goa and in Nagarhaveli usually on poor soils.

DUNBARIA Wt. & Arn.

Leaflets exstipellate ; hairs on the pod glandular	*glandulosa*
Leaflets stipellate ; hairs on the pod not glandular	*heynei*

Dunbaria glandulosa (Dalz.) Prain in Journ. As. Soc. Beng. 66 : 433, 1898 ; C. 1 : 411. *Atylosia glandulosa* Dalz. in Jour. Linn. Soc. 13 : 185, 1873. *A. roxtrata* Baker in FBI 2 : 216, 1876.

Fl. : December March.

Loc. : NAGARHAVELI : Morkhal.

D. heynei Wt. & Arn. Prodr. 258, 1834 ; FBI 2 : 217 ; C. 1 : 411 ; T. 1 : 414 ; G. 1 : 261.

Fl. ; December March.

Loc. : GOA : *Canacona* : Nadquem.

Occasional near stream.

ERYTHRINA Linn.

Calyx minutely 5 - cleft ; corolla bright - red ; 5 - toothed ; seeds 6 8	*variegata*
Calyx entire ; corolla bright scarlet ; seeds 2 - 3	*stricta*

Erythrina stricta Roxb. [Hort. Beng. 53. 1814 (*nom. nud.*)] Fl. Ind. 3 : 251, 1832 ; FBI 2 : 189 ; C. 1 : 391 ; T. 1 : 402 ; G. 1 : 250 ; S. 59.

Fl. : January May. *Fr.* : March May. *Ill.* : T. f. 226.

Vern. : Pangara (Mar.) ; Keechaga (Kan.).

Loc. : GOA : *Canacona* : Angidiv. DAMAN : Calc area.

Rare. Leaf - fall starts from January and is completed at the beginning of March when the tree comes in full bloom.

E. **variegata** Linn. in Stickm. Herb. Amb. 10, 1754 & Amoen. Acad. 4 : 122, 1759 ; Bullock in Kew Bull. 20 : 194, 1966 ; Saur. 162. S. 59. *E. corallodendron* Linn. var. *orientalis* Linn. Sp. Pl. 706, 1753. *E. indica* Lamk. Encycl. 2 : 391, 1786 ; FBI 2 : 788 ; DG. 51 : C. 1 : 390 ; T. 1 : 400 ; G. 1 : 249.

Fl. : April May. *Fr.* : June. *Ill.* ; Wt Ic. t. 58 ; T. f. 225.

Vern. : Pangara (Mar.) ; Mullu mutala (Kan.) ; Pongero (Konk.) ; Pomguero (Port.). NAGARHAVELI : Velugaon.

This species is mostly observed in the open deciduous forests, rather sparsely. It is, however, normally grown as a support for pepper plantations. Bark and leaves are said to be medicinal.

FLEMINGIA Roxb. ex W. T. Aiton (1812) *nom. cons.*

After cosidering the various names that are involved in one way or the other in the correct nomenclature of this taxon, namely, *Flemingia* Roxb. ex Rottler (1803) and *Lourea* ("Luorea" original spelling) Necker ex J. St. Hillaire (1812), *Lourea* Necker ex Desv. (Feb. 1813) [both applied to a genus non properly called *Christia* Moench. (1802)], *Maughania* J. St.- Hil. (Jan. 1813) and *Moghania* J. St.-Hil. (Feb. 1813), as against *Flemingia* Roxb. ex W.T. Aiton (1812), the nomenclatural committee (I.A.P.T.) had finally decided (Taxon 21 : 532. 1972) to conserve the name *Flemingia* as noted above. The reasons given are the confusion between the two Loureas and the two *Maughania-Moghania* and the preoccupation of *Flemingia* Roxb. ex Rottler (1803) by *Thunbergia* Retz of the Acanthaceae. Further, in decid-

ing between *Flemingia* and "*Maughania, (Moghania)*", the Committee considered not only the possibility of confusion if *Maughania* were taken up, but the need for its conservation and the consequent necessity of using it for some years along with "*Moghania*". As such *Flemingia* is conserved as there is little likelihood of confusion with *Flemingia* of other families, none of which have had much use except in synonymy.

1. Erect shrubs or undershrubs
   2. Leaves simple ; bracts large, concealing the flowers, persistent *strobilifera*
   2. Leaves trifoliate ; bracts shorter than flowers, silky hairy outside, deciduous ; corolla purple *macrophylla*
1. Trailing herbs with tuberous roots
   3. Inflorescence capitate, terminal *nilgheriensis*
   3. Inflorescence lax, axillary *tuberosa*

Flemingia macrophylla (Willd.) Merr. in Philip J. Sci. 5 : 130. 1910. *Crotalaria macrophylla* Willd. Sp. Pl. 3 : 982. 1802 ; *Flemingia congesta* Roxb. [Hort. Beng. 56. 1814 (*nom. nud.*)] Fl. Ind. 3 : 982, 1832 ; FBI 2 : 228, *p.m.* excl car. ; DG. 56 ; C. 1 : 418 ; T. 1 : 420 ; G. 1: 267. *F. congesta* var. *viridis* Prain in Jour. As. Soc. Beng. 66 : 440, 1898 ; C. 1 : 418. *Moghania macrophylla* (Willd.) O. Kuntze, Rev. Gen. Pl. 1 : 199, 1891.

Fl. : November. *Ill.* : Wt. Ic. t. 390.

Vern. : Daudaula (Mar.) ; Damdarlo (Konk.).

Loc. : Goa : *Bardez* : Paliem (Bastora).

Occasional.

The species which is known for its variation in characters particularly in the inflorescence and the nature of hairiness, is now considered as a single polymorphic species including its variety *viridis* (Cooke *l.c.*), distributed along the Western ghats.

F. nilgheriensis Wight, MS in Herb. Kew ex Cooke, Fl. Bombay 1 : 393, 1902. *F. procumbens* Wight, Ic. 3(3) : 9. t. 987. 1845, *non* Roxb. *F. vestita* var. *nilgheriensis* Benth. ex Baker in FBI 2 : 230, 1876 ; DG. *Moghania nilgheriensis* (Benth. ex Baker) Hui Li in Amer. Jour. Bot 31 : 225, 1944.

Fl. : August - October. *Ill.* : Wt. Ic. t. 987 (*non* Roxb.).

Cooke (l.c.) is the first author to restore the specific epithet *nilgheriensis* as corrected by Wight himself on a specimen of his herbarium (Kew), after realising his slip in naming his Icone 987 as *F. procumbens*, as he also knew *F. procumbens* Roxb., figured in his Icone No. 408. This is a distinct species and can never be a variety of *F. vestita* Benth. as identified by Cooke (*l.c.*).

Rare along the ghats. The species collected from Phonda ghat of Ratnagiri district and said to be endemic in Concan (Cooke *l.c.*), may be

considered as distributed further south including Goa based on author's recent collections in Karnataka State and Dalgado's record from Goa.

Flemingia strobilifera R. Br. in Ait. Hort. Kew ed. 2, 4 : 350, 1812 ; FBI 2 : 227 ; DG. 56 ; C. 1 : 416 ; T. 1 : 418 ; G. 1 : 266. *Hedysarum strobiliferum* Linn. Sp. Pl. 764, 1753. *F. bracteata* (Roxb.) Wight Ic. t. 268, 184. 1840 ; C. 1 : 416 ; G. 1 : 266. *Moghania bracteata* (Roxb.) Hui-Lin Li in Am. Jour. Bot. 31 : 227, 1944. *M. strobilifera* (Linn.) St. Hil. ex Jacks. in Ind. Kew 2 : 252, 1894 ; Dangs 318.

Fl. : December April. *Ill.* Wt. Ic. t. 268 ; T. 1 : f. 236.

Vern. : Kumalu (Kan.).

Loc. : Goa : *Satari* : Naneeha Dongar, near Codal ; Nandore forest. *Salcete* : Goodier. *Canacona* : Ordofond Butpal ; Pansola hill ,Ordofond.

Baker (in FBI 2 : 227. 1876) regards *Flemingia bracteata* as a variety of *F. strobilifera* but Prain [in Jour. As. Soc. Bengal, 66(2) : 438, 1897], Gamble (*l.c.*) and others regard both species as distinct. According to them, *F. bracteata* differs from *F. strobilifera* by the pubescent emarginate bracts and long stipules. But van Steenis (Reinw. 5 : 433 34. 1960) clearly indicates that those characters are unreliable, the length of stipules, being highly variable. Further, bracts that are pubescent but not emarginate and vice-versa are seen in different populations of both the taxa and hence considers both representing only one species.

F. tuberosa Dalz. in Kew Journ. Bot. 2 : 34, 1850 ; FBI 2 : 228 ; DG. 56 ; C. 1 : 420 ; T. 1 : 421. *Moghania tuberosa* (Dalz.) O. Kuntze, Rev. Gen. Pl. 1 : 199, 1891.

Fl. : September.

Vern. : Birmolo (Konk.).

Though indicated by Cooke (*l.c.*) as apparently endemic in the forests of Concan, Dalgado's record of the species from Goa and the author's collections from North Kanara of Karnataka extend the distribution of the species further south.

The tubers are said to be edible.

Geissaspis Wt. & Arn.

Bracts orbicular, imbricate, long ciliate ; flowers purplish, enclosed in the bracts	***cristata***
Bracts ovate, mucronate, short ciliate ; flowers yellow, slightly exerted or as long as the bracts	***tenella***

Geissaspis cristata Wt. & Arn. Prodr. 218, 1834 ; FBI 2 : 141 ; C. 1 : 353 ; G. 1 : 229 ; S. 52 ; Dangs 316.

Fl. : September October. *Ill.* : Bedd. Ic. t. 293.

Loc. : GOA : *Bardez* : Baga jungle ; Porvorim village fields. *Satari* : Satrem. *Salcete* : Margao fields near the rest house. *Sanguem* : Molem ; Patrem. *Marmugao* : Rice fields near Santa Cruz village. NAGARHAVELI : Velugaon ; Damanganga river bank ; Saily ; Khanvel. DADRA. DAMAN : Marvor.

A delicate plant found occasionally in moist situations.

Geissaspis tenella Benth. in Flora3 2 : 559, 1849 ; FBI 2 : 141 ; C. 1 : 354 ; G. 1 : 229 ; S. 52.

Fl. : August September. *Fr.* : October - November.

Loc. : Goa ; *Bardez* : Porvorim rocky plateau. *Sanguem* : Rumda near Netreval. *Canacona* : Ordofond Butpal, 6 km point.

Occasional on moist rocky plateau.

GONIOGYNA DC.

Goniogyna hirta (Willd.) Ali in Taxon 16 : 453, 1966. *Hallia hirta* Willd. Sp. Pl. 3(2) : 1169, 1803. *Heylandia latebrosa* DC. Mem. Leg. 201, 1826 ; FBI 2 : 65 ; C. 1 : 310 ; G. 1 : 199 ; S. 48 ; Dangs 315 ; Saur. 111 ; Pav. 85.

Fl. & *Fr.* : August October.

Vern. : Adadiya (Guj.).

Loc. : DIU : Rocky creek in the sea, Nagoa ; Gogale ; Jalandhar.

An occasional, spreading herb on sandy, rocky sea shore ; it also occurs in open grass fields. It strongly resembles *Indigofera cordifolia* in general habit. *Goniogyna* DC. (Jan. 1825) has priority over *Heylandia* DC. (Nov. 1825, Jan. 1826) and hence is to be adopted. In the Floras, the species under discussion is known as *Heylandia latebrosa* (Linn.) DC., based on *Hedysarum latebrosum* Linn. However the identity of *Hedysarum latebrosum* in the Linnaean herbarium (921.15) is obscure but it is evident that it has no relation with the genus *Goniogyna*. Hence the next available epithet is to be chosen. In fact De Candolle did not see the Linnaean specimen when he effected the combination *Heylandia latebrosa*.

INDIGOFERA Linn.

1. Leaves imparipinnate
   2. Flowers in axillary racemes, not in heads
      3. Leaflets 1 - 5
         4. Leaflets 3

5. Plants with sparse appressed brownish pubescence ; pods long or slender
6. Pods stout, narrowly winged or both sides of the sutures, not torulose, 4 - 6 seeded *trifoliata*
6. Pods very slender, very faintly winged at the sides of the sutures, slightly torulose, about 8 seeded *prostrata*
5. Plants with white appressed pubescence ; pods tetragonous *trita*
4. Leaflets 1 - 4 rarely 5 *oblongifolia*
3. Leaflets 5 - 21
7. Leaflets 5 - 13
8. Pods linear or tetragonous
9. Pods linear
10. Seeds 8 - 12 *tinctoria*
10. Seeds 15 - 20 *parviflora*
9. Pods tetragonous
11. Pods deflexed, hirsute, not constricted between the seeds *astragalina*
11. Pods not deflexed, thinly hairy, constricted between the seeds *constricta*
8. Pods quite flat and papery *hochstetteri*
7. Leaflets 13 - 21 *cassioides*
2. Flowers in axillary, sessile or shortly peduncled heads
12. Leaflets 7 - 9 ; pods appressedly silky hairy *linnaei*
12. Leaflets 3, nigro - punctate on the undersurface ; pods more or less angled, the angles winged *glandulosa*
1. Leaves simple
13. Pods 1 - seeded *linifolia*
13. Pods 2 (or more) - seeded
14. Pods 2 - seeded ; leaves ovate, cordate *cordifolia*
14. Pods 4 - 6 seeded ; leaves oblong, not cordate *dalzellii*

Indigofera astragalina DC. Prodr. 2 : 228, 1825 ; Gillett in Kew Bull. 1960 : 290 ; Pav. 78. *I. hirsuta* Baker in FBI 2 : 98 *p. p.*, *non* Linn. ; DG. 46 ; C. 1 : 339 ; G. 1 : 221, all *p. p.*

Fl. : September October. *Fr.* : October December.

Vern. : Runchali gali (Guj.).

Loc. : GOA : *Bardez* : Porvorim village fields. *Ilhas* : Miramar, Panaji. *Salcete* : Gonsua. *Quepem* : Balli area. *Canacona* ; Ordofond Tudal. NAGARHAVELI : Saily ; Chispana ; Velugaon ; Nana Randha ; Umberkoi ; Damanganga bank, near Kawcha.

Common in grasslands, in fields and as forest undergrowth.

There has been considerable confusion over the two taxa *Indigofera hirsuta* Linn. and *I. astragalina* DC., the latter, though predominantly

African, is now recorded from India by Gillett (Kew Bull. 1958 : 110). *I. hirsuta* is widely distributed from Australia to West Indies including Malesia, India and Africa. Though the various workers on African Floras recorded *I. astragalina* as distinct from *I. hirsuta*, Ali [Bot. Notiser 3 (3) : 559, 1958], while working on wide range of material, considers both the species identical as the criteria used to distinguish these two species are not constant and found to be ineffective. Further as no correlation has been observed between variation of characters with the geographical distribution, he treats *I. hirsuta* as a single polymorphic species, including *I. astragalina* as its synonym. But subsequently Gillett (Kew Bull. 1960 : 290) presents a very convincing statistical data gathered from a wide range of material from Australia to Africa, particularly on the characters of peduncle, pod, seeds and leaf and indicates that *I. astragalina* DC. is quite distinct from *I. hirsuta* Linn and in fact it is *I. astragalina* that is more common and widely distributed in India and *I. hirsuta* is recorded in India only from the high rainfall zones of Kerala and Assam States. Baker's description in FBI (*l.c.*) under *I. hirsuta* includes *I. astragalina* also and this error has been followed in all the subsequent Indian Floras. Gillett's opinion, being more appropriate as evident from the author's study of Western Indian collections, is followed in this work.

Indigofera cassioides Rottl. ex DC. Prodr. 2 : 225, 1825 ; Ali in Botan. Notis. 3 (3) : 556, 1958. *I. pulchella* Roxb. Fl. Ind. 3 : 382, 1832 ; FBI 2 : 101 ; DG. 46 ; C. 1 : 341 ; G. 1 : 221.

Fl. & *Fr.* : October January. *Ill.* : Wt. Ic. t. 367 & 368 ; T. 1 : 217.

Vern. : Baroli (Mar.) ; Chimnati (Konk.).

Loc. : GOA : *Sanguem* : Verlem.

This species is common in moist forests along ghat areas.

I. constricta Trim. Cat. Ceyl. Pl. 23, 1885 ; C. 1 : 340 ; G. 1 : 221.

Fl. : October November. *Ill.* : T. 1 : 216.

Loc. : GOA : *Canacona* : Butpal Kanpal, hill top.

Rare. This interesting species, though indicated by Cooke (*l.c.*) as confined to Kanara, and recorded by Gamble for evergreen forests of Kerala and Ceylon, may now be considerd as growing in Goa hill also.

I. cordifolia Heyne ex Roth Nov. Pl. Sp. 357, 1821 ; FBI 2 : 93 ; DG. 45 ; C. 1 : 331 ; G. 1 : 218 ; Dangs 317 ; Saur. 125 ; Pav. 75.

Fl. & *Fr.* : August December.

Vern. : Goddi (Konk.) ; Bhakhs, Dadiys (Guj.).

Loc. : DAMAN : Marvor. DIU : Sea shore, Nagoa ; Castle area ; Gogali.

Occasional. In Goa, generally observed in leafy condition along sandy beds near Panaji.

Indigofera dalzellii Cooke, Fl. Pres. Bomb. 311, 1902. *I triquetra* Dalz. in Hook. Kew Journ. 2 : 36, 1850 ; FBI 2 : 93, (*non* Meyer, 1836).

Fl. & Fr. : July September.

Loc. : GOA : *Bicholim* : Usgao Onda ; Nagoa. *Salcete* : Verna plateau.

Occasional on open, rocky, grassy plateau. The species recorded as common on Panchgani plateau and considered as endemic to Sahyadris (Cooke) may be considered as distributed along the Goa ghats and possibly further south.

I. glandulosa Roth ex Willd. Sp. Pl. 3 : 1227, 1803 ; FBI 2 : 94 ; DG. 45 ; C. 1 : 332 ; G. 1 : 218 ; S. 51 ; Dangs 317 ; Saur. 125.

Fl. & Fr. : August November. *Ill.* : Wt. Ic. t. 330.

Vern. : Bargadan (Mar.) ; Vekharyo (Konk.) ; Vekkarujo (Guj.).

Loc. : NAGARHAVELI : Saily ; Khanvel.

Occasional on grassy areas in open situations. Seeds are used in medicine.

I. hochstetteri Baker in Oliv. Fl. Trop. Afr. 2 : 101, 1811 ; Saur. 126. *I. anabaptista* Steud. ex Baker in FBI 2 : 102, 1876 ; C. 1 : 334.

Fl. & Fr. : May.

Vern. : Bethi - gali (Guj.).

Loc. : DAMAN : Fort area.

Rare, in open areas.

I. linifolia (Linn. f.) Retz. Obs. Bot. 4 : 29, 1786 ; FBI 2 : 92 ; DG. 45 ; C. 1 : 330 ; G. 1 : 218 ; S. 50 ; Dangs 317 ; Saur. 124 ; Pav. 74. *Hedysarum linifolia* Linn. f. Suppl. 331, 1781.

Fl. & Fr. : August October. *Ill.* : Wt. Ic. t. 333.

Vern. : Bhangra (Mar.) ; Torki (Konk.). Jhinkigali (Guj.).

Loc. : NAGARHAVELI : Dudhni Bildhari forest ; Morkhal ; Dhapsa. DADRA. DAMAN : Regunvara ; Bimpur. DIU : Nagoa, Air port area.

Occasional in open fields, sandy places and grasslands.

I. linifolia var. **campbellii** Wt. ex Baker in FBI 2 : 93, 1876 ; C. 1 : 331.

Loc. : NAGARHAVELI : Saily.

Rare.

I. linnaei Ali in Bot. Notis. III : 549 ; 1958 ; Saur. 126 ; Pav. 75. *I. enneaphylla* Linn. Mant. 2 : 272. 1771, Append. 571, 1771. *nomen illegit.*, FBI 2 : 94 ; C. 1 : 322, Dangs 317.

Fl. & Fr. : August October. *Ill.* : Wt. Ic. t. 403.

Vern. : Bhonya gali (Guj.).

Loc. : Diu: Near Rest house, Diu town ; Castle area.

Occasional, on sandy soil and moist fields.

In Australia this species is reported to be causing Birdsville disease in horses ; in India it may apparently be harmless.

Indigofera oblongifolia Forsk. Fl. Aeg. Ar. 137, 1775 ; Saur. 127. *I. paucifolia* Del. Fl. Eg. 251, 1813 ; FBI 2 : 97 ; C. 1 : 334.

Fl. : September October. *Fr.* : October - December. *Ill.* : Wt. Ic. t. 331.

Vern. : Jhil, Khiladi (Guj.).

Loc. : Diu : Castle area.

Occasional on rocky, sandy areas near the sea shore.

I. parviflora Heyne in Wall. Cat. 5457, 1828 ; FBI 2 : 97 ; C. 1 : 338 ; G. 1 : 220.

Fl. : November - December.

Loc. : Goa : *Satari* : Caranzol.

I. prostrata Willd. Sp. Pl. 3 : 1226, 1803 ; G. 1 : 219 ; S. 51 ; *I. trifoliata* Baker in FBI 2 : 96, 1876, *p.p.* ; C. 1 : 335, *p.p.* (*non* Linn.).

Fl. : August October. *Fr.* : October December.

Loc. : Goa : *Satari* : Nagargao, near Valpoi ; Wadicha dongar ; Caranzol ; Nanacha dongar ; Coda. *Bardez* : Porvorim village fields ; Porvorim rocky plateau. *Sanguem* : Molem area ; Alduna, near Netravali ; Dudal Velemol. *Quepem* : Charchorim. *Canacona* : Angidiv.

Common on rocky, gravelly plateau and grassy fields.

I. trifoliata Linn. as treated by Baker in FBI 2 : 26 and Cooke in Fl. Pres. Bomb. 1 : 335, actually include two distinct species, *I. prostrata* Willd. and *I. trifoliata* Linn. Gamble (*l.c*) clarifies this confusion after examining at Kew the earlier collections of these two taxa which are distinct in their habit and nature of pods. *I. prostrata* is a very thin plant with almost filiform, torulose pods and *I. trifoliata* is a much stouter plant with pods that are not torulose. Following such understanding, the material from Goa as well as from southern part of Western India, are to be treated under *I. prostrata*.

I. tinctoria Linn. Sp. Pl. 751, 1753 : FBI 2 : 99 ; DG. 46 ; C. 1 : 339 ; G. 1 : 220 ; S. 131 ; Dangs 317 ; Saur. 131 ; Pav. 77.

Fl. & Fr. : September. *Ill.* : Wt. Ic. t. 365.

Vern. : Nīli (Mar.) ; Nili (Kan.) ; Nili (Konk.) ; Anileira (Port.) ; Gudi, Nil, Gari, Gali (Guj.).

Loc. : Goa : *Satari* : Nandore village ; Pali forests, 8 km north - east of Valpoi. Nagarhaveli : Dhapsa. Diu : Castle area.

Though not distinctly wild, the plant, once widely cultivated for indigo in many parts of India is now found growing as a weed in waste places on sandy soil.

Indigofera trifoliata Linn. Cent. Pl. 2 : 29, 1756 & Amoen. Acad. 4 : 327, 1759 ; FBI 2 : 96, *p.p.* ; C. 1 : 335, *p.p.* ; Saur. 128.

Fl. : August October. *Fr.* : October December. *Ill.* Wt. Ic. t. 314.

Vern. : Ratimethi (Guj.).

Loc. : Diu : Gogale.

Rare, along roadside near the sea shore.

I. trita Linn. f. Suppl. 335, 1781 ; FBI 2 : 96 ; C. 1 : 335 ; Dangs 317 ; Saur. 128 ; Pav. 76.

Fl. : February March. *Ill.* : Wt. Ic. t. 315 & 386.

Vern : Adbau-gali, Vekhario (Guj.).

Loc. : DAMAN : Dabel.

Rare, along the bunds of fields.

The seeds are considered as valuable tonic.

MUCUNA Adans.

Perennial, woody twiner ; pods orbicular, winged on the sutures, single seeded	*monosperma*
Annual twiner ; pods linear, not winged on the sutures, 5 - 6 seeded	*prurita*

Mucuna monosperma DC. Prodr. 2 : 406, 1825 ; FBI 1 : 185 ; DG. 51 ; C. 1 : 388 ; T. 1 : 398 ; G. 1 : 251.

Fl. : November - January. *Ill.* : T. f. 224.

Vern. : Vhadhi Khatkhutli (Konk.) ; Negro bean (Eng.).

The species has been collected along the ghats of Ratnagiri and also North Kanara. Dalgado (*l.c.*) records the species from Goa forests and ghats.

M. prurita Hook. Bot. Misc. 2 : 348, 1830 31 ; G. 1 : 251 ; S. 59. Dangs 318 ; Saur. 160. *M. puriens* Baker in FBI 2 : 187, 1876 ; C. 1 : 389 ; T. 1 : 399 (*non* DC., 1825).

Fl. : August December. *Fr.* : October March.

Vern. : Hasaguni gidda (Kan.) ; Kavancha (Mar.).

Loc. : GOA : *Bicholim* : Tirla. *Salcete* : Near Santa Cruz village. *Sanguem* : Orgoni near Netraveli. *Quepem* : Budsari Goundugarha. NAGARHAVELI : Chispana area ; Sindhoni forest ; Dongerpad Umberkoi.

Common along hedges.

Santapau (Fl. Purandhar 43, 1957) is of the view that the Indian plant *M. prurita* is distinct from *M. pruriens* (Linn.) DC., an American plant. The Indian plants have short adpressed hairs on the undersurface of leaves, a longitudinal midrib on the valves and 2 - 3 nate peduncles.

MUNDULEA (DC.) Benth.

Mundulea sericea (Willd.) A. Cheval in Compt. Rend. 180 ; 1521, 1925. *Cytisus sericeus* Willd. Sp. Pl. 3 : 1121, 1802. *Mundulea suberosa* (DC.) Benth. Pl. Jungh. 248, 1851 - 55 ; FBI 2 : 110 ; DG. 46 ; C. 1 : 343 ; T. 1 : 385 ; G. 1 : 222.

Fl. : August - October. *Ill.* : Wt. Ill. t. 79.

Vern. : Supti (Mar.) ; Menbundeti (Kan.) ; Supi (Konk.).

The species which is common along Belgaum hills and ghats adjoining to Goa, is also recorded by Dalgado (*l.c.*). The seeds are used for poisoning fish.

OUGEINIA Benth.

Ougeinia oojeinensis (Roxb.) Hochreut. in Bull. Soc. Bot. Geneve, 13 & 14 : 51, 1909. *Dalbergia oojeinensis* Roxb. Fl. Ind. 3 : 220. 1832. *Ougeinia dalbergioides* Benth. Pl. Jungh. 216, 1851 - 55 ; FBI 2 : 161 ; C. 1 : 373 ; T. 1 : 390 ; Dangs 318.

Fl. : February - May. *Fr.* : June. *Ill.* : T. f. 221 ; Troup Silv. Ind. Trees t. 103, 1921.

Vern. : Tivas ; Tanasse (Guj.).

Loc. : NAGARHAVELI : Dudoni ; Dolara forest,

Rare.

The timber is next in importance to teak.

PHASEOLUS Linn.

Based on certain specific characters like stipules not prolonged beyond insertion, style without apical appendix and also a few characters of corolla, pod shape, seed etc., a group of taxa which are American in origin and are mostly known in India under cultivation, is now treated under the genus *Phaseolus* Linn. (in contrast to the genus *Vigna* Savi. For details see under *Vigna* Savi). With such understanding, all the wild species including

'Urd' and 'Moong' which are treated under *Phaseolus* in various Floras, are essentially Asiatic in origin and hence treated under the genus *Vigna* Savi, [vide : Verdcourt in Taxon 17 : 172. 1968 ; Kew Bull. 23(3) : 464. 1969 ; 24(3) : 507. 1970 ; T. Ohwi & J. Ohashi in Journ. Jap. Bot. 44(1) : 29. 1969].

A few interesting American species of *Phaseolus* were introduced and cultivated in Goa besides indigenous pulses. Dalgado (52 54) records the following species as introduced and cultivated in Goa. It appears that most of the species are still under cultivation on a very small scale and have spread under cultivation to other adjoining parts in Maharashtra and Karnataka States.

Cult. species :

Phaseolus adnanthus G. F. W. Meyer. Prim. Fl. Esseq. 239, 1818 ; FBI 2 : 200 ; DG. 53.

P. caracalla Linn. Sp. Pl. 725, 1753 ; DG. 53.

Vern. : Caracalla (Port.) ; Snail Plant (Eng.).

This species has been introduced by the Portuguese from Brazil.

P. lunatus Linn. Sp. Pl. 724, 1753 ; FBI 2 : 200 ; DG. 52 ; C. 1 : 402.

Vern. : Lobiya (Mar.) ; French bin (Konk.) ; Feijoes verdes (Port.) ; Lima bean (Eng.).

P. trilobatus (Linn.) Schreb. in Nova Acta Acad. 4 : 132, 1770. *Dolichos trilobatus* Linn. Mant. 1 : 101. 1767. *Vigna trilobatus* Verdcourt in Taxon 17(2) : 172. 1968. *Phaseolus trilobus sensu* Ait. Hort. Kew 3 : 30, 1789 ; FBI 2 : 201 ; DG. 53 ; et *auct. mult.* non *Dolichos trilobus* Linn. : Cooke 1 : 401.

Vern. : Kukni, Jangli math (Mar.) ; Ran math (Konk.).

P. vulgaris Linn. Sp. Pl. 723, 1753 ; FBI 2 : 200 ; DG. 52 ; C.1 : 403.

Vern. : Loba (Mar.) French bean from South America with several cultivated forms.

PONGAMIA Vent. *nom. cons.*

Pongamia pinnata (Linn.) Pierre, Fl. For. Cochinch. sub. t. 385, 1899 ; S. 68, Thoth. in Bull. bot. Surv. India 3 : 418. 1961. *Cytisus pinnatus* Linn. Sp. Pl. 741. 1753. *Pongamia glabra* Vent. Jard. Malm. t. 28, 1803 ; FBI 2 : 240 ; DG. 58 ; C. 1 : 429 ; T. 1 : 432 ; G. 1 : 272 ; Dangs 319 ; Saur. 180 ; Pav. 87.

Fl. : April June. *Fr.* : Throughout the year. *Ill.* : Wt. Ic. t. 59 ; T. f. 243.

Vern. : Karanj (Mar.) ; Kanaga, Longa (Kan.) ; Karamji (Konk.) ; Favas de chapa (Port.).

Loc. : GOA : *Satari* : Codal ; Codal Satrem road, 5 km point. *Salcete* : Margao. *Sanguem* : Verlem ; Kargal Jungle ; Netraveli. *Canacona* : Butpal forest. NAGARHAVELI : Near Nala, Dudeni.

Occasional along streams, sometimes planted along roadsides.

Pongam oil extracted from the seeds is used for skin diseases.

PSEUDARTHRIA Wt. & Arn.

Pseudarthria viscida (Linn.) Wt. & Arn. Prodr. 209, 1834 ; FBI 2 : 154 ; C. 1 : 366. G. 1 : 236. *Hedysarum viscidum* Linn. Sp. Pl. 747, 1753.

Fl. : August September. *Fr.* : October - November. *Ill.* : Wt. Ic. t. 286.

Loc. : GOA : *Bicholim* : Mahim forests, near Bicholim. *Marmugao* : Nuvem hills. *Sanguem* : Netraveli. *Canacona* : Canacona Balli ; Ordo-fond Tudal.

Common along forest edges on hill slopes.

PSORALEA Linn.

Psoralea corylifolia Linn. Sp. Pl. 764, 1753 ; FBI 2 : 103 ; DG. 46 ; C. 1 : 341 ; G. 1 : 222 ; S. 51.

Fl. : August December.

Vern. : Bavchi (Mar.) ; Bavchi (Konk.).

The species which is common along the Western ghats adjoining to Goa, is also recorded by Dalgado (*l.c.*).

The seeds are said to be used in medicine particularly in skin ailments.

PTEROCARPUS Linn.

Pterocarpus marsupium Roxb. Pl. Cor. 2 : 9, t. 116, 1798 & Fl. Ind. 3 : 234, 1832 ; FBI 2 : 239 ; DG. 57 ; C. 1 : 427 ; T. 1 : 431 ; G. 1 : 271 ; Dangs 320 ; Saur. 179. (incl. var. *acuminatus* Prain).

Fl. : May June. *Fr.* : December March. *Ill.* : T. f. 242.

Vern. : Netra, Hond (Kan.) ; Bibla (Mar.) ; Asan (Konk.) ; Kino de Amboina (Port.).

Loc. : GOA : *Bardez* : Porvorim, forests. *Ponda* : Pelernum village. NAGARHAVELI : Saily forest. Dudeni ; Morkhal.

Common in deciduous forest, along the ghat areas. Dalgado records it from Asagao area also.

In view of considerable variation in the shape and apex of leaves, the variety *acuminatus* Prain cannot stand.

The plant yields a resinous gum "kino" of commerce and timber of good quality.

PUERARIA DC.

Pueraria tuberosa (Roxb.) DC. in Mem. Leg. 6 : 97, 1825 & Prodr. 2 : 240, 1825 ; FBI 2 : 197 ; DG. 52 ; C. 1 : 399 ; T. 1 : 405 ; G. 1 : 254 S. 62. *Hedysarum tuberosum* Roxb. ex Willd. Sp. Pl. 3 : 1197, 1802.

Fl. & Fr. : March April. *Ill.* : T. f. 229 ; Wt. Ic. t. 412.

Vern. : Pithana (Mar.) ; Birmolo (Konk.).

Loc. : GOA : *Canacona* : Ordofond.

Not very common. The tubers are sometimes eaten.

RHYNCHOSIA Lour. *nom. cons.*

Leaflets at least 5 cm long and broad ; flowers in close racemes ; corolla purple ; fruits densely hairy	*rothii*
Leaflets less than 5 cm long ; flowers in lax racemes ; corolla yellow or ochre-yellow ; fruits slightly hairy	*minima* var. *laxiflora*

Rhynchosia minima (Linn.) DC. var. **laxiflora** Baker in FBI 2 : 223. 1876 ; C. 1 : 414 ; Saur. 177.

Fl. & Fr. : August October.

Vern. : Dariavel (Guj.).

Loc. : DIU : Jalandhar ; Castle area ; Airport, Nagoa.

Occasional on hedges in sandy soil along the sea shore.

The leaves are sometimes used in medicine.

This plant differs from var. *minima* in the acute leaflets, larger size and sparsely pubescent Nature.

R. rothii Benth. ex Ait. Cat. Pl. Punj. & Sindh 50, 1869 ; Saur. 175 ; Pav. 89. *R. sericea* Span. in Linnaea 15 : 195, 1841 ; FBI 2 : 225, *non* Gill. ex Hook. & Arn. (1833).

Fl. : August October.

Vern : Fagiyo, Makhmali-fagiyo (Guj.).

Loc. : NAGARHAVELI : Saily forest.

Rare as forest undergrowth.

The species is normally cited as *Rhynchosia sericea* Span. in many floras but it is a *nomina illegit*, being a later homonym of *R. sericea* Gill. ex Hook. & Arn. As such *R. rothii* is the correct name as shown by Raizada (Sci. & Cult. 26 : 282-83, 1960.).

SESBANIA SCOP.

Unarmed shrub or small trees ; pods twisted, torulose	*sesban*
Armed shrubs or undershrubs with prickles on the stem ; pods not twisted	*bispinosa*

Sesbania bispinosa (Jacq.) Steud. ex Fawcett & Rendle, Fl. Jam. 4 : 24, 1920 ; S. 52 ; Saur. 140. *Aeschynomene bispinosa* Jacq. Ic. Pl. Rar. 3, t. 564. 1793. *Sesbania aculeata* Pers. : FBI 2 : 114 ; C. 1 : 350 ; G. 1 : 228.

Fl. : September October. *Fr.* : November-December.

Vern. : Ran shevari (Mar.) ; Mulluji nangi (Kan.) ; Ikhad (Guj.).

Loc. : GOA : *Satari* : Choraundem. *Sanguem* : Foot of the hill, Patiem ; Netraveli. NAGARHAVELI : Silvassa ; Khanvel ; Umberkoi ; Nanarandha ; Morkhal- DADRA : Tingra village. DIU : Banxiwara.

Occasional on the hill slopes in Goa and common along the roads in Nagarhaveli.

S. sesban (Linn.) Merr. in Philip. Journ. Sci. Bot. 7 : 235, 1912. *Aeschynomene sesban* Linn. Sp. Pl. 714, 1753. *Sesbania aegyptiaca* Pers. Syn. 2 : 316, 1807 : FBI 2 : 114 : C. 1 : 349 : T. 1 : 387 ; G. 1 : 228.

Fl. : August October. *Fr.* : October December. *Ill.* Wt. Ic. t. 32.

Vern. : Sewari (Mar.) ; Karijinangi (Kan.).

Loc. : GOA : *Ilhas* : Chimbel reservoir area, near Panaji.

Occasional on the hill slopes.

Cult. species :

S. grandiflora (Linn.) Pers. Syn. 2 : 316, 1807 ; FBI 2 : 115 ; DG. 47 ; G. 1. 350 ; T. 1 : 388 ; G. 228.

Fl. & *Fr.* : At various times throughout the year. *Ill.* T. f. 220.

Vern. : Agasto (Konk.) ; Agati (Port.).

The tree is often cultivated in villages particularly in Hindu temples (Dalgado) for showy flowers. The plant is said to be used in Indian medicine.

SMITHIA Ait

1. **Calyx** rigid ; veins close, parallel, simple
   2. Flowers in short simple racemes — *sensitiva*
   2. Flowers 1 or 2 in the axils of leaves which are crowded at the ends of the branches — *conferta*
1. Calyx membranous ; veins distinctly anastomosing
   3. Flowers in globose terminal heads — *pycnantha*
   3. Flowers in racemes
      4. Lower lip of calyx 3 lobed — *bigemina*
      4. Lower lip of calyx entire — *salsuginea*

Smithia bigemina Dalz. in Kew Jour. Bot. 2 : 208, 1851 ; FBI 2 : 149 ; C. 1 : 360 ; G. 1 : 233, S. 59.

Fl. : September January.

Vern. : Berki (Mar.).

Loc. : GOA : *Satari* : Waghori. *Sanguem* : Molem Belgaum road.

S. conferta Sm. in Rees, Cycl. 33 no. 2. 1816 ; C. 1 : 358 ; G. 1 : 232 ; S. 53 ; Dangs 1 ; Saur. 143 ; Pav. 68. *S. geminiflora* Roth in Nov. Pl. Sp. 352, 1821. *S. geminiflora* var. *conferta* Baker in FBI 2 : 149, 1876.

Fl. & Fr. : August November.

Loc. : GOA : *Bicholim* : Usgao Onda ; Bicholim Sangulim, 3 km point. *Satari* : Valpoi ; Caranzol ; Arvolem. *Bardez* : Porvorim. *Salcete* : Verna village plateau. *Marmugao* : Vasco da Gama, plateau of Navy office ; Nuvum. *Sanguem* ; Sanverdem Darbandora ; Balli Quepem. NAGARHAVELI : Saily ; Morkhal ; Dapsa. DADRA. DAMAN : Marwor.

Common, gregarious on the open rocky plateau and in cultivated fields and grasslands.

S. pycnantha Benth. ex Baker in FBI 2 : 150, 1876 ; C. 1 : 360 ; S. 59.

Fl. : October December.

Loc. : GOA : *Sanguem* ; Ravancha dongar ; Verlem.

Very rare and possibly endemic to Western coast of Maharashtra, Goa and the North and South Kanara districts of Karnataka.

S. salsuginea Hance in Journ. Bot. 7 : 164, 1869 ; C. 1 : 362 ; G. 1 : 233 ; S. 55. *S. dichotoma* Dalz. MS. ex Baker in FBI 2 : 150, 1876.

Fl. & Fr. : September - November.

Loc. : GOA : *Bicholim* : Dodamarg area. *Satari* : Codal ; Nanacha dongar, near Codal ; Valpoi ; Gadauli ; Deosali ; Caranzol ; Satrem. *Bardez* : Porvorim rocky plateau. *Ponda* : Curti village. *Sanguem* : Rest house compound, Barazon. *Canacona* ; Butpal ; Ordofond, forest, on way to Tudal ; Angidiv. NAGARHAVELI ; Saily ; Khanvel. DADRA. DAMAN ; Marvor.

Common on moist, rocky, open situations and cultivated fields. This record of the species establishes the continuity of its growth along the Western ghats further south even though considered as rare in Concan (Cooke).

Smithia sensitiva Ait. Hort. Kew 3 : 496. 1789 ; FBI 2 : 148 ; DG. 47 ; C. 1 : 357 ; G. 1 : 232 ; S. 53.

Fl. & Fr. : September November.

Vern. : Kavla, Damapan (Konk.).

Loc. : NAGARHAVELI Sindhori forest.

Grows as a common weed and sometimes cultivated in Goa (Dalgado) as a pot herb.

TEPHROSIA Pers

1. Leaves simple ; pedicels filiform — *strigosa*
1. Leaves compound (sometimes a few casually simple in *T. tinctoria* and *T. coccinea*)
   2. Flowers in elongated racemes
      3. Style bearded throughout
         4. Leaflets 7-13, elliptic oblong — *tinctoria*
         4. Leaflets 5, obovate — *coccinea*
      3. Style not bearded throughout — *purpurea*
   2. Flowers 1 to 2 axillary — *uniflora*

Tephrosia coccinea Wall. Cat. 5633, 1828 ; Wall. Pl. As. Rar. 1 : t. 60, 1830 ; C. 1 : 346 ; S. 56. *T. tinctoria* var. *coccinea* Baker in FBI 2 ; 112 1876.

Fl. : October November. *Fr.* : October December. *Ill.* : Wall. Pl. As. Rar. t. 60.

Loc. : GOA ; *Satari* ; Ambechagol ; Wagora. *Sanguem* : Bavanbunda ; Molem Belgaum road.

Rare, along forest edges.

T. purpurea Pers. Syn. Pl. 2 : 329, 1807 ; FBI2 : 112 ; DG. 46 ; C. 1 : 346 ; T. 1 : 385 ; G. 1 : 226 ; Dangs 1 : Saur. 136.

Fl. : August October. *Fr.* : October December. *Ill.* : T. f. 219.

Vern. : Unhal (Mar.) ; Phanike (Kan.) ; Unhali (Konk.) ; Gallega (Port.). Godakan, Sharpankho (Guj.).

Loc. : GOA : *Illhas* : Chimbel reservoir Brahmapuri temple. NAGARHAVELI : Towards Atola forest ; Damanganga river bank, near Silvassa ; Saily ; Khanvel ; Umberkoi ; Nana Randha ; Morkhal ; Velugaon. DAMAN : Coileque area ; Fort area.

Occasional along dry rocky plateau in Goa. In other places along open areas and river banks.

The plant is used in medicine as a tonic and laxative.

Tephrosia strigosa (Dalz.) Sant. & Mahesh. in Journ. Bomb. nat. Hist. Soc. 54 : 805, 1957 ; Saur. 124 ; Pav. 80. *Macronyx strigosus*. Dalz. in Hook. Kew Journ. Bot. 2 : 35, 1850. *Tephrosia tenuis* Wall. ex. Dalz. & Gibs. Bomb. Fl. 61. 1861 ; FBI 2 : 111 ; C. 1 : 344.

Fl. & Fr. : September October.

Vern. : Jhinko sarapankho (Guj.).

Loc. : Diu : Jalandhar : Airport, Nagoa ; Gogale sea shore.

Occasional, on sandy soil along the sea shore.

T. tinctoria Pers. Syn 2 : 329, 1807 ; FBI 2 : 111 ; C. 1 : 345 ; G. 1 : 225 ; S. 51.

Fl. & Fr. : September - November.

Vern. : Nil, Guli (Mar.).

Loc. : Goa : *Canacona* : Butpal Ordofond ; Ordofond - Tudal.

Rare, along forest edges.

T. uniflora Pers. subsp. **petrosa** (Blatt. & Hallb.) Gillett & Ali in Kew Bull. 1958 ; 114, 1958. *T. pauciflora* Graham ex Baker in FBI 2 : 114, 1876 ; *pro minore parte, non quoad typum* ; C. 1 : 348.

Fl. & Fr. : August - September.

Loc. : Diu : Near Airport, Nagoa ; Rocky creek in the sea.

Occasional in rocky area along sea shore.

This sub species differs from subsp. *uniflora* in the closely appressed indumentum, leaflets mostly 5 and pods that are 3 5 cm long with 5 9 seeds as against the spreading indumentum, 5 - 9 leaflets and pods that are 5 6 cm long with 9 15 seeds as present in subsp. *uniflora*.

Cult. species :

T. candida (Roxb.) DC. Prodr. 2 : 249, 1825 ; FBI 2 : 111 ; C. 1 : 349.

Fl. & Fr. : October - November.

Loc. : Goa : *Canacona* : Poinguinen.

This species of the tropical Himalayas is known in Goa only under cultivation in gardens for its showy flowers.

TERAMNUS Browne

Teramnus labialis (Linn. f.) Spreng. Syst. 3 : 235, 1826 ; FBI 2 : 184 ; DG. 51 ; C. 1 : 387 ; G. 1 : 249 ; S. 58 ; Dangs 2 ; Saur. 159 ; Pav. 86. *Glycine labialis* Linn. f. Suppl. 325, 1781.

Fl. : October November. *Fr.* : November. *Ill.* : Wt. Ic. t. 168.

Vern. : Ran udid (Konk.) ; Veliyovelo, Rinari (Guj.).

Loc. : GOA : *Satari* : Onda ; Ambechagol ; Pale ; Tanem ; Wadicha dongar ; Caranzol. *Bardez* : Betim hill slopes. *Salcete* : Chinchinim. *Ponda* : Ponda Barim, 8 km point. *Sanguem* : Sanguem Dudal ; Nandoria ; near Molem ; Suria ; Valemol ; Patole, Netraveli ; Perichetem ; Cumbari. *Canacona* : Ordofond Butpal ; Kudal village, Butpal : Angidiv. NAGARHAVELI ; Saily Khuntly forest area ; Dolara ; Chispana area ; Dongerpad Umberkoi ; Carconde forest ; Phalandi river bank ; Sindhoni forest ; Dapara ; Dudhni Bildhari forest ; Morkhal.

Common in cleared forest area on rocky slopes, along hedges in cultivated fields and along sea shore. Climbing on *Leea, Calycopteris, Glochidion* etc.

URARIA Desv.

Leaves 5 - 9 foliate, the leaflets linear - oblong ; racemes long, cylindrical	*picta*
Leaves 1 - 3 foliate ; leaflets broadly ovate, acute - mucronate ; racemes in panicles	*rufescens*

Uraria picta (Jacq.) Desv. in Journ. Bot. 1 : 123, t. 5, f. 19, 1813 ; FBI 2 : 155 ; C. 1 : 367 ; Dangs 2 : Saur. 145. *Hedysarum pictum* Jacq. Coll. 2 : 262, 1789.

Fl. : August September.

Vern. : Pilo samervo, Pitoan (Guj.).

Loc. : NAGARHAVELI : Dapara. DAMAN : Airport area.

Rare, along the roadside.

The root, fruit and leaves are medicinal.

U. **rufescens** (DC.) Schindl. in Fedde, Repert. 21 : 14, 1925. *Desmodium rufescens* DC. in Ann. Sci. Nat. 4 : 101, 1825. *Uraria hamosa* Wall. ex Wt. & Arn. Prodr. 222, 1834 ; FBI 2 : 156 ; G. 1 : 237.

Fl. & Fr. : October November. *Ill.* : Wt. Ic. t. 284.

Loc. : GOA : *Satari* : Codal village. *Quepem* : Budsari Goundugarha. NAGARHAVELI : Saily, Chispana area ; Morkhal ; Carconda forest ;Umberkoi Dongarpad forest.

Occasional in the forest undergrowth. This is an interesting record for Western India indicating specific localities. Gamble records this species for Western ghats of South India.

VIGNA Savi

The *Phaseolus Vigna* complex has been under critical study during the last few years and it is indicated that all the American taxa of this complex belong to the genus *Phaseolus* Linn. and all the Asiatic (possibly Afro Asiatic) taxa are referable to the genus *Vigna* Savi (Pisa Nuov. Giorn. 8 : 113. 1824—vide note under *Phaseolus* (Linn.) Ohwi has further suggested the possibility of separating a group of taxa with reticulate pollen grains and keel bearing a horn, as a distinct genus *Azukia* Ohwi (Hutchinson, Gen. Fl. Pl. 1 : 438. 1964) ; but Verdcourt indicates [Taxon 17 (2) : 172. 1968], that such characters are seen in *Vigna* also and sometimes they form typical characters. As such, the genus *Vigna* as interpreted by Savi and elaborated by Verdcourt, is now maintained here. Key is omitted as the species are known under cultivation.

Vigna radiata (Linn.) R. Wilczek, Fl. Congo Belge & Ruanda Urundi 6 : 386. 1954. *Phaseolus radiatus* Linn. Sp. Pl. 725, 1753 ; C. 1 : 403 in part ; S. 62.

Fl. : August November. *Fr.* : September October.

Vern. : Udid (Mar.) ; Uddu (Kan.).

Loc. : GOA : *Satari* : Valpoi. *Salcete* : Margao. *Ponda* : Borim. *Sanguem* : Fields near Gurti village ; Rivona Colomba. *Quepem* : Budsari Goundugarha.

Common in grasslands and along forest edges.

The species mostly known under cultivation as 'Urd' is an important pulse in India. There are several forms with considerable variation, some of them growing in wild condition.

V. vexillata (Linn.) A. Rich. in Sagra, Hist. Cub. 2 (10) : 191. 1845 ; Gooding, Loveless & Proctor in Fl. Barbados 220. 1965 ; FBI 2 : 206 ; DG. 54 ; G. 1 : 251, *Phaseolus vexillatus* Linn. Sp. Pl. 724. 1753. *Vigna capensis* Walp. in Linnaea 13 : 533, 1839 ; C. 1 : 404 ; S. 63.

Fl. : September October. *Fr.* : October November. *Ill.* : Wt. Ic. t. 202.

Vern. : Halunda (Mar.) ; Indian sweet pea (Eng.).

Loc. : GOA : *Bardez* : Porvorim rocky plateau. *Salcete* : Santacruz village area. *Sanguem* : Quepem Sanguem ; Bavaubunda ; Molem Belgaum road ; Bati Sidh ; near Anvaldem ; Molem road. *Canacona* : Ordofond Tudal. NAGARHAVELI : Saily.

Rare, climbing on the hedges and *Zizyphus* bushes.

Cult. species :

V. angularis (Willd.) Ohwi. et Ohashi in Journ. Jap. Bot. 44 (1) : 29, 1969. *V. radiata* (Linn.) Wilczek, forma *aurea* (Roxb.) Ohwi et Ohashi,

Journ. Jap. Bot. 44 (1) : 30, 1969. *Phaseolus aureu* Roxb. [Hort. Beng. 55. 1814] ex Fl. Ind. 3 : 297, 1832 ; Cooke 1 : 403 in part. *Phaseolus mungo* auct., (*non* Linn.) ; FBI 2 : 203, DG. 53 ; C. 1 : 403. *P. radiatus* auct. (*non* Linn.) ; C. 1 : 403.

Vern. : Udid (Mar.) ; Mug (Konk.) ; Grao de pulha (Port.).

The species was very much confused with *Phaseolus radiatus* var. *aureus*. It is cultivated in India and other parts of Asia and is presented by Ohwi & Ohashi (*l.c.*) with as many as 15 forms under cultivation in Japan due to their extreme variation and all of them were once treated as forms of *Phaseolus radiatus* var. *aureus*. The species is seen also as escape from cultivation.

Phaseolus radiatus Linn. complex has been very confusedly interpreted by various authors dealing with tropical pulses. Roxburgh (1832) changed the application of Linnaeus names in several respects interpreting *Phaseolus radiatus* Linn. as black seeded pulse, 'the urd' and *Phaseolus aureus* Roxb. as the golden seeded pulse 'the mung'. With the present understanding as interpreted by Piper (Bull. U.S. Dept. Agr. 119: 17, 1914) and Ohwi & Ohashi (*l.c.*) and others, *Vigna radiata* includes both the cultivated pulses and also the wild forms such as var. *setulosa* etc. Ohwi & Ohashi (*l.c.*) have described from Japan several cultivated and possibly wild forms under *Vigna radiata*.

Vigna unguiculata (Linn.) Walp. Repert. 1 : 779, 1842. *Dolichos unguiculatus* Linn. Sp. Pl. 725, 1753. *Vigna catjang* Walp. var. *sinensis* Prain, Beng. Pl. 389, 1903 ; FBI 3 : 205 ; DG. 54 ; C. 1 : 405. *V. sinensis* (Linn.) Savi ex Hassk. ; S. 61.

Vern. : Chavli (Mar.) ; Virvil (Konk.) ; Feijao Fradinho (Port.).

The species is known only under cultivation in Goa (Satrem, Satari).

ZORNIA Gmel.

Zornia gibbosa Span in Linnaea 15 : 192, 1841. *Z. diphylla auct. plur, non* Pers. (1807) ; FBI 2 : 147 ; DG. 47 ; C. 1 ; 355 ; G. 1 : 229 ; S. 53 ; Dangs 2 ; Saur. 142.

Fl. & Fr. : August September.

Vern. : Landgu (Mar.) ; Samam Pani (Guj).

Loc. : GOA : *Satari* : Pale ; Tanem. *Bardez* : Porvorim. *Ilhas* : Miramar, Panaji. *Sanguem* : Cumbari ; Barazon ; Aldune ; Netraveli. *Canacona* : Angidiv. NAGARHAVELI : Saily ; near nala, Dudeni ; Sindhoni forest. DADRA. DAMAN : Marvor.

Rare, annual on gravelly soil.

This taxon has been described under the name *Zornia diphylla* Pers or *Z. angustifolia* Sm. in the Indian Floras. Mohlenbrook [in *Webbia* 16 (1) ;

112, ff. 44 & 76, (1961)] points out that the plant growing in India is actually *Z. gibbosa* Span and not *Z. diphylla* Pers., the latter being a perennial herb with a limited range of distribution.

Cult. species :

Arachis hypogaea Linn. Sp. Pl. 741. 1753 ; FBI 2 : 161 ; DG. 48 ; C. 1 : 435 ; G. 1 : 230 ; S. 69 ; Dangs 312.

Vern. : Bhui mug (Mar.) ; Mosambi chim biknam (Konk.) ; Mandobi (Port.) ; Mandbi (Guj.).

This species, a native of South America is cultivated for the oil from the seeds. Roasted seeds are eaten. This was introduced into Goa from Mozambique, Africa (Dalgado).

Cajanus cajan (Linn.) Millsp. in Publ. Field Mus. Nat. Hist. Bot. ser, 2 : 53, 1900 ; S. 69. *Cytisus cajan* Linn. Sp. Pl. 739, 1753. *Cajanus indicus* Sprong. Syst. 3 : 248, 1826 ; FBI 2 : 217 ; DG. 55 ; C.-I : 435 ; G. 1 : 261.

Vern. : Tur (Mar. & Konk.) ; Tantaraga (Port.) ; Pigeon Pea (Eng.).

This species possibly of African origin is mostly cultivated for its nutritious edible pulses. The leaves are used as cattle fodder. For cultivation in Goa, it was brought from America (Dalgado).

Cicer arietinum Linn. Sp. Pl. 738, 1753 ; FBI 2 : 176 ; DG. 49 ; C. 1 : 435 ; G. 7 : 246 ; S. 70 ; Dangs 313. *Ill.* : Wt. Ic. t. 20.

Vern. : Harbara (Mar.) ; Chane (Konk.) ; Shana (Guj.) ; Grao de bico (Port.) ; Gram (Eng.).

The species, possibly of Asia minor (middle - east region, is cultivated in different parts of Goa and more particularly in Mapuca area (Dalgado). The seeds form chief food for horses.

Gliricidia sepium (Jacq.) Kunth ex Steud. Nom. Bot. (ed. 2), 1 : 688, 1840 ; Dangs 316. *Robinia sepium* Jacq. Enum. Pl. Carib. 28, 1960.

Fl. : February March. *Fr.* : May. *Ill.* : Blatt & Mill. Some Beaut. Ind. Tr. ed 2, t. 16 & f. 26, 1954. Mostly cultivated and often found as an escape in Daman.

Lablab niger Medic. in Vorles. Churpf. Phy. Ges. 2 : 354, 1787. *Dolichos lablab* Linn. Sp. Pl. 725, 1753 ; FBI 2 : 209 ; DG. 55 ; C. 1 : 406 ; G. 1 : 259 ; S. 66. Saur. 173.

Fl. & Fr. : November.

Vern. : Val papadi (Mar. & Konk.) ; Papdi Valol (Guj.) ; Feijas cutclinho (Port.).

Mostly cultivated in back-yards and as a dry crop in rice fields. Pods used as vegetable. This plant, normally known in the Indian Floras as *Dolichos lablab* is now separated from *Dolichos* Linn. (glabrous style and

stigma with a ring of hairs) and included under *Lablab* Adams. (bearded style with glabrous stigma).

Lathyrus sativus Linn. Sp. Pl. 730, 1753 ; FBI 2 : 179 ; DG. 50 ; C. 1 : 384 ; G. 1 : 246.

Vern. : Lang (Mar.) ; Lamg (Konk.) ; Ervilhaca (Port.) ; Chick Pea (Eng.).

The species of Mediteranian origin, though mostly cultivated in Gujarat, is sometimes grown as a cold season crop. It is said to be brought into Goa from Bengal (Dalgado).

Lens culinaris Medic in Vorles. Churpf. Phy. Ges. 2 : 367, 1787. *Lens esculenta* Moench. Meth. 131, 1794 ; C. 1 : 435 ; G. 1 : 246. *Ervum lens* Linn. ; FBI 1 : 179 ; DG. 50.

Vern. : Masur (Mar. & Konk.) ; Lentilhas (Port.) ; Lentil (Eng.).

The species possibly of Mediteranean origin, is mostly found in cultivation.

Medicago sativa Linn. Sp. Pl. 778, 1753 ; FBI 2 : 90 ; DG. 45 ; C. 1 : 327 ; G. 1 : 215.

Vern. : Vilayti ghas (Mar.) ; Lujen (Konk.) ; Luzerna (Port.).

The species possibly of south west Asia origin, is mostly cultivated for cattle fodder.

Melilotus alba Desr. in Lamk. Encycl. 4 : 63, 1797 ; FBI 2 : 89 ; DG. 44.

Vern. ; Pik (Konk.) ; Trevo de cheiro (Port).

The species mostly of Mediteranian origin, is cultivated in Asgao and other parts of Goa (Dalgado).

Pisum sativum Linn. Sp. Pl. 727, 1753 ; FBI 2 : 181 ; DG. 50 ; C. 1 : 436 ; G. 1 : 246.

Vern. : Vatana (Mar.) ; Vatonem chane (Konk.) ; Matar (Guj.) ; Ervilha (Port.) ; Green Pea (Eng.).

The species possibly introduced from West Asia, is cultivated as a vegetable crop.

Psophocarpus tetragonolobus DC. Prodr. 2 : 403, 1825 ; FBI 2 : 211 ; C. 1 : 435.

Vern. : Dolla val (Guj.). The young pods are cooked and eaten.

Trigonella foenum-graecum Linn. Sp. Pl. 777, 1753 ; FBI 2 : 87 ; DG. 44 ; G. 1 : 215.

Vern : Methi (Mar. & Konk.) ; Feno grego (Port.).

The species, possibly of South Europe and West Asia, is widely cultivated for vegetable and sometimes as medicinal plant. Introduced into Goa from Kashmir and Punjab (Dalgado).

CAESALPINIACEAE

1. Leaves simple, shallowly or deeply lobed
   2. Trees or shrubs without tendrils. Receptacle never dilated at base. Sepals spathaceous, dentate or lobed. Ovarial stipe free or partly so
      3. Flowers bisexual, buds fusiform, crested. Calyx spathaceous. Fertile stamens 1-10, rest staminodes but mostly 9-10 fertile. Style slender ; stigma small. Pod dehiscent — *Bauhinia*
      3. Flowers unisexual ; buds ellipsoid, top rounded. Calyx dentate or lobed. All 10 stamens fertile, staminodes nil. Style thick, almost absent ; stigma large. Pod, indehiscent — *Piliostigma*
   2. Scandent shrub with tendrils. Receptacle dilated at base. Sepals free to the receptacle, never spathaceous, some connate or all free. Ovarial stipe connate with wall of receptacle — *Phanera*
1. Leaves compound
   4. Leaves simply pinnate
      5. Petals present ; calyx tube very short or turinbate
         6. Petals 5 — *Cassia*
         6. Petals 3 — *Tamarindus*
      5. Petals absent ; calyx tube elongate — *Saraca*
   4. Leaves bipinnate
      7. Flowers in elongate spikes ; sepals valvate pods with thickend sutures. — *Wagatea*
      7. Flowers in racemes or panicles ; sepal imbricate ; pods without thickened sutures. — *Caesalpinia*

BAUHINIA Linn.

Leaflets connate for about half their length ; flowers usually in pairs on short peduncles — *tomentosa*

Leaflets connate for two-thirds their length or more ; flowers in 5-12 cm long racemes — *racemosa*

Bauhinia racemosa Lamk. Encycl. 1 : 330, 1783 ; FBI 2 : 276 ; DG. 62 ; C. 1 : 400 ; T. 1 : 463 ; G. 1 : 288 ; S. 73 ; Dangs 2 ; Saur. 197 ; Pav. 91.

Fl. : September November. *Fr.* : November March. *Ill.* : T. f. 262 & 263.

Vern. ; Apta (Mar.) ; Banne (Kan.) ; Dhavo, apto (Konk.) ; Asundro Jenjavo (Guj.).

Loc. ; GOA : *Satari* : Valpoi ; Codal Satrem road, 5 km point. *Canacona* : Amdiga, near Butpal ; Butpal - Ordofond ; Butpal. NAGARHAVELI : Dudhari Bildhare forest. DAMAN : Varacunda.

Common in forests and also roadsides and hedges.

Bauhinia tomentosa Linn. Sp. Pl. 375, 1753 ; FBI 2 : 275 ; DG. 62 ; C. 1 : 459 ; G. 1 : 288.

Fl. : August October. *Fr.* : November January. *Ill.* : Bor & Raizada in Jour. Bomb. nat. Hist. Soc. 42 : 4, 1940.

Vern. : Vana sampaje (Kan.) ; Halduvo apto (Konk.).

Loc. : GOA : *Bicholim* : Usgao.

Often cultivated in gardens ; rarely seen in forests as an escape.

Cult. species :

B. acuminata Linn. Sp. Pl. 375, 1753 ; FBI 2 : 276 ; DG. 62 ; C. 1 : 462 ; G. 1 : 289.

Fl. : June July.

This beautiful shrub with pure white fragrant flowers is often cultivated in gardens.

B. purpurea Linn. Sp. Pl. 375, 1753 ; FBI 2 : 284 ; DG. 63 ; C. 1 : 461 ; T. 1 : 466 ; G. 1 : 288 ; S. 74.

Fl. & Fr. : October November.

Vern. : Deva kanchan (Mar.) ; Tambdo apto (Konk.).

The ornamental tree is grown in gardens for its fragrant flowers.

B. variegata Linn. Sp. Pl. 375, 1753 ; FBI 2 : 276 ; DG. 63 ; C. 1 : 462 ; T. 1 : 466 ; G. 1 : 288.

Fl. : April May.

Vern. : Kanchan (Mar.) ; Kamchan (Konk.).

Commonly grown along roadsides and in the gardens for its beautiful flowers with variegated red and yellow colours.

CAESALPINIA Linn.

1. Pods not armed with prickles
   2. Leaflets 2 to 3 pairs ; flowers in terminal racemes — *crista*
   2. Leaflets 8 to 20 pairs ; flowers in terminal and leaf- opposed racemes
      3. Pod inflated, bristly, 2-seeded — *mimosoides*
      3. Pod ligulate, glabrous, 4-8 seeded — *decapetala*
1. Pods armed with wiry prickles — *bonduc*

Caesalpinia bonduc (Linn.) Roxb. Fl. Ind. 2 : 362, 1832 ; emend Dandy et Exell in Journ. Bot. 76 : 176, 1938. *Guilandina bonduc* Linn. Sp. Pl. ed. 2, 545, 1762. *Caesalpinia bonducella* (Linn.) Fleming in Asiat. Res.

11. 159. 1810 ; FBI 2 : 254 ; DG. 58 ; C. 1 : 437 ; T. 1 : 439 ; *C. crista auct. non.* Linn. : G. 1 ; 271.

Fl. : July October. *Fr.* ; September December. *Ill.* : Gooding *et al*, Fl. Barbados. t. 10, 1965.

Vern. ; Sagargota (Mar.) ; Gazzaja (Kan.) ; Gajri (Konk.) ; Silva de praia (Port.) ; Kachaka, Gajga (Guj.).

Loc. ; Diu ; Banxiwara (Bucharwada) ; Diu road.

Rare, along roadside in hedges (Dalgado).

Caesalpinia crista Linn. Sp. Pl. 380, 1753. *C. nuga* (Linn.) Ait. Hort. Kew ed. 2, 3 : 32, 1811 ; FBI 2 : 255 ; DG. 58 ; C. 1 : 438 ; T. 1 : 440 ; G. 1 : 279 ; *Cuilandina nuga* Linn. Sp. Pl. 546, 1753.

Fl. : January. *Fr.* : October - December. *Ill.* : Wt. Ic. t. 36.

Vern. ; Vakeri (Konk.) ; Grao de veado (Port.).

Loc. : Goa : *Pernem* : Conad ; Terekhol, *Bicholim* ; Pilegao ; Tirla ; *Canacona* : Maxem.

Occasional, along backwaters.

C. decapetala (Roth) Alston in Trimen, Handb. Fl. Ceyl. 6: 89, 1931. *Reichardia decapetala* Roth, Nov. Pl. Sp. 212, 1821. *Caesalpinia sepiaria* Roxb. [Hort. Beng. 32, 1814 (*nom. nud.*) &] Fl. Ind. 2 : 360, 1832 ; FBI 2 : 256 ; DG. 59 ; C. 1 : 439 ; T. 1 : 440 ; G. 1 : 279.

Fl. : February May. *Ill.* ; Wt. Ic. t. 37 ; T. f. 248.

Vern. : Chilhar (Mar.) ; Hotsige (Konk.).

The name *Caesalpinia sepiaria*, commonly used in Indian Floras has to be replaced by an earlier specific epithet, *decapetala* according to rules (Santapau & Wagh in Bull. Bot. Surv. Ind. 5 : 105, 1963).

C. mimosoides Lamk. Encycl. Method. 1 : 462, 1785 ; FBI 2 : 256 ; DG. 59 ; C. 1 : 439 ; T. 1 : 442 ; G. 1 : 279.

Vern. : Kenchigi-balli (Kan.) ; Lajri (Konk.) ; Herva mimosa (Port.)

Loc. : Goa : *Canacona* : Kanpal hill top ; Tudal hill.

Rare, on open hills.

Cult. species :

C. pulcherrima (Linn.) Sw. Obs. 166, 1791 ; FBI 2 : 255 ; DG. 59 ; C. 1 : 440 ; G. 1 : 279 ; *Poinciana pulcherrima* Linn. Sp. Pl. 380, 1753.

Fl. : More or less throughout the year.

Vern. : Florde pavao pequena (Port.) ; Small gold Mohar (Eng.).

The tree, possibly of American origin, is mostly grown in the gardens and along road sides.

C. sappan Linn. Sp. Pl. 381. 1753 ; FBI 2 : 255 ; DG. 59 ; C. 1 : 438 ; T. 1 : 443 ; G. 1 : 279.

Fl. : September-October. *Ill.* ; Bedd. For. Man. in Flor. Sylv. t. 13, f. 1.

Vern. : Pau de Sapan (Port.).

Often cultivated in gardens. Introduced to Goa in earlier days possibly for the red dye used for colouring silk.

CASSIA Linn.

1. Pods 30-60 cms long, terete	*fistula*
1. Pods less than 30 cms long, more or less flattened	
2. Fertile stamens 7 ; the others reduced to staminodes	
3. Glands of the leaf rachis absent	
4. Pod not above 6 cm long	*italica*
4. Pod 8 cm to 16 cm long	*timoriensis*
3. Glands of the leaf rachis present	
5. Leaf rachis with a single gland on the petiole, none between the leaflets	
6. Leaflets 3 to 5 pairs, more than 1 cm broad ; flowers up to 2 cm across ; pods compressed	*occidentalis*
6. Leaflets 5 to 10 pairs, up to 1 cm broad ; flowers about 3.8 cm across ; pods somewhat turgid	*sophora*
5. Leaf rachis with a gland between one or more pairs of leaflets	
7. Leaflets 3 pairs	
8. Gland between each of the 2 lowest pairs of leaflets ; plants fetid	*tora*
8. Gland between the lowest pair of leaflets only ; plants not fetid	*obtusifolia*
7. Leaflets 8-12 pairs	*auriculata*
2. Fertile stamens of 5 or 10 ; staminodes 0	
9. Fertile stamens 5	
10. Leaflets 2 pairs	*absus*
10. Leaflets 10 - 20 pairs	*pumila*
9. Fertile stamens 10	
11. Shrubs or small trees ; leaflets 4-6 pairs	*surattensis*
11. Under shrubs ; leaflets 40-60 pairs	*mimosoides*

Cassia absus Linn. Sp. Pl. 376, 1753 ; FBI 2 : 265 ; C. 1 : 451 ; G. 1 : 285 ; S. 72 ; Dangs 3 ; Saur. 192 ; Pav. 91.

Fl. & Fr. : August November.

Vern. : Kankuti (Mar.) ; Chimad (Guj.).

Loc. : GOA : *Satari* : Onda ; Tanem ; Golauli-Ambechogol. *Bardez* : Porvorim village fields. *Illhas* : Chimbel reservoir area. *Salcete* : Near

Cavollosim. *Sanguem* : Darguina ; Patrem ; Barazan ; Dudal. NAGARHAVELI : Saily ; Chispana area. DAMAN : Fort area.

Common on the hill slopes, in open situations, in the fields and wastelands.

Cassia auriculata Linn. Sp. Pl. 379, 1753 ; FBI 2 : 263 ; DG. 60 ; C. 1 : 448 ; T. 1 : 450 ; G. 1 : 284.

Fl. : January July. *Ill.* : T. f. 254, Trim. Fl. Ceyl. t. 33.

Vern. : Aval (Mar.) ; Tangadi-gidda (Kan.) : Avul (Konk).

The species which is rather fairly common along the Western India, is said to be introduced to Goa from Deccan (Dalgado).

C. fistula Linn. Sp. Pl. 377, 1753 ; FBI 2 : 261 ; DG. 60 ; C. 1 : 444 : T. 1 : 448 ; G. 1 : 283 ; S. 71 ; Saur. 187 ; Pav. 93.

Fl. April May. *Ill.* : Wt. Ic. t. 269. (under *C. rhombifolia* Roxb.) ; T. f. 253.

Vern. : Bohava, Boya (Mar.) ; Kakkai (Kan.) ; Balo (Konk.) : Cassia fistula (Port.) ; Girmala (Guj.).

Loc. : GOA : *Sanguem* : Patrem. NAGARHAVELI : Saily forest ; Berpam forest ; Bank of Damanganga river, on way to Kawcha ; Umberkoi-Dongarpada forest.

Occasional, in the deciduous forest. The tree flowers after complete leaf fall. Frequently cultivated in gardens for its attractive floral bunches.

C. italica (Mill.) Lamk. ex F. W. Andrews, Fl. Pl. Anglo-Egypt Sud. 2 : 117, 1952 ; Saur. 191. *Senna italica* Mill. Gard. Dict. ed. 8, no. 2, 1768. *Cassia obovata* Collad Hist. Cass. 92, t. 15A, 1816 ; FBI 2 : 264. *C. obtusa* Roxb. : C. 1 : 421.

Fl. & Fr. ; September.

Vern. : Bhony-Aval, Mindiawal (Guj.).

Loc. : DIU ; Castle area.

Rare, on sandy soil. The whole plant is used as a substitute for Senna.

C. mimosoides Linn. Sp. Pl. 379, 1753 ; FBI 2 ; 266 ; C. 1 : 453 ; G. 1 : 285 ; S. 72.

Fl. : August-October. *Fr.* : October December.

Loc. : GOA : *Bicholim* : 5 miles beyond Dodamarg. *Satari* : Caranzol. *Bardez* : Porvorim ; Bastara ; Porvorim village fields. *Salcete* : Navelim hills. *Sanguem* : Molem rest house compound ; Alduna (Netraveli) ; Rumda (Netraveli) ; Cumbari. *Canacona* : Ordofond. NAGARHAVELI : Dongarpad-Umberkoi.

Common on rocky, open plateau and slopes.

C. obtusifolia Linn. Sp. Pl. 377, 1753 ; C. 1 : 447.

Fl. & Fr. : September December.

Loc. : GOA : *Sanguem* : Netraveli ; Patrem ; Cumbari ; Babanbanda (Molem-Belgaum road). NAGARHAVELI : Dudeni : Khanvel ; Bank of Damanganga river on way to Kawcha ; Nana Randha ; Jamunpada fores'

Occasional on the gravelly river beds, sometimes along roadsides andt in wastelands.

This species is often confused with *Cassia tora* Linn. and is even reduced as a synonym under it. It can be distinguished from *C. tora* by a gland between the leaflets in the lowest pair, pedicels (of flowers) 1.2-3.5 cm long and of pods 1.5-4.5 cm long, three larger anticous anthers narrowed like neck of a bottle and linear areoles of seeds hardly 0.3-0.5 cm wide. In *C. tora* a gland occurs between the two lowest pairs of leaflets, pedicels of flowers 5-10 mm long and of pods up to 15 mm long only, three larger anticous anthers are abruptly round at apex and areoles 1.5-2 mm wide, almost as wide as seed.

Cassia occidentalis Linn. Sp. Pl. 377, 1753 ; FBI 2 : 262 ; DG. 60 ; C. 1 : 445 ; G. 1 : 284 ; Dangs 3 ; Saur. 188 ; Pav. 92.

Fl. : Most of the year, particularly in January March. *Ill.* : Tadulingam & Venkatnarayana, Handb. S. Indian Weeds, t. 65, f. 1 7, 1955.

Vern. : Ran-takla, Kasoda (Mar.) ; Kolutagase (Kan.) ; Kasodari (Guj.) ; Fegegosa (Port.).

Loc. : GOA : *Bardez* : Betim road ; Bastara. *Illhas* : Panaji, along the coastal area. *Marmugao* : Marmugao harbour hills ; Gonsua - Cavollisim. 10 km point. DAMAN : Nani Daman. DIU : Gogale village.

Common in wastelands on the hills and sometimes along road sides in Daman and Diu.

C. pumila Lamk. Encycl. 1 : 651, 1785 ; FBI 2 : 266 ; C. 1 : 452 ; G. 1 : 285 ; S. 72 ; Dangs 3 ; Saur. 193 ; Pav. 92.

Fl. & Fr. August October.

Vern. : Sarmal (Mar.) ; Nelatagache (Kan.) ; Chamedujun (Guj.).

Loc. : GOA : *Marmugao* : Novelim. NAGARHAVELI : Morkhal : Silvassa. DAMAN : Dundorta. DIU : Nagoa, near Airport ; Gogale.

Common along sea shore, in grassfields and as forest undergrowth.

C. sophera Linn. Sp. Pl. 379, 1753 ; FBI 2 : 262 ; DG. 60 ; C. 1 : 446 ; G. 1 : 284.

Fl. : September.

Vern. : Jangli takla (Mar.).

Loc. : GOA : *Canacona* : Angidiv.

Rare, in wastelands, fallow fields etc. during the rainy season.

Cassia surattensis Burm. f. var **surattensis** Burm. f., Fl. Ind. 97, 1768 ; Chatterjee in Jour. Bomb. Nat Hist. Soc. 57 : 697, 1960. *C. glauca* Lamk. Encycl. Method. 1 : 647 1785 ; FBI 2 : 265 ; DG. 61 ; C. 1 : 453 ; T. 1 ; 452 ; G. 1 : 282.

Fl. : September - March. *Ill.* : T. f. 256.

Vern. : Motha farvad (Mar.) ; Betta. davare (Kan.) ; Sarpuli (Konk.).

Dalgado records this species from Goa.

The species, commonly known in the Indian Floras under *C. glauca* Lamk. (1785) and *C. arborescens* Vahl (1794) should be correctly called *C. surattensis* Burm. f. (1768), being prior to the other two names (Chatterjee *l.c.*).

C. timoriensis DC. Prodr. 2 : 499, 1825 ; FBI 2 : 265 ; C. 1 : 451 ; T. 1 : 452 ; G. 1 : 285.

Fl. : October November. *Fr.* : November December.

Loc. : GOA : *Sanguem* : Patole (Netraveli) ; Patrem ; Organi (Netraveli). Fairly common along Goa ghats and further south.

C. tora Linn. Sp. Pl. 376, 1753 ; FBI 2 : 263, *p.p.* ; DG. 60 ; C. 1 : 447 ; G. 1 : 284 ; S. 71 ; Dangs 4 ; Saur. 189 ; Pav. 92.

Fl. : August - October. *Fr.* : October November

Vern. : Takla, Tarota (Mar.) ; Chogata (Kan.) ; Kuvadiyo, Pondadio, (Guj.).

Loc. : GOA : *Satari* : Nandore village ; Satrem ; Kutachemal, Ivorem ; Deosali (Caranzol) ; Wadichadonger ; *Bardez* : Betim border ; Baga beach ; Porvorim. *Ilhas.* : Panaji, along the coastal area ; near Merces village. *Sanguem* : Near Anverdam (Molem) ; Molem Bati. *Canacona* ; Amdiga, near Butpal ; Ordofond ; Angidiv. NAGARHAVELI : Suily ; Velugaon ; Umberkoi - Dongarpada forest ; Nana Randha. DAMAN : Fort area. DIU : Jalandhar ; Gogale.

Common in wastelands, along roadside and sea shore.

PHANERA LOUR.

Phanera vahlii (Wt. & Arn.) Benth. Pl. Jungh. 263, 1852 ; S. ed. 3 ; 329. *Bauhinia vahlii* Wt. & Arn. Prodr. 297, 1834 ; FBI 2 : 279 ; DG. 62 ; C. 1 ; 461 ; T. 1 : 465 ; G. 1 : 288 ; S. 73.

Fl. : March - May. *Fr.* : June September.

Vern. : Chimbil (Mar.) ; Chimbeli (Konk.).

The species, though occasional along the forests of Western ghats, grows in Goa forests also rather sparsely (Dalgado).

The taxon with its distinct habit and floral construction, is now considered under a separate genus, *Phanera*, closely allied to *Bauhinia*.

PILIOSTIGMA Hochst. *nom. cons.*

Leaves 7-9-nerved	*malabaricum*
Leaves 15-17-nerved	*foveolata*

Piliostigma foveolata (Dalz.) Thoth. Bull. Bot. Soc. Beng. 19 : 131, 1965. *Bauhinia foveolata* Dalz. in Journ. Linn. Soc. 13 : 188, 1872 ; C. 1 : 460 ; T. 1 : 464 ; S. 73 ; *Bauhinia lawii* Benth.ex Baker in FBI 2 : 277, 1876.

Fl. : November January.

Loc. : NAGARHAVELI : Berpam forest.

Occasional on the slopes.

Prain (1897) after examining specimens of Talbot, remarked that *Bauhinia foveolata* Dalz. & *B. lawii* Baker are conspecific and *B. foveolata* Dalz. (1872) has priority over *B. lawii* Baker (1878). Cooke (*l.c.*) also concurs with this view. Following de Wit (Reinw. 3 : 381 539, 1956), this species (earlier placed in section *Piliostigma*) is now treated as a species under the genus *Piliostigma*.

P. malabaricum (Roxb.) Benth. in Miq. Pl. Jungh. 261, 1852 ; S. ed. 3 : 329. *Bauhinia malabarica* Roxb. [Hort. Beng. 31. 1814 (*nom. nud.*) &] Fl. Ind 321, 1832 ; FBI 2 : 277 ; DG. 62 ; C. 1 : 460 ; T. 1 : 463 ; G. 1 : 288 ; S. 73.

Fl. : October November. *Fr.* : April May.

Vern. : Amli (Mar.) : Shadloo (Kan.) ; Korat (Konk.) ; Moca (Guj.).

Loc. : GOA : *Satari* : Satrem. NAGARHAVELI : Atal forest ; near Khanvel Rest House : Dongarpada Umberkoi.

The species is common along the Western ghat.

The taxon which has been so far treated under *Bauhinia* in different floras, is now transferred to *Piliostigma* based, on distinct floral structure.

SARACA Linn.

Saraca asoca (Roxb.) De Wilde in Blumea 15 : 393, 1968. *Jonesia asoca* Roxb. As. Res. 4 : 355, 1795. *Saraca indica* Linn. Mant. 1 : 98, 1767 ; FBI 2: 271 ; DG. 61 ; C. 1 : 456 ; T. 1 : 457 ; G. 289 ; S. 72.

Fl. : March April. *Fr.* : August September. *Ill.* T. f. 259.

Vern. : Ashoka, Jasundra (Mar.) ; Akshath (Kan.) ; Asok (Konk.) ; Flar do diabo (Port.).

Loc. : GOA : *Satari* : Pashiyen forest near Penaeral village ; Codal-Satrem road, 5 km. *Canacona* : Tudal area ; Nadquem Butpal ; Butpal.

Occasional, growing near streams. Also grown near temples at Mulgao (Dalgado)

TAMARINDUS Linn.

Tamarindus indica Linn. Sp. Pl. 34, 1753 ; FBI 2 : 273 ; DG. 62 ; C. 1 : 457 ; T. 1 : 459 ; G. 1 : 290 ; Dangs 4 ; Saur. 196 ; Pav. 93.

Fl. : May June, sometimes at other times of year also. *Fr.* : August September. *Ill.* T. f. 260, 261.

Vern. : Chinch (Mar.) ; Hunase (Kan.) ; Chinch (Konk.) ; Tamarindo (Port.) ; Ambli (Guj.).

Loc. : GOA : *Canacona* : Angidiv. DIU : Jhoola. Also planted in Daman and Nagarhaveli.

Occasional in forests and also planted along roadsides and back-yards of houses for its useful fruits.

WAGATEA Dalz.

Wagatea spicata Dalz. in Kew Journ. Bot. 3 : 89, 1851 ; FBI 2 : 261 ; DG. 60 ; C. 1 : 443 ; T. 1 : 446 ; G. 1 : 281 ; S. 71.

Fl. : January February. *Fr.* : April May. *Ill.* : Wt. Ic. t. 1095.

Vern. : Wagati (Mar.) ; Hooliganji (Kan.) ; Vagati (Konk.).

Loc. : GOA : *Satari*: Bhatvadi forest, near Nandore village. *Sanguem* : Dargaina ; Orgoni (Netraveli) *Canacona* : Canacona ; Tudal village.

Occasional in forests and common near the villages.

Cult. species :

Delonix regia (Boj.) Raf. Fl. Tell. 2 : 92, 1836 : G. 280 ; S : 71. *Poinciana regia* Boj. ex Bot. Mag. t. 2884, 1829 ; FBI 2 : 260 ; DG. 59 ; C. 1 : 442 ; T. 1 : 444.

Fl. : March - June. *Fr.* : August September. *Ill.* : Blatt. & Mill. Beaut. Ind. Trees, ed. 2, 88, 1954.

Vern. : Gul mohor (Mar.) ; Flor de pavao (Port.) ; Gul mor (Konk.).

The species, a native of Madagascar and Mauritius Island, was introduced into India and Goa and is now grown in the gardens and along road sides as avenue tree.

Gliricidia sepium (Jacq.) Kunth ex Steud. Nom. Bot. (ed. 2), 1 : 688, 1840 ; Dangs. 316. *Robinia sepium* Jacq. Enum. Pl. Carib. 28, 1830.

Fl. : February March. *Fr.* : May. *Ill.* : Blatt. & Mill. Some Beaut. Ind. Tr. ed. 2, t. 16 & f. 26, 1954.

Mostly cultivated and often found wild also as an escape in Daman.

Hardwickia binata Roxb. Cor. Pl. 3 : 6, t. 209, 1811 ; FBI 2 : 270 ; DG. 61 ; C. 1 : 456 ; T. 1 : 456 ; G. 1 : 292.

Fl. : October January. *Fr.* : April May.

Vern. : Anjan (Mar.) ; Jivan (Konk.) ; Kamra (Kan.). *Ill.* : Bedd. Fl. Sylv. t 26 ; T. f. 258.

The species, though not very common in forests of Goa, is grown near Margao (Dalgado).

Peltophorum pterocarpum (DC.) Backer ex K. Heyne, Nutt. Pl. Ned. Ind. (ed. 2) 2 : 755, 1927. *Inga pterocarpa* DC. Prodr. 2 : 447, 1825. *Peltophorum ferrugineum* (Decne) Benth. Fl. Austr. 2 : 279, 1864 ; FBI 2 : 257. *P. inerme* (Roxb.) Naves : S. 70.

Fl. ; March May.

Planted at Margao near Agriculture office (*Salcete*, Goa) and also along road sides and in the parks.

Psophocarpus tetragonolobus DC. Prodr. 2 : 403. 1825 ; FBI. 2 : 211 ; C. 1 : 435.

Vern. : Dolla val (Guj.). The young pods are cooked and eaten.

MIMOSACEAE

1. Stamens 10
   2. Anthers gland-crested
      3. Flowers in globose heads — *Xylia*
      4. Large trees — *Neptunia*
      4. Small herbs or undershrubs
      3. Flowers in elongate spikes
      5. Lianas ; tendrils present — *Entada*
      5. Erect trees or shrubs
      6. Unarmed trees — *Adenanthera*
      6. Prickly shrubs — *Dichrostachays*
   2. Anthers not gland - crested ; prickly herbs or shrubs
      7. Pods straight, with continuous valves, dehiscing through the sutures — *Leucaena*
      7. Pods slightly curved, with segmented valves, with pertaisent indehiscent sutures — *Mimosa*
1. Stamens indefinite
   8. Stamens free — *Acacia*
   8. Stamens monadelphous
      9. Pods thin, ligulate — *Albizia*
      9. Pods circinate — *Pithecellobium*

ACACIA Mill.

In Indian floras the generic name is wrongly attributed to Willdenow. Isely in Rhodora 59 : 118. 1957 points out that the genus was first published by P. Miller in Gard. Dict. ed. 4, 1, 1754 which was followed later by Anderson (1763) and Willdenow (1806).

1. Climbing shrubs armed with prickless	
2. Leaflets 40 - 50 pairs	*pennata*
2. Leaflets 12 -30 pairs	
3. Gland columnar, near the base of the petiole	*columnaris*
3. Gland conical, near the base of the petiole	
4. Pods thick, fleshy, rugose partially indehiscent ; pinnae 4 - 5 pairs	*rugata*
4. Pods thin, brown, smooth, dehiscent ; pinnae 5 - 15 pairs	*torta*
1. Erect shrubs or trees	
5. Stipular spines uniform	
6. Flowers in globose heads	
7. Pods moniliform	*nilotica*
7. Pods cylindric, turgid, not moniliform	*farnesiana*
6. Flowers in spikes	
8. Pods not winged	
9. Leaflets 20 - 40 pairs, glabrous, nerves prominent ; petals 3 times as long as calyx	*chundra*
9. Leaflets 30 - 50 pairs, pubescent, nerves obscure ; petals twice as long as calyx	
10. Bark white ; branchlets white pubescent ; petals narrow ; pods 7.6 - 12.7 cm long ; many - seeded	*polyacantha*
10. Bark brown ; branchlets brown, glabrous ; petals broad ; pod 5.08 - 7.6 cm long ; few seeded	*catechu*
8. Pods winged on the upper suture	*ferruginea*
5. Stipular spines dimorphic	*latronum*

Acacia catechu (Roxb.) Willd. Sp. Pl. 4 : 1079, 1805 ; FBI 2 : 295 ; C. 1 : 476 ; T. 1 : 488 ; G. 1 : 303. *Mimosa catechu* Roxb. Cor. Pl. t. 175, 1802.

Fl. & Fr. : August - October. *Ill.* : Roxb. Cor. Pl. t. 175.

Vern. : Khair ; Khair babhal (Mar., Guj.) ; Kaggali (Kan.).

Loc. : NAGARHAVELI : Carchand forest ; near Khanvel rest house.

Its range of wild growth in Nagarhaveli and surroundings seems to be quite limited. It is however, planted at several places.

The heartwood of the species is used in the preparation of *Katha* or pale catechu which is used in '*Pan*', medicine and industry.

Acacia chundra (Roxb.) Willd. Sp. Pl. 4 : 1078, 1806 ; S. 75. *Mimosa chundra* Roxb. ex Rottl. in Gesel. Naturf. Freund. Berlin, n. s. 4 : 207, 1803. *Acacia sundra* DC. Prodr. 2 : 458, 1825 ; FBI 2 : 295 ; DG. 65 ; G. 1 : 303. *A. catechu* var. *sundra* Prain in Journ. As. Soc. Beng. 5 : 66, 1898 ; C. 1 : 477 ; T. 1 : 488.

Fl. & Fr. : May September. *Ill.* : Roxb. Cor. Pl. t. 225 ; T. f. 277.

Vern. : Lalkhair (Mar.) ; Shemi (Kan.) ; Tambdi khair (Konk.).

Loc. : GOA : *Sanguem* : Barazon ; Netraveli. NAGARHAVELI : Bank of Damanganga river on way to Kawcha : Morkhal.

The species is fairly common along the lower slopes of Western ghats.

This species has been considered as a variety of *A. catechu* by Cooke (*l.c.*). Baker in FBI considers it as a distinct species. This approach has been further confirmed by the study of wide range of material by Raizada (Ind. For. 70 : 437, 1944). The species is mostly confused with *A. catechu* from which it can be distinguished by the glabrous rhachii, calyx and corolla. The spelling of the species in the floras is given as '*sundra*' which is now corrected as '*chundra*' following the original spelling.

A. columnaris Craib in Kew Bull. 1915 ; 410, 1915 ; G. 1 : 304.

Fl. : September.

Loc. : GOA : *Satari* : Kaparde. *Canacona* : Tudal.

Rare, growing near streams. This record extends the distribution of the species further north of Karnataka ghats.

A. farnesiana (Linn.) Willd. Sp. Pl. 4 : 1083, 1806 ; FBI 2 : 292 ; DG. 64 ; C. 1 : 473 ; T. 1 : 479 ; G. 1 : 301. *Mimosa farnesiana* Linn. Sp. Pl. 521, 1753.

Fl. & Fr. : November December. *Ill.* : T. f. 271 ; Wt. Ic. t. 300.

Vern. : Falli (Kan.) ; Kankri (Mar.) ; Kemsar (Konk.) ; Esponjeira (Port.).

Loc. : Goa : *Ilhas* : Panaji, bank of river Mandovi.

Rare, on river banks and also cultivated in gardens.

A. ferruginea DC. Prodr. 2 : 458, 1825 ; FBI 2 : 295 ; DG. 65 ; C. 1 : 477 : T. 1 : 490 ; G. 1 : 303 ; Saur. 209.

Fl. : January-February. *Fr.* : March.

Vern. : Pandhra khair (Mar.) ; Dhar khair (Konk.) ; Khaiger, Kanti (Guj.).

Loc. : NAGARHAVELI : Dolara forest ; Silvassa.

Occasional along Western ghats. It is also included for Goa on the basis of its occurrence in the adjoining region of Savantwadi ghats (Dalgado).

Acacia latronum Willd. Sp. Pl. 4 : 1077. 1806 ; FBI 2 : 296 ; DG. 65; C. 1 ; 478 ; T. 1 486 ; G. 1 : 302.

Fl. : October-March. *Ill.* : Wt. Ic. t. 1157.

Vern. : Tambuti (Mar.) ; Donnumullira (Kan.) ; Bhes (Konk.).

Recorded by Dalgado as common in open dry plateau areas.

A. nilotica (Linn.) Del. Fl. Aegypt. *Ill.* 79, 1813. subsp. *indica* (Benth.) Brenan in Kew Bull. 1957 : 84, 1957. *Mimosa nilotica* Linn. Sp. Pl. 521, 1753. *Acacia arabica* auct. *non* (Lamk.) Willd. *sensu stricto* ; FBI 2 : 293 ; DG. 64 ; C. 1 : 472 ; T. 1 : 480 ; G. 1 : 301 ; S. 75.

Fl. : April-June. *Fr.* : August-October. *Ill.* : T. 1 : f. 272 & 273.

Vern. : Vedi-babul (Mar.) ; Fali (Kan.) ; Babhul (Konk.) ; Gomma da indica (Port.) ; Baval (Guj.).

Loc. : NAGARHAVELI : Dolara. DAMAN : Varacunda. DIU : Banxiwara-(Bucharwada)—Diu road ; Dhapsa.

The species is fairly common along drier regions and also edges of fields and as a good source of Gum-Arabic.

The wide conception of this difficult species as interpreted by A. F. Hill (Bot. Mus. Leafl. Harvard Linn. 8 : 94-100. 1940) under five varieties of *Acacia nilotica* has been further worked out and interpreted by Brenan (*l. c.* 1957) as five appropriate subspecies with entities distinct both morphologically and geographically but yet evidently conspecific. The Indian subspecies is distinct in the shape of the fruit.

A. pennata (Linn.) Willd. Sp. Pl. 4 : 1090. 1806; FBI 2 : 297 ; DG. 66 ; C. 1 : 480 ; T. 1 : 494 ; S. 76 ; Dangs 5 ; Saur. 204. *Mimosa pennata* Linn. Sp. Pl. 1507, 1753 ; (excl. syn.).

Fl. : May-August. *Fr.* : August-October.

Vern. : Babul (Mar.) ; Kadusige (Kan.) ; Sambo, (Konk.) Kerval, Kharvelio-baval (Guj.).

Loc. : GOA ; *Pernem* : Varcanda. *Bicholim* : Nanora. *Bardez* : Betim forests, *Sanguem* : Viliyan forests. *Canacona* : Ordofond-Tudal. NAGARHAVELI : Saily.

Common in open areas on hills.

A. polyacantha Willd. Sp. Pl. 4 : 1079, 1806. *A. suma* (Roxb.) Buch. Ham. ex Voigt, Hort. Suburb Calc. 260, 1845 ; FBI 2 : 294 ; DG. 65 ; C. 1 : 476 ; T. 1 : 487 ; G. 1 : 303 ; S. 75.

Fl. : April-July. *Fr.* : August-October.

Vern. : Kamtya (Mar.) ; Bannimara, mugli (Kan.) ; Khair (Konk.) ; Catechucira (Port.).

Loc. : GOA : *Sanguem* : Near Darbandora. *Quepem* : Churchorim ; near Quepem.

Rare, in waste places.

Acacia rugata (Lam.) Ham. ex Merr. Enum. Philip. Legum. 28, 1910 ; G. 1 : 304. *Mimosa rugata* Lamk. Encycl. 1 : 20, 1783, *Acacia concinna* (Willd.) DC. Prodr. 2 : 464, 1825 ; FBI 2 : 296 ; DG. 65 ; C. 1 : 479 ; T. 1 : 491 ; G. 1 : 304 ; S. 76. *Mimosa concinna* Willd. Sp. Pl. 4 : 1039, 1806.

Fl. & *Fr.* : March-May. *Ill.* : T. f. 278.

Vern. : Shikakai (Mar.) ; Sigekai (Kan.) ; Sikekay (Konk.).

Loc. : Goa : *Satari* : Ivorem Curdo. *Sanguem* : Charaundem.

Common along the ghats (Dalgado).

The fruit is used for washing hair.

A. torta (Roxb.) Craib in Kew Bull. 1915 ; 410, 1915 ; S. 76. *Mimosa torta* Roxb. Fl. Ind. 2 : 566, 1832. *Acacia caesia* Wt. & Arn. Prodr. 278, 1834, *non* Willd. (1806) ; C. 1 : 480 ; T. 1 : 493 : G. 1 : 304. *A. intsia* var. *caesia* Baker in FBI 2 : 297, 1878.

Fl. : April-November. *Fr.* : April January. *Ill.* T. 2 : f. 279.

Vern. : Ghilari (Mar.) : Sandemullu (Kan.)

Loc. : Goa : *Sanguem* : Colem-Caranzol old railway station ; Varlem.

Baker (FBI) treats *Acacia caesia* as a mere variety of *Acacia intsia* Bentham (Trans. Linn. Soc. 30 : 350, 1875) and Brandis (For. Fl. 189, 1874) have united the two species under *A. intsia*. Prain (Jour. As. Soc. Beng. 66 : 510, 1898) & Talbot (For Fl. 1 : 492), however, treat them as two distinct species, indicating that the crowded leaflets, always hairy beneath, is a distinct character to recognise *A. caesia*. But the general judgement based on wide range of material of both the taxa growing in similar habitat and along wide geographical area, indicates a very close identity between the two. As such I have followed the earlier authors and Santapau (JBNHS 50 : 310, 1951) and treated them under one species following Craib's nomenclature.

Adenanthera Linn.

Adenanthera pavonina Linn. Sp. Pl. 384, 1753 ; FBI 2 : 287 ; DG. 64 ; C. 1 : 466 ; T. 1 : 470 ; G. 1 : 296.

Fl. : March - May. *Fr.* : August October. *Ill.* : T. f. 266.

Vern. : Ratan gunj (Mar.) ; Munjuti (Kan.) ; Vhadli gunj (Konk.) ; Mangelim (Port.).

The species is sometimes planted and also rerely found wild (Dalgado).

The wood is sometimes used as a substitute for *Pterocarpus santalinus* (red sandle wood).

ALBIZIA Durazz.

1. Pinnae 2 to 4 pairs
   2. Flower heads panicled ; flowers sessile
      3. Leaflets 10 - 20 pairs ; calyx pubescent, teeth obsolute — *odoratissima*
      3. Leaflets 6 - 10 pairs ; calyx glabrous, teeth distinct — *procera*
   2. Flower heads from the upper leaf axils ; flowers pedicelled — *lebbeck*
1. Pinnae 6 to 20 pairs
   4. Stipules very large ; heads of flowers panicled — *chinensis*
   4. Stipules minute ; heads of flowers not panicled — *amara*

Albizia amara Boivin in Encycl. du xix Siecle 2 : 34, 1838 ; Benth. in Hook. Lond. Journ. Bot. 3 : 90, 1844 ; FBI 2 : 301 ; C. 1 : 483 ; T. 1 : 500 ; G. 1 : 306. *Acacia amara* (Roxb.) Willd. Sp. Pl. 4 : 1074, 1805.

Fl. : April June. *Fr.* : September October. *Ill.* : Roxb. Cor. Pl. t. 122 (under *Mimosa amara* Roxb.).

Vern. : Tugli, Lalai (Mar.).

Loc. : GOA : *Satari* : Pale (Tanem).

A. chinensis (Osb.) Merrill in Amer. Journ. Bot. 3 : 575, 1916 ; S. 77. *Albizia stipulata* Boivin in Encyl. du xix Siecle 2 : 33, 1838 ; FBI 2 : 300 ; DG. 66 ; C. 1 : 483 ; T. 1 : 499 ; G. 1 : 307.

Fl. : April June. *Fr.* : May August. *Ill.* : Worthington, Ceyl. trees, t. 215.

Vern. : Udal, Laeli (Mar.) ; Bagala (Kan.) ; Udul (Konk.).

Loc. : GOA : *Sanguem* : Forest near Colem railway station.

Rare, near the river.

A. lebbeck (Linn.) Benth. in Hook. Lond Journ. Bot. 3 : 87, 1844 ; FBI 2 : 298 ; DG. 66 ; C. 1 : 481 ; T. 1 : 496 ; G. 1 : 306; S. 77 ; Dangs 5 ; Saur. 210. *Mimosa lebbeck* Linn. Sp. Pl. 516, 1753.

Fl. : March - May. *Fr.* ; September. *Ill.* : T. f. 280 - 82.

Vern. : Chichola (Mar.) ; Sirsul (Kan.) ; Siras (Konk.) ; Albizia (Port.) ; Kaloshirish, Kaliosarar (Guj.).

Loc. : GOA : *Canacona* : Angidiv. NAGARHAVELI : Saily forest ; Umberkoi Dongarpada.

Rare, in the deciduous forest, usually in the vicinity of streams.

A odoratissima (Linn. f.) Benth. in Hook. Lond. Journ. Bot. 3 : 88, 1844 ; FBI 2 : 299 ; DG. 66 ; C. 1 : 482 ; T. 1 : 497 ; G. 1 : 306 ; S. 77. *Mimosa odoratissima* Linn. f. Suppl. 437, 1753.

Fl. : April June. *Fr.* : October November. *Ill.* : T. f. 283.

Vern. : Siris (Mar.) ; Bilkumbi (Kan.) ; Favas de Lazaso (Port.) ; Kali Siras (Konk.).

Loc. : GOA : *Satari* : Caranzol hill road. *Bardez* : Near Porvorim. *Sanguem* : Siwai (Surla). *Canacona* : Maxem ghat. NAGARHAVELI : Near Khanvel Rest house.

Frequent, along roadside and in the forest.

Albizia procera (Roxb.) Benth. in Hook. Lond. Journ. Bot. 3 : 89, 1844 ; FBI 2 : 299 ; DG. 66 ; C. 1 : 482 ; T. 1 : 499 ; G. 1 : 306 ; S. 77. *Mimosa procera* Roxb. Pl. Cor. 2 : 12, t. 121, 1798.

Fl. : May June. *Ill.* : Roxb. Pl. Cor. 2 : 12, t. 121.

Vern. : Kinhai (Mar.) ; Kilai (Kan.) ; Kinay (Konk.).

Loc. : NAGARHAVELI : Near Khanvel Rest house ; Morkhal.

Common on ghat (Dalgado).

DICHROSTACHYS (DC.) Wt. & Arn. *nom. cons.*

Dichrostachys cinerea (Linn.) Wt. & Arn. Prodr. 271, 1834 ; FBI 2 : 288 ; DG. 64 ; C. 1 ; 468 ; T. 1 : 473 ; G. 1 : 297. *Mimosa cinerea* Linn. Sp. Pl. 520, 1753.

Fl. : September October. *Fr.* ; November January. *Ill.* : Wt. Ic. t. 357 ; T. f. 269.

Vern. : Sigamkati (Mar.) ; Sigam kamti (Konk.).

Occasional in open dry areas. Also cultivated in gardens (Dalgado).

Entada pursaetha DC. Prodr. 2 : 425, 1825. *Entada scandens* Cooke, Fl. Pres. Bomb. 1 : 465, 1903 (*non* Benth., 1841) ; FBI 2 : 287 ; DG. 63 ; T. 1 : 470 ; G. 1 : 296. *Entada phaseoloides* (Linn.) Merr. in Phill. Journ. Sci. Bot. 9 : 86, 1914 ; S. 74.

Fl. : March May. *Fr.* : May November.

Vern. : Thorligunj (Mar.) ; Munjuti (Kan.) ; Gardul (Konk.) ; Gaiso (Port.).

Loc. : GOA : *Satari* : Nandore forest, near Mahadevi nadi. *Canacona* : Butpal.

Occasional in the forest along streams.

This taxon is known as *Entada scandens* or *E. phaseoloides* in most of the floras. According to Brehan (Kew Bull. 1955 : 164), the Indian plant is *Entada pursaetha* which has a wide distribution along the Western ghats. *E. phaseoloides* does not occur in India.

LEUCAENA Benth.

Leucaena leucocephala (Lamk.) de Wit in Taxon 10 : 53, 1961 ; Saur. 202. *Mimosa leucocephala* Lamk. Encycl. 1 : 12, 1783. *Leucaena glauca* Benth. in Hook. Journ. Bot. 4 : 416, 1842 ; FBI 2 : 290 ; C. 1 : 469 ; T. 1 : 474 ; S. 74.

Fl. : July October.

Vern. : Vilayatibaval (Guj.).

Loc. : DAMAN : Fort area.

Rare.

This plant is said to be injurious to animals, causing fall of hair.

MIMOSA Linn.

Mimosa pudistea Linn. Sp. Pl. 518, 1753 ; FBI 2 : 291 ; DG. 64 ; C. 1 : 470 ; T. 1 : 475 ; G. 1 : 298 ; S. 75.

Fl. & Fr. : September January.

Vern. : Lajalu (Mar.) ; Hadergitte (Kan.).

Loc. : GOA : *Pernem* Tamboxin. *Satari* : Nandore village side ; Pale (Tanem) ; Tanem. *Bardez* : Betim ; Colvale, Coconut plantation area. *Ilhas* : Chimbel reservoir area, near Panaji. *Salcete* : Lake near Chinchinim area ; Borda village near Margao. *Sanguem* : Barazon. *Quepem* : Balli area. *Canacona* : Ordofond.

Common, mostly in shady and moist areas.

NEPTUNIA Lour.

Annual, aquatic	*oleracea*
Perennial, terrestrial	*triquetra*

Neptunia oleracea Lour. Fl. Cochinch. 654, 1790 ; FBI 2 : 285 ; DG. 63 ; C. 1 : 463 ; G. 1 : 295.

Fl. : October December. *Ill.* : Roxb. Cor. Pl. t. 119.

Vern. : Lajri (Konk.).

Commonly found floating in tanks (Dalgado).

N. triquetra Benth in Hook. Journ. Bot. 4 : 355, 1842 ; FBI 2 : 286 ; C. 1 ; 464 ; Saur. 199.

Fl. : August October. *Ill.* Wt. Ic. t. 756.

Vern. : Risamani (Guj.).

Loc. : Dadra.

Rare.

PITHECELLOBIUM Mart. *nom. cons.*

An armed moderately large tree ; seeds with a white edible aril	*dulce*
Unarmed medium sized tree ; seeds not arillate	*bigeminum*

Pithecellobium bigeminum Mart. Fl. v. 20, ii, Biebl 115 *in Obs.*, 1837 ; FBI 2 : 303 ; DG. 67 ; C. 1 : 485 ; T. 1 : 501 ; G. 1 : 308.

Fl. : January February. *Fr.* : May July. *Ill.* ; T. f. 284, 285.

Vern. : Kachlor (Mar.) ; Kan karinje (Kan.) ; Kachlar (Konk.).

Commonly occurs in Concan and North Kanara areas and is also recorded in Goa by Dalgado.

P. dulce (Roxb.) Benth. in Hook. Lond. Journ. Bot. 3 : 199, 1844 ; FBI 2 : 302 ; DG. 67 ; C. 1 : 485 ; T. 1 : 502 ; G. 1 : 308 ; S. 78 ; Dangs 5 ; Saur. 211 ; Pav. 98. *Mimosa dulcis* Roxb. Pl. Cor. 1 : 67, t. 99, 1795.

Fl. : January February. *Fr.* : March May. *Ill.* : Wt. Ic. t. 198.

Vern. Vilaytichinch (Mar.) ; Pirangi chinch (Konk.) ; Vilayati ambli (Guj.).

Loc. : NAGARHAVELI : Dapsa.

The species, a native of Mexico, is normally cultivated as a hedge plant and is also found to run wild.

The aril of the seeds is sweet and edible.

XYLIA Benth.

Xylia xylocarpa Taub. in Bot. Centralbl. 47 : 395, 1891 ; G. 1 : 295. *X. dolabriformis* Benth. in Hook. Journ. Bot. 4 : 417, 1842 ; FBI 2 : 286 ; DG. 63 ; C. 1 ; 465 ; T. 1 : 468.

Fl. : April - May. *Fr.* : November. *Ill.* : T. f. 269.

Vern. : Yerul, Jamba (Mar.) ; Tiruwa, Jambe (Kan.).

Loc. : GOA : *Satari* : Forest near Nandore village. *Bardez* : Bastara. *Sanguem* : Sanguem Barazon mine area ; Mattan donger (Netraveli). *Canacona* : Ordofond Tudal ; Butpal Ordofond.

Common in the open forest area.

ROSACEAE

Erect, unarmed tree ; carpel - 1	*Prunus*
Prickly, usually trailing shrub ; carpels many	*Rubus*

PRUNUS Linn.

Prunus ceylanica (Wight) Miq. Fl. Ind. Bat. 1, 1 : 366, 1855. *Polydontia ceylanica* Wt. Ill. 1 : 203, 1840. *Pygeum acuminatum* Colebr. Trans. Linn. Soc. 12, 360, t. 18, 1818 ; G. 1 : 311. *Pygeum gardneri* Hook. f. in FBI 2 : 321, 1878 ; DG. 68 ; C. 1 : 488 ; T. 1 : 505 ; G. 1 : 311; S. 78.

Fl. : November. *Ill.* : T. f. 286, 287 ; Wt. Ic. t. 993.

Vern. ; Daka (Mar.) ; Sugnigari (Kan.) ; Dakh (Konk.).

Occasionally found in forests (Dalgado).

Kalkman (Blumea 13 : 1 -115, 1965), after the study of wide range of African material, feels that *Pygeum* Gaertn. becomes homogeneous to *Prunus* Linn., as the distinguishing characters between the two genera are not well defined and hence treats *Pygeum* under the genus *Prunus*, subgenus *Laurocerasus*. However, Hutchinson (Genera Fl. plants 1 : 187, 1964), presents all the three, *Prunus*, *Pygeum* and *Laurocerasus* as distinct genera. Kalkman's discussion and opinion, being more appropriate, are followed in this work.

RUBUS Linn.

Leaves simple	*moluccanus*
Leaves 5 - 9 foliate	*lasiocarpus*

Rubus lasiocarpus Sm. in Rees, Cyclop. 30, 1819 ; FBI 2 : 339 ; DG. 68 ; C. 1 : 489 ; T. 1 : 507 ; G. 1 : 313 (under different names).

Fl. : November. *Ill.* : T. f. 288 ; Wt. Ic. t. 232. Bedd. Fl. Sylv. t. 59.

Vern. : Gauriphal (Mar.) ; Framboezeiro do paiz (Port.) ; Country Raspberry (Eng.).

Though mostly cultivated in Mahabaleshwar of Maharashtra State it is found wild as well, rather sparsely in the higher slopes (Dalgado).

In view of considerable confusion in the nomenclature (Gamble *l.c.*), I prefer to keep the old name.

R. moluccanus Linn. Sp. Pl. 1197, 1753 ; FBI 2 : 330 ; DG. 68 ; C. 1 : 489 ; T. 1 : 506 ; G. 1 : 312 (under another name).

Fl. : May. *Ill.* : Wt. Ic. t. 225.

Vern. : Country Raspberry (Eng.).

Rare along ghats (Dalgado), though mostly cultivated in Mahabaleshwar.

In view of unsettled nomenclature for the cultivated forms of this species, I retain the old name for the present.

Cult. species :

Most of the species noted below which were once cultivated in Goa on experimental basis, are not at present quite popular in the gardens of Goa. However, as Dalgado recorded these species, they are briefly noted below.

Fragaria vesca Linn. Sp. Pl. 494, 1753 ; FBI 2 : 344 ; DG. 68 ; C. 1 : 492.

Fr. : March June.

Vern. : Strawberry (Eng.).

Rarely cultivated (Dalgado).

Parinari excelsa Sabine in Trans. Hort. Soc. 5 : 451, 1824 ; FBI 2 : 313 ; DG. 67.

Ill : Fl. West Trop. Africa 1(2) : t. 141, 1958.

Vern. : Matamb (Konk.) ; Matomba (Port.) ; Gray plum tree (Eng.).

The species which yields edible fruits, was introduced by the Portuguese into Goa from Mozambique, Africa (Dalgado). Their growth in Goa, is however, not very encouraging.

Prunus amygdalus Stokes in Bot. Mat. Med. 3 : 101, 1812 ; FBI 2 : 313 ; DG. 67.

Vern. : Amendocira (Port.) ; Amenamcham (Konk.) ; Almond (Eng.).

Introduced from Persia and rarely grown in gardens of Panaji and Santo Estevo and other places (Dalgado).

Rosa sp. : Cultivated in gardens. There are many garden varieties. (Dalgado, p. 68).

Rubus idaeus Linn. Sp. Pl. 492, 1753.

Vern. : Raspberry (Eng.) ; Framboezeiro (Port.).

Introduced from Europe and cultivated in gardens.

CRASSULACEAE

Kalanchoe Adans.

Kalanchoe pinnata (Lamk.) Pers. Syn. 446, 1805. *Cotyledon pinnatum* Lamk. Encycl. 2 : 141, 1786. *Bryophyllum pinnatum* (Lamk.) Oken. Alleg. Naturgesch. 3(3) :1966, 1841 ; G. 1 : 319 ; S. 79. *Bryophyllum calycinum* Salisb. Parad. Lond. t. 3, 1805 & Bot. Mag. t. 1409, 1811 ; FBI 2 : 413 ; DG. 69 ; C. 1 : 494.

Fl. : December January. *Ill* : Bot. Mag. t. 1409 ; Wt. Ill. 1 : t. 25, f. 2.

Vern. : Ghaipat (Mar.) ; Lonnahadakana gida (Kan.) ; Ayapanm (Konk.).

Loc. : Goa : *Sanguem* : Maduka bungla jungle.

The species, a native of tropical Africa is mostly naturalised and is also cultivated in gardens.

DROSERACEAE

Drosera Linn.

Leaves all radical, rosulate, spathulate ; styles 5, undivided	*burmanni*
Leaves cauline, alternate, linear ; styles 3, bifid to the base	*indica*

Drosera burmanni Vahl, Symb. 3 : 50, 1794 ; FBI 2 : 424 ; DG. 69 ; C. 1 ; 499 ; G. 1 ; 320.

Fl. : December-February. *Ill.* ; Wt. Ic. t. 944.

Vern. : Rozella de Burmann (Port.).

Fairly common in south Ratnagiri district and occasional in Goa (Dalgado).

D. indica Linn. Sp. Pl. 282, 1753 ; FBI 2 : 424 ; DG. 69 ; C. 1 ; 499 ; G. 1 : 320 ; S. 79.

Fl. ; August-September. *Ill.* Wt. Ill. t. 20C (excl. style).

Loc. : Goa : *Pernem* : Varcanda. *Bicholim* : Bicholim Sanquilim. *Bardez* : Porvorim rocky plateau. *Salcete* : Verna village. *Sanguem* : New Anvaldem (Molem).

Rare in association with *Murdannia* sp. Dalgado records for Majgao area.

HALORAGACEAE

The correct spelling of the family is as above and not Haloragidaceae.

Myriophyllum Linn.

Myriophyllum intermedium DC. Prodr. 3 : 69, 1828 ; FBI 2 : 433 ; C. 1 : 500 ; G. 1 : 321. *M. indicum* Wt. Ill. t. 102 [except the fruit (*non* Willd.)] ; DG. 70.

Fl. : June-December. *Ill.* : Wt. Ic. t. 1061 ; C.S.I.R. Bot. Mon. no. 3, f. 12.

Vern. : Selo (Konk.).

The species is common, floating or submerged in ponds and lakes.

Dalgado records for Goa *Myriophyllum indicum* Willd. which is rather more common along east coast of India. Such inclusion by Dalgado is possibly due to misidentification or misunderstanding of *M. intermedium* which is commonly found along Western ghats.

RHIZOPHORACEAE

1. Mangrove plants, littorale ; radicle large, protruding while the fruit is on the tree (viviparous)
   2. Flowers axillary in 2 to 3-chotomously branched cymes: bracteoles present
      3. Leaves ovate, elliptic, mucronate; calyx 4-lobed; stamens 8 — *Rhizophora*
      3. Leaves oblong, obtuse ; calyx 5 to 6-lobed ; stamens indefinite — *Kandelia*
   2. Flowers axillary, peduncled, 1 to many flowered ; bracteoles absent — *Bruguiera*
1. Non-mangrove trees, in semievergreen or evergreen forests, inland; radicle minute, not protruded — *Carallia*

BRUGUIERA Lamk

Bruguiera gymnorrhiza (Linn.) Lamk. Ill. t. 379. 1797 & Encycl. 4 : 696, 1798 ; FBI 2 : 437 ; DG. 70 ; C. 1 : 504 ; T. 2 : 8. *Rhizophora gymnorrhiza* Linn. Sp. Pl. 443, 1753. *Bruguiera conjugata* Merr. in Phil. J. Sci. Bot. 9 : 118, 1914 ; G. 1 : 324 ; V. 50.

Fl. : November-January. *Fr.* : March-April. *Ill.* : Wt. Ic. t. 239A.

Vern. : Sanvar (Mar.) ; Impli (Konk.) ; Pau Salado macho (Port.).

Loc. : Goa : *Marmugao* : Sancoleon-Vasco road. *Ponda* : Near Borim bridge. Zueri river, Borim.

Occasional in the shady areas, along the sea-coast and salt marshes.

CARALLIA Roxb. *nom. cons.*

Carallia brachiata (Lour.) Merril in Phil. Journ. Sci. Bot. 15 : 249, 1919 ; S. 80. *Diatoma brachiata* Lour. Fl. Cochinch. 296, 1790. *Carallia integerrima* DC. Prodr. 3 : 33, 1828 ; FBI 2 : 439 ; DG. 70 ; C. 1 : 506 ; G. 1 : 325. *C. lucida* Roxb. [Hort. Beng. 92, 1814 (*nom.nud.*) &] Pl. Cor. 3 : 8. t. 211, 1819 ; T. 2 : 9.

Fl. : October-March. *Fr.* : March-May. *Ill.* ; Wt. Ic. t. 605 ; Wt. Ill. t. 90 ; T. f. 292.

Vern. : Shengali. Punschi (Mar.) ; Andi, Makad-bhirand (Kan.) ; Ponsi (Konk.).

Loc. : *Pernem* : Pallem. *Satari* : Codal : Ambeachagol.

Rare along hilly slopes. Also recorded from Marmugao hills (Cooke 1: 506).

KANDELIA Wt & Arn.

Kandelia candel (Linn.) Druce in Rep. Bot. Exch. Cl. Brit. Isles, 3 ; 420, 1914. *Rhizophora candel* Linn. Sp. Pl. 443, 1753. *Kandelia rheedii* Wt. & Arn. Prodr. 311, 1834 : FBI 2: 437 ; C. 1 : 504 : T. 2 : 5 ; G. 1: 324.

Fl. : June-July. *Fr.* : September-November. *Ill.* : T. f. 290.

Vern. : Kandal (Mar.) ; Kandale (Kan.).

Loc. : GOA : *Bicholim* : Amona ferry crossing, muddy banks of river Goa, Pilegao. *Ponda* : Candola area, Borim, Zueri river. *Canacona* : Ordofond-Sadashivagad, 5 km.

Cammon on muddy, saline area in the shade of other Mangroves.

RHIZOPHORA Linn.

Leaves elliptic, long mucronate; cymes 3 to 7-flowered; flowers pedicelled; peduncles longer than the petiole. Petals villous on the inner faces and margins	*mucronata*
Leaves oblong-lanceolate, shortly mucronate ; cymes 2-flowered, flowers sessile; peduncles shorter than the petiole and stout. Petals glabrous	*conjugata*

Rhizophora conjugata Linn. Sp. Pl. 443, 1753 ; FBI 2 : 436 ; C. 1: 502 ; T. 2 : 4.

Fl. : August-December. *Fr.* : December-February.

Loc. : GOA : *Bicholim* : Amona ferry crossing, muddy banks of river Goa ; Tirla. *Marmugao* : Sancole area, on Vasco road.

Rare, a long marshy areas mixed with other mangroves.

R. mucronata Lamk. Encycl. 6 : 189, 1804 ; FBI 2 : 435 ; DG. 70 ; C. 1 : 501 : T. 2 : 2 ; G. 1 : 323 ; V. 50.

Fl. : August-September. *Fr.* : October-January. *Ill.* : T. f. 289.

Vern. : Kandal, Dumbi (Mar.) ; Kandale (Kan.) ; Komdiam (Konk.); Salgueiro mainto (Port.).

Loc. : GOA : *Bicholim* ; Pilegao. *Ponda* : Near Borim bridge ; Borim, Zueri river. *Canacona* : Maxem.

Very common all along Mangrove swamp.

COMBRETACEAE

1. Climbing or scandent shrubs
   2. Calyx accrescent, persistent ; petals absent ; flowers in dense axillary racemes — *Calycopteris*
   2. Calyx not accrescent, deciduous ; petals 4-5 ; flowers in spikes, often panicled — *Combretum*
1. Erect shrubs or trees
   3. Petals absent (inland)
      4. Flowers in spikes or racemes — *Terminalia*
      4. Flowers in globose heads — *Anogeissus*
   3. Petals 4-5 (littorale) — *Lumnitzera*

ANOGEISSUS Wall.

Anogeissus latifolia (Roxb. ex DC.) Wall. ex Guill. & Perr. Fl. Seneg. Tent. 1 : 208. 1832 ; Bedd. Fl. Sylv. t. 15. 1869 ; FBI 2 : 450 ; C. 1 : 512 ; T. 2 : 22 ; S. 82 ; Saur. 220 ; Scott in Kew Bull. 33 : 560, 1979. *Conocarpus latifolia* Roxb. ex DC. Prodr. 3 : 16, 1828.

Fl. : May - July. *Fr.* : August October. *Ill.* : T. f. 301.

Vern. : Damara, Dhavado (Guj.).

Loc. : NAGARHAVELI : Saily forest ; Dolara forest.

Occasional in open forests. The wood is very hard. Leaves are used in tanning industries and bark reportedly medicinal.

CALYCOPTERIS Lamk.

Calycopteris floribunda (Roxb.) Lamk. Encycl. Meth. Suppl. 2 : 41, 1811 ; FBI 2 : 449 ; DG. 72 ; C. 1 : 512 ; T. 2 : 21 ; G. 1 : 331 ; S. 81 ; Saur. 218. *Getonia floribunda* Roxb. Pl. Cor. 1 : 61, t. 87, 1798.

Fl. : March April. *Fr.* : April May. *Ill.* : T. f. 300.

Vern. : Ukshi (Mar.) ; Bili yadi (Kan.) ; Uski (Konk.) ; Damara, Dhavada (Guj.).

Loc. : GOA : *Pernem* : Tomboxim. *Satari* : Nagrum, near Valpoi, Masarde village, near Valpoi ; Codal. *Bardez* : Betim. *Salcete* : Raiya village. *Marmugao* : Cortalim Margoa, Plateau area. *Sanguem* : Sidh

forest, near Bati village ; Nondrena near Molem. *Canacona* : Ordofond, NAGARHAVELI : Morkhal ; Jamunpada forest ; Carchand forest ; Nana Randha.

Common in the deciduous forest.

COMBRETUM Loefl. *nom. cons.*

Leaves elliptic-lanceolate, acuminate, pubescent on the nerves beneath : main rachis of the panicles and branches pubescent ; fruits 2-2.5 cm long *ovalifolium*

Leaves broadly elliptic to nearly orbicular, glabrous ; rachis glabrous ; fruits 3-3.5 cm long *latifolium*

Combretum latifolium Blume, Bijdr. 641, 1825 (*non* Don, 1827) ; S. 82. *C. extensum* Roxb. [Hort. Beng. 28, 1814, (*nom. nud.*) &] ex Don in Trans. Linn. Soc. Lond. 15 : 414, 1827 ; FBI 2 : 458 ; DG. 72 ; C. 1 : 515 ; T. 2 ; 27 ; G. 1 : 332.

Fl. : January February. *Fr.* : March May. *Ill.* ; Wt. Ic. t. 227.

Vern. : Piluki (Mar.) ; Gamgoli (Konk.) ; Penacho (Port.).

Loc. : GOA ; *Satari* ; Matachirai near Palem, Valpoi area ; Satre river bank, Codal Ambachagol.

Occasional.

C. ovalifolium Roxb. [Hort. Beng. 28, 1814 (*nom. nud.*) &] Fl. Ind. 2 : 226, 1832 ; FBI 2 : 458 ; DG. 72 ; C. 1 : 515 ; T. 2 : 26 ; G. 1 : 332 ; S. 82 ; Dangs. 6 ; Saur. 219 ; Pav. 100.

Fl. : January February. *Fr.* : March May. *Ill.* : T. f. 303.

Vern. : Madbel (Mar.) ; Pirlnk (Konk.) ; Madvel, Dhumasnivel (Guj.).

Loc. : NAGARHAVELI : Silvassa along Damanganga river.

Rare, along river bank inside the forest in Goa area (Dalgado).

LUMNITZERA Willd.

Lumnitzera racemosa Willd. in Ges. Naturf. Fr. Neue. Schr. 4 : 187, 1803 ; FBI 2 : 452 ; DG. 72 ; C. 1 : 514 ; T. 2 : 24 ; G. 1 : 331.

Fl. : March April. *Fr.* : July September. *Ill.* : T. f. 302.

Vern. : Kharo kamdel (Konk.) ; Salgueiro falso (Port.).

Loc. : DAMAN : Cale area.

Rare in the Mangrove swamps. Recorded along the muddy banks of Siolim and Rarim rivers of Goa (Dalgado).

TERMINALIA Linn.

1. Fruits not winged
   2. Leaves alternate, clustered at the ends of the branches ; fruits globose, minutely brown, tomentose — *bellirica*
   2. Leaves opposite, not clustered ; fruit obovoid, faintly angled, glabrous — *chebula*
1. Fruits winged
   3. Fruit with 3 unequal wings — *paniculata*
   3. Fruit 5-winged
      4. Leaves alternate or sub-opposite ; wings of the fruit broad
         5. Underside of leaves, twigs, inflorescence and calyx villous ; panicles dense — *tomentosa*
         5. Underside of leaves, twigs, inflorescence and calyx glabrous or nearly so ; panicles lax — *crenulata*
      4. Leaves sub-opposite, wings of fruits narrow — *arjuna*

Terminalia arjuna (Roxb. ex DC.) Wt. & Arn. Prodr. 314, 1834 ; FBI 2 : 447 ; DG. 72 ; C. 1 : 509 ; T. 2 : 16 ; G. 1 : 329. *Pentaptera arjuna* Roxb. [Hort. Beng. 34, 1814 (*nom. nud.*) &] ex DC. Prodr. 3 : 14, 1828, *cum descript.*

Fl. : April - May. *Ill.* : T. f. 296.

Vern. : Kahu (Mar.) ; Holematti (Kan.) ; Nadiam (Konk.).

Occasional along river banks and edges of forests of Goa (Dalgado).

T. bellirica (Gaertn.) Roxb. pl. Cor. 2 : 54, t. 198, 1805 ; FBI 2 : 445 ; DG. 71 ; C. 1 : 508 ; T. 2 : 13 ; G. 1 : 328 ; S. 80 ; Dangs. 6 ; Saur. 217 ; Pav. 99. *Myrobalanus bellirica* Gaertn. Fruct. 2 : 90, t. 97, 1791.

Fl. : March May. *Fr.* : September November. *Ill.* : Wt. Ill. t. 91 ; Bedd. Fl. Sylv. t. 19 ; T. f. 294.

Vern. : Behada (Mar.) ; Tare (Kan.) ; Goting (Konk.) ; Myrabolanco bellerica (Port.) ; Beheda (Guj.).

Loc. : GOA : *Satari* : Ivorem. *Bardez* : Porvorim ; Open forest, Porvorim Betim. NAGARHAVELI : Betpam forest ; Nana Randha ; Corchond forest.

Common at the edges of deciduous forests.

The specific epithet is wrongly spelt in the floras as "*bellerica* or *belerica*".

The fruits are used in the Indian medicine.

T. chebula Retz. Obs. 5 : 31, 1798 ; FBI 2 : 446 ; DG. 71 ; C. 1 : 509 ; T. 2 : 14 ; G. 1 : 328 ; S. 81.

Fl. : March August. *Fr.* : April August. *Ill.* : T. f. 295.

Vern. : Hirda (Mar.) ; Amale (Kan.) ; Hardi (Konk.) ; Myrobalano (Port.).

Loc. : GOA : *Canacona* : Nadquem forest.

Rare, on the hill slopes.

The tree yields black 'Myrobalan' of commerce used for tanning and in Indian medicine.

Terminalia crenulata Roth, Nov. Pl. Sp. 380, 1821 ; G. 1 : 329 ; S. 81 ; Saur. 216 ; Pav. 99. *T. tomentosa* Wt. & Arn. var. *crenulata* Clarke in FBI 2 : 448, 1878. *T. tomentosa* Cooke in Fl. Pres. Bomb. : 479, 1903 ; T. 2 : 181 (*non* Wt. & Arn. *nisi partim, nec.* Mart.). DG. 72 (*p.p.*).

Fl. : March August. *Fr.* : June August. *Ill.* : T. f. 297.

Vern. : Ain (Mar.) ; Madati (Kan.) ; Sajad, Sadri (Guj.).

Loc. : GOA : *Bicholim* : Usgao ; Curchirem. *Satari* : Sukuo forest, near Maloli ; Wolencha Dongar ; Caranzol. *Ponda* : Bicholim Ponda. *Sanguem* : Molem ; *Canacona* : Choram hill top, Nadquem. NAGARHAVELI : Dolara forest ; Umberkoi Dongarpada forest ; Velugaon ; Jamunpada forest ; Morkhal ; Carchond forest.

Common plant in the deciduous forest.

The three varieties of *Terminalia tomentosa* as treated by C.B. Clarke in FBI though reduced by Cooke (*l.c.*) under *T. tomentosa* only, are now considered as distinct species, *T. tomentosa*, *T. crenulata* and *T. coriacea* following a more detailed analysis of the taxa concerned, as proposed by Wight and Arnott (Prodr. 1834) and Gamble (*l.c.*).

T. paniculata Roth, Nov. Pl. Sp. 383, 1821 ; FBI 2 : 448 ; DG. 72 ; C. 1 : 510 ; T. 2 : 20 ; G. 1 : 329.

Fl. : September November. *Fr.* : December. *Ill.* : T. f. 299.

Vern. : Kindal (Mar.) ; Honal (Kan.) ; Kimdal (Konk.).

Loc. : GOA : *Satari* : Nagram, near Valpoi ; Walancha Donger (Caranzol) ; Ambeacho Gol. ; Ivorem Buzuruco. *Bicholim* : Betim ; Porvorim forest. *Ilhas* : Palernem village. *Salcete* : Goodier, beyond Margoa. *Ponda* : Ponda Margao, 8 km point ; Bicholim Ponda. *Sanguem* : Molem ; Verlem ; Netravali (Mattan Donger). *Quepem* : Budsari Goundugarha. *Canacona* : Nadquem, Quer hills.

Common, along with *Emblica, Clerodendrum, Ziziphus, Breynia* etc.

T. tomentosa Wt. & Arn. Prodr. 314, 1834 ; *T. tomentosa* Wt. & Arn. var. *typica* C.B.Cl. in FBI 2 : 447, 1878. *T. tomentosa* Cooke in Fl. Pres. Bomb. 1 : 479 ; 1903 ; T. 2 : 18 (*non* Wt. & Arn. *nisi partim, nec* Mart.) ; DG. 72 (*p.p.*).

Fl. : May July. *Fr.* : August November. *Ill.* : Wt. Ic. t. 195.

Vern. : Ain (Mar.) ; Asan (Konk.) ; Aini, Matti (Kan.) ; Mareta (Port.).

Loc. : GOA : *Salcete* : Goodier, near Margao. *Sanguem* : Durgin forest ; Matton Dongar (Netravali). *Canacona* : Ordofond Butpal, 6th km.

Common at the edge of forests.

Cult. species :

Terminalia catappa Linn. Mant. 579, 1771 ; FBI 2 : 444 ; DG. 71 ; C. 1 : 511 ; T. 1 : 21 ; G. 1 : 328 ; V. 50.

Fl. & Fr. : November July. *Ill.* : Wt. Ic. t. 172.

Vern. : Deshi badam (Mar.) ; Bengali amenamchem jhad (Konk.) ; Pinha (Port.).

The species, a native of Moluccas is mostly cultivated for edible fruits.

Quisqualis indica Linn. Sp. Pl. ed. 2 : 556, 1763 ; FBI 2 : 459 ; DG. 73 ; C. 1 : 517 ; T. 1 : 27 ; G. 1 : 332 ; S. 82 ; V. 51.

Fl. : March August. *Ill.* : T. f. 304.

Vern. : Lalachameli (Mar.) ; Phirangi chameli (Konk.) ; Rangoon creeper (Eng.) ; Liane (Port.).

The species, a native of Java and Malayan Peninsula is commonly cultivated in gardens.

MYRTACEAE

1. Calyx limb closed in bud, the lobes valvate in flower ; berry many-seeded — *Psidium*
1. Calyx limb 4 to 5 - lobed, the lobes free in flower ; berry one or few seeded
   2. Calyx tube produced beyond the ovary ; flowers in cymes ; stamens bent inwards in bud — *Syzygium*
   2. Calyx tube not produced beyond the ovary ; flowers solitary or in fascicles or in short racemes ; stamens not bent — *Eugenia*

EUGENIA Linn.

Eugenia macrocephala Duthie in FBI 2 : 501, 1879 ; C. 1 : 524 ; T. 2 : 44.

Fl. : March. *Ill.* : T. f. 314.

Loc. : GOA : *Satari* : Panchi, near Nandore. *Kanodia* 96431.

Rare, in the open forest area. The species described by Duthie on the basis of a single collection of Stocks from North Kanara is doubtfully recorded from Ahmednagar by Cooke (525). The present collection extends distribution further north of Mysore State, thus offering the possibility of locating it in Ratnagiri Ghats also.

PSIDIUM Linn.

Psidium guajava Linn. Sp. Pl. 470, 1753 ; FBI 2 : 468 ; DG. 73 ; C. 1 : 529 ; T. 2 : 30 ; G. 1 : 334 ; S. 84 ; Saur. 223 ; Pav. 101.

Fl. : October June. *Fr.* : July September.

Vern. : Peru (Mar.) ; Jamaphala (Kan.) ; Per (Konk.) ; Goaiveira, Pereira (Port.).

Loc. : GOA : *Sanguem* : Avelde jungle, Molem. *Canacona* : Angidiv.

The species, a native of Mexico and introduced into Goa by the Portuguese, is mostly cultivated and is also naturalized in the country.

Several good hybrid forms have been developed for cultivation for their fruits.

SYZYGIUM Gaertn.

1. Flowers large, showy, 4 - merous, cymose, calyx with a thickened staminal disc — *hemispherieum*
1. Flowers small, compact, in cymes ; staminal disc absent
   2. Petals free — *zeylanica*
   2. Petals calyptrate
      3. Cymes terminal or in axils of present leave ; calyx tube shortly turbinate, limb distinct — *caryophyllatum*
      3. Cymes axillary in the axils of fallens leaves ; calyx tube slender and tapering, lib 4 - 5 lobed
         4. Nerves irregular, distant, not forming a distinct intramarginal nerve — *stoksii*
         4. Nerves close, joining in a distinct intramarginal netve
            5. A large tree ; leaves variable, over 2.5 cm broad ; flowers somewhat large ; fruit ellipsoid or globose — *cumini*
            5. A large shrub ; leaves narrow - oblong, under 2.5 cm broad ; flowers smaller ; fruit obovoid crowned with a cuplike calyx limb — *heyneana*

Syzygium caryophyllatum (Linn.) Alston in Trim. Handb. Fl. Ceyl. 6 : 116, 1931 ; S. 83. *Myrtus caryophyllatus* Linn. Sp. Pl. 472, 1753 (*non* Thunb.). *Eugenia corymbosa* Lamk. Encycl. 3 : 199, 1789 ; C. 1 : 522 ; T. 2 : 37. *Syzygium caryophyllaceum* Wt. Ic. t. 540, 1843 ; G. 339 (*non* Gaertn.). *Eugenia caryophyllaea* Wt. Ill. 2 : 15, 1850 ; FBI 2 : 490 ; DG. 74.

Fl. : March May. *Fr.* : July November. *Ill.* : Wt. Ic. t. 540 ; T. f. 309.

Vern. : Rai Javang (Mar.) ; Kunti neer (Kan.) ; Bhedshi (Konk.) ; Grao de gato (Port.).

Loc. : GOA : *Pernem* : Mandrem, near Palem. *Bicholim* : Bicholim. *Satari* : Nandore forest ; Caranzol hills ; Vangiri forest near Nandore ; Masarde village. *Marmugao* : Nuvem hills. *Sanguem* : Molem Avelde jungle ; Colem Caranzol old railway station ; Potiem forest ; Sidh forest, near Bhati village ; Talem, near Patiem forest ; Chorandom ; Wagheri (Tanem) ; Kargal Jungle (Netravali). *Canacona* : Ordofond ; Nadquem forest ; Ordofond forest Tudal ; Jalem, near Nadquem.

Common inside the forest near water streams and along roadsides.

Syzygium cumini (Linn.) Skeels in U.S. Dept. Agric. Bur. Pl. Ind. Bull. 248 ; 2, 1912 ; S. 83 ; Dangs 7 ; Saur. 221 ; Pav. 101. *Myrtus cumini* Linn. Sp. Pl. 471, 1753. *Eugenia jambolana* Lamk. Encycl. 3 : 198, 1789 ; FBI 2 : 499 ; DG. 74 ; C. 1 : 523 ; T. 2 : 41. *Syzygium jambolanum* DC. Prodr. 3 : 259, 1828 ; G. 1 : 340.

Fl. : March-May. *Fr.* : May-August. *Ill.* : T. f. 313.

Vern. : Jaman (Mar.) ; Nerlu (Kan.) ; Jambul (Konk.) ; Jambuleiro (Port.) ; Jambu (Guj.).

Loc. : GOA : *Satari* : Near Nandore nala. *Sanguem* : Matton Dongan (Netravali) ; Kargol jungle (Netravali). *Canacona* : Tudal hill. NAGARHAVELI : Surangai forest. DAMAN : Varacunda.

Common along the streams and sometimes cultivated. Fruits are edible and the seeds are said to be useful in the treatment of Diabetes. Considerable investigation on such medicinal use has been carried out at Central Drug Research Institute, Lucknow during the recent years.

S. hemispbericum (Walp.) Alston in Trim. Hand. Fl. Ceyl. (6 Suppl.), 116, 1931. *Jambosa hemisphericus* Walp. Rep. 2 : 192, 1843 ; C. 1 : 335 ; *Eugenia hemispherica* Wt. Ill. 2 : 14, 1850 ; FBI 2 : 477 ; DG. 74 ; C. 1 : 519 ; T. 2 : 33.

Fl. : March-May. *Ill.* : Wt. Ic. t. 525 ; T. f. 306.

Vern. : Redi jambul (Konk.).

Loc. : GOA : *Satari* : Near Nandore ; along the stream, beyond Nandore ; Satre river bank, Codal-Ambechagol. *Sanguem* : Kiraban forest, towards Patiem.

Frequent near the streams.

S. heyneanum Wall. (Cat. 3599, 1831 ; *nom. nud.*) ex Wt. & Arn. Prodr. 330, 1834 ; G. 1 : 341. *Eugenia heyneana* Duthie in Hook. f. FBI 2 : 500, 1879 ; C. 1 : 524 ; T. 2 : 43.

Fl. : March-April. *Fr.* : May-June. *Ill.* : Ic. t. 539

Vern. : Bedas (Mar.).

Loc. : GOA : *Canacona* : Ordofond, Goktamala. NAGARHAVELI : Chispana area.

Common on river beds, thus establishing the continuity of its distribution along the Western ghats.

Syzygium stocksii (Duthie) Gamble, in Fl. Pres. Madras 3 : 481, 1919. *Eugenia stocksii* Duthie, in Hook. f. FBI 2 : 498 ; DG. 74 ; C. 1 : 522 ; T. 2 : 41.

Vern. : Ran-jambul (Konk.).

The species, though collected by Stocks and Law from Concan, is rather rare ; but Dalgado reports it from the ghats of Goa. It is worth investigating its occurrence in Goa hills.

S. zeylanicum (Linn.) DC. Prodr. 3 : 260. 1828 ; G. 1 : 338. *Myrtus zeylanica* Linn. Sp. Pl. 675. 1753. *Eugenia zeylanica* Wt. Ic. t. 73. 1878 ; FBI 2 : 485 ; DG. 74 ; T. 2 : 35.

Fl. : February-April. *Fr.* : May-July. *Ill.* : Wt. Ic. t. 73 ; T. f. 308.

Vern. : Bhedas, Pitculi (Mar.) ; Nerkal (Kan.) ; Dhavi bhedas (Konk.) ; Fructa caurim (Port.).

Loc. : GOA ; *Sanguem* : Molem, Moduka bungla jungle.

A tree with beautiful white flowers.

Cult. species :

Eucalyptus globulus Labill. Voy. 1 : 153, t. 13, 1799 ; DG. 73.

Vern. : Eucalypto (Port.). *Ill.* : Wealth of India 3 : 212, f. 134.

Mostly cultivated as an introduced species. A few more species have, of late, been introduced by the forest department.

Myrtus communis Linn. Sp. Pl. 471, 1753 ; FBI 2 : 462 ; DG. 73 ; C. 1 : 529.

Vern. : Phirangi methi (Konk.) ; Nurta (Port.).

A native of south Europe, occasionally cultivated in gardens.

Syzygium aromaticum (Linn.) Merr. & L. M. Perry in Mc. Am. Acad. Arts & Sc. 18 : 196, 1939. *Caryophyllus aromaticus* Linn. Sp. Pl. 515, 1753 ; DG. 75.

Vern. : Lavang (Mar.) ; Kalaphul (Konk.) ; Cravo de India (Port.).

The species, a native of Moluccas was once cultivated in Sawantwadint hills (Dalgado). The dried flower buds are used as spices.

S. jambos (Linn.) Alston in Trim. Hand-book Fl. Ceyl. (6 Suppl.), 115, 1937. *Eugenia jambos* Linn. Sp. Pl. 470, 1753 ; FBI 2 : 474 ; DG. 74 ; C. 1 : 526 ; T. 1 : 32, S. 83.

Fl. : January-March. *Fr.* : June-August. *Ill.* : T. f. 305.

Vern. : Gulab-jamb (Mar.) ; Punneerl (Kan.) ; Jamb (Konk.) ; Jambeiro (Port.).

Commonly cultivated for its edible fruits.

Syzygium malaccensis (Linn.) Merrill & Perry in Journ. Arn. Arb. 19 : 215, 1938. *Eugenia malaccensis* Linn. Sp. Pl. 470, 1753 ; FBI 2 : 471 ; DG. 73 ; C. 1 : 526.

Fl. : April-May.

Vern. : Malacca jam (Mar.) ; Neerl (Kan.) ; Malakacho jamb (Konk.) ; Jambeiro de Malaca (Port.).

A native of Malaya often cultiated in gardens.

BARRINGTONIACEAE Rudolphi *nom. cons.*

Calyx tube funnel - shaped or campanulate ; flowers creamy or yellow, lare, crowded at the ends of branches ; fruit globose	*Careya*
Calyx tube scarcely produced above the ovary ; flowers pink in long pendant racemes ; fruit angular	*Barringtonia*

BARRINGTONIA J.R. & G. Forst *nom. cons.*

Leaves large upto 30 cm ; calyx lobes valvate ; fruit ovoid, 5 cm long	*racemosa*
Leaves upto 15 cm ; calyx lobes imbricate ; fruit quadrangular, 2.5 cm long	*acutangula*

Barringtonia acutangula (Linn.) Gaertn. Fruct. 2 : 97, t. 101, 1791 ; FBI 2 : 508 ; DG. 75 ; C. 1 : 528 ; T. 2 : 47 ; G. 1 : 344. *Eugenia acutangula* Linn. Sp. Pl. 471, 1753.

Fl. : April May. *Fr.* : September October. *Ill.* : Bedd. Fl. Sylv. t. 204.

Vern. : Datte Phal (Mar.) ; Hole - Kauva (Kan.) ; Imgli (Konk.) ; Rosario bravo (Port.).

Loc. : Goa ; *Bicholim* : Sanquelim. *Bardez* : Aujuna. *Canacona* : Nadquem forest.

Rare, in swampy places along river and stream banks.

B. racemosa (Linn.) Spreng. Syst. Veg. 3 : 127, 1826 ; FBI 2 : 507 ; DG. 75 ; C. 1 : 527 ; T. 2 : 47 ; G. 1 : 344. *Eugenia racemosa* Linn. Sp. Pl. 471, 1753.

Fl. : April May. *Fr.* : June August. *Ill.* : Wt. Ic. t. 152.

Vern. : Nivar (Mar.) ; Sadphal (Konk.) ; Rosario de jambo (Port.).

The species which is fairly common along river banks and coastal areas, was recorded from Bardez taluk by Dalgado.

CAREYA Roxb.

Careya arborea Roxb. Pl. Cor. 3 : 14, t. 218, 1819 ; FBI 2 : 511 ; DG. 75 ; C. 1 ; 528 ; T. 2 ; 48 ; G. 1 : 345 ; S. 84 ; Dangs. 8.

Fl. : March May. *Fr.* : April August. *Ill.* : T. f. 316.

Vern. : Kuba, Kumbia (Mar.) ; Kaval (Kan.) ; Kombyo (Konk.) ; Pereira brava (Port.) ; Kumbi (Guj.).

Loc. : GOA : *Pernem* : Pernem village. *Satari* : Nagram. *Bardez* : Betim. *Salcete* : Lake near Chinchinim. *Sanguem* : Sidh forests, near Beti ; Kargal jungle (Netravali). *Canacona* : Near Tudal ; Ordofond Thari Jaital. NAGARHAVELI : Dudeni ; Velugaon ; Jamunpada forest.

Common, deciduous tree in the open areas.

MELASTOMATACEAE

1. Trees, glabrous all over ; leaves not ribbed — *Memecylon*
1. Villous herbs or shrubs ; leaves 3 to 5-ribbed from the base
   2. Setose herb ; flowers usually capitate ; calyx covered usually with bulbous based bristles ; stamens equal — *Osbeckia*
   2. strigosely hairy shrub ; flowers large in terminal, paniculate cymes ; calyx curbed with strigose or paleaceous hairs ; stamens unequal — *Melastoma*

MELASTOMA Linn.

Melastoma malabathricum Linn. Sp. Pl. 390, 1753 ; FBI 2 : 523 ; DG. 76 ; C. 1 : 532 ; T. 2 : 50 ; G. 1 : 350.

Fl. : March May. *Fr.* : August - November. *Ill.* : T. f. 317.

Vern. : Palore (Mar.) ; Liakeri (Kan.) ; Nakeri (Konk.) ; Fructo da gralha (Port.).

Loc. : GOA : *Pernem* : Tamboxim. *Satari* : Masarde village ; Maloli forest ; Nandore ; Satre river bank, Codal Ambechagol ; Onda. *Salcete* : Raiya village. *Sanguem* : Moduka bungla jungle ; Talem, towards Patiem ; Choraundem. *Canacona* : Nadquem.

Very common in the forest areas along streams.

MEMECYLON Linn.

1 Leaves petiolate, attenuated at the base ; branches terete
   2. Flowers pedicelled, in umbellate cymes ; fruit black when ripe — *umbellatum*

2. Flowers sessile, in compact heads ; fruit yellow when ripe *talbotianum*
1. Leaves sessile or nearly so, base cordate or rounded ; branches quadrangular or almost winged *wightii*

Memecylon talbotianum Brandis in Talbot Tr. Bomb., ed. 2, (Appendix), 1902 ; C. 1 : 536 ; T. 2 : 54 ; G. 1 : 355 ; S. 86.

Fl. :March April. *Fr.* : June September. *Ill.* : T. f. 320.

Vern. : Anguni (Mar.) ; Bhedas (Konk.).

Loc. : Goa ; *Satari* : Dinarai forest ; Matachi rai near Palle. *Sanguem* : Molem area.

Rare in forest areas along streams. This record in Goa area establishes the continuity in its distribution along the Western ghats.

M. umbellatum Burm. f. Fl. Ind. 87, 1768 ; C. 1 : 535 ; G. 1 : 355 ; S. 86. *M. edule* Roxb. Pl. Cor. 1 : 59, t. 82, 1795.

Fl. : January - March. *Fr.* : April - May. *Ill.* : T. f. 318, 319.

Vern. : Anjan (Mar.) ; Harchari (Kan.).

Loc. : Goa : *Satari* : Satre river bank, Codal-Ambegachagol. *Salcete*. Raiya village.

Fairly common in forest areas.

M. wightii Thw. Enum. 113, 1859 ; FBI 2 : 554 ; C. 1 : 534 ; T. 2 : 55.

Fl. : January March. *Fr.* : April June.

Loc. : Goa : *Sanguem* : Moduka bungla jungle.

Though the species grows quite sparsely, the present record extends its distribution further north along the Western ghats.

Osbeckia Linn.

Osbeckia truncata Don ex Wt. & Arn. Prodr. 322, 1834 ; FBI. 2 : 514 ; DG. 76 ; C. 1 : 530 ; G. 1 : 349 ; S. 85.

Fl. : August November. *Fr.* : November. *Ill.* : Wt. Ic. t. 375.

Vern. : Dhakti nakeri (Konk.) ; Fructa de gralha pequena (Port.).

Loc. : Goa : *Pernem* : Pollem ; Pernem Bicholim. *Bicholim* : 8 km. beyond Dodamarg. *Satari* : Valpoi, Ambechagol ; Wadicha dongar, near Caranzol ; Caranzol ; Pale. *Ilhas* : Chimbel reservoir. *Salcete* : Towards Raiya village. *Ponda* : Near Darbandora. *Sanguem* : Babanbanda, near Molem ; near Anvaldem ; Chansuja ghats, near Netravali ; Alduna, near Netravali. *Quepem* : Budsari Goundugarha. *Canacona* : Ordofond ; Angidiv.

Common in rice fields and wastelands in open situations.

Considering *O. truncata* as *nom. confu.*, Hansen in Ginkgoana 4 : 41, 1977, proposes *O. muralis* Naud. (in Ann. Sci. nat. Bot. er. 3, 4 : 56, 1850) as the next available valid name. The reasons given by Hansen for such proposal are not convincing.

LYTHRACEAE

1.	Herbs (usually in wet places)	
2.	Capsule dehiscing through valves ; the valves minutely, horizontally striate	*Rotala*
2.	Capsules indehiscent ; valves not striate	*Ammannia*
1.	Shrubs or trees	
3.	Flowers irregular ; calyx ; tube curved ; stamens 12 ; leaves black, glandular-dotted on the under surface	*Woodfordia*
3.	Flowers regular, 4-9 merous ; calyx tube not curved ; stamens indefinite ; leaves not gland-dotted on the undersurface	*Lagerstroemia*

AMMANNIA Linn.

Calyx striate with 8 vertical lines	*multiflora*
Calyx not striate with vertical lines	*baccifera*

Ammannia baccifera Linn. Sp. Pl. ed. 2. 175. 1762, FBI. 2 : 569 ; DG. 77 ; C. 1 : 541 ; G. 1 : 360 S. 87.

Fl. & Fr. : August November. *Ill.* : Tadulingam and Venkatanarayana, Handb. S. Indian Weeds, t. 68, f. 1-8.

Vern. : Bharajambhula (Mar.) ; Dadmari (Konk.) ; Jal agiyo, Jalaogiya (Guj.).

Loc. : GOA : *Ilhas* : Near Merces Military camp, on Santacruz road ; Miramar, Panaji. *Canacona* : Butpal - Nadquem. NAGARHAVELI : Dudeni. Silvassa, along Damanganga river ; Dhapsa ; Velugaon ; Sindhoni forest. DAMAN : Marvar ; Cale area.

Common on moist, sandy areas.

A. multiflora Roxb. Fl. Ind. 1 : 447, 1820 ; FBI 2 : 570 ; C. 1 : 541 ; S. 87 ; Dangs. 8 ; Saur. 225 ; Pav. 102.

Fl. & Fr. : October December.

Vern. : Zino agaiyo (Guj.).

Loc. NAGARHAVELI : Khanvel ; Chispana forest area.

Occasionally found in moist situations and in cultivated fields.

LAGERSTROEMIA Linn.

1. Calyx tube ribbed ; petals large, mauve *speciosa*
1. Calyx tube not ribbed ; petals rather small, white
   2. Leaves elliptic - oblong, green, glabrous above and glaucous beneath ; calyx lobes appressed ; capsule ovoid or obovoid, 0.75 - 1.25 cm long *parviflora*
   2. Leaves elliptic - lanceolate, glabrous and shining above, greyish - blue and hoary - tomentose beneath ; calyx lobes reflexed ; capsule ellipsoid, 0.5 - 0.75 cm long *lanceolata*

Lagerstroemia lanceolata Wall. ex Wt. & Arn. Prodr. 309, 1834, *p. p.* ; FBI 2 : 576 ; DG. 78 ; C. 1 : 545 ; T. 2 : 62 ; G. 1 : 362 ; S. 90.

Fl. : March - April. *Fr.* : May July. *Ill.* ; T. f. 324.

Vern. : Nana (Mar.) ; Bili nandi (Kan.) ; Naram (Konk.).

Loc. : GOA : *Satari* : Nandore forest ; Onda ; Walanchodongar (Caranzol). *Sanguem* : Molem Colem ; Durgin forest ; Butabaichadongar. *Canacona* : Ordofond Tudal. NAGARHAVELI : Dongarpad ; Umberkoi ; Berpam forest ; Dudeni.

Common on hill slopes inside forest area.

L. parviflora Roxb. Pl. Cor. 1 : 47, t. 66, 1795 ; FBI 2 : 575 ; DG. 78 ; C. 1 : 545 ; T. 2 : 61 ; G. 1 : 362 ; S. 90.

Fl. : March - June. *Fr.* : May December. *Ill.* : Wt. Ic. 69 ; T. f. 323

Vern. : Bondga, Lende (Mar.) ; Nano (Konk.) ; Bemteka (Port.).

Loc. : GOA : *Satari* : Onda ; Chorchorim *Sanguem* : Sidh forest, near Bati. NAGARHAVELI : Barpam forest ; Khuntly forest ; Dudeni ; Jamunpada forest, Sindhoni khanvel.

Common in deciduous forests along the edges.

L. speciosa (Linn.) Pers. Syn. 2 : 72, 1806 ; *Munchausia speciosa* Linn. in Muench. Hausv. 1 ; 357, t. 2, 1770. *Lagerstroemia flosreginae* Retz. Obs. 5 : 25, 1788 ; FBI 2 : 577, DG. 78 ; C. 1 : 546 ; T. 2 : 64 ; G. 1 : 362.

Fl. : March - May. *Fr.* : July October. *Ill.* : Wt. Ic. t. 413 ; T. f. 326.

Vern. : Toman (Mar.) ; Hole dasal (Kan.) ; Sotulari (Konk.) ; Catupinaca das serras (Port.).

Loc. : GOA : *Sanguem*: Durgin forest ; *Canacona* : Ordofond ; Butpal-Nadquom.

Common along rivers and streams. In some places cultivated in gardens.

Cult. species :

L. indica Linn. Syst. ed. 10 : 1076, 1759 ; FBI. 2 : 575 ; DG. 77 ; C. 1 : 546 ; T. 2 : 65 ; G. 1 : 362.

Fl. : June July. *Ill.* : Wealth of India 6 : 20 f. 10.

Vern. : Chinai Mendhi (Mar.) ; Joje mart (Konk.) ; Veio dos jardim das Picos (Port.).

This species, a native of China, is cultivated in gardens for beautiful white and rose coloured flowers.

ROTALA Linn. *sensu amp.* Koehne

1. Capsule 2-valved
   2. Flowers axillary, solitary — *indica*
   2. Flowers in terminal spicate racemes — *serpyllifolia*
1. Capsule 3-valved
   3. Leaves verticillate ; flowers 3-4 merous in axillary whorls — *verticillaris*
   3. Leaves opposite, decussate ; flowers 5-merous, axillary, solitary — *densiflora*

Rotala densiflora (Roth) Koehne in Bot. Jahrb. 1 : 164. 1880 ; & 4 : 388. 1883 & in Pflanzenr. 17 : 35, f. 3 C, 1903 ; G. 1 : 359 ; S. 88. *Ammannia densiflora* Roth in R. & S. Syst. 3 ; §304, 1818. *Ammannia pentandra* Roxb. Fl. Ind. 1 : 448. 1832 *p. p.* ; FBI 2 : 568 ; C. 1 : 539.

Fl. & Fr. : August November. *Ill.* : Wt. Ic. t. 260 B ; Pflanzenr. 17 : f. 3C.

Loc. : GOA : *Pernem* : Agaruada. *Satari* : Valpoi ; Codal ; Caranzol ; Pale. *Bardez* : Porvorim rocky plateau. *Ilhas* : Rice fields near Santacruz village. *Salcete* ; Verna. *Marmugao* : Vasco naval office plateau. *Ponda* : Bicholim Ponda. *Sanguem* ; Surla ; cumbari. *Quepem* : Budsari Goundugarha. *Canacona*. Towards Tudal.

Common in moist places and rice fields, often associated with *Burmannia*, *Eriocaulon* etc.

Rotala indica (Willd.) Koehne in Bot. Jahrb. 1 : 172, 1880 & in pflanzenr. 17, 40, 1903 ; S. 88. *Peplis indica* Willd. Sp. Pl. 2 : 244, 1799. *Ammania peploides* Spreng. Syst. 1 : 444, 1825 ; FBI. 2 : 566 ; C. 1 : 538 ; G. 1 : 359.

Fl. & Fr. : November March.

Loc. : NAGARHAVELI : Umberkoi ; Dhapsa.

Common weed in wet places.

R. serpyllifolia (Roth) Bremek. in Acta Bot. Neerl. 3(1) : 149, 1954 ; Saur. 224. *Micranthus serpyllifolius* Roth, Nov. Pl. Sp. 282, 1821. *Ammannia tenuis* Clarke in FBI. 2 : 567, 1879 ; C. 1 : 538. *Rotala tenuis* (Wt.) Koehne in Engl. Bot. Jahrb. 1 : 177, 1880 & in Pflanzenr. 17 : 42, f. 4C, 1903 ; S. 89 ; Dangs. 9.

Fl. & Fr. : October January. *Ill.* : Wt. Ic. t. 257B.

Vern. : Zinako Jal Agaio (Guj.).

Loc. : NAGARHAVELI : Silvassa, along Damanganga river ; Dudeni ; Morkhal ; Umberkoi - Dongerpad ; Jamunpati forest ; Velugaon.

Rare, on moist rocky areas.

Rotala verticillaris Linn. Mant. 2 : 175. 1771 ; excl. icone Rheedeana ; G. 1 : 358. *Ammannia rotala* C. B. Clarke in FBI. 2 : 567, 1879, *non* F. Muell. (1858) ; DG. 77 ; C. 1 : 539.

Fl. : December. *Ill.* : Wt. Ic. t. 260A.

The species though not quite common, is included here based on Dalgado's record and Cooke's report from Concan and North Kanara. It would be possible to locate the species along moist edges of tanks and pools.

WOODFORDIA Salisb.

Woodfordia fruticosa (Linn.) Kurz in Journ. Asiat. Soc. Beng. 40 : 56, 1871 ; G. 1 : 361 ; S. 89. Dangs 29 ; Saur. 227 ; Pav. 103. *Lythrum fruticosum* Linn. Sp. Pl. (ed. 2), 641, 1762. *Woodfordia floribunda* Salisb. Parad. Lond. t. 42, 1806 ; FBI. 2 : 572 ; DG. 77 ; C. 1 : 543 ; T. 2 : 58.

Fl. & Fr. : November April. *Ill.* : T. f. 322.

Vern. : Dayati (Mar.) ; Dhavri (Konk.) ; Bela (Kan.) ; Downy grislea (Eng.) ; Dhavdi, Dhavad in (Guj.).

Loc. GOA : *Canacona* : Ordofond, Parsol hill ; Charam hill top. NAGARHAVELI : Atola forest ; Carchond forest ; Dudhari to Bildhari forest ; Morkhal. DAMAN : Regunvara.

Common in open forests and on hill slopes.

Cult. species :

Lawsonia inermis Linn. Sp. Pl. 349, 1753 ; C. 1 : 544 ; G. 1 : 363 ; S. 89. *L. alba* Lamk. Encycl. 3 : 106, 1789 ; FBI. 2 : 573 ; DG. 77 ; T. 2 : 60.

Fl. & Fr. : January August. *Ill.* : Wt. Ill. t. 87 ; Wealth of India 6, pl. 3

Vern. : Mendhi (Mar.) ; Garanthi (Kan.) ; Methi Padchi (Konk.) ; Henna (Port.) ; Medi Mendi (Guj.).

Loc. : DADRA. DAMAN : Fort area.

Cultivated as a hedge plant and for its leaves for extracting 'henna'. Sometimes found running wild.

PUNICACEAE

Cult. species :

Punica granatum Linn. Sp. pl. 472, 1753 ; FBI. 2 : 581 ; DG. 78.

Fl. : July August. *Fr.* : September November.

Vern. : Dalimb (Mar.) ; Pomegranate (Eng.) ; Romeira (Port.). A native of Persia, cultivated in gardens for its edible fruits.

SONNERATIACEAE

SONNERATIA Linn. *f. nom. cons.*

Calyx lobes 4 ; petals 0 ; stigma large, umbrella - shaped ; leaves narrowly oblong	*apetala*
Calyx lobes 6 ; petals 6 ; stigma capitate ; leaves obovate	*caseolaris*

Sonneratia apetala Buch. - Ham. in Symes, Embassy Ava, 3 : 313, cum tab., 1800 ; FBI 2 : 579 ; C. 1 : 547 ; T. 2 : 66.

Fl. & Fr. : February. *Ill.* T. f. 327.

Loc. : DAMAN : Varacunda ; Thana Paidi ; Cale area.

Rare, in saline marshy areas.

S. caseolaris (Linn.) Engl. in Engl. & Prantl, Nachtr. 261, 1897 emend. Sm. in Rees, Cycl. 33, 1819. *Rhizophora caseolaris* Linn. (*p.p.*) in Stickman, Herb. Amb. 13, 1754 et in Amoen. Acad. 4 : 123, 1759. *Sonneratia acida* Linn. f. Suppl. Pl. 252. 1781 ; FBI 2 : 579 ; DG. 78 ; C. 1 : 547 ; T. 2 : 67.

Fl. : March July. *Fr.* : October November. *Ill.* : T. f. 328, 329.

Vern. : Tiwar (Mar.) ; Kandale (Kan.) ; Ambeti (Konk.) ; Jambeiro do mato (Port.).

Loc. : GOA : *Pernem* : River bank opposite to Colvale ferry crossing. *Bicholim* : Ammona ferry crossing, along Goa river bank ; Pilegao, near Bicholim. *Ilhas* : Panaji, along Mandovi river bank. *Ponda* : Borim, along Zueri river bank.

Common along muddy flats of river banks.

ONAGRACEAE

LUDWIGIA Linn.

1. Erect plants of wet places ; petals 4
   2. Stamens twice as many as sepals
      3. Raphe equal in diameter to the body of the seed ; pollen grains shed in tetrads — *octovalvis*

3. Raphe about 1/3 the diameter of the body of the seed ; pollen grains shed individually — *linifolia*
2. Stamens usually as many as sepals — *perennis*
1. Water plants, creeping or floating ; petals 5 — *adscendens*

Ludwigia adscendens (Linn.) Hara in Journ. Jap. Bot. 28 : 290, 1953. *Jussiaea adscendens* Linn. Mant. 1 : 69, 1767. *Jussiaea repens* Linn. Sp. Pl. 1 : 388, 1753 ; FBI. 2 : 587 ; DG. 79 ; C. 549 ; G. 1 : 365 (*non Ludwigia repens* Forster, 1771).

Fl. : November December. *Ill.* : Hook. Bot. Misc. 3 ; 300, t. 40.

Vern. : Kamadi (Konk.).

Occasional along margins of tanks. A fairly common species recorded by Dalgado.

L. linifolia (Vahl) Rolla Rao *nov. comb. Jussiaea linifolia* Vahl, Ecolog. Am. 2 : 32, 1798. *Ludwigia hyssopifolia* (G. Don) Exell, Garcia de Orta 5 : 471, 1957. *Jussiaea hyssopifolia* G. Don Gen. Syst. 2 : 693, 1832. *J. fissendocarpa* Haines in J. As. Soc. Bengal n.s. 15 : 314, 1919.

Fl. & Fr. : August December.

Loc. : GOA ; *Satari* : Satrem ; Caranzol. *Ilhas* : Miramar, Panaji. *Sanguem* : Patrem ; Bati. NAGARHAVELI : Bank of Daman Ganga river, on way to Kawcha.

Bennet, on the basis of dimorphous seeds, has raised this taxon to a new genus *Fissendocarpa* (Haines) Bennet (*Jussiaea* sect. *Fissendocarpa* Haines *l.c.*) and published this as *Fissendocarpa linifolia* (Vahl) Bennet in J. Bomb. nat Hist. Soc. 67 : 126, 1970. In view of the close range of characters of seeds and other parts of various species as observed on World basis, there is considerable difference of opinion with regard to the status of this new genus *Fissendocarpa* and hence the taxon under study is now treated under *Ludwigia* for the present.

This is fairly common in other parts of India and is mostly misidentified and thus mixed up with *Ludwigia parviflora* Roxb. and *L. prostrata* Roxb. in various Indian floras.

L. octovalvis (Jacq.) Raven in Kew Bull. 15 (3) : 476, 1962 & in Reinw. 6 : 362, f. 3, 1963. subsp. **Octovalvis.** *Oenothera octovalvis* Jacq. Enum. Syst. Pl. 19, 1760. *Jussiaea suffruticosa* Linn. Sp. Pl. 388, 1753 ; FBI. 2 : 587 ; FBL 2 : 587 ; DG. 79 ; C. 1 : 549 ; G. 1 : 365 ; S. 90. *Ludwigia suffruticosa* (Linn.) Gomez, An. Hist. Nat. Madrid 23 : 66, 1894, *non* Walt. 1788. *L. octovalvis* subsp. *sessiliflora* (Mich.) Raven (*l.c.*).

Fl. & Fr. : September June.

Vern. : Panalavanga (Mar.) ; Kakakula (Kan.) ; Karpuli (Konk.).

Loc. : GOA : *Canacona* ; Nadquem.

The pubescent character of the Indian plants of *Ludwigia octovalvis* on which Raven (*l.c.*) based his two Indian sub-species *octovalvis* and *sessiliflora* has been found to be highly variable with several intermediate forms (supported by recent Indian workers also) and hence the two sub-species are now treated as a single taxon.

Rare, near streams.

Ludwigia perennis Linn. Sp. Pl. 119, 1753 excl. verba falsa "*foliis oppositis*". *Ludwigia parviflora* Roxb. [Hort. Beng. 11, 1814 (*nom. nud.*) &] Fl. Ind. 1 : 440, 1820 ; FBI 2 : 588 ; DG. 79 ; C. 1 : 550 ; G. 1 : 365; S. 91. Dangs. 9. *Jussiaea perennis* (Linn.) Brenan in Kew Bull. 8 : 163, 1953 ; Saur. 235.

Fl. & Fr. : August December. *Ill.* : Wt. Ill. t. 101.

Vern. : Bhumy vayingi (Konk.).

Loc. : Goa : *Satari* : Codal forest area. *Ilhas* : Panaji ; Merces Curca ; Chimbel reservoir area. *Salcete* : Goodier ; Margao rest house ; towards Cavolossim. *Ponda* : Borim. *Sanguem* : Patiem, foot hill area. *Quepem* : Budsari Goundugarha ; Balli Quepem. Nagarhaveli : Umberkoi ; Dongarpada forest ; Silvassa, river bank ; Saily forest ; Khanvel. Dadra. Daman :Marvor.

Very common along moist areas in fields and river banks.

Cult. species :

Trapa bispinosa Roxb. Cor. Pl. 3 : 29, t. 234, 1819 ; FBI 2 : 590 ; DG. 79 ; C. 1 : 551 ; G. 1 : 366.

Fl. : February March. *Fr.* : May July.

Vern. : Shingada (Mar.) ; Simgari (Konk.) ; Castanhas de agua (Port.).

The species is known mostly under cultivation for its edible fruits (Dalgado).

SAMYDACEAE

Casearia Jacq.

Casearia graveolens Dalz. in Hook. Jour. Bot. 4 : 107, 1852 ; FBI 2 : 592 ; C. 1 : 552 ; G. 1 : 367. *C. glomerata* Talb. For. Fl. 2 : 69, 1911 (*non* Roxb.).

Fl. : March May (occasionally winter flowering). *Fr.* : April - September.

Vern. : Bokhara (Mar.).

Loc. : Nagarhaveli : Jamunpada forest ; Carchond forest.

A fairly common species in the forest areas. The fruits are used as fish poison and the wood, for carving work.

PASSIFLORACEAE

One or more branches of cymes cirrhiferous, flowers unisexual, small ; fruit a capsule	*Adenia*
Stem cirrhiferous but inflorescence not tendrillate ; flowers hermaphrodite, large ; fruit a fleshy berry	*Passiflora* (Cult.)

ADENIA Forsk.

Adenia hondala (Gaertn.) de Wilde in Blumea 15 (2) : 265, 1967. *Granadilla hondala* Gaertn. Fruct. 11 : 480, t. 180, f. 10, 1791. *Modecca palmata* Lamk. Encycl. Meth. 4 : 209, 1797 ; FBI. 2 : 603 ; DG. 80 ; C. 1 : 556. *Adenia palmata* (Lamk.) Engl. Bot. Jahrb. 14 : 375, 1892 ; G. 1 : 371.

Fl. : April May. *Ill.* : Wt. Ic. t. 201.

Vern. : Bhumikumti (Konk.) ; Narola (Port.).

Loc. : GOA : *Sanguem* : Madka bungalow, Molem area.

Though rare along the Sahyadris, Dalgado records it from Nanachepani of Ratnagiri district, besides Goa ghats in general. It also grows along North Kanara ghats and further south.

Cult. species :

Passiflora foetida Linn. Sp. Pl. 959, 1753 ; C. 1 : 557 ; G. 1 : 370.

Fl. & Fr. : April August.

Vern. : Kukkiballi (Kan.) ; Valighani (Mar.).

The species, a native of Tropical America, is mostly cultivated in Goa Gardens and is frequently found as an escape [Valpir (Satari), Panaji Ilhas) and other places].

P. quadrangularis Linn. Syst. ed. 10, 1248, 1759 ; DG. 80.

Vern. : Grenadilla (Eng.) ; Granadilho (Port.).

A species of tropical America, mostly cultivated in gardens for its leafy cover and curious flowers along with a few more species of *Passiflora.*

P. racemosa Brot. in Trans. Linn. Soc. 12 : 71, 1817 ; C. 1 : 557.

The species an introduction from Tropical America, is also cultivated for its deep red or scarlet flowers and is seen as an escape in Nagarhaveli (Sindhoni forest) and Goa.

CARICACEAE

Cult. species :

Carica papaya Linn. Sp. Pl. 1036, 1753 ; FBI 2 : 599 ; DG. 80 ; C. 1 : 557 ; G. 1 : 371 ; S. 92.

Vern. ; Popai (Mar.) ; Pappay (Konk.) ; Papacira (Port.).

This plant, a native of West Indies and Gulf of Mexico is cultivated for its edible fruit. Several interesting hybrid forms, yielding good variety of fruits, have been developed in India in the recent years.

CUCURBITACEAE

The classification of some genera in the family Cucurbitaceae as proposed by earlier workers like, Clarke (FBI, 1879), Cogniaux (1881) and others has been quite confusing to some extent. Recently, C. Jeffrey [Kew Bull. 15 (3) : 337 - 371, 1962] had carried out critical studies on the family, using extensive herbarium and living material, clarifying the confused generic limits and other circumscriptions. In this work, the various taxa are presented following Jeffrey's interpretation which appears to be more appropriate and natural.

As regards *Melothria* Linn. (*sensu lato*), as interpreted in the Indian Floras, Jeffrey indicates that the genus *Melothria* is an entirely New World genus though Cogniaux has included *Zehneria* Endl., *Solena* Lour. and *Mukia* Arn. under it. Jeffrey feels that some generic realignment is necessary within *Melothria* Linn., and on the basis of palynological and morphological data he has restored these genera sunk by Cogniaux earlier under *Melothria* Linn. The pollens in *Mukia*, *Solfrsa*, *Melothria* (*sensu stricto*) and *Zehneria* are quite different. Further, *Zehneria* Endl. is characterised by its three 2 - thecous anthers, *Solena* Lour. by the peculiar obliquely-triplicate anther- thecae and *Mukia* Arn. by its tumid seeds and clustered flowers which are distinct from *Melothria* Linn. (*sensu stricto*). As such, the various genera except *Melothria* Linn. (*sensu stricto*) which does not occur in India are treated separately in this work.

1. Flowers white
   2. Corolla 5-partite up to the base, petals fimbriate — *Trichosanthes*
   2. Corolla campanulate, divided not more than half way down, petals not fimbriate — *Coccinia*
1. Flowers yellow
   3. Flowers with a conspicuous bract on the peduncle — *Momordica*
   3. Flowers without bracts
      4. Connective of the anthers produced at apex
         5. Male flowers fascicled, racemose or corymbose
            6. Fruit ellipsoid or obtusely 4-angled — *Cucumis*
            6. Fruit rostrate or baccate — *Kedrostis*
         5. Male flowers solitary ; fruits globose — *Citrullus*

4. Connectives of anthers not produced
   7. Stamens 5 ; styles 3 — *Zanonia*
   7. Stamens 3 ; style 1
      8. Flowers in distinctly peduncled racemes or heads ; anther cells S-shaped ; fruits oblong or cylindric, ribbed or terete — *Luffa*
      8. Flowers solitary, fascicled or in sessile fascicled racemes ; anthers straight, curved or flexuous but not S-shaped ; fruit globose or ovoid, conical, smooth
         9. Anther cells flexuose or conduplicate ; rudiment of pistil absent in male flowers — *Diplocyclos*
         9. Anther cells never flexuose ; rudiment of pistil present between stamens
            10. Stamens 3, all bilocular — *Zehneria*
            10. Stamens 3, two of which are bilocular and one unilocular
               11. Anther-thecae triplicate, oblique — *Solena*
               11. Anther-thecae arcuate, straight or apically hooked — *Mukia*

CITRULLUS Schrad. *nom. cons.*

Annual ; fruit oblong or ellipsoid up to 25.40 cm in diam, edible — *lanatus*
Perennial ; fruit globose up to 7.62 cm in diam., very bitter — *colocynthis*

Citrullus colocynthis (Linn.) Schrader, in Linnaea 12 : 414, 1838 ; Wt. Ic. 2(2) : 7, t. 498, 1843 ; FBI 2 : 620 ; C. 1 : 571 ; Pav. 110. *Cucumis colocynthis* Linn. Sp. Pl. 1011, 1753. *Colocynthis vulgaris* Schrader, Ind. Sem. Gotting 2, 1833.

Fl. : September. *Ill.* : Wt. Ic. t. 498.

Loc. : DIU : Gogale.

Rare, along roadside near the sea. Also Cultivated for its cool and refreshing fruits.

C. lanatus (Thunb.) Matsumura & Nakai in Cat. Sem. et Spor. Hort. Bot. Univ. Imp. Tokyo 1916 : 30, 1916. *Momordica lanata* Thunb. Prodr. Fl. Cap. 13, 1794. *Citrullus vulgaris* Schrad. ex Ectl. & Zeyh. Enum. 2 : 279, 1836 ; FBI 2 : 621 ; DG. 84 ; C. 1 : 571 ; G. 1 : 379.

Fl. & Fr. : September-October.

Vern. : Tarbuj, Kalingad (Mar.) ; Kalimgam (Konk.) ; Melao de India (Port.).

Loc. : GOA : *Ilhas* : Panaji sea shore.

Rare. Cultivated for its cool and refreshing fruits.

COCCINIA Wt. & Arn.

Coccinia grandis (Linn.) J. O. Voigt Hort. Suburb. Calc. 59. 1845. *Bryonia grandis* Linn. Man. 1 : 126, 1767. *Coccinia indica* Wt. & Arn. Prodr. 347, 1834 ; C. 1 : 572 ; G. 1 : 379. *Cephalandra indica* Naud. in Ann. Sci. Nat. (ser. 5) 5 : 16, 1866 ; FBI 2 : 621 (*excl. syn.*) ; DG. 84. *Coccinia cordifolia* (Linn.) Cogn. *p.p.* ; Saur. 242 ; Pav. 110.

Fl. : August-September. *Ill.* : Hook. Icon. Pl. 2 : t. 138 ; Wt. Ill. t. 105.

Vern. : Tondali (Mar.) ; Tondeballi (Kan.) ; Tomdli (Konk.) ; Tendali (Port.) ; Glutu, kadvi gholi (Guj.).

Loc. : GOA : *Canacona* : Angidiv. DAMAN : Cale area. DIU : Jalandhar.

Rare. The fruit is sometimes eaten. The plant is said to be effective in the treatment of diabetes.

CUCUMIS Linn.

1. Fruit smooth, glabrous or pubescent
   2. Annual ; leaves usually 5 - angled, softly hairy ; male flowers in clusters ... *melo*
   2. Perennial ; leaves 5 to 7 - angled, scabrid ; male flowers solitary ... *callosus*
1. Fruit echinate ... *prophetarum*

Cucumis callosus (Rottl.) Cogn. ex Cogn. & Harms in Pflanzenr. 88 : 129. 1924 ; S. 93. *Bryonia callosa* Rottl. in Neue Schrift. Ges. Nat. Fr. Berlin 4 : 210, 1803 (*callosa*). *Cucumis trigonus* Roxb. [Hort. Beng. 70. 1814 (*nom. nud.*) &] Fl. Ind. 2 : 619, 1832 (excl. syn.) ; FBI 2 : 619 ; DG. 83 ; C. 1 : 569 ; G. 1 : 378.

Fl. : August-October. *Fr.* : October-May. *Ill.* : Wt. Ic. t. 497.

Vern. : Takamake (Mar.) ; Kadvi (Konk.) ; Tindalica (Port.) ; Gai Vasukdu, Kolhiban (Guj.).

Loc. : DIU : Sandstone ditch, Castle area.

Common in bushes and hedges (Dalgado).

C. melo Linn. var. **agrestis** Naud. in Ann. Sci. Nat. (4) 11 : 73, 1859 & 12 : 110, 1859 ; C. 1 : 569 ; S. 93 ; Saur. 248 ; Pav. 109. *C. pubescens* Willd. Sp. Pl. 4 : 614. 1805 ; Wt. Ic. 2 (2) : 6, t. 496, 1843.

Fl. : August-October. *Fr.* : November-December. *Ill.* : Wt. Ic. t. 496.

Vern. : Mak, Chivadu, Shinde (Mar.) ; Chibdin (Konk.) ; Melao (Port.) ; Chibdu (Guj.).

Loc. : Goa : *Sanguem* : Mahim village, near Bicholim. *Satari* : Caranzol ; Nagargao ; Palle, Babanbanda ; Molem-Belgaum road. *Quepem* ; Budsari-Goundugarha. *Canacona* : Amdiga, near Butpal ; Poinguinam.

Common along forest slopes and hedges in the rice fields ; often in waste lands, creeping on ground.

Cucumis prophetarum Linn. Cent. Pl. 1 : 33, 1755 & Amoen. Academ. 4 : 295, 1759 ; FBI 2 : 619 ; C. 1 : 570 ; G. 1 : 378 ; Saur. 250.

Fl. & Fr. : September.

Vern. : Kantalan Indranan (Guj.).

Loc. : Diu : Sandstone ditch, Castle area.

Rare, on sandy soil near the sea shore.

Cult. species. :

C. sativus Linn. Sp. Pl. 1012, 1753 ; DG. 83 ; C. 1 : 570 ; G. 1 : 378.

Ill. : Duthie & Fuller, Field and Garden crops 2 : 53, t. 51 & 52, 1882.

Vern. : Kakri (Mar.) ; Tavsini (Konk.) ; Pepine (Port.) ; Cucumber (Eng.), Kakdy (Guj.).

The species is cultivated for fruits. Also seen as escape in Sindhoni forest and Dhapsa of Nagarhaveli.

Diplocyclos (Endl.) von Post & Kuntze

Diplocyclos palmatus (Linn.) Jeffrey in Kew Bull. 15 (3) : 352, 1962. *Bryonia palmata* Linn. Sp. Pl. 1012, 1753, excl. syn. *B. laciniosa* auct. (*non* Linn. Sp. Pl. 1013, 1753) ; FBI, 2 : 622 ; DG. 85. *Bryonopsis laciniosa* sensu Naud. in Ann. Sc. Nat. ser. 4, 12 : 141, 1859 [*pro majore parte*, excl. typ., et sensu auct. mult. *non* (Linn.) Naud., 1859] ; C. 1 : 568 ; G. 1 : 377.

Fl. : August-September. *Ill.* : Wt. Ic. t. 500.

Vern. : Kavdodi (Mar.) ; Kaumdali (Konk.) ; Nota (Port.).

Loc. : Nagarhaveli : Morkhal.

Occasionally found to be growing in hedges and on bushes (Dalgado).

Kedrostis Medik.

Kedrostis rostrata (Rottl.) Cogn. in DC. Mon. Phan. 3 : 636, 1881 ; C. 1 : 577 ; G. 1 : 381. *Bryonia rostrata* Rottl. Neue Schriff. Ges. Freunde Berlin, 4 : 212, 1803. *Rhynchocarpa foetida* C. B. Clarke in FBI 2 : 627, 1879 *p.p.*

Fl. & *Fr.* : September-November.

Vern. : Nurak vel (Mar.).

Loc. : GOA : *Satari* : Near Ponda village, Valpoi ; Nanache Dongar ; Codal.

Rare.

LUFFA Mill.

Stamens 5 ; fruits longitudinally striate seeds winged	*cylindrica*
Stamens 3 ; fruits strongly, acutely 10 ribbed ; seed not wingeds	*acutangula*

Luffa acutangula (Linn.) Roxb. [Hort. Beng. 70, 1814 (*nom. nud.*) &] Fl. Ind. 3 ; 713, 1832 ; FBI 2 ; 615 ; DG. 82 ; C. 1 : 566 ; G. 1 : 377 ; Pav. 106. *Cucumis acutangulus* Linn. Sp. Pl. 1011, 1753.

Fl. & *Fr.* : October.

Vern. : Dodka-turai (Mar.) ; Gomsali (Konk.) ; Patola (Port.) ; Gonsali, Tunya (Guj.).

Loc. : GOA : *Canacona* : Poinguinam. NAGARHAVELI : Silvassa, towards Atal forest. DIU : Jalandhar.

Occasional.

L. cylindrica (Linn.) M. J. Roem. Syn. Mon. 2 : 63 ; 1846 ; Saur. 246 ; Pav. 106. *Momordica cylindrica* Linn. Sp. Pl. ed. 1, 1009, 1753 ; ed. 2, 1433, 1763. *Luffa aegyptiaca* Mill. Gard. Dict. ed. 8, 1768 ; FBI. 2 : 614 ; DG. 82 ; C. 1 : 565 ; G. 1 : 376.

Fl. : June September. *Ill.* : Wt. Ic. t. 499.

Vern. : Ghosale (Mar.) ; Marti gomsali (Konk.) ; Fructa cota (Port.) ; Marti Gonsali, Galaka (Guj.).

Mostly cultivated for its fruit used as vegetable ; sometimes found as an escape (Dalgado).

MOMORDICA Linn.

Flowers monoecious ; fruit fusiform, rostrate, tuberculate	*charantia*
Flowers dioecious ; fruit ellipsoid with soft spines	*dioica*

Momordica charantia Linn. Sp. Pl. 1009, 1753 ; FBI 2 : 616 ; DG. 83 ; C. 1 : 562 ; G. 1 : 375.

Fl. : May August. *Ill.* : Wt. Ic. t. 504.

Vern. : Karale (Mar.) ; Kareti (Konk.) ; Careteria (Port.).

Cultivated for its fruit used as vegetable and sometimes found to run wild (Dalgado).

Momordica dioica Roxb. ex Willd. Sp. Pl. 4 : 605, 1805 ; Wt. Ic. 2(2) : 7, tt. 505 & 506, 1846 ; FBI 2 : 617 ; DG. 83. C. 1 : 563 ; G. 1 : 375 ; S. 92.

Fl. : June August. *Fr.* : August October. *Ill.* : Wt. Ic. t. 505 & 506.

Vern. : Kartoli (Kar.) ; Phalguni (Konk.) ; Gidhagalu (Kan.) ; Balsamina (Port.).

Loc. : GOA : *Satari* : Codal ; Nanecha Dongar. *Marmugao* : Nuvem fields. *Sanguem* : Viliyan forest ; Nandrena near Molem ; Periche Tem (Cumbari) ; Netravali. *Canacona* : Angidiv.

Fairly common.

MUKIA Arn.

Mukia maderaspatana (Linn.) M. Roem. Syn. Pop. 47. 1846. *Cucumis maderaspatanus* Linn. Sp. Pl. 1012. 1753. *Mukia scabrella* (Linn. f.) Arn. in Hook. Journ. Bot. 3 : 276, 1841 ; FBI 2 : 623 ; DG. 85. **Melothria maderaspatana* (Linn.) Cogn. in DC. Mon. Phan. 3 : 623, 1881 ; C. 1 : 573 ; G. 1 : 381 ; S. 94 ; Dangs 11 ; Saur. 244 ; Pav. 112.

Fl. : July. *Ill.* : Wt. Ic. t. 501.

Vern. : Chirati (Konk.).

Loc. : GOA : *Sanguem* : Barazon. NAGARHAVELI : Nana Randha ; Carchond forest ; Velugaon ; Umberkoi Dongarpada forests ; Saily ; Khuntly forest. DADRA. DAMAN : Dundorta. DIU : Sandstone ditch, Castle area ; Rocky creek in sea, Nagoa ; Cogale.

Common on the lower hills and in hedges (Dalgado).

SOLENA Lour.

Solena heterophylla Lour. Fl. Coch. 1 : 514, 1790 ; S. (ed. 3) : 104. *Bryonia umbellata* Klein in Willd. Sp. Pl. 4 : 618, 1805. *Zehneria umbellata* Thw. Enum. 125, 1858 ; FBI 2 : 625, *p. p* ; DG. 85. ***Melothria heterophylla* (Lour.) Cogn. in DC. Mon. Phan. 3 : 618, 1881 et in Pflanzenr. 66 : 121 124, t. 28, 1916 ; C. 1 : 575 ; G. 1 : 380 ; S. 94 ; Dangs 10 ; Pav. 111. *M. angulata* Chakravarty in Journ. Bomb. nat. Hist. Soc. 50 : 899, 1952 & in Rec. Bot. Surv. Ind. 17 (1) : 165, 1959.

Fl. : April October. *Fr.* : August-October. *Ill.* : Rec. Bot. Surv. Ind. 17 (1) : tt. 1K & 2B, 1959.

**Melothria maderaspatana* (Linn.) Cogn. is now the accepted name.

***Melothria heterophylla* (Lour.) Cogn. is now the accepted name.

Vern. : Gometi (Mar.) ; Goimtina (Konk.) ; Popineiro dos pastos (Port.).

Loc. : GOA : *Pernem* : Towards Cargao. *Satari* : Valpoi Nagargao ; Ivorem ; Onda, *Sanguem* : Durgin hills ; Sanguem Dudal, 5 km ; Surla. *Quepem* : Budsari Goundugarha. NAGARHAVELI : Saily.

Occasional on granite rocks, climbing on hedges or shrubs.

Melothria angulata Chakravarty (*l.c.*) is closely allied to *M. heterophylla* (Lour.) Cogn. and is distinguished from the latter species by the angular fruits and the seeds strongly margined with a girdle. However, the girdle is evident only in young seeds and in fully mature ones hardly discernable at all. The angular nature of fruits is yet another unreliable character as it is not consistent in nature. In view of the obscure distinguishing characters which are also intergrading and variable, these two taxa are to be merged under *M. heterophylla* only. In fact *M. heterophylla* is itself a highly variable polymorphic species and Chakravarty (*l.c.*) recognises atleast 12 forms.

TRICHOSANTHES Linn.

1. Leaves entire, cordate, distantly denticulate — *nervifolia*
1. Leaves lobed or angled
   2. Male racemes without bracts ; fruit fusiform, green, with white stripes when immature — *cucumerina*
   2. Male racemes with large, broad, lacinlate bracts ; fruits globose, red with 10 orange streaks — *bracteata*

Trichosanthes bracteata (Lamk.) Voigt, Cat. Hort. Calc. 58, 1845. *Modeca bracteata* Lamk. Encycl. Meth. Bot. 4 : 210, 1797. *Trichosanthes palmata* Roxb. Fl. Ind. 3 : 704, 1832 ; FBI 2 : 606 ; DG. 81 ; C. 1 : 560 ; G. 1 : 374.

Fl. : April July. *Ill.* : Wt. Ill. tt. 104 & 105.

Vern. : Mukal ; Kamdvel (Konk.).

Loc. : GOA : *Sanguem* : Verlem. NAGARHAVELI : Dhapsa.

Common in forests (Dalgado).

T. cucumerina Linn. Sp. Pl. 1008, 1753 ; FBI 2 : 609 ; C. 1 : 560 ; G. 1 : 373 ; Saur. 241 ; Pav. 105.

Fl. : July October. *Fr.* : October December.

Vern. : Ranpadaval (Mar.) ; Padvala (Guj.) ; Kuipodla (Kan.).

Loc. : GOA : *Pernem* : Mandrem near Pallem. *Satari* : Caranzol. *Salcete* : Margao ghat. *Canacona* : Poinguinam. NAGARHAVELI : Silvassa. DAMAN : Fort area.

Frequent climber along dry, rocky slopes and fort walls.

Trichosanthes nervifolia Linn. Sp. Pl. 1008 ; 1753 ; FBI 2 : 609, *p. p.* ; DG. 81 ; C. 1 : 559 ; G. 1 : 373.

Vern. : Padavli (Konk.).

This species seems to be rare even in Concan (Dalgado).

Cult. species :

T. **anguina** Linn. Sp. Pl. 1008, 1753 ; FBI 2 : 610 ; DG. 81 ; C. 1 : 561 ; G. 1 : 374.

Vern. : Padvel (Mar.) ; Padvali (Konk.) ; Snake gourd (Eng.) ; Patola (Port.) ; Padvol (Guj.).

Normally cultivated for its fruit, used as vegetables.

ZANONIA Linn.

Zanonia indica Linn. Sp. Pl. ed. 1, 1028, 1753 ; ed. 2, 1457, 1763 (*non* Plum.) ; FBI. 2 : 633 ; DG. 85 ; C. 1 : 581 ; G. 1 : 383.

Fr. : April May. *Ill.* : Wt. Ill. t. 103.

Vern. : Chirpoti (Mar.) ; Gomitini (Konk.) ; Pructo bandoleira (Port.).

Though recorded from Vengurla which is adjoining to Goa (Dalgado) there is every possibility of its growth in Goa area also.

ZEHNERIA Endl.

Zehneria bookeriana (Wt. & Arn.) Arn. in Hook. Journ. Bot. 3 : 275, 1841 ; FBI 2 : 624 (excl. syn.). **Melothria perpusilla* (Bl.) Cogn. in DC. Mon. Phan. 3 : 607, 1881 ; C. 1 : 574 ; G. 1 : 380.

Fl. : November.

Vern. : Varali (Mar.).

Loc. : GOA : *Canacona* : Butpal Ordofond. *Satari* : Wadicha Dongar, Caranzol. *Sanguem* : Rumda, Netravali ; Babanda. Angidiv.

Rare.

Cult. species :

Benincasa hispida (Thunb.) Cogn. in DC. Mon. Phan. 3 : 513, 1881. *Cucurbita hispida* Thunb. Fl. Jap. 322, 1784. *Benincasa cerifera* Savi, Bibl. Ital. 9 : 158, 1818 ; FBI 2 : 616 ; DG. 82 ; C. 1 : 582 ; G. 1 : 383.

**Melothria perpusilla* (Bl.) Cogn. is now the accepted name.

Vern. : Bhusa ; Daru Koru (Guj.).

A native of South East Asia, cultivated for its fruit throughout India.

Cucurbita maxima Duchesne ex Lam. Encycl. 2 : 151, 1786 ; FBI 2 : 622 ; DG. 84 ; C. 1 : 582 ; G. 1 : 383 ; S. 95 ; Saur. 252 ; Pav. 111.

Vern. : Tambadabhopala (Mar.) ; Duthni (Konk.) ; Red gourd (Eng.) ; Cucurbita (Port.).

Cultivated for its fruit throughout India.

C. moschata (Duch. ex Lam.) Poir. Dict. Sci. Nat. 8 : 234, 1818 ; FBI 2 : 622 ; DG. 84 ; C. 1 : 582 ; G. 1 : 383. *C. pepo* var. *moschata* Duch. ex Lam. Encycl. 2 : 152, 1786.

Vern. : Kala bhopala (Mar.) ; Kali dudhni (Konk.) ; Musk Melon (Eng.) ; Abobora da Guine (Port.).

Cultivated for its fruits throughout India.

C. pepo Linn. Sp. Pl. ed. 1, 1010, 1753 ; FBI 2 : 622 ; DG. 85 ; C. 1 : 582 ; G. 1 : 383.

Vern. : Kashi bhopala (Mar.) ; Bhopli (Konk.) ; Pumpkin (Eng.) ; Abobreina (Port.).

Cultivated for its fruit throughout India.

Lagenaria siceraria (Molina) Standl. in Publ. Field Mus. Nat. Hist. Chicago Bot. ser. 3 : 435, 1930. *Cucurbita siceraria* Molina, Sagg. Chile, 133, 1782. *Lagenaria vulgaris* Seringe, Mem. Soc. Phys. Hist. Nat. Geneve, III. 1 ; 25, t. 2, 1825 ; FBI 2 : 613 ; DG. 81 ; C. 1 : 581 ; G. 1 : 383.

Vern. : Dudhi bhopala (Mar.) ; Mharo-dudhi (Konk.) ; Colombro (Port.) ; Dudio (Guj.).

Cultivated for its fruit throughout India.

BEGONIACEAE

BEGONIA Linn.

Begonia crenata Dryand. Trans. Linn. Soc. Lond. 1 : 164, t. 14, f. 3, 1791 ; FBI 2 : 651 ; DG. 86 ; C. 1 : 584 ; G. 1 : 385 ; S. 95. *Begonia minima* Bedd. Ic. Pl. Ind. Or. t. 110, 1874.

Fl. & Fr. : July October. *Ill.* : Bedd. Ic. t. 110.

Vern. : Mutya (Konk.).

Loc. : GOA : *Satari* : Usgao Ponda, *Salcete* : Verna village ; Cortallim-Vasco. *Sanguem* : Varkin forest ; Near forest Chowki, Darban-

dora ; Molem ; Barazon ; Surla. *Canacona* : Near Ordofond forest office ; Ordofond Sadashivghad.

Common on moist, rocky beds of streams. Also cultivated in gardens (Dalgado).

CACTACEAE

Cult. species ;

Cereus pentagonus Haw. Syn. Pl. Succ. 180, 1812 ; DG. 87.

Vern. : Phiramgi nivalkamtem (Konk.).

This is a native of Brazil introduced by Portuguese into Goa where it is naturalised in Pernem and other parts. (Dalgado).

Opuntia elatior Mill. Gard. Dict. (ed. 8) no. 4, 1768 ; G. 1 : 387 ; S. 96 : Saur. 253 ; Pav. 112, *Opuntia dillenii* (Ker-Gawl.) Haw. Suppl. Pl. Succ. 79, 1819 ; FBI 2 : 657, *p.p.* ; DG. 86.

Vern. : Nigadung (Mar.) ; Nag-nival (Konk.) ; Figueira da India (Port.) ; Prickly Pear (Eng.).

Loc. : DAMAN : Fort area.

This is an American plant introduced by the Portuguese into India where it is naturalised in many parts (Dalgado).

AIZOACEAE

Some botanists prefer to split this family into Molluginaceae (with perianth free) and Ficoidaceae (with perianth united). In this work, I have followed Backer's treatment in Flora Malesiana [ser. 1, 4 (3) : 267 270, 1951] keeping them both under Aizoaceae.

1. Succulent herbs or under shrubs ; stamens inserted on the calyx tube ; capsule circumsciss : (FICOIDACEAE)
   2. Styles 3-4, ovary 3-5-celled — *Sesuvium*
   2. Styles 1-2, ovary 1-2-celled — *Trianthema*
1. Diffuse, prostrate herbs ; stamens hypogynous ; capsule 3 to 5-celled, loculicidal : (MOLLUGINACEAE)
   3. Flowers in axillary fascicles ; seeds appendaged with a slender white thread curved round them — *Glinus*
   3. Flowers in terminal cymes ; seeds not appendaged — *Mollugo*

GLINUS Linn.

Prostrate, densely hairy herbs	*lotoides*
Erect or sub-erect, glabrous herbs	*oppositifolius*

Glinus lotoides Linn. Sp. Pl. 463, 1753 ; S. 97 ; Dangs. 11 ; Saur. 232 ; Pav. 114. *Mollugo lotoides* O. Kuntze, Rev. Gen. Pl. 264, 1891 ; G. 1 : 390. *Mollugo hirta* Thunb. Prodr. Fl. Cap. 24, 1794 ; FBI. 2 : 662 ; DG. 87 ; C. 1 : 593.

Fl. : February April. *Fr.* : April - June.

Vern. : Kotak (Mar.) ; Kadvi bhaji (Konk.) ; Ghalo-okharod (Guj.).

Ill. : Tadulingam & Venkatanarayana Handb. South Ind. Weeds, t. 75, f. 1 7, 1955.

Loc. : GOA : *Satari* : Ambechegol. NAGARHAVELI : Bank of Daman ganga river on way to Kawcha ; Atal forest ; Dudeni. DADRA.

Occasional, along gravely river bank. A very common species along Concan ghats (Dalgado).

G. **oppositifolius** (Linn.) A. DC. in Bull. Herb. Boiss. 1 (2) : 552, 1901 ; S. 97 ; Saur. 233 ; Pav. 114. *Mollugo oppositifolia* Linn. Sp. Pl. 89, 1753 ; C. 1 : 593 ; G. 1 : 390. *M. spergula* Linn. Syst. (ed. 10) 881, 1789 ; FBI 2 : 662, DG. 87.

Fl. : January March. *Fr.* : April June. *Ill.* : Fl. Malcs. ser. 1, 4(3) : 271, f. 1, 1951.

Vern. : Jharasi (Mar.) ; Parpataka (Kan.) ; Kadvokhad (Guj.).

Loc. ; GOA : *Satari* : Masarde village, near Valpoi ; Nandorem. *Salcete* : Margao town. DAMAN : Nani Daman. DIU ; Podamo.

Common in moist, shady areas along canal and river banks.

MOLLUGO Linn.

Mollugo pentaphylla Linn. Sp. Pl. 89, 1753 ; C. 1 : 594 ; G. 1 : 390, S. 97 ; Dangs. 11 ; Saur. 234 ; Pav. 114. *M. stricta* Linn. Sp. Pl. (ed. 2) 131, 1762 ; FBI 2 : 663 ; DG, 88.

Fl. : August September. *Fr.* : October November.

Vern. : Jharasa (Mar.) ; Kadvi bhaji (Konk.).

Loc. : GOA : *Satari* : Golauli. *Marmugao* : Nuvem. *Sanguem* : *Patrem.*

Canacona : Angidiv. NAGARHAVELI : Sindhori ; Bank of Damanganga river on way to Kawcha ; Duderi ; Silvassa towards Atal forests. DAMAN : Dundorta.

Occasional, in wastelands and on gravelly river beds ; sometimes also on rocky ground.

SESUVIUM Linn.

Sesuvium portulacastrum (Linn.) Linn. Syst. ed. 10 : 1058, 1759 ; FBI 2 : 659 ; DG. 37 ; C. 1 : 589. *Portulaca portulacastrum* Linn. Sp. Pl. 446, 1753.

Fl. & Fr. : November December.

Loc : GOA : *Ilhas* : Panaji sea shore. DAMAN : Fort area.

Rare, along sea shore sandy and salty ground.

TRIANTHEMA Linn.

1. Stamens 10 or more
   2. Flowers solitary, sessile ; style 1 — *portulacastrum*
   2. Flowers in clusters of dichasioid cymes ; styles 2 — *decandra*
1. Stamens less than 10 — *triquetra*

Trianthema decandra Linn. Mant. 1 : 70, 1767 ; FBI 2 : 661 ; DG. 87 ; C. 1 : 591 ; G. 1 : 389 ; Saur. 230. *T. pentandra auct. non* Linn.

Fl. : December. *Ill.* : Wt. Ic. t. 296.

Vern. : Phasartani (Konk.).

Loc. : DIU : Sand Stone ditch, Castle area.

Common along moist places (Dalgado).

T. **portulacastrum** Linn. Sp. Pl. 223, 1753 ; G. 1 : 389. *T. monogyna* Linn. Mant. 1 : 69, 1767 ; FBI 2 : 660 ; DG. 87 ; C. 1 : 589.

Fl. : August June. *Ill.* : Wt. Ic. t. 288.

Vern. : Biskhapra (Mar.) ; Khapra (Konk.).

Fairly common and also cultivated in gardens (Dalgado).

T. **triquetra** Rottl. & Willd. in Ges. Naturf. Fr. Neue. Schr 4 : 181, 1803 ; C. 1 : 590 ; Saur. 231. *T. crystallina auct. non* Vahl. FBI 2 : 660.

Fl. & Fr. : September November.

Vern. : Satodi (Guj.).

Loc. : DIU : Nagoa.

Rare, on sandy sea shore. *Trianthema crystallina* Vahl differs in the oval or lanceolate, smaller (0.5 - 2 cm long), unequal sided leaves and is distinct from the present species.

APIACEAE (=UMBELLIFERAE)

1.	Leaves simple ; flowers red, in simple umbels	*Centella*
1.	Leaves decompound ; flowers white, in compound umbels	
	2. Styles short ; fruit glabrous	*Pimpinella*
	2. Styles long, recurved on the fruit ; fruit puberulous or hispidulous, rarely glabrous	*Trachyspremum*

CENTELLA Linn.

Centella asiatica (Linn.) Urb. in Mart. Fl. Braz. 11 : 287 1879 ; G. 1 : 392 ; S. 97 ; Dangs. 11 ; Saur. 253. *Hydrocotyle asiatica* Linn. Sp. Pl. 234, 1753, *p.p.* ; FBI 2 : 669 ; DG. 88 ; C. 1 : 598.

Fl. & Fr. : Most of the year except during mid monsoon. *Ill.* : Wt. Ic. t. 565.

Vern. : Brahmi (Mar.) ; Vondelago (Kan.) ; Umdri (Konk.) ; Hortela brava indiana (Port.) ; Brahmi (Guj.).

Loc. : GOA : *Pernem* : Tamboxim. *Satari* : Valpoi. *Sanguem* : Rumde (Netravali). *Canacona* : Nadquem. DAMAN : Airport area.

Occasional, on moist ground and also in nurseries, gardens etc.

PIMPINELLA Linn.

1.	Fruit glabrous	*heyneana*
1.	Fruit papillose, scabrid or pubescent	
	2. Flowers monoecious	*wallichiana*
	2. Flowers hermaphrodite	*adscendens*

Pimpinella adscendens Dalz. in Hook. Journ. Bot. 2 : 261, 1850 ; FBI 2 : 689 ; C. 1 : 603 ; S. 98.

Fl. & Fr. : November May.

Loc. : NAGARHAVELI : Silvassa, along Damanganga river bank.

Rare, on the rocky river bed.

Pimpinella heyneana (DC.) Kurz in Journ. As. Soc. Beng. 46 : 115, 1877 ; FBI 2 : 684 ; DG. 89 : C. 1 : 601 ; G. 1 : 395 ; S. 98. *Heloscladium heyneanum* DC. Prodr. 4 : 106, 1830 ; Wt. & Arn. Prodr. 368, 1834.

Fl. & *Fr.* : August December.

Vern. : Ran-ervados (Konk.).

Loc. : GOA : *Satari* : Onda. *Salcete* : Margao. *Marmugao* : Marmgoa hill top ; Kanpal hill top. *Sanguem* : Bati Sidh. *Canacona* : Ordofond-Butpal. NAGARHAVELI : Dolara forest ; Carchond forests ; Dudhani to Bidhari forests ; Dongarpad-Umborkoi, Sindhori forest ; Morkhal.

Common in shady, rocky forest edges.

P. Wallichiana (Miq.) Gandhi in Said. & Nicols. Fl. Hassan Dt. 417, 1976. *Holosciarum wallichianum* Miq. Bot. Zeit. 7 : 775, 1849. *Pimpinella monoica* Dalz. in Hook. Kew Journ. Bot. 3 : 212, 1851 ; Dalz & Gibs. Bomb. Fl. 106 ; FBI. 2 : 687 ; C. 1 : 602 ; G. 1 : 395 ; Dangs. 48.

Fl. : November.

Loc. : GOA : *Satari* : Pale (Tanem). *Sanguem* : Verlem.

TRACHYSPERMUM Link *nom. cons.*

Trachyspermum stictocarpum (C. B. Cl.) Wolff. var. **stictocarpum** Wolff, in Pflanzenr. 43 : 89, 1927, *emend.* Rolla Rao & Hemadri (*Trachispermum*) in Journ. Bomb. nat. Hist. Soc. 67(2) : 355, 1970 ; S. 98. *Carum stictocarpum* C. B. Cl. in FBI 2 : 681, 1879 ; DG. 89 ; C. 1 : 600. *Carum stictocarpum* var. *hebecarpa* C. B. Cl. *l. c.* 682 ; C. *l. c.* ; S. *l. c. Pimpinella lateriflora* Dalz. in Dalz. & Gibs. Bomb. Fl. 106, 1861, *non* Link, 1821 ; C. B. Cl. *l. c.*, 689 : C. *l. c.* 603.

Fl. : August October.

Vern. : Ran onva (Mar.) ; Ranjivem (Konk.).

Loc. : NAGARHAVELI : Dudhani to Bildhari forest.

The species is fairly common along the Western ghats as a weed and Dalgado also records it for Goa.

Pimpinella lateriflora was described by Dalzell (Bombay Fl. 106, 1861) based on the specimens collected "from the ravines in the Deccan (Bombay)" where it was found common. As proper type material was not available to C. B. Clarke, he was not clear about Dalzell's species. So, while retaining Dalzell's species as such, he described another species, *Carum stictocarpum* (FBI 2 : 681, 1879) which was later transferred to *Trachispermum* by Wolff (Pflanzenr. 43 : 89, 1927). Now with the extensive field studies in Deccan ravines and the scrutiny of wide range of material belonging to this taxon, the author clearly establishes that *Carum Stictocarpum* is nothing but *Pimpinella lateriflora*.

Under the normal procedure, the name *Carum stictocarpum* would have become superfluous, had not the specific epithet *lateriflora* of Dalzell is preoccupied by an European species, *Pimpinella lateriflora* Link (En. Hort. Berol. 1 ; 285, 1821 descr.). Hence the next available epithet, *stictocarpum* of C. B. Clarke is accepted for this taxon. The author while publishing a note on this taxon (*l. c.*) designated a *neotype* for *Pimpinella lateriflora* Dalz. collected from type locality region in general and deposited in CAL. The spelling of the genus is given as *Trachispermum* in the Indian Floras, but the correct spelling as given by Link, is *Trachyspermum* [*Nomina Conservanda* list no. 6014 (1960)].

Cult. species :

Apium graveolens Linn. Sp. Pl. 264, 1753 ; FBI 2 : 679 ; DG. 89 ; C. 1 : 609 ; G. 1 : 399.

Vern : Celery (Eng.) ; Aipo (Port.).

Cultivated in gardens. The leaves are used as Salad.

Arracacia xanthorrhiza Bauer in Jamaic. Journ. 4 : 18, 1826. *A. esculenta* DC. Prodr. 4 : 244, 1830 ; DG. 88.

This species is a native of America and cultivated in Sawantwadi (Dalgado) and possibly in Goa.

Coriandrum sativum Linn. Sp. Pl. 256, 1753 ; FBI 2 : 717 ; DG. 91 ; C. 1 : 609 ; G. 1 : 399.

Ill. : Wt. Ic. t. 516.

Vern. : Kothmir (Mar.) ; Karphir (Konk.) ; Coriander (Eng.) ; Coentro (Port.). ; Dhana (Guj.).

Cultivated for the green leaves and dried fruits which are used for culnary purposes.

Daucus carota Linn. Sp. Pl. 242, 1753 ; FBI. 2 : 718 ; DG. 91 ; C. 1 : 609 ; G. 1 : 399.

Vern. : Gajar (Mar.) ; Gajar (Konk.) ; Carrot (Eng.) ; Cenoura (Port.) ; Gajar (Guj.).

Cultivated in gardens as vegetable.

Foeniculum vulgare Mill. Gard. Dict. ed. 8, 1768 ; FBI 2 : 695 ; DG. 90 ; C. 1 ; 609 ; G. 1 : 399.

Ill. : Wt. Ic. t. 570.

Vern. : Badishep (Mar.) ; Fumch (Konk.) ; Fennel (Eng.) ; Funcho ordinario (Port.).

Commonly cultivated in the gardens and the seeds are medicinal, particularly in case of latulence.

Petroselinum crispum (Mill.) Nym. ex Airy Shaw in Kew Bull. 1938 ; 257, 1938. *Apium crispum* Mill. Gard. Dict. ed. 8, no. 2, 1768. *Carum petroselinum* Benth. & Hook. f. Gen. Pl. 1 : 891, 1867 ; DG. 89 : C. 1 : 600 ; G. 1 : 394.

Vern. : Parsley (Eng.). Salsa hortense on vulgare (Port.).

A European plant, sometimes cultivated in gardens.

Peucedanum graveolens Benth. & Hook. f. Gen. Pl. 1 : 919, 1867 ; FBI 2 : 709 ; DG. 90 ; C. 1 : 606.

Ill. : Wt. Ic. t. 572.

Vern. ; Shepu (Mar.) ; Sepo (Konk.) ; Dill (Eng.) ; Endrao (Port.).

Mostly cultivated for its fruits which has carminative properties.

P. sativum Benth. & Hook. f. Gen. Pl. 1 : 920, 1867 ; DG. 90 ; C. 1 : 606.

Vern. : Parsing (Eng.) ; Pastinaca (Port.).

A native of Europe, mostly cultivated.

ARALIACEAE

SCHEFLERA J. R. & G. Forst.

Schefflera venulosa (Wt. & Arn.) Harms in Engl. & Prantl, Pflanzenf. 3, 8 : 39, 1894. *Paratropia venulosa* Wt. & Arn. Prodr. 377, 1834. *Heptapleurum venulosum* Seem in Jour. Bot. 3 : 80, 1865 ; FBI. 2 : 729 ; C. 1 : 610 ; T. 2, 77.

Fl. : April. *Ill.* : Wt. Ill. t. 118 ; T. f. 332.

Vern. : Rawanito (Mar.) ; Tengarballi (Kan.).

Loc. : GOA : *Canacona* : Barsare Tudal.

Rare, near a rocky stream.

Cult. species :

Aralia guilfoylei Cogn. & March. Pl. Ornem. 2, t. 58, 1874 ; DG. 91.
Vern. ; Tapmari (Konk.).

This species has been introduced from Fiji island and grown in gardens.

ALANGIACEAE

ALANGIUM Lamk. *nom. cons.*

Alangium salvifolium (Linn. f.) Wang. in Pflanzenr. 41 : 9, f. 2A E, 1910 ; G. 1 : 404. *Grewia salvifolia* Linn. f. Suppl. 409, 1781. *Alangium*

lamarckii Thw. Enum. 133, 1859 ; FBI 2 : 741 ; DG. 91 ; C. 2 : 1 ; T. 2 : 79.

Fl. : March. *Ill.* ; T. f. 333.

Vern. : Ankul (Mar.) ; Lucki, Ansroli (Kan.).

Loc. : Goa : *Satari* : Nanecha dongar, Valpoi.

Rare, along stream beds in forest edges.

CORNACEAE

Mastixia Blume

Mastixia arborea (Wt.) C.B. Clarke, in FBI 2 : 745, 1879 ; DG. 92 ; G. 1 : 405. *Burnisopetalum arboreum* Wt. Ic. t. 956. *Mastixia pentandra* Bl. Bijdr. 654, 1825 ; FBI 2 : 746 ; C. 2 : 2.

Fl. & Fr. : February June. *Ill.* : Wt. Ic. t. 956.

With the present understanding of the two species of *Mastixia* and the range of its distribution along the Concan and North Kanara ghats, it is quite possible to locate *M. arborea* in Goa ghats and Dalgado also records it.

The distinction between *Mastixia pentandra* and *M. arborea* is based on slender grounds and the main distinguishing feature as given in the floras is that in *M. arborea* the bracts are minute and triangular-lanceolate whereas in M. *pentandra* the bracts are large and foliaceous. An extensive collection in the forests of Western ghats revcals that *M. pentandra* need not necessarily have large foliaceous bracts which are quite variable. The degree of pubescence in the two species, cited as yet another distinguishing character, is again unreliable. Even a reference to Kew Herbarium also confirms our views that both these two species can be merged under M. *arborea* C.B. Cl only, which is the earlier name.

CAPRIFOLIACEAE

Cult. species :

Lonicera sempervirens Linn. Sp. Pl. 173, 1753 ; DG. 92.

Vern. : Madarsilv (Konk.) ; Madresilva (Port.).

An American plant, cultivated in gardens.

Viburnum foetidum Wall. Pl. As. Rar. 1 : 49, t. 61, 1830 ; FBI 3, 4 ; DG. 92.

Vern. : Narvel (Konk.) ; Viburno foetido (Port.).

Cultivated in gardens.